



Project Manual
for the
Remodel of
Best Buy Stores
Gilbert, AZ
BBY #1189

2288 E. Williams Field Rd.
Gilbert, AZ 85295

December 8, 2014

CMA

800 Washington Ave. No.
Suite 208
Minneapolis, MN 55401
612-547-1300
Project #: 14128.015

Dunham Associates, Inc.

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**SECTION 00 0101
PROJECT TITLE PAGE**

PROJECT MANUAL: GENERAL, MECHANICAL AND ELECTRICAL

PROJECT TITLE: BEST BUY #1189 - REMODEL
2288 E. WILLIAMS FIELD ROAD
GILBERT, AZ 85295

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7601 PENN AVE. SOUTH
RICHFIELD, MN 55423
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CONTACT: PHILIP FOSTER/BRIAN
"SCOTTY" SCOTT

MECH/ELEC ENGINEERS: DUNHAM ASSOCIATES, INC
50 SOUTH SIXTH STREET, SUITE 1100
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TROY ROLPH (ELEC)

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END OF PROJECT TITLE PAGE

SECTION 00 0105
CERTIFICATIONS PAGE

PROJECT TITLE:

BEST BUY #1189 - GILBERT, AZ

ARCHITECT'S CERTIFICATION:

I hereby certify that this specification, was prepared by me, or under my direct supervision and that I am a duly registered Architect under the laws of the state of Arizona.

Signed: _____

Seal:

Date: _____

Expiration Date: _____

Project Manual and Specifications sections contained in Divisions 00 through Division 12.

MECHANICAL ENGINEER'S CERTIFICATION:

I hereby certify that this specification, was prepared by me, or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the state of Arizona.

Signed: _____ Seal:

Date: _____

Expiration Date: _____

Specifications sections contained in Division 21 through Division 23.

ELECTRICAL ENGINEER'S CERTIFICATION:

I hereby certify that this specification, was prepared by me, or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the state of Arizona.

Signed: _____ Seal:

Date: _____

Expiration Date: _____

Specifications sections contained in Division 26 through Division 28.

END OF CERTIFICATIONS PAGE

SECTION 00 0110
TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

- 00 0101 - Project Title Page
- 00 0105 - Certifications Page
- 00 0110 - Table of Contents
- 00 0130 - Instructions for Project Development
- 00 0203 - Material Procurement Responsibilities Contacts
- 00 0205 - Best Buy Materials Schedule
- 00 0210 - Critical Dates
- 00 2713 - National Accounts Vendor List

SPECIFICATIONS

DIVISION 01 -- GENERAL REQUIREMENTS

- 01 1000 - Summary
- 01 2000 - Price and Payment Procedures
- 01 3000 - Administrative Requirements
- 01 3217 - Alteration Project Procedures
- 01 3546 - Green Building Project Requirements
- 01 6000 - Product Requirements
- 01 7000 - Execution Requirements
- 01 7419 - Construction Waste Management and Disposal
- 01 7800 - Closeout Procedures and Submittals

DIVISION 02 -- EXISTING CONDITIONS

- 02 4100 - Demolition

DIVISION 03 -- CONCRETE

- 03 0130.75 - Concrete Repair
- 03 5400 - Cast Underlayment

DIVISION 04 -- MASONRY (NOT USED)

DIVISION 05 -- METALS

- 05 4000 - Cold-Formed Metal Framing
- 05 5000 - Metal Fabrications

DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES

- 06 1000 - Rough Carpentry
- 06 2000 - Finish Carpentry

DIVISION 07 -- THERMAL AND MOISTURE PROTECTION

- 07 2100 - Thermal Insulation
- 07 8400 - Firestopping
- 07 9005 - Joint Sealers

DIVISION 08 -- OPENINGS (NOT USED)

DIVISION 09 -- FINISHES

09 0561 - Moisture Testing for Concrete Slabs

09 2116 - Gypsum Board Assemblies

09 5100 - Acoustical Ceilings

09 6500 - Resilient Flooring

09 6800 - Carpeting

09 6813 - Tile Carpeting

09 9000 - Painting and Coating

DIVISION 10 -- SPECIALTIES

10 2113.13 - Metal Toilet Compartments

10 2601 - Wall and Corner Guards

10 2800 - Toilet, Bath, and Laundry Accessories

10 4400 - Fire Protection Specialties

DIVISION 11 -- EQUIPMENT (NOT USED)

DIVISION 12 -- FURNISHINGS (NOT USED)

DIVISION 13 -- SPECIAL CONSTRUCTION (NOT USED)

DIVISION 14 -- CONVEYING EQUIPMENT (NOT USED)

DIVISION 21 -- FIRE SUPPRESSION (NOT USED)

DIVISION 22 -- PLUMBING

22 0523 - General-Duty Valves for Plumbing Piping

22 0529 - Hangers and Supports for Plumbing Piping and Equipment

22 0553 - Identification for Plumbing Piping and Equipment

22 0719 - Plumbing Piping Insulation

22 1116 - Domestic Water Piping

22 1316 - Sanitary Waste and Vent Piping and Storm Drain Piping

22 4000 - Plumbing Fixtures

DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC) (NOT USED)

DIVISION 26 -- ELECTRICAL

26 0500 - Common Work Results for Electrical

26 0519 - Low-Voltage Electrical Power Conductors and Cables

26 0523 - Control-Voltage Electrical Power Cables

26 0526 - Grounding and Bonding for Electrical Systems

26 0529 - Hangers and Supports for Electrical Systems

26 0533 - Raceways and Boxes for Electrical Systems

26 0544 - Sleeves and Sleeve Seals for Electrical Raceways and Cabling

26 0548 - Vibration and Seismic Controls for Electrical Systems

26 0553 - Identification for Electrical Systems

26 0943 - Network Lighting Controls

26 2200 - Low-Voltage Transformers

26 2726 - Wiring Devices

26 2813 - Fuses

26 2816 - Enclosed Switches and Circuit Breakers

26 2913 - Enclosed Controllers

26 4313 - Surge Protective Devices for Low-Voltage Electrical Power Circuits

26 5100 - Interior Lighting

26 7500 - Communications and Systems Rough-In Requirements

DIVISION 27 -- COMMUNICATIONS (NOT USED)

DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY

28 3112 - Fire Alarm System

DIVISION 31 -- EARTHWORK (NOT USED)

DIVISION 32 -- EXTERIOR IMPROVEMENTS (NOT USED)

DIVISION 33 -- UTILITIES (NOT USED)

END OF TABLE OF CONTENTS

SECTION 00 0130
INSTRUCTIONS FOR PROJECT DEVELOPMENT

1.01 DEFINITION OF OWNER

- A. The term "Owner" shall refer to the party that is responsible for the development and construction of the Best Buy project and with whom the Designer and General Contractor will contract to perform the project work. For a Best Buy Developed project, the Owner is Best Buy; For a "Build-To-Suit" (BTS) project, the Owner is the Landlord/Developer.

1.02 LANDLORD/DEVELOPER FURNISHED INFORMATION IN A BUILD-TO-SUIT PROJECT

- A. The Owner is required to provide the following information at the start of discussions with Best Buy.
1. Site survey electronically in AutoCAD showing the following information to scale
 - a. Boundaries survey.
 - 1) Topographical survey.
 - 2) ALTA survey of existing conditions including location of existing utilities. On a new project show proposed utilities.
 - b. Proposed site plan showing the entire development including surrounding roads, access points, setbacks, retention and greenspace.
 2. Copy of traffic study, if required by local authorities.
 3. Copy of Geotech reports with borings at all four corners of the proposed Best Buy and three within the parking field, at a minimum. Engineering evaluation should also be provided.
 4. Copy of Environmental Phase I Assessment (and any other environmental reports compiled including the Asbestos Reports on all existing buildings or improvements).
 5. Copy of Site-Inspection report on an existing building, if applicable.
 6. Copy of Water flow test data. This work must be completed by Fire Protection Consultant. Refer to article in 1.06 for contact information.
 7. Best Buy should be notified of any special statutory requirements of the local jurisdiction concerning the store fixture plan.
 8. Copy of Local sign ordinances including any special sign packages for the proposed development.
 9. A copy of the photometrics of the proposed site lighting will be required as an exhibit to the lease.
 10. (2) completed copies of Pad Certification form (to be provided by Best Buy) no more than 15 days prior to building pad certification date.
- B. Owner shall acknowledge that he has satisfied himself as to the nature and location of the work, general local conditions, codes and ordinances, disposal, handling and storage of materials, availability of labor, type of equipment and facilities required prior to and during prosecution of work, the nature and effect of any business being conducted on the premises or adjacent thereto, as well as all other matters which may in any way affect the work, cost, or ability to complete the Best Buy facility on schedule thereof. Any failure by the Owner to acquaint himself with all available information concerning these conditions will not relieve him from the responsibility of properly estimating the difficulty, cost, or schedule in the successful performance the work

1.03 BEST BUY FURNISHED INFORMATION

- A. Best Buy provides a set of Criteria Documents after the project is approved and as part of the exhibits attached to the Landlord's lease with Best Buy. The criteria are composed of the site specific drawings, the prototype drawings and prototype specifications. Additional sheets may be generated for non-prototype stores. The Landlord's Design Consultant is to use the Best Buy prototype layout format and sheets for developing the Construction Documents, making modifications as required for the specific project.

1. The Construction Documents prepared by the Design consultants shall incorporate all the requirements of the Best Buy Prototype Specifications, Best Buy prepared Criteria Drawings and Prototype Drawings. All design requirements of these "Lease Exhibits" shall be shown on the Construction Documents. The Design Consultant shall prepare the project specifications using this document as a base, editing and adding sections as required for specific projects. Specific materials specified in the prototype specification shall not be changed without prior written approval from the Best Buy representative. **The Design Consultant shall include a memorandum inserted at the beginning of the Specification that details descriptions of any known changes. The memorandum shall state that where there is any conflict between the the Construction Documents and the "Lease Exhibits", the Lease and attached documents shall govern.**

1.04 CLAIMS FOR CHANGES OF WORK

- A. This specification anticipates that the GC shall provide Best Buy with a building complete and suitable for its intended use. However, Best Buy reserves the right to request changes for the purpose of modifying the building in accordance with Article 5 of the lease (in a BTS project). Claims for additional costs or schedule impacts will be accepted only with prior WRITTEN APPROVAL of Best Buy's Representative prior to the work being performed. Best Buy will not be responsible for costs associated with correcting any undocumented change that is rejected.
 1. The Design Consultant shall be notified by Best Buy's Representative of any changes to the work. These changes will be posted to "Centric" (see article 1.07). Upon notice of change, it is the Design Consultant's responsibility to promptly review all changes and consult with Best Buy's Representative and Owner (where applicable) to determine the impact to the construction of the project.
 2. Prior to proceeding with the changes, the Design Consultant will provide Best Buy's Representative and Owner (where applicable) with a cost proposal for incorporating the changes into the project. Best Buy's written authorization will be required for any reimbursement.

1.05 DESIGN CONSULTANTS

- A. The Design Consultant is required to provide exhibits to Best Buy for Capital Expense Committee. The required documents will be transmitted electronically as jpeg electronic files constructed as 11" x 17" drawings. The documents required are colored elevations (showing approximate colors, material and allowed signs); overall site plan of development; enlarged site plan of the Best Buy building and parking area and all monument/pylon signs. A detailed guidebook to the presentation, "The Development Manual" is available from Best Buy's Representative. It is imperative that the rendered elevations provided for Best Buy's Capital Expense Committee represent signage allowed as of right or pre-approved by variance, if required.
- B. The Design Consultant shall get appropriate zoning approval and permits so the building shall be constructed in full compliance with all laws and ordinances governing construction. In the event of any conflict between architectural specifications and/or Best Buy's Criteria Documents and a legally valid law, ordinance, or code requirement, the law, ordinance, or code requirement shall govern. Best Buy shall be promptly notified of any conflict which could result in modification of Best Buy's Criteria Documents. A code review analysis outlining changes to Best Buy's prototype criteria required by local code is required to be provided to Best Buy's representative prior to Best Buy's Capital Expense Request meeting. Specific items relating to local code required building restrictions, fire alarm systems, environmental agencies, etc. which alters or modifies Best Buy Criteria Documents should be included in a report prepared by Design Consultant to Best Buy's Representative.
- C. The Design Consultant shall get appropriate zoning approval and permits to ensure Best Buy can install a satellite communications dish in the location indicated on Best Buy's Criteria Documents and shown on site plan and roof plan of construction documents submitted for permit.

1.06 BEST BUY PROTOTYPE CONSULTANTS

- A. Best Buy requires that the services of the Best Buy prototype Mechanical / Electrical Engineer be used in the development of the Construction Documents (Review Lease). The contact information for both electrical and mechanical engineers is:

Dunham Engineers
Greg Steinmetz
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402
612-465-7684
greg.steinmetz@dunhameng.com

- B. Best Buy requires the Design Consultant to utilize the services of a Best Buy commissioning agent. A sample set of the required commissioning documents are located in <Section 01 9113.13>. The contact information for the commissioning agents are:

Dunham Engineers
Matt Jensen
50 South Sixth Street / Suite 1100
Minneapolis, Minnesota 55402
612-465-7629
matt.jensen@dunhameng.com

Karges-Falconbridge, Inc.
Robert Linder
670 West County Road B
St. Paul, MN 55113
(651) 254-6881
rjlinder@kfi-eng.com

- C. Best Buy requires the services of a fire protection engineer to develop a fire protection report, including fire flow test. The results of this report are required to be incorporated into the Construction Documents. The contact information for fire protection is:

Johnson Consulting Specialists, LLC
Kris Johnson
(612) 760-1430
kjohnson@johnsonconsultingspecialists.com

- D. Best Buy requires the services of a preferred Architect be utilized in the development of construction documents. The contact information for these groups are:

MJM Architects
Jaima Darsinos
105 Broadway, 4th Floor
Nashville, TN 37201
615-244-8170
j.darsinos@mjmarch.com

Herschman Architects
Eric Cox
25001 Emery Road, Suite 400
Cleveland, OH 44128

216-223-3218
ecox@herschmanarchitects.com

CMA
Philip Foster
800 Washington Ave. No., Suite 208
Minneapolis, MN 55401
612-547-1300
pfoster@cmarch.com

Abdul Salehi
10 Andalucia
Irvine, CA 92614
949-701-3346
abdul.salehi@cox.net

HBC
Ralph Castelli
122 West 27th Street
New York, NY 10001
212-647-0011
ralph@hbcarch.com

- E. Best Buy requires the services of their prototypical fixture racking structural engineer be obtained in cases where the local jurisdiction requires submittal of fixture racking design and associated structural calculations. The contact information for this consultant is:

Advanced Structural Technologies, Inc.
David C. Buchanan
7212 Metro Blvd.
Edina, MN 55439
952-854-9302, extension 2
dbuchanan@astmn.com

1.07 USING THE BEST BUY WEBSITE

- A. The Design Consultants must use Best Buy Property Development Website for communication and plan delivery to Best Buy as directed by Best Buy Representative. Design Consultants will be given access upon request to Best Buy Representative. The Best Buy Representative will post scans of the project's redlined drawings for downloading by Design Consultants. Criteria updates and project specific updates will be posted by Best Buy Representative.

1.08 CONSTRUCTION DOCUMENT APPROVAL

- A. The Design Consultants shall provide all the Construction Documents, including plans for the site work, landscaping & irrigation, grading, site lighting, site utilities, drainage plans, building shell plans and Project Manual as applicable, for the review.
1. Final approval shall be obtained from Best Buy's Representative prior to commencement of any construction in time period outlined in the Lease. Best Buy requires that one (1) complete full-size set of Design Consultant signed construction documents and specifications be forwarded to Best Buy Representative for review at the time of submission for building permit. Best Buy takes up to three (3) weeks to complete a review and redline of the project's Construction Documents; refer to lease for timeline. After Best Buy completes the redline review, copies of the redlines will be posted to Best Buy's

website for the Design Consultant to download and make corrections to the Construction Documents.

2. Promptly after completion of corrections to Construction Documents, one printed half size set of Construction Documents and Specifications shall be forwarded to Best Buy's Representative. CAD drawings of the Best Buy store are to be uploaded to Best Buy's website (including Site Civil, and Building Shell where applicable) after permit and review comments are incorporated into the Construction Documents. The Design Consultant is required to use the website to post all construction documents, revisions, specifications and other documents as required. Criteria document updates by Best Buy will be posted on the website as well and the Design Consultant is required to review and update as directed by Best Buy Representative. Documents which should be posted to the website upon any drawing issuance or revision shall include:
 - a. All drawings in CAD (AutoCad 2004 or later) format combined into "zip" file.
 - b. Complete current set of drawings, including any revised sheets, combined into separate PDFs, per discipline (Architectural, Structural, Mechanical, Electrical, Fire, etc).
 - c. Revised sheets only in PDF format, separated into disciplines as necessary based on file size of PDF.
3. Temporary and Final Certificates of Occupancy shall be the responsibility of the General Contractor to be obtained in a timely manner so as not to hold up or delay any of Best Buy's activities. See Section 01320 for critical dates. Provide copy of CofO to Best Buy within 7 days after issuance or sooner if Grand Opening is imminent.

1.09 SUBSTITUTIONS

- A. Substitutions will NOT be considered without prior written approval by Best Buy Representative. Substitutions will NOT be considered when requested directly by subcontractor or supplier.
 1. Substitute products will not be ordered or installed without prior written acceptance by Best Buy Representative.
 2. Provide product data of specified item and the proposed substitution for comparison with substitution by Best Buy. It is the burden of the requestor to prove that the proposed product or material meets the intent of the specification. Submittals with insufficient information will be rejected. Additional studies, investigations, submittals, redesign and/or analysis by the Design Consultants caused by the requested substitutions shall be paid by the GC at no expense to Best Buy.
 3. Substitute products must comply with the following guidelines:
 - a. Adhesives, Sealants and Sealant Primers that are used on the interior of the building (defined as inside of the weatherproofing system and applied on site) must meet the VOC limits determined by the South Coast Air Quality Management District (SCAQMD) Rule #1168. VOC limits are listed below:

Architectural Application

	<u>VOC g/L</u>
Indoor Carpet Adhesive	50
Carpet Pad Adhesive	50
Rubber Floor Adhesive	60
Subfloor Adhesive	50
Ceramic Tile Adhesive	65
Drywall & Panel Adhesive	50
Cove Base Adhesive	50
Multipurpose Construction Adhesive	70
Structural Glazing Adhesive	100

Substrate Specific Applications

Metal to Metal	30
Plastic Foams	50
Porous Material (except wood)	50
Wood	30

Fiberglass	80
<u>Sealant Primers</u>	
Architectural Non Porous	250
Architectural Porous	775
Other	750
<u>Specialty Applications</u>	
PVC Welding	510
CPVC Welding	490
ABS Welding	325
Plastic Cement Welding	250
Adhesive Primer for Plastic	550
Contact Adhesive	80
Special Purpose Contact Adhesive	250
Structural Wood Member Adhesive	140
Sheet Applied Rubber Lining	850
Top and Trim Adhesive	250
<u>Sealants</u>	
Architectural	250
Nonmembrane Roof	300
Roadway	250
Single-Ply Roof Membrane	450
Other	420

- b. Aerosol Adhesives shall meet the VOC limits required by Green Seal Standard for Commercial Adhesives GS-36:

<u>Aerosol Adhesive</u>	<u>% VOC by Weight</u>
General Purpose Mist Spray	65%
General Purpose Web Spray	55%
Special Purpose Aerosol Adhesive	70%

- c. Paints and Coatings used on the interior of the building (defined as inside of the weatherproofing systems and applied on-site) shall comply with the following VOC limits:

<u>Paints, Coatings and Primers</u>	<u>VOC g/L</u>
Flat	50
Non-Flat	150
Anti-Corrosive/Anti-Rust Paints Applied to Metal Substrates	250
<u>Floor Coating, Sealer, Shellac</u>	
Floor Coating	100
Waterproofing Sealer	250
Sanding Sealer	275
All Other Sealer	200
Clear Shellac	730
Pigmented Shellac	550
Stains	250

- d. Flooring must comply with the following:
- 1) Carpet must meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus Program
 - 2) Carpet cushion must meet the requirements of the Carpet and Rug Institute's Green Label Plus Program

- 3) Carpet adhesives must comply with the above mentioned carpet adhesive VOC limits
 - 4) Resilient flooring must be 3rd party certified as compliant with the current FloorScore standard
 - 5) Grout and mortar must not exceed the VOC limit of 250 g/L
- e. All gypsum board, interior insulation, ceiling tile and wall coverings shall comply with the following:
- 1) California Department of Health Services - Standard Practice for the Testing of VOC Emissions from Various Sources Using Small Scale Environmental Chambers including 2004 Addenda. Standards that comply with this requirement include Greenguard Children and Schools, Indoor Advantage Gold, and Collaborative for High Performance Schools (CHPS).

1.10 RECORD DRAWINGS

- A. The General Contractor shall, at his sole cost, from the commencement of construction, maintain at the site the drawings, Project Manual, addenda, change orders and other modifications, in good order and marked currently to record changes and selections made during construction. In addition, the location of all buried exterior service lines and equipment and those lines within the structure that are hidden in the construction and cannot readily be uncovered by means of removable ceilings, floors or wall panels shall be located by dimension. These record drawings shall be forwarded at turnover of the building to the Design Consultant to be incorporated into the building plans in AutoCAD format and copied onto CD. Disk(s) will be submitted to Best Buy as a set of "As-Built drawings" within 30 days after the store's Grand Opening.
1. Drawing files shall be submitted in electronic format on CD, uncompressed.
 2. All drawings shall be prepared using AutoCAD 2004 format or later versions. Drawings created using another system or platform and translated into AutoCAD format will be closely scrutinized, and if not satisfactory will be rejected. Any additional work or effort on the part of the Design Consultant to translate and conform drawings to the standards will be the responsibility of the Design Consultant.
 3. All the drawings will be required to be provided as PDFs as well.
 4. ALL drawings must be submitted, including but not limited to Civil, Architectural, Structural, Mechanical and Electrical drawings.
 5. ALL drawings must be designated as "As-Built" in the title block of each sheet with the date of creation.
 6. Remove all extraneous graphics outside the border area and zoom to extents.
 7. All external reference files (X-Ref) to be attached without device or director specifications.
 8. Include all support files, both graphic and text, required for the project (plotting tables, font files, etc).
 9. Make sure all support files are in the same directory and that any references to those files do not include device or directory specifications.
 10. Note related Change Orders where applicable.
 11. Non-drawing items to be submitted on the CD shall include, but not be limited to, the following: (a) Project Manual in PDF format, (b) geotechnical report, (c) fire protection survey, (d) flow tests, (e) phase I environmental site assessment, (f) asbestos survey and/or certification and (g) weekly progress reports and photographs.
 12. Provide the following information on the cover of the CD:
 - a. Best Buy Store Number
 - 1) City and State
 - 2) Name of Mall, Plaza, Development, etc.
 - 3) Name of General Contractor
 - 4) Name of Design Consultants
 - 5) Name of Best Buy Representative(s)

1.11 RE-MEASUREMENT CERTIFICATION OF BEST BUY BUILDING

- A. The Design Consultant shall re-measure the Best Buy building using the definition in the lease, defined as being "The floor area within the inside perimeter of the exterior walls of the building under consideration, exclusive of vent shafts, decorative pilasters and courts, without deduction for corridors, stairways, closets, the thickness of interior walls, columns or other features. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above. The gross floor area shall not include shafts with no openings or interior courts." A wall that contains a shared Demising Line will be measured to the centerline within the wall.
1. The Design Consultant shall sign the completed form, to be provided by Best Buy, and return to Best Buy within 30 days after Grand Opening.

END OF SECTION

SECTION 00 0203

MATERIALS PROCUREMENT RESPONSIBILITIES CONTACTS

PART 1 GENERAL

Mike Maney

Construction Purchasing Manager

Phone: (612) 291-7499

Fax: (952) 430-4695

E-mail: michael.maney@bestbuy.com

Carla Asleson

Purchasing Specialist - Materials & Signage

Phone: (612) 21-7481

Fax: (952) 430-4770

E-mail: carla.asleson@bestbuy.com

TBD

Construction Purchasing Coordinator

Phone: (612) 291-?

Fax: (952) 430-?

E-mail: ?.?.@bestbuy.com

PART 2 PRODUCTS - (NOT USED)

PART 3 EXECUTION - (NOT USED)

END OF SECTION

SECTION 00 0205
BEST BUY MATERIALS SCHEDULE

Refer to drawings for material provision responsibilities related to Magnolia Design Center.

Materials	Purchased By		Installed By		
	Best Buy	<u>GC or Subcontractor</u>	Best Buy	Selling Vendor	<u>GC or Subcontractor</u>
Projector Screen and Projector Mounting Plate (stores with MHT Rooms only)	XX				XX
Lockers in HUB	XX				XX
Bathroom/HUB Dispenser Package (SEE NOTE 1)		XX			XX
Store Fixtures and Shelving (SEE NOTE 3)	XX				XX
Compactor Including Electrical & Final Connection		XX		XX	XX
Receiver Box for Compactor	XX		XX		
Baler		XX		XX	
Exterior Wall Signage (Freestanding pylon, monument signs and wall mounted signs per lease) (SEE NOTE 2)	XX			XX	XX
Light Fixture Type FC (installed within valance of store fixtures)	XX				XX
All Other Light Fixtures		XX			XX
Fire Alarm System		XX			XX
Energy Management System (EMS)		XX		XX	XX
Low Voltage Communications System	XX		XX		
Security System (SEE NOTE 4)	XX		XX		
Telephone System (SEE NOTE 5)	XX		XX		

Note 1: Bathroom/HUB dispenser package consists of toilet paper dispensers, sanitary napkin disposal units, air freshener dispensers, soap dispensers, paper towel dispensers and diaper changing stations. Coordinate with drawings on specific items to be reused and/or relocated. Existing accessories to be reused shall be cleaned thoroughly and brought to "like-new" condition.

Note 2: Electrical power supply and connection to signs by General Contractor. GC shall coordinate the relocation of existing ticket sign, where applicable, directly with Thomas Sign & Awning sign vendor.

Note 3: GC shall select fixture installer from list of contractors below.

Note 4: GC shall coordinate the relocation of various security items (motion sensors, security cameras, sensoromatic pedestals, store safe, etc) as outlined in electrical drawings sheet E-4, where applicable, directly with the appropriate security vendor.

Note 5: Refer to specification section 33 8000 Communication Utilities for responsibilities of GC/Landlord.

Experienced Best Buy Fixture Installation Contractors				
Company	Location	Contact Name	Contact Number	Contact Email
Coast to Coast Contractors	644 Hillcrest Drive, Ste 1 Waupaca, WI 54981	Murray Stegath	(800) 620-7088	mstegath@coasttocoastcontractors.com
Groom Construction	324 Essex Street Swampscott, MA 01907	Dwight Groom	(781) 592-3135	dwight@groomco.com
Lankford Construction	1455 Karlens Way Johnsburg, IL 60050	Rob Copenharve	(800) 445-3413	rcopenharve@lcco.com
Rapid Fix Inc.	7668 El Camino Real, #452 Carlsbad, CA 92009	Rebecca Carroll	(760) 436-3622	rebeccac@rapidfixinc.com
Thomas Grace Construction	1912 Greeley Street South Stillwater, MN 55082	Don Harvieux	(651) 342-1298	don.harvieux@thomas-grace.com
Harco, Inc	1495 Columbia Ave, Bldg 2 Riverside, CA 92507-2013	Maurice Garcia	(951) 684-1909 x 120	mgarcia@harcoinc.us
Prime Retail Services	135 Maple St, Ste 200 Gainesville, GA. 30501	Darrel Chaney	(866) 341-2490	dchaney@primeretailservices.com
Mallard	209 W Main St., Suite 205Grand Prairie, TX 75050-5672	Brian Mallard	(972) 642-6838	brian@mallardgroup.net
Powerhouse Retail Services	812 S. Crowley Rd, Ste A Crowley, TX 76036	Robert Blake-Ward	817-297-8575 x 7006	robert.blake-ward@powerhouseretail.com
Central Construction, Inc	14526 Central Ave Chino, CA 91710	Gordon Paciorek	909-597-3300	centcon1@aol.com

END OF SECTION

SECTION 00 0210**CRITICAL DATES**

PRIOR TO THE START OF CONSTRUCTION, THE GENERAL CONTRACTOR SHALL PREPARE AND SUBMIT TO BEST BUY FOR APPROVAL A PROGRESS SCHEDULE WHICH WILL INCLUDE CRITICAL EVENTS AS WELL AS ALL MAJOR TRADE ACTIVITIES, THE TIME REQUIRED FOR EACH CONSTRUCTION DISCIPLINE, INCLUDING SITE WORK, AND A FINAL COMPLETION DATE FOR THE ENTIRE PROJECT. THE WORK SHALL BE CARRIED ON AT SUCH LOCATIONS AND IN SUCH SEQUENCE AS INDICATED IN THE PROGRESS SCHEDULE. THE ABSENCE OF REFERENCE IN SAID SCHEDULE TO SPECIFIC LOCATION, DETAILS OR CONSTRUCTION SEQUENCE FOR ANY PORTION OF THE WORK SHALL NOT RELIEVE GENERAL CONTRACTOR FROM HIS OBLIGATION TO COMPLETE THE WORK ACCORDING TO SAID SCHEDULE AND THE COMPLETION DATE.

1.01 FOR OPEN-STORE REMODEL PROJECTS AND/OR PROJECTS OF LIMITED SCOPE, ALL CRITICAL DATES AND SCHEDULE REQUIREMENTS SHOULD BE COORDINATED WITH BEST BUY REPRESENTATIVE.

1.02 FOR NEW STORES, BEST BUY HAS CERTAIN CRITICAL DATES AND WORK SEQUENCES WHICH MUST BE MAINTAINED:

A. 7 Weeks prior to Substantial Completion:

1. Building shell shall be secure and roof membrane complete.

B. 6 Weeks prior to Substantial Completion:

1. Termination of the main phone cable (typically 50 pair cable) to the building at the phone demarcation location indicated in the drawings. All required entry conduit, plywood backboard, electrical outlet (temporary power if permanent power not available at time of cable installation) and #6 Bond Ground connection complete. Note that Contractor shall be responsible for the application and the payment of the 50 pair telephone cable installation to the building by the local telephone utility, to insure that this important milestone shall be completed on schedule.

C. 3 Weeks prior to Substantial Completion:

1. Contractor shall have all Utility Services (electrical, gas, water, sewer) complete and functional. The Communication Room shall be 100% complete, lockable and ready for its intended use except for floor finishes. Sales floor shall be complete and the electrical pathway system ready to receive low-voltage cabling.

D. Substantial Completion/Possession Date:

1. Only final electrical connections of store fixtures, final termination of Best Buy equipment and minor punch list items of a cosmetic nature shall remain. This coincides with Best Buy's store fixture installation which starts on the first Sunday following Substantial Completion.
2. Temporary Certificate of Occupancy, or equivalency as to allow Best Buy to commence installation of store fixtures. Site, Landscape, Receiving area, Access Drives and Exterior Building Elevations shall be 100% complete. Building is secure; permanent power and phone lines functional.

E. 3 Weeks AFTER Substantial Completion:

All Construction complete. This coincides with the start of Best Buy's Merchandising and employee training process which typically starts on a Monday. Punch list work, final electrical connection of store fixtures, Parking Lot and Common Area is complete. All requirements necessary to receive a Certificate of Occupancy shall be complete.

F. Grand Opening:

1. Typically on a Friday three weeks following the start of Merchandising phase. Certificate of Occupancy received, all off-site work, site clean-up or any other work which could negatively impact store opening to the public shall be 100% complete.

END OF SECTION

SECTION 00 2713
NATIONAL ACCOUNTS VENDORS

AMPINNERGY MODULAR WIRING**ANIXTER**

Contact: Mark Gabel
Sales and Support

Phone: (763) 656-4048

Mark.Gabel@anixter.com

AUTOMATIC ENTRY DOORS**STANLEY ACCESS TECH.**

Contact: Chris Lombardo

65 Scott Swamp Road

Farmington, CT 06032

Phone: (860) 679-6445

CLombardo@stanleyworks.com

STANLEY ACCESS TECH.

Contact: Scott Harris

7617 Graham Road

Grant Township, MI 48032

Phone: 810-772-3455

scott.harris@sbdinc.com

CART BUMPERS, POSTS & RAILS**ALVARADO MFG**

Contact: Sue Theising

12660 Colony St

Chino, CA 91710

Phone: (800) 423-4143 ext 321

stheising@alvaradomfg.com

DOORS, FRAMES, & HARDWARE**TWIN CITY HARDWARE**

Contact: Bob Haen

723 Hadley Avenue, North

Oakdale, MN 55128

Phone: (651) 735-2200

bhaen@tchco.com

TWIN CITY HARDWARE

Contact: Tim McDonald

723 Hadley Avenue, North

Oakdale, MN 55128

Phone: (651) 731-7132

tmcdonald@tchco.com

ELECTRICAL LOOSE GEAR**CAROLINA PRODUCTS, INC.**

Contact: Christian Bartus

1132 Pro Am Drive

Charlotte, NC 28211

Phone: (800) 736-4455

christianh@cpipanel.com**CAROLINA PRODUCTS, INC.**

Contact: Tony Thornton

1132 Pro Am Drive

Charlotte, NC 28211

Phone: (704) 364-9029, ext 237

TonyT@cpipanel.com**FLOORING: CARPET (AS INDICATED ON DRAWINGS)****MANNINGTON COMMERCIAL**

Contact: Andrea Dipazo

1844 US Highway 41 SE

Calhoun, GA 30701

Phone: (706) 602-6500

bestbuyinfo@mannington.com**MASLAND CONTRACT**

Contact (Ordering) : Lyndsi Greer

Phone: (251) 679-3531

Lyndsi.greer@maslandcontract.com

Contact (Acct Mngr): John McCarthy

Phone: (847) 997-9944

John.mccarthy@maslandcontract.com**FLOORING: BROADLOOM CARPET (AS INDICATED ON DRAWINGS)****BOLYU CONTRACT CARPET**

Contact: Michelle Anderson

Phone: (612) 702-1606

michelle.anderson@bolyu.com**FLOORING: VINYL TILE (LVT, LAM and VCT)**LVT Cleaning and Finishing:**DIVERSIFIED MAINTENANCE SYSTEMS, LLC**

Contact: Syd Shaw

Cell: 615-975-6860

sshaw@divinc.comwww.divinc.comMetroFlor:**HERREGAN DISTRIBUTORS**

Contact: Craig Folven

Cell: 651-261-0623

Phone: 651-452-7200

craig.folven@herregan.com**ACOUSTIC SURFACES****ACOUSTICAL SURFACES, INC.**

Contact: Mike Lynner

952-466-8206

mlynner@acousticgeometry.comwww.acousticalsurfaces.com

HVAC SYSTEMS**CARRIER**

Contact: Deborah Roy-Jones
6304 Thompson Road
Syracuse, NY 13221
Phone: 315-432-7941
deborah.roy-jones@carrier.com

Kathy.lavassaur@carrier.utc.com

CARRIER

Contact: Kathy LaVassaur
1140 Delta Acres Road
Sandy Ridge, NC 27046
Phone: 336-871-8461

INSTALL BAY & DOCK DOORS**RAYNOR GARAGE DOORS**

Contact: Vikki Heaton
1101 East River Road
Dixon, IL 61021
Phone: (888) 472-9667 Ext. 7364
vheaton@raynor.com

RAYNOR GARAGE DOORS

Contact: Craig Walden
5625 Westbrook Road
Golden Valley, MN 55422
Phone: (800) 831-7102 ext. 1413
craigw@raynor.com

LIGHT FIXTURES, EXTERIOR**WLS LIGHTING**

Contact: Steve Vardeman
4100 International Plaza
Suite 420
Fort Worth, TX 76109
Phone: (800)633-8711 ext 115
steve@wslighting.com

LIGHT FIXTURES, INTERIOR & ASSOCIATED MODULAR WIRING**VILLA LIGHTING**

Contact: Dan Ludwig
2929 Chouteau Avenue
St. Louis, MO 63103
Phone: (314) 633-0418
dludwig@villalighting.com

VILLA LIGHTING

Contact: Del Garland
2929 Chouteau Avenue
St. Louis, MO 63103
Phone: (314) 633-0540
del.garland@villalighting.com

LOADING DOCK EQUIPMENT**STAR EQUIPMENT**

Contact: Mike Schmid

2100 107th Lane NE

Blaine, MN 55449

Phone: (763) 783-9420 Ext. 126

mikes@starequipment.com

RESTROOM ACCESSORIES – HAND SOAP DISPENSERS**BETCO**

Contact: Pam Tolford

Phone: (888) 667-9018

ptolford@betco.com

RESTROOM ACCESSORIES – SANITARY NAPKIN DISPOSAL UNITS**TWIN CITY HARDWARE**

Contact: Bob Haen

723 Hadley Avenue, North

Oakdale, MN 55128

Phone: (651) 731-7132

bhaen@tchco.com

RESTROOM ACCESSORIES – TOILET TISSUE DISPENSERS, ROLL TOWEL DISPENSERS, AIR FRESHENERS, DIAPER CHANGING TABLES & TOILET SEAT COVER DISPENSERS**OFFICE DEPOT**

Contact: Jody Kurpierz

Phone: (763) 513-4078

Jody.Kurpierz@officedepot.com

ROOFING**FLEX MEMBRANES**

Contact: Steve Crone

1530 Kirkwood Drive

Geneva, IL 60134

Phone: (630) 232-7808

Cell: (630) 234-4543

scrone@flexmembranes.com

SARNAFIL, INC

Contact: Tom O'Brien

100 Dan Road

Canton, MA 02021

Phone: (800) 451-2502 ext 227

tom.obrien@sarnafilus.com

JOHNS MANNVILLE

1530 Kirkwood Drive

Geneva, IL 60134

Phone: (630) 845-0075

SECURITY GRILLES & SHUTTERS**QMI SHUTTER SUPPLY**

Contact: Rob Hansen

1661 Glenlake Avenue

Itasca, IL 60143

Phone: (800) 446-2500

rhansen@qmisecuritysolutions.com**METRO DOOR**

(Acceptable in the following states: CO, IA, ID, ME, MN, MT, ND, NE, NH, SD, UT, WV and WY)

Contact: Gayle Capozzi

821 Industrial Drive

Lewisburg TN 37091

Phone: 800-669-3667 X640

gcapozzi@metrodoor.com**SIGNAGE (EXTERIOR)****THOMAS SIGN & AWNING**

Contact: Tammy Taylor

4590 118th Avenue, North

Clearwater, FL 33762

Phone: (800) 846-4590 x 218

Tammy.Taylor@thomassign.com**SKYLIGHTS AND CURBS****SUNOPTICS PRISMATIC SKYLIGHTS**

Contact: Brian Grohe

6201 27th Street

Sacramento, CA 95822

Phone: (847) 340-1556

Brian_Grohe@acuitybrands.com**AES CURB**

Contact: George Lasher

2171 Hwy 229 Post Office Box 781147

Tallassee, AL 36078

Phone: 800-786-0402

glasher@aescurb.com**TRAFFIC DOORS****CHASE DOORS**

Contact: Tom Shircliff

10021 Commerce Park Dr.

Cincinnati, OH 45246

Phone: (513) 603-2932

tshircliff@chasedoors.com**CHASE DOORS**

Contact: Eric Rich

10021 Commerce Park Dr.

Cincinnati, OH 45246

Phone: (651) 485-8312

Cell: (651) 485-8312

TRASH COMPACTOR & BALER

MARATHON EQUIPMENT

Contact: Gina Hollis
Phone: (800) 633-8974
gina.hollis@marathonequipment.com

Contact: Jim Squier
Phone: 205-695-1678
Cell: 770-355-9351
jim.squier@marathonequipment.com

WALL PROTECTION

IN PRO

Contact: Lacey Meyer
Phone: (888) 715-8390 ext 5433
lmeyer@inprocorp.com

END OF SECTION

**SECTION 01 1000
SUMMARY OF WORK**

PART 1 GENERAL**1.01 DEFINITION OF OWNER**

- A. The term "Owner" shall refer to the party that is responsible for the development and construction of the Best Buy project and with whom the Designer and General Contractor will contract to perform the project work. For a Best Buy Developed project, the Owner is Best Buy; For a "Build-To-Suit" (BTS) project, the Owner is the Landlord/Developer.

1.02 PROJECT INFORMATION

- A. Project Name: Best Buy Remodel - Gilbert, AZ.
Address: 2288 E. Williams Field Road
Gilbert, AZ 85295
- B. Owner's Name: Best Buy.
Address: 7601 Penn Ave. So.
Richfield, MN 55423
- C. The Project consists of the open store remodel of store #1189 in Gilbert, AZ.

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is shown on drawings and specified in Section 02 4100.
- B. Scope of alterations work is shown on drawings.

1.04 WORK UNDER SEPARATE CONTRACTS

- A. General: Work in this section is work that is contracted separately, and affecting the Work under this Contract. This work includes work preceding, concurrent with, and subsequent to, the Work under this Contract. See section 00 0205 - Best Buy Material Schedule.
- B. Claims for Delays: Comply with procedural requirements specified in contract for Contractor claims stemming from delayed work under separate contract.
- C. Contractor's Obligations: Take measures to ensure proper performance of the Work under this Contract as it relates to and interfaces with work under separate contract.
1. Coordination: Coordinate the Work of this Contract with work under separate contracts, including the following:
 - a. Request and obtain sufficient information about the work under separate contract. If information is insufficient, notify Owner and Architect.
 - b. Cooperate and communicate with other contractors and personnel.
 - c. Incorporate new information stemming from work under separate contract into coordination drawings and schedules
 2. Performance: Properly perform Work under this Contract to enable successful completion of concurrent and subsequent work under separate contracts.
 3. Access: Provide reasonable access to the Work under this Contract for other contractor's.
 4. Non-conforming Work: Document incomplete or non-conforming work under separate contract.
- D. Owner Provisions: Owner will provide the following:
1. Sufficient information pertaining to the work under separate contract, related to scope, cost, quality, schedule, administrative procedures, products, and technical processes.
 2. Timely scheduling of submittals pertaining to the work under separate contract.
 3. Proper performance of work under separate contract, so that concurrent and subsequent Work under this Contract can be performed.
- E. Drawings and Specifications indicate and distinguish work under separate contract and Work under this Contract.

1.05 BEST BUY-FURNISHED PRODUCTS

- A. Best Buy will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Best Buy-furnished products [and making building services connections]. See section 00 0205 - Best Buy Material Schedule.

1.06 COORDINATION WITH BEST BUY

- A. Best Buy Owner Limited Occupancy of Completed Areas of Construction: Best Buy reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Best Buy occupancy.
 2. Before limited Best Buy occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed.

1.07 CONTRACTOR USE OF SITE AND PREMISES

- A. Provide access to and from site as required by law and by Owner:
1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- B. Limit use of premises for construction operations for the Best Buy building, to allow for Best Buy occupancy and work by separate contractors.
- C. Coordinate use of premises under direction of Best Buy.
- D. In a remodel project, the existing building will be occupied and open for business during construction. Conduct operations to permit public access to existing buildings. Maintain public walks, driveways, and entrances and exit ways and Life Safety Systems in safe condition, free of equipment, material and debris.
- E. Notify Best Buy as far as possible in advance of commencement of work which would interfere with use of existing buildings.

1.08 UNIT PRICES

- A. UNIT PRICES
1. Section Includes:
 - a. List of unit prices, for use in preparing Bids.
 - b. Measurement and payment criteria applicable to Work performed under a unit price payment method.
 2. Costs Included:
 - a. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.
 3. Unit Quantities Specified:
 - a. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.
 4. Measurement of Quantities:
 - a. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
 - b. Take all measurements and compute quantities. Measurements and quantities will be verified by Architect.

END OF SECTION

SECTION 01 2000**PRICE AND PAYMENT PROCEDURES - BEST BUY DEVELOPED PROJECTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Price and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

- A. Form to be used: Typed form G703.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Best Buy for approval
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate a minimum of 15 days prior to submittal of first application for payment. _____
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section.
- F. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.
- G. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 SUBMITTALS

- A. Submit the following Administrative Submittals within 7 days of date established for Notice to Proceed, or date of Best Buy - Contractor Agreement, whichever is earlier, under the provisions of Section 013000, and as specified in this Section:
 - 1. Schedule of Values.
 - 2. Contractor's Staff and Consultant List.
 - 3. Work by Bidder's Forces List.
 - 4. Subcontractor/Supplier List.
 - 5. Progress Schedule.
- B. Submit the following Administrative Submittals at regular intervals, under the provisions of Section 013000, and as specified in this Section:
 - 1. Updated Progress Schedule.
 - 2. Construction Progress Photographs.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Form to be used: 2 copies of G702/G703.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Best Buy for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Total Completed and Stored to Date of Application.

7. Percentage of Completion.
 8. Balance to Finish.
 9. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- I. Submit two copies of each Application for Payment.
- J. Include the following with the application:
1. Transmittal letter as specified for Submittals in Section 01 3000.
 2. Construction progress schedule, revised and current as specified in Section 01 3000.
 3. Partial release of liens from major Subcontractors and vendors.
- K. When Owner requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

- A. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.
- B. For other required changes, Owner's representative will issue a document signed by Owner instructing Contractor to proceed with the change with be issued, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Price or Contract Time.
 2. Promptly execute the change.
- C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 2days.
- D. Contractor may propose a change by submitting a request for change to Owner, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.
1. Substantiation of Costs:
 2. Not-to-Exceed Contract Pricing:
- E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.
- F. Substantiation of Costs: Provide full information required for evaluation.
1. Support each claim for additional costs with additional information:
- G. Execution of Change Orders: Owner will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Preconstruction meeting.
- B. Progress meetings and weekly reports.
- C. Construction progress schedule.
- D. Submittals for review, information, and project closeout.
- E. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution Requirements: Additional coordination requirements.
- B. Section 01 7800 - Closeout Procedures and Submittals: Project record documents.

1.03 PROJECT COORDINATION

- A. Project Coordinator: Best Buy Owner's Representative and Owner's Representative (BTS project).
- B. Cooperate with the Project Coordinator(s) in allocation of mobilization areas of site; for field offices and sheds, for Best Buy access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 PRECONSTRUCTION MEETING**

- A. Architect and/or Owner will administer pre-construction conference for execution or discussion of Owner-Contractor Agreement and preliminary submittals.
- B. Architect or Owner will schedule conference within 15 days of date established for Notice to Proceed or date of Owner-Contractor Agreement, whichever is earlier.
- C. Attendance Required:
 - 1. Owner.
 - 2. Contractor.
 - 3. Major subcontractors.
- D. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates to Best Buy Contracts Management.
 - 3. Designation of personnel representing the parties to Contract.
 - 4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 5. Scheduling.
 - 6. Scheduling activities of a Geotechnical Engineer, if required.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, and/or Architect, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems that impede, or will impede, planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Maintenance of progress schedule.
 - 7. Corrective measures to regain projected schedules.
 - 8. Planned progress during succeeding work period.
 - 9. Maintenance of quality and work standards.
 - 10. Effect of proposed changes on progress schedule and coordination.
 - 11. Other business relating to Work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 WEEKLY REPORTS:

- A. The GC shall submit a Weekly Report (copy of report shall be provided to GC by Best Buy upon request) to Best Buy, which shall include:
 - 1. Status of construction progress as compared to the approved Construction Schedule
 - 2. Digital pictures showing the weekly progress
 - 3. Copy of the current Job Meeting Minutes, if requested
 - 4. Copy of the current Shop Drawing log, if requested
- B. Weekly reports shall be provided to Best Buy's Owner's Representative via email Wednesday morning of each week of construction, including the weeks the GC is fixturing and Best Buy is merchandising.

3.04 CONSTRUCTION PROGRESS SCHEDULE

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 14 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within five days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.
- E. Schedule Format:
 - 1. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
 - 2. Sheet Size: Multiples of 8-1/2 x 11 inches.
- F. Content:
 - 1. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
 - 2. Identify each item by specification section number.
 - 3. Include conferences and meetings in schedule.
 - 4. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

5. Provide legend for symbols and abbreviations used.

3.05 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - CLOSEOUT SUBMITTALS.

3.06 NUMBER OF COPIES OF SUBMITTALS

- A. Documents for Review:
 1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies that Contractor requires, plus two copies that will be retained by Architect.
 2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Architect.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 1. After review, produce duplicates.
 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.07 SUBMITTAL PROCEDURES

- A. Transmit each submittal with a copy of approved submittal form.
- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- E. Deliver submittals to Architect at business address.
- F. Schedule submittals to expedite the Project, and coordinate submission of related items.
- G. For each submittal for review, allow 10 days excluding delivery time to and from the Contractor.
- H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- I. Provide space for Contractor and Architect review stamps.
- J. When revised for resubmission, identify all changes made since previous submission.
- K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- L. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01 3217
ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL**1.01 SECTION INCLUDES**

- A. Procedural requirements.
- B. Rehabilitation and renovations of existing spaces and materials.
- C. Installation of products removed under Section 02 4100 - Demolition.

1.02 RELATED SECTIONS

- A. Section 02 4100 - Demolition: Removal and storage of products to be reused and reinstalled.

1.03 SYSTEM DESCRIPTION

- A. Items indicated to "remain" shall be left in their present condition.
- B. Items indicated to be "repaired" shall be restored, not replaced, following the general guidelines of Part 3 of this Section, and any more specific guidelines specified in Sections governing work of the respective materials.
- C. Items indicated to be "replaced" shall follow the more specific guidelines specified in Sections governing work of the respective materials.
- D. Contractor shall notify Architect if items indicated to "remain" or be "repaired", appear to need "replacement". Beginning replacement work without prior approval will result in loss of compensation for additional work.

PART 2 - PRODUCTS**2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK**

- A. New Materials: As specified in individual Sections.
- B. Match existing products and work for patching and extending work.
- C. Determine type and quality of existing products by inspection and any necessary testing, and workmanship by use of existing as a standard. Presence of a product, finish, or type of work, requires that patching, extending, or matching shall be performed as necessary to make Work complete and consistent with specifications.

PART 3 - EXECUTION**3.01 INSPECTION**

- A. Contractor shall field survey existing building, verify all dimension, existing building components, mechanical and electrical systems.
- B. Verify that demolition is complete, and areas are ready for installation of new work.
- C. Beginning of restoration work means acceptance of existing conditions.

3.02 PREPARATION

- A. Cut, move, or remove items as necessary for access to alterations and renovations work; replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, rusted metals, and deteriorated masonry and concrete; replace materials as specified for finished work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Prepare surfaces and remove surface finishes to provide for proper installation of new work and new finishes.
- E. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

- F. Provide temporary shoring, bracing and structural supporting members of work to be cut to carry existing and imposed loads as required.
- G. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- H. Maintain all means of egress and exit ways from space and adjacent spaces.

3.03 INSTALLATION

- A. Coordinate work of alterations and renovations to expedite completion sequentially and to accommodate Best Buy occupancy.
- B. Project rooms shall be complete in all respects including operational mechanical and electrical systems.
- C. Remove, cut, and patch work in a manner to minimize damage and to provide means of restoring products and finishes to specified condition.
- D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent new finishes.
- E. In addition to specified replacement of equipment and fixtures, restore existing plumbing, heating, ventilation, air conditioning and electrical systems.
- F. Install products as specified in individual Sections.

3.04 TRANSITIONS

- A. Where new work abuts or aligns with existing, make a smooth and even transition. Patched work shall match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.

3.05 ADJUSTMENTS

- A. Where removal of partitions results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads. Where a change of plane of 1/8 inch or more occurs, submit recommendation for providing a smooth transition for Architect review.
- B. Trim existing doors as necessary to clear new floor finishes; refinish trimmed areas.
- C. Fit work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES

- A. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
- B. Repair substrate prior to patching finish.

3.07 FINISHES

- A. Finish surfaces as specified in individual Sections.
- B. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.08 CLEANING

- A. Clean the Best Buy-occupied areas of work in which Contractor is working or traversing on a daily basis.

END OF SECTION

SECTION 01 3546
GREEN BUILDING PROJECT REQUIREMENTS

PART 1 GENERAL**1.01 SUMMARY**

- A. Best Buy strives to utilize environmentally sensitive building practices, which include the items listed below. These requirements are listed in applicable specification sections and should be followed as directed. Any requested substitution of any of these items shall also adhere to the applicable environmental limitation to be considered.

1.02 DEFINITIONS

- A. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles (800 km) from Project site. Manufacturing refers to the final assembly of components into the building product that is installed at Project site.
- B. Regionally Extracted and Manufactured Materials: Regionally manufactured materials made from raw materials that are extracted, harvested, or recovered within a radius of 500 miles (800 km) from Project site.
- C. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
 - 1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - 2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

PART 2 PRODUCTS**2.01 REGIONAL MATERIALS**

- A. Not less than 20 percent of materials (by cost) shall be regionally manufactured materials.

2.02 LOW-EMITTING MATERIALS

- A. Adhesives and Sealants: For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with the following VOC content limits according to South Coast Air Quality Management District (SCAQMD) Rule 1168, when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Aerosol adhesives shall comply with Green Seal Standard for Commercial Adhesives GS-36 requirements.
 - 1. Refer to VOC LIMITS, item E below.
- B. Paints and Coatings: For field applications that are inside the weatherproofing system, paints and coatings shall comply with the following VOC content limits established in Green Seal Standard GS-11 Paints, for architectural paints and coatings; Green Seal Standard GS-03 Anti-Corrosive Paints for anti-corrosive and anti-rust paints; and South Coast Air Quality Management District (SCAQMD) Rule 1113 Architectural Coatings, for clear wood finishes, floor coatings, stains, primers, and shellacs, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Refer to VOC LIMITS, item E below.
- C. Flooring: For field applications that are inside the weatherproofing system, flooring shall comply with the following requirements below. Refer to VOC LIMITS, item E below.
 - 1. All carpet installed in the building interior shall meet the testing and product requirements of the Carpet and Rug Institute Green Label Plus program.
 - 2. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.
 - 3. All carpet adhesive shall have less than 50 g/L VOC.

4. All hard surface flooring shall be certified as compliant with the Floor Score standard by an independent third party. Flooring products covered by FloorScore including resilient flooring, vinyl, linoleum, laminate flooring, wood flooring, ceramic flooring, rubber flooring and wall base.
 5. Concrete, wood, bamboo, and cork floor finishes such as sealers, stains, and surface finishes shall meet the requirements of South Coast Air Quality management District (SCAQMD) Rule 1113, Architectural Coatings.
 6. Tile setting adhesives and grout shall meet South Coast Air Quality management District (SCAQMD) Rule 1168.
- D. Ceiling and Wall Systems: For field applications that are inside the weatherproofing system, all gypsum board, insulation, acoustical ceiling systems, and wall coverings installed in the building interior shall meet the testing and product requirements of the California Dept of Health Services Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Small-Scale Environmental Chambers. The following standards adhere to the CA standard listed above: Greenguard Children & Schools, Indoor Advantage Gold and Collaborative for High Performance Schools (CHPS)

E. **VOC LIMITS:**

South Coast Air Quality Management District Rule #1168

Architectural Adhesives Applications **VOC Limits (g/L)**

Indoor Carpet Adhesive	50
Carpet Pad Adhesive	50
Outdoor Carpet Adhesive	150
Wood Flooring Adhesive	100
Rubber Flooring Adhesive	60
Sub floor Adhesives	50
Ceramic Tile Installation	65
VCT and Asphalt Tile Adhesive	50
Dry Wall and Panel Adhesive	50
Cove Base Installation	50
Multipurpose Construction Adhesive	70
Structural Glazing Adhesive	100

Substrates **VOC Limits (g/L)**

Metal to Metal	30
Plastic Foams	50
Porous Material Except Wood	50
Wood	30
Fiberglass	80

Welding and Installation **VOC Limits (g/L)**

PVC Welding	510
CPVC Welding	490
ABS Welding	400
Plastic Cement Welding	350
Adhesive Primer for Plastic	650
Contact Adhesive	80
Special Purpose Contact Adhesives	250

Structural Wood Member Adhesive	140
Sheet Applied Rubber Lining Operations	850
Top and Trim Adhesive	250
<u>Sealants</u>	<u>VOC Limits (g/L)</u>
Architectural	250
Porous Architectural Sealant Primer	775
Non-Porous Architectural Sealant Primer	250
Ceramic Tile Adhesive	65
Grout and Mortar	250

Green Seal Standard for Commercial Adhesives, GS-36

<u>Aerosol Adhesive</u>	<u>VOC Limit</u>
General Purpose Mist Spray	65% VOCs by weight
General Purpose Web Spray	55% VOCs by weight
Special Purpose Aerosol Adhesive	70% VOCs by weight

Green Seal Standard GS-11, Paints

<u>Paints, Coatings and Primers</u>	<u>VOC Limits (g/L)</u>
Flat	50
Non-Flat	150

Green Seal Standard GS-03, Anti-Corrosive Paints

<u>Anti-Corrosive & Anti-Rust Paints Applied to Metal</u>	<u>VOC Limits (g/L)</u>
All anti-corrosive and anti-rust paint	250

South Coast Air Quality Management District Rule # 1113

<u>Architectural Coatings</u>	<u>VOC Limits (g/L)</u>
Clear Wood Finishes - Varnish	350
Clear Wood Finishes - Lacquer	550
Floor Coatings	100
Waterproofing Sealers	250
Sanding Sealers	275
All Other Sealers	200
Clear Shellac	730
Pigmented Shellac	550
Stains	250

PART 3 EXECUTION**3.01 REFRIGERANT REMOVAL**

- A. CFC Reduction in HVAC&R Equipment: Remove CFC-based refrigerants from existing HVAC&R equipment indicated to remain and replace with refrigerants that are not CFC based. Replace or adjust existing equipment to accommodate new refrigerant as described in Division 23 Sections.

3.02 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with Division 01 Section "Construction Waste Management and Disposal."

3.03 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

- A. Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."
 - 1. Where Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
 - 2. Replace all air filters immediately prior to occupancy.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Transportation, handling, storage and protection.
- B. Product option requirements.
- C. Substitution limitations and procedures.
- D. Procedures for Best Buy-supplied products.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 3546 - Green Building Project Requirements: VOC Content Restrictions
- B. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting packaging and substitutions.

1.03 REFERENCE STANDARDS**1.04 SUBMITTALS**

- A. Refer to Section 01 3000 Administrative Requirements and individual sections for submittal requirements.

PART 2 PRODUCTS**2.01 PRODUCT OPTIONS**

- A. National Accounts Vendor Program: The GC is responsible for purchasing, scheduling and coordinating all of the products and building materials listed with a Best Buy National Account Vendor, without exception or substitution, utilizing the information and individual specifications sections for applicable products.
- B. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- C. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- D. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.02 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections and in Section 01 7800 Closeout Procedures and Submittals.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION**3.01 SUBSTITUTION PROCEDURES**

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. GC shall utilize Substitution Request Form, to be provided to GC by Architect/Best Buy upon request.
- C. All substitutions shall comply with 01 3546 Green Building Project Requirements.
- D. Architect will consider requests for substitutions only within 15 days after date of Agreement.
- E. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- F. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

- G. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- H. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- I. Substitutions will not be considered when requested directly by a subcontractor or supplier.
- J. Substitution Submittal Procedure:
 - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. The Architect will notify Contractor in writing of decision to accept or reject request.

3.02 BEST BUY -SUPPLIED PRODUCTS

- A. See Section 00 0205 - Best Buy Material Schedule for identification of Best Buy-supplied materials.
- B. Best Buy responsibilities:
 - 1. Arrange and pay for product delivery to site.
- C. Contractor's Responsibilities:
 - 1. Receive and unload products at site; inspect for completeness or damage; immediately notify Best Buy representative of any discrepancies in amount and/or damaged product. GC shall be liable, at his expense, for replacement of all shortages or damaged product not reported to Best Buy at time of delivery.
 - 2. Handle, store, install and finish products.
 - 3. Repair or replace items damaged after receipt.
 - 4. GC is responsible to fax the OSM Material Receiving Log to the Best Buy Construction Purchasing Dept (see section 00 0203 for contacts). Log should note when materials arrived on site, any damage, any shortage, and who has received the product. Failure to do so will result in a back charge to the GC from Best Buy for any and all discrepancies.

3.03 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- H. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000
EXECUTION REQUIREMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures.
- C. Section 01 7419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
- D. Section 02 4100 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

1.03 REFERENCE STANDARDS**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.

1.05 QUALIFICATIONS

- A. For survey work, employ a land surveyor registered in Arizona and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
- B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in Arizona.

1.06 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- F. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Best Buy occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Best Buy's activities.

1.08 OVERLAPPING AND CONFLICTING REQUIREMENTS

- A. Where compliance with two or more standards or requirements is indicated, and where overlapping requirements establish different or conflicting levels of quality; the most stringent, requirement shall prevail and will be enforced unless written approval is granted otherwise by the Architect.
- B. At Bidding stage: Notify Architect of overlapping and conflicting requirements for clarification.
- C. During Construction: Refer to Architect for resolution of conflicting requirements and uncertainties as to which level of quality is more stringent and receive written clarification from Architect before proceeding with questioned work.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.
- H. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.

2. Grid or axis for structures.
3. Building foundation, column locations, ground floor elevations.
- I. Periodically verify layouts by same means.
- J. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 1. Verify that construction and utility arrangements are as shown.
 2. Report discrepancies to Architect before disturbing existing installation.
 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
 1. Remove items indicated on drawings.
 2. Relocate items indicated on drawings.
 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 4. Verify that abandoned services serve only abandoned facilities.
 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- D. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- H. Clean existing systems and equipment.
- I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- J. Do not begin new construction in alterations areas before demolition is complete.
- K. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-conforming work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
- J. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and owner seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

END OF SECTION

SECTION 01 7419**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL****PART 1 GENERAL****1.01 WASTE MANAGEMENT REQUIREMENTS**

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- E. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- F. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- G. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 6000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- C. Section 01 7000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.

- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
 - 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 - 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 - 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- C. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
 - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
 - 2. Submit Report on a form acceptable to Owner.
 - 3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - 4. Incinerator Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
 - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - 5. Recycled and Salvaged Materials: Include the following information for each:

- a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
6. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.
7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

- A. See Section 01 6000 - Product Requirements for substitution submission procedures.
- B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 6000:
 1. Relative amount of waste produced, compared to specified product.
 2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Price.
 3. Proposed disposal method for waste product.
 4. Markets for recycled waste product.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 1. Pre-bid meeting.
 2. Pre-construction meeting.
 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

1. As a minimum, provide:
 - a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
 - b. Separate dumpsters for each category of recyclable.
 - c. Recycling bins at worker lunch area.
 2. Provide containers as required.
 3. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 4. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

3.03 RECYCLING DEMOLITION WASTE

- A. Asphalt Paving: Grind asphalt to maximum 1-1/2 inch size.
- B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 1. Pulverize concrete to maximum 1-1/2 inch size.
- D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 1. Pulverize masonry to maximum 1 inch to 1-1/2 inch size.
 2. Clean and stack undamaged, whole masonry units on wood pallets.
- E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- F. Metals: Separate metals by type.
 1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
- H. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- J. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- K. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 1. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- L. Carpet Tile: Remove debris, trash, and adhesive.
 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- N. Conduit: Reduce conduit to straight lengths and store by type and size.

3.04 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.05 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION

SECTION 01 7800
CLOSEOUT PROCEDURES AND SUBMITTALS

PART 1 - GENERAL**2.01 SECTION INCLUDES**

- A. Substantial Completion Closeout Procedures.
- B. Final Completion Closeout Procedures.
- C. Re-inspection Fees.
- D. Final Cleaning.
- E. Project Record Documents.
- F. Operation and Maintenance Data.
- G. Warranties and Bonds.
- H. Spare Parts and Maintenance Materials.

2.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Individual Product Sections: Specific requirements for operation and maintenance data.
- C. Individual Product Sections: Warranties required for specific products or Work.

2.03 SUBSTANTIAL COMPLETION CLOSEOUT PROCEDURES

- A. Prior to inspection for Substantial Completion perform Final Cleaning under provisions of this Section.
- B. When General Contractor considers work is Substantially Complete as defined in General Conditions, submit written notice to Architect, Best Buy, and Owner (BTS Project) accompanied with or preceded by Substantial Completion submittals as follows:
 - 1. Occupancy Permits and other similar approvals by governing authorities, assuring Best Buy's full access and use of completed work.
 - 2. Warranties and Bonds under provisions of this Section.
 - 3. Test/adjust/balance records, meter readings, start-up performance reports, and similar changeover information.
 - 4. Application for reduction of retainage, with Consent of Surety to Reduction in or Partial Release of Retainage (G702 and G703)(Best Buy Developed Project).
 - 5. Coordinate with Best Buy to shift insurance coverages, including proof of extended coverages as required.
 - 6. General Contractor's punch list, listing incomplete work recognized as exceptions to Certificate of Substantial Completion.
- C. Should Best Buy find Work is defective or not Substantially Complete:
 - 1. Best Buy will notify General Contractor in writing, listing observed deficiencies.
 - 2. General Contractor shall remedy deficiencies and send a second written notice of Substantial Completion.
 - 3. Best Buy will re-inspect Work.

2.04 FINAL COMPLETION CLOSEOUT PROCEDURES

- A. Complete items on General Contractor's Substantial Completion punch list, or provide assurance satisfactory to Best Buy that incomplete work will be completed without undue delay.
- B. Remove temporary facilities, services, surplus materials, rubbish and similar elements.
- C. When General Contractor considers work is complete, submit the following to Best Buy:
 - 1. Written Certificate of Final Completion, stating:
 - a. Contract Documents have been reviewed.

- b. Work has been inspected for compliance with Contract Documents.
- c. Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
- d. Equipment and systems have been tested, adjusted and balanced, and are fully operational.
- e. Operation of systems has been demonstrated to Best Buy's personnel.
- f. Work is complete and ready for final inspection.
2. Project Record Documents under provisions of this Section.
3. Operation and Maintenance Data under provisions of this Section.
4. Spare Parts and Maintenance Materials under provisions of this Section.
5. General Contractor's Affidavit of Payment of Debts and Claims (AIA G706); proving satisfactorily to Best Buy that taxes, fees and similar obligations of General Contractor have been paid.
6. General Contractor's Affidavit of Release of Liens (AIA G706A); providing evidence of payment and release of liens in accordance with Conditions of the Contract.
7. General Contractor's Final Lien Waiver in full amount of Contract Sum.
8. Final Lien Waivers from all subcontractors, sub-subcontractors, and major suppliers to Project legally entitled to file a lien in excess of one thousand dollars (\$1,000.00) arising out of work of this Contract and covered by payments, totaling full amount of Contract Sum.
9. Consent of Surety Company to Final Payment (AIA G707).
10. Certificates of Insurance for Products and Completed Operations in accordance with Conditions of the Contract.
11. Application for final payment (Best Buy Developed Project).
12. Statement of Adjustment of Accounts to Contract Sum indicating (Best Buy Developed Project):
 - a. Original Contract Sum.
 - b. Previous change orders.
 - c. Changes under allowances.
 - d. Changes under unit prices.
 - e. Deductions for uncorrected work.
 - f. Penalties and bonuses.
 - g. Deductions for liquidated damages.
 - h. Deductions for reinspection fees.
 - i. Other adjustments to Contract Sum.
 - j. Total Contract Sum as adjusted.
 - k. Previous payments.
 - l. Sum remaining due.
- D. Should Best Buy find Work incomplete or defective:
 1. Best Buy will promptly notify General Contractor in writing listing observed deficiencies.
 2. General Contractor shall remedy deficiencies, subject to Arbitration if disputed, and send a second certification of final completion.
 3. Best Buy will re-inspect.
- E. When Best Buy finds work is complete, Best Buy will consider closeout submittals:

2.05 REINSPECTION FEES

- A. Should status of completion of work require re-inspection by Best Buy due to failure of work to comply with General Contractor's claims on initial inspection, Best Buy will deduct the amount of Best Buy's compensation for re-inspection services from final payment to General Contractor on Best Buy Developed Projects. In any case, Owner shall not pay fees associated with additional Best Buy/engineer/architect/vendor inspections which are required as a result of GC's failure of work or incompleteness of work.

2.06 FINAL CLEANING

- A. Execute cleaning prior to inspection for Substantial Completion of the work.

- B. General Contractor will be responsible to provide final cleaning of their own work and others in the building after Substantial Completion. Including cleaning of fixtures and components installed by the fixture subcontractor.
- C. Use materials which will not create hazards to health or property, and which will not damage surfaces.
- D. Use only materials and methods recommended by manufacturer of material being cleaned.
- E. In addition to removal of debris and cleaning specified in other sections, clean interior and exterior exposed-to-view surfaces.
- F. Remove temporary protection and labels not required to remain.
- G. Clean finishes free of dust, stains, films and other foreign substances.
- H. Clean transparent, glass and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
- I. Vacuum clean carpeted and similar soft surfaces.
- J. Clean and damp mop, resilient and hard-surfaced floors.
- K. Clean surfaces of equipment; remove excess lubrication.
- L. Clean plumbing fixtures to a sanitary condition.
- M. Clean permanent filters of ventilating equipment and replace General Contractor supplied temporary disposable filters when units have been operated during construction.
- N. Clean light fixtures and lamps.
- O. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.
- P. Remove waste, debris, and surplus materials from site. Clean grounds; remove stains, spills, and foreign substances from paved areas and sweep clean. Rake clean other exterior surfaces.

2.07 PROJECT RECORD DOCUMENTS

- A. Store Record Documents and samples in Field Office apart from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.
- B. Label and file Record Documents and samples in accordance with Section number listings in Table of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- C. Maintain Record Documents in a clean, dry and legible condition. Do not use Record Documents for construction purposes.
- D. Make available Record Documents and samples for inspection by Best Buy.
- E. Record information on a set of translucent mylar drawings, and in a copy of Project Manual, provided by Owner.
- F. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- G. At Contract closeout, deliver Record Documents and samples, signed by General Contractor, to Best Buy under provisions of this Section. Transmit with cover letter, with copy to Best Buy.
- H. The Design Consultant shall, at his sole cost, re-measure the Best Buy building using the definition in defined as being "The floor area within the inside perimeter of the exterior walls of the building under consideration, exclusive of vent shafts, decorative pilasters and courts, without deduction for corridors, stairways, closets, the thickness of interior walls, columns or other features. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above. The gross floor area shall not include shafts with no openings or interior courts." A wall that contains a shared Demising Line will be measured to the centerline within the wall. Design Consultant shall verify that definition of demised premises herein is in accordance with Best Buy lease prior to completing the form.

- I. The Design Consultant shall sign the completed form (to be provided by Best Buy upon request) and return to Landlord and Best Buy within 30 days after Grand Opening.

2.08 OPERATION AND MAINTENANCE DATA

- A. Submit three sets prior to final inspection, bound in 8-1/2 x 11 inch three-ring side binders with durable plastic covers.
- B. PART 1: DIRECTORY, LISTING NAMES, ADDRESSES, AND TELEPHONE NUMBERS OF: ARCHITECT, CONSULTANTS, GENERAL CONTRACTOR, SUBCONTRACTORS AND SUPPLIERS (A COPY OF THIS INFORMATION SHOULD BE TURNED OVER TO THE NSOM, RFM AND GM AT TURNOVER).
- C. PART 2: OPERATION AND MAINTENANCE INSTRUCTIONS, ARRANGED BY SYSTEM, AS SPECIFIED IN EACH SECTION. FOR EACH SYSTEM, GIVE NAMES, ADDRESSES, AND TELEPHONE NUMBERS OF SUBCONTRACTORS AND SUPPLIERS. LIST THE FOLLOWING: TO BE RETAINED IN THE GENERAL GENERAL CONTRACTORS OFFICE FOR 1 YEAR FROM GRAND OPENING.
 1. Appropriate design criteria.
 2. List of equipment.
 3. Parts list.
 4. Operating instructions.
 5. Maintenance instructions, equipment.
 6. Maintenance instructions, finishes.
 7. Shop drawings and product data.
 8. Warranties.
- D. Instruction of Best Buy Personnel:
 1. Before final inspection, instruct Best Buy's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
 2. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
 3. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction. These manuals will be retained by the General General Contractor for a period of 1 year from Grand Opening.
 4. Coordinate with Best Buy for final forms to be completed, 3 copies required filled out in its entirety and submit at Merchandise Turnover 2 copies with all back up and 1 copy sent in with final pay application.

2.09 WARRANTIES AND BONDS

- A. Provide original, notarized copies to Best Buy, with duplicate to Architect. Execute General Contractor's submittals and assemble documents executed by subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in binder with durable plastic cover.
- B. The warranty period is in force for 1 year starting Grand Opening Day.
- C. Submit material prior to final application for payment. For equipment put into use with Best Buy's permission during construction, submit within ten days after first operation. For items of work delayed materially beyond Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.
- D. Any warranty shall not relieve rights available to Best Buy under common law or other reserved rights.
- E. Provide individual product and system warranties as defined in specification Sections, which may extend beyond Complete Project Warranty period.

2.10 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of work. Coordinate with Best Buy, deliver to Project site and obtain receipt prior to final payment.
- B. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

END OF SECTION

SECTION 02 4100 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Section 01 3546 - Green Building Project Requirements:
- B. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- C. Section 01 7419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
 - 1. Areas for temporary construction and field offices.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.
- D. Minutes of pre-execution conference.

1.05 QUALITY ASSURANCE

- A. Pre-Execution Conference: Convene a pre-execution conference at least one week prior to commencement of selective demolition work. Comply with Section 01 1700 - Execution and Closeout Requirements.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 5. Do not close or obstruct roadways or sidewalks without permit.
 - 6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 - 7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.

- C. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Comply with requirements of Section 01 7419 - Waste Management.
 - 2. Dismantle existing construction and separate materials.
 - 3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.02 DEMOLISHING PORTIONS OF EXISTING CONCRETE STRUCTURE

- A. Demolish and modify designated portions of existing building structure to accommodate new and future work, including the following:
 - 1. Portions of existing concrete columns.
 - 2. Existing concrete floor and roof slabs, including work to accommodate new expansion joint cover assemblies.
 - 3. Existing slabs at elevator pits.
 - 4. Portions of existing concrete foundation.
- B. Employ methods as required to achieve clean, straight edges, and to accommodate new Work. Use precision sawing and drilling equipment, such as diamond- and carbide-tipped saws and drills. Employ methods that prevent over-cutting of corners, such as stitch-drilling or hand sawing methods.
- C. Cut and dismantle large areas of concrete in pieces. Drill holes in mass concrete and split with hydraulic splitters or non-explosive demolition agents, where required by conditions.
- D. Expansion Joint Cover Assemblies: Cut areas of existing slabs to accommodate manufactured products. Refer to Section 07 9513 - Expansion Joint Cover Assemblies.
- E. Make final modifications and leave work in a ready condition for new Work specified in other Sections.

3.03 DEMOLISHING PORTIONS OF EXISTING MASONRY WALLS

- A. Demolish and modify designated portions of existing masonry walls, including the following:
 - 1. Portions of existing masonry parapets.
 - 2. Portions of exterior masonry walls.
 - 3. Portions of interior load-bearing masonry walls and non-load-bearing partitions;
 - 4. New openings in existing masonry walls for new windows and doors.
 - 5. New opening and modifications for other areas as required to accommodate the Work.
- B. Utilize means and methods that prevents damage to adjacent building structure and material indicated to remain. Use precision equipment, such as rotary power saws, to make new openings and areas requiring clean, straight, accurate cuts.
- C. Salvage existing concrete and stone copings and sills, and masonry units in good conditions. Comply with Salvaging Materials article specified in this Section. Discard excess mortar, anchors and attachments, and units in poor condition.
- D. Make final modifications and leave work in a ready condition for new work specified in other Sections.
- E. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.04 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.05 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. **Report discrepancies to Architect before disturbing existing installation.**
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings .
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch as specified for patching new work.

3.06 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 7419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.

- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 0130.75
CONCRETE REPAIR

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Preparation of concrete and application of repair materials.
- B. Rehabilitation of concrete surfaces.
- C. Repair of concrete internal reinforcement.

1.02 REFERENCE STANDARDS

- A. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2009b.
- C. ASTM C33 - Standard Specification for Concrete Aggregates; 2008.
- D. ASTM C150 - Standard Specification for Portland Cement; 2007.
- E. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2007.
- F. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear; 2005.
- G. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2010.
- H. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2008.
- I. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2010.

1.03 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years of experience.
- B. Design reinforcement splices under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Arizona.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturers' instructions for storage, shelf life limitations, and handling.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Epoxy Mortars:
 - 1. Dayton Superior Corporation: www.daytonsuperior.com.
 - 2. Chase Construction Products: www.e-poxy.com.
 - 3. STO Corp: www.stocorp.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cementitious Mortars:
 - 1. Bonsal American, Inc: www.sakrete.com.
 - 2. BASF Construction Chemicals-Building Systems: www.chemrex.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- C. Bonding Agents:
 - 1. BASF Construction Chemicals-Building Systems: www.chemrex.com.
 - 2. Larsen Products Corp: www.larsenproducts.com.
 - 3. L&M Construction Chemicals, Inc: www.lmcc.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PATCHING MATERIALS

- A. Epoxy Resin: Two-part epoxy adhesive containing 100 percent solids, meeting the following minimum characteristics:
 - 1. Bond Strength (ASTM C882): 2,700 psi.
 - 2. Tensile Strength (ASTM D638): 6,600 psi.
 - 3. Percent Elongation (ASTM D638): 2 percent at 7 days at 70 degrees F.
 - 4. Flexural Strength (ASTM D790): 8,000 psi.
 - 5. Compressive Strength (ASTM D695): 6,500 psi.
- B. Bonding Agent: Polyvinyl acetate emulsion, dispersed in water while mixing, non-coagulant in mix, water resistant when cured.
- C. Portland Cement: ASTM C150, Type I, grey .
- D. Sand: ASTM C 33 or ASTM C 404; uniformly graded, clean.
- E. Water: Clean and potable.

2.03 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M Grade 40 (280) billet-steel deformed bars, unfinished.
- B. Stirrup Steel: ASTM A 82/A 82M.

2.04 MIXING EPOXY MORTARS

- A. Mix epoxy mortars in accordance with manufacturer's instructions for purpose intended.
- B. Mix components in clean equipment or containers. Conform to pot life and workability limits.

2.05 MIXING CEMENTITIOUS MATERIALS

- A. Mix cementitious mortar and grout in accordance with manufacturer's instructions for purpose intended.
- B. Include bonding agent as additive to mix.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination; wire brush using water; rinse surface and allow to dry.
- B. Flush out cracks and voids with cleaning agent recommended by manufacturer to remove laitance and dirt. Chemically neutralize by rinsing with water.
- C. Provide temporary entry ports spaced to accomplish movement of fluids between ports; no deeper than the depth of the crack to be filled or port size diameter no greater than the thickness of the crack. Provide temporary seal at concrete surface to prevent leakage of adhesive.
- D. For areas patched with epoxy mortar, remove broken and soft concrete 1/4 inch deep. Remove corrosion from steel. Clean surfaces mechanically; wash with cleaning agent; rinse with water.
- E. Blast clean the exposed reinforcement steel surfaces. Mechanically cut away damaged portions of bar.

3.03 REPAIR WORK

- A. Repair exposed structural, shrinkage, and settlement cracks of concrete by the bonding agent and cementitious paste method.
- B. Repair spalling. Fill voids flush with surface. Apply surface finish.
- C. Repair reinforcement by welding new bar reinforcement to existing reinforcement with sleeve splices. Strength of welded splices to exceed original stress values.

3.04 INJECTION - EPOXY RESIN ADHESIVE

- A. Inject adhesive into prepared ports under pressure using equipment appropriate for particular application.
- B. Begin injection at lower entry port and continue until adhesive appears in adjacent entry port. Continue from port to port until entire crack is filled.
- C. Remove temporary seal and excess adhesive.
- D. Clean surfaces adjacent to repair and blend finish.

3.05 APPLICATION - EPOXY MORTAR

- A. Trowel apply mortar mix to an average thickness as recommended by manufacturer. Tamp into place filling voids at spalled areas.
- B. For patching honeycomb, trowel mortar onto surface, work mortar into honeycomb to bring surface flush with surrounding area. Finish trowel surface to match surrounding area.
- C. Cover exposed steel reinforcement with epoxy mortar, feather edges to flush surface.

3.06 APPLICATION - CEMENTITIOUS MORTAR

- A. Apply brush coating of bonding agent to dry concrete surfaces. Provide full surface coverage.
- B. Apply cementitious mortar by steel trowel to an average thickness as recommended by manufacturer. Tamp into place filling voids at spalled areas. Work mix into honeycomb.
- C. Damp cure cementitious mortar for four days.

3.07 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 4000, will perform field inspection and testing.
 - 1. Test concrete for calcium chloride content during the execution of the Work.

END OF SECTION

**SECTION 03 5400
CAST UNDERLAYMENT**

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Liquid-applied self-leveling cementitious type floor underlayment.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution and Closeout Requirements: Alteration project procedures; selective demolition for remodeling.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.
- B. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2008.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.

1.06 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Cementitious Underlayment:
 - 1. Ardex Engineered Cements Inc: www.ardex.com.
 - 2. Bonsal American, an Oldcastle company; Level Set 300: www.prospec.com.
 - 3. Dayton Superior Corporation: www.daytonsuperior.com.
 - 4. Dependable Chemical Co., Inc: www.floorprep.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
 - 1. Compressive Strength: Minimum 4000 psi after 28 days, tested per ASTM C109/C109M.
 - 2. Flexural Strength: Minimum 1000 psi after 28 days, tested per ASTM C348.
 - 3. Density: 125 lb/cu ft, nominal.
 - 4. Final Set Time: 1-1/2 to 2 hours, maximum.
 - 5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
 - 6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- B. Water: Potable and not detrimental to underlayment mix materials.
- C. Primer: Manufacturer's recommended type.
- D. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.03 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.
- B. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION**3.01 APPLICATION**

- A. Install underlayment in accordance with manufacturer's instructions.
- B. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.
- C. Place before partition installation.
- D. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.02 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.

3.03 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Formed steel stud interior wall framing.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking and miscellaneous framing.
- B. Section 09 2216 - Non-Structural Metal Framing.
- C. Section 09 2116 - Gypsum Board Assemblies: Lightweight, non-load bearing metal stud framing.

1.03 REFERENCE STANDARDS

- A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- D. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.
- F. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 2008.
- G. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- C. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Indicate stud layout.
 - 2. Describe method for securing studs to tracks and for bolted framing connections.
 - 3. Provide design engineer's stamp on shop drawings.
- D. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention, and prefabricated systems.
- E. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Recycled Content.
 - 2. Regional Materials.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Arizona.

- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing:
1. Clarkwestern Dietrich Building Systems LLC; Product ____: www.clarkdietrich.com.
 2. Marino: www.marinoware.com.
 3. Clark Western.
 4. The Steel Network, Inc: www.SteelNetwork.com.
- B. Framing Connectors and Accessories:
1. Same manufacturer as metal framing.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Design Criteria: Provide completed framing system having the following characteristics:
1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
 2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
 3. Design Loads: In accordance with applicable codes.
 4. Live load deflection meeting the following, unless otherwise indicated:
 5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
- C. Shop fabricate framing system to the greatest extent possible.
- D. Deliver to site in largest practical sections.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
1. Gage and depth: As required to meet specified performance levels.
 2. Galvanized in accordance with ASTM A653/A653M G60/Z180 coating.
- B. Framing Connectors: Factory-made, formed steel sheet.
1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for thicknesses less than 10 gage (0.118 inch), and factory punched holes and slots.
 2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold Formed Steel Structural Members.
 3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
 - a. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1 inch.
 - b. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

2.04 WALL SHEATHING

- A. Wall Sheathing: Specified in Section 06 1000 - Rough Carpentry.

2.05 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.06 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.
- C. Welding: If required, in conformance with AWS D1.1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing components are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C 1007 requirements.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.
- C. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.
- D. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- E. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- F. Install intermediate studs above and below openings to align with wall stud spacing.
- G. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- H. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- I. Touch-up field welds and damaged galvanized surfaces with primer.

3.03 WALL SHEATHING

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.
 1. Use plywood at building corners, for not less than 96 inches, measured horizontally.
 2. Provide steel diagonal bracing at corners.

3.04 TOLERANCES

- A. Comply with ASTM C1007.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Shop fabricated steel items., including the following:
 - 1. Steel shapes in exterior walls:
 - a. Loose steel lintels.
 - b. Loose steel bearing and leveling plates.
 - c. Formed steel plates.
 - 2. Interior steel framing and supports.
 - a. Ceiling hung equipment and furnishings.
 - b. Applications where framing and supports are not specified in other Sections.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 09 9000 - Painting and Coating: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2012.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2013.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- F. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- G. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2013.
- H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2010.
- J. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- K. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).
- L. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

PART 2 PRODUCTS**2.01 MATERIALS - STEEL**

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.
- C. Plates: ASTM A 283.
- D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.
- E. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
 - 1. Exterior Bollards (Type B) fabricated from 6 inch I.D. by length as indicated, set with minimum 4'-2" above grade, set in concrete.
- B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.
- C. Lintels: As detailed; prime paint finish.

2.04 FINISHES - STEEL

- A. Prime paint all steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete or masonry.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Paint Preparation for Galvanized Steel: For newly prepared zinc-coated steel that has been hot-dip galvanized after fabrication and within 48 hours of painting, prepare hot-dip galvanized surfaces in the shop for painting according to ASTM D 6386, and as follows:
 - 1. Do not water- or chromate-quench; do not oil.
 - 2. Provide slightly roughened surface using profiling methods, such as filing high spots, sweep blasting, phosphating, and using wash primers or acrylic passivations, as required to improve paint adhesion, taking measures to prevent damage to the galvanized coating.
- F. Shop Paint for Galvanized Steel Surfaces: 100 percent acrylic latex specifically recommended by paint manufacturer for the specific applications on this Project.
- G. Paint manufacturer's consistently recommend SSPC SP-6 Commercial Blast for surface prep even for DTM type paints.
- H. Mil thickness of zinc-rich primers and DTM primers needs to cover the profile height of the commercial blast surface prep.
- I. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.
- J. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated .
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Non-structural dimension lumber framing.
- B. Fire retardant treated wood materials.
- C. Miscellaneous framing and sheathing.
- D. Concealed wood blocking, nailers, and supports.
- E. Miscellaneous wood nailers, furring, and grounds.
- F. Dust and vapor barrier enclosures.

1.02 RELATED REQUIREMENTS

- A. Section 03 5400 - Cast Underlayment.
- B. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.

1.03 DEFINITIONS

- A. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.

1.04 REFERENCE STANDARDS

- A. APA PRP-108 - Performance Standards and Qualification Policy for Structural-Use Panels (Form E445); 2001.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
- D. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2012.
- E. PS 1 - Structural Plywood; 2009.
- F. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.
- C. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Regional Materials.
- D. Certificates: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Stud Framing (2 by 2 through 2 by 6):
 - 1. Species: Any allowed under referenced grading rules.
 - 2. Grade: No. 3 or Stud.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Parapet Sheathing Panels: APA PRP-108/APA PRP-108, Form B455 Rated Sheathing, Exterior Exposure Class, and as follows:
 - 1. Span Rating: 24/0.
 - 2. Thickness: 1/2 inch, nominal.
 - 3. Provide fire-retardant-treated material, unless noted otherwise.
- B. Plywood Roof Blocking: APA PRP-108/APA PRP-108, Form B455 Rated Sheathing, Exterior Exposure Class, and as follows:
 - 1. Thickness: 1/2 inch, nominal.
 - 2. Provide fire-retardant-treated material, unless noted otherwise.
- C. Wall Sheathing, For Cold-Formed Metal Framing Assemblies: Plywood, PS 1, Grade C-D, Exposure I. 3/4 inches thick, unless noted otherwise.
- D. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- E. Other Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 - 3. Other Locations: PS 1, C-D Plugged or better.
- F. Wall Wainscot Panels:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 - 3. Other Locations: PS 1, C-C Plugged or better.

2.04 ACCESSORIES

- A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B. Dust and Vapor Barrier Membrane: Fire-retardant, nylon- or polyester-reinforced polyethylene sheet.
 1. Performance Characteristics:
 - a. Weight: Not less than 22 lb/1000 sq.ft. (10 kg/100 sq.m.).
 - b. Maximum Permeance Rating: 0.1317 perm (7.56 ng/Pa x s x sq. m).
 - c. Flame Spread: Not more than 5, per ASTM E 84.
 - d. Smoke Developed Index: Not more than 60, per ASTM E 84.
 2. Acceptable Products:
 - a. Raven Industries Inc.; DURA-SKRIM 2FR.
 - b. Reef Industries, Inc.; Griffolyn T-55 FR.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWP A U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
- B. Fire Retardant Treatment:
 1. Manufacturers:
 - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
 - b. Hoover Treated Wood Products, Inc: www.frtw.com.
 - c. Osmose, Inc: www.osmose.com.
 2. Interior Type A: AWP A U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. All interior rough carpentry items are to be fire retardant treated.
 - c. Treat rough carpentry items as indicated .
 - d. Do not use treated wood in applications exposed to weather or where the wood may become wet.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.03 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
- B. Communications and Electrical Room Mounting Boards: Secure with screws to structural substrate with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.

3.05 DUST AND VAPOR BARRIER ENCLOSURES

- A. Place dust and vapor barrier membrane with exposed framing on construction side of enclosure, unless otherwise directed or indicated on Drawings.
- B. Extend enclosure to extremities of enclosure areas and cover miscellaneous voids to protect from dust and vapor transmission. Secure enclosure in place with heavy-duty staples, adhesives and/or other anchorage system as required to complete the work.
- C. Seal vertical joints in dust and vapor barrier membrane over framing by lapping no fewer than two studs.
- D. Fasten dust and vapor barrier membrane to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints.
- E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating dust and vapor barrier membrane with vapor-retarder tape to create an airtight seal between penetrating objects and membrane.
- F. Maintain enclosure in good conditions throughout construction. Repair tears or punctures in dust and vapor barrier membrane immediately before concealment by other work. Cover with vapor-retarder tape or another layer of membrane.
- G. Remove enclosure when no longer required for use. Prior to removal, shut off HVAC units at rooftop disconnect, remove partitions, then turn units back on.

3.06 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 7419.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Finish carpentry items.
- B. Wood casings and moldings.
- C. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 09 9000 - Painting and Coating: Painting and finishing of finish carpentry items.

1.03 DEFINITIONS

- A. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.

1.04 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
- D. AWP A U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association; 2012.
- E. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide data on fire retardant treatment materials and application instructions.
 - 2. Provide instructions for attachment hardware and finish hardware.
- C. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Regional Materials.
 - 2. Low Emitting Materials - Adhesives and Sealants.
 - 3. Low Emitting Materials - Paints and Coatings.
- D. Certificates: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS**2.01 FINISH CARPENTRY ITEMS**

- A. Provide all of the labor, materials, equipment, and services required to furnish and install the millwork in addition to complying with all pertinent codes and regulations, the "Quality Standards" of the Architectural Woodwork Institute shall apply and be reference hereby made a

part of the contract documents. Any reference to "Premium", "Custom", and "Economy" shall be defined in the latest edition of AWI "Quality Standards".

B. Interior Woodwork Items for **Magnolia Design Center**, where applicable:

1. Standing and running trim, interior stain finish:
 - a. AWI Quality grade "Premium"
 - b. Plain Sawn Poplar, unless noted otherwise on the drawings.
2. Standing and running trim, interior paint finish:
 - a. AWI Quality grade "Premium"
 - b. Poplar, Natural Birch, Ponderosa Pine, unless noted otherwise on the drawings.
3. Plywood:
 - a. Birch Veneer fiberwood board as manufactured by Weyerhaeuser, unless otherwise noted on the drawings.
4. Closet and Storage Shelving, interior stain finish:
 - a. Birch Veneer Plywood with 3/4" Minimum hardwood edging
5. Closet and Storage Shelving, interior paint finish:
 - a. AWI Quality grade "Custom"
6. Trim Profiles: Provide trim with the following profiles (AWI woodwork quality standards). Profiles indicate general shape and pattern only. Submit Manufacturer's matching profiles for sizes of trim indicated on drawings.
 - a. Base: BAS-1024 (6" Profile)
 - b. Chair Rail: CAS-2080 (2-3/4" Profile)
 - c. Casing: CAS-2065 (2-1/4" Profile)
 - d. Picture Mould: 1" x 1-1/4" w/ 15/16" x 1/4" rabbet one side

2.02 WOOD-BASED COMPONENTS

- A. Certified Wood: The following wood products shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
1. Interior trim.
 2. Shelving.

2.03 SHEET MATERIALS

- A. Particleboard: ANSI A208.1; composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders containing no urea-formaldehyde resin; of grade to suit application; sanded faces.

2.04 FASTENINGS

- A. Fasteners: Of size and type to suit application; Stainless steel finish in concealed locations and galvanized finish in exposed locations.

2.05 ACCESSORIES

- A. Lumber for Shimming, Blocking, and : Softwood lumber of species.
- B. Wood Filler: Solvent base, tinted to match surface finish color.

2.06 HARDWARE

- A. Hardware for **Magnolia Design Center**, where applicable, unless otherwise noted on the drawings: Comply with BHMA A156.9.
1. Shelf Support Clips: Knap & Vogt No. 345
 2. Hinges: 170 degree concealed casework hinge for inset door application: Blum 70T6650; Maximum door reveal 1/8"; (2) per door for doors less than 36" tall and less than 15 lbs; (3) per door for doors 36"-60" tall and less than 30 lbs; (4) per door for doors 60"-80" tall and less than 45 lbs.
 3. Concealed opener/closer: Blum Tip-On 955A1004 for large doors with adapter plate for inset door application; locate at mid-point of door on strike side.

2.07 WOOD TREATMENT

- A. Factory-Treated Lumber: Comply with requirements of AWWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
- C. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.
- D. Provide identification on fire retardant treated material.
- E. Redry wood after pressure treatment to maximum ____ percent moisture content.

2.08 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Fit exposed sheet material edges with matching veneer edging. Use one piece for full length only.
- C. Field Measurements: Check actual locations of walls and other construction to which millwork fabrications must fit by accurate field measurements before fabrication. Show recorded measurements of final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards requirements for grade indicated.
- B. Set and secure materials and components in place, plumb, level, true and straight with no distortions. Shim as required using concealed shims.
- 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. Kerf the back side of all trim 3/4" and under. Back cut trim 3/4" x 2-1/4" and over in lieu of kerfing to prevent warping. All exposed corners to be mitered. Trim shall be anchored with screws which have been countersunk and plugged with wood.
- E. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- F. Anchor millwork to anchors or built-in blocking and secure to grounds. Stripping and blocking with countersunk concealed fasteners and blind nailing as required for a complete installation except where prefinished matching fastener heads are required. Use fine finishing nails for exposed nailing, countersunk and filled flush with millwork, and matching final finish where transparent finish is indicated.
- G. Install running and standing trim with minimum number of joints possible, using full length pieces from maximum length of lumber available to the greatest extent possible. Stagger joints in adjacent and related members, cope at returns, miter at corners, and comply with referenced quality standards for joinery.
- H. All other materials not specifically described but required for a complete and proper installation of the millwork items shall be as selected by the Contractor but subject to the approval of the Owner's representative.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth. On items to receive transparent finishes, use wood filler which matches the natural color of the wood.
- B. Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing of concealed surfaces and similar preparations for finishing of millwork as applicable to each unit of work.
- C. See spec section 09 9000 Painting and Coating for finish requirements related to painting and staining woodwork.

3.04 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 07 2100
THERMAL INSULATION**

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Sound attenuation batt insulation at interior partitions.

1.02 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing: Board insulation as wall sheathing.
- B. Section 09 2116 - Gypsum Board Assemblies: Acoustic insulation inside walls and partitions.

1.03 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
- C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Recycled Content.
 - 2. Low Emitting Materials - Adhesives and Sealants.

PART 2 PRODUCTS**2.01 APPLICATIONS**

- A. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.
- B. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.

2.02 BATT INSULATION MATERIALS

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 - 1. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 - 2. Formaldehyde Content: Zero.
 - 3. Facing: Aluminum foil, flame spread 25 rated; one side.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
 - 1. Where indicated, provide foil facing on one side; with flame spread index of 25 or less, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 - 3. Thermal Resistance: R of 3.8 per inch.
 - 4. Manufacturers:
 - a. Thermafiber, Inc: www.thermafiber.com.
 - b. Roxul Inc. www.roxul.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements. Interior insulation must meet the standards for low emittance as established by California Department of

Health Services. Standards that comply with this requirement: The Collaborative for High Performance Schools (CHPS), Greenguard Children and Schools, and Indoor Advantage Gold.

- D. Sound Attenuation Insulation: semi-rigid mineral fiber blanket, complying with ASTM C 665, Type I.
 - 1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E 84.
 - 2. Thickness: 1-1/2" min.
 - 3. Manufacturers:
 - a. Owens-Corning, Sound Attenuation Batts, Sonobatts
 - b. Substitutions: See Section 01 6000 - Product Requirements. Interior insulation must meet the standards for low emittance as established by California Department of Health Services. Standards that comply with this requirement: The Collaborative for High Performance Schools (CHPS), Greenguard Children and Schools, and Indoor Advantage Gold.

2.03 ACCESSORIES

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- B. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- C. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
- F. Tape insulation batts in place.
- G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- H. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.
- I. Tape seal tears or cuts in vapor retarder.
- J. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.03 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 8400 FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire-resistance rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 23 0500: Firestopping of mechanical work.
- B. Section 26 0500: Firestopping of electrical work.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- B. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- C. FM 4991 - Approval of Firestop Contractors; Factory Mutual Research Corporation; 2001.
- D. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Low Emitting Materials - Adhesives and Sealants.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Certificate from authority having jurisdiction indicating approval of materials used.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
- B. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Approved by Factory Mutual Research under FM Standard 4991, Approval of Firestop Contractors, or meeting any two of the following requirements:
 - 2. With minimum 3 years documented experience installing work of this type.
 - 3. Able to show at least 5 satisfactorily completed projects of comparable size and type.
 - 4. Licensed by authority having jurisdiction.

1.06 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

PART 2 PRODUCTS

2.01 FIRESTOPPING - GENERAL REQUIREMENTS

- A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

2.02 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E 814 that has F Rating equal to fire rating of penetrated assembly and T Rating Equal to F Rating and that meets all other specified requirements.

2.03 MATERIALS

- A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Elastomeric Silicone Firestopping: Single component silicone elastomeric compound and compatible silicone sealant; conforming to the following:
 - 1. Manufacturers and Products:
 - a. FS 2000 Non-Sag and FS 2003 Self Leveling, single component silicone sealant, by 3M.
 - b. Biotherm 100/200 Self-Leveling, single component silicone sealant, by Bio Fireshield, Inc.
 - c. Fyre Putty ceramic fiber hard setting putty, by Carborundum.
 - d. CLK N/S and S/L Firestop Sealant, by Nelson Fire Stop Products.
 - e. Rectoseal Metacaulk 835+.
- C. Foam Firestopping: Single component silicone foam compound; conforming to the following:
 - 1. Manufacturers and Products:
 - a. FS 2001 two component foam silicone sealant, by Dow Corning.3M Fire Protection Products; Product ____: www.3m.com/firestop.
 - b. Substitutions: See Section 01 6000 - Product Requirements. Any substitution shall meet VOC limits identified in section 01 3547.
- D. Fiber Firestopping: Mineral fiber insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to the following:
 - 1. Manufacturers:
 - a. A/D Fire Protection Systems Inc; Product ____: www.adfire.com.
 - b. Pecora Corporation; Product ____: www.pecora.com.
 - c. Thermafiber, Inc; Product ____: www.thermafiber.com.
- E. Firestop Devices - Wrap Type: Mechanical device with incombustible filler and sheet stainless steel jacket, intended to be installed after penetrating item has been installed; conforming to the following:
- F. Firestop Devices - Cast-In Type: Sleeve and sealing material, intended to be cast in concrete floor forms or in concrete on metal deck, not requiring any additional materials to achieve penetration seal.
- G. Intumescent Putty: Compound that expands on exposure to surface heat gain; conforming to the following:
 - 1. Manufacturers and Products:
 - a. CP-25 N/S Non-Sag, CP-25 S/L Self-Leveling or CP-25 WB Water Base of Caulks; or MPP-1 Pads or MPS-2 Stick of Moldable Putty, by 3M.
 - b. Biostop 500 +.
 - c. Flame Stop V caulk or putty and Flame Stop VP caulk, by Flame Stop, Inc.
 - d. FSP Firestop Putty, by Nelson Fire Stop Products.
 - e. Rectoseal Metacaulk 1000.
 - f. Substitutions: See Section 01 6000 - Product Requirements. Any substitution shall meet VOC limits identified in section 01 3547.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authority having jurisdiction.
- C. Install labeling required by code.
- D. Install firestopping materials strictly according to the material manufacturer's instructions and the rated design.
1. Firestopping material shall completely fill void spaces regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping for filling floor voids 4 inches or more in any direction shall be capable of supporting the same load as the floor is designed to support or shall be protected by a permanent barrier to prevent loading or traffic in the firestopped area.
- E. Following installation of each firestop condition, affix the manufacturer's adhesive-backed, high visibility, printed label, indicating that a firestop system has been installed at the condition. Identical conditions in close proximity may be served by one label.
1. Label shall clearly indicate manufacturer's name and the system number, the installing firm's name, telephone number, and a contact within that firm who can provide information regarding the installation, and the date of the installation. A sample of an acceptable label is shown below:

WARNING
FIRESTOP SYSTEM
DO NOT DISTURB

SYSTEM # _____
CONTRACTOR _____
DATE _____

XYZ Firestop Co.
Address
Telephone

For Information Contact: _____
Telephone: _____

3.04 INSPECTION

- A. Firestopped areas shall not be covered or enclosed until inspection is complete and approved. A manufacturer's representative shall inspect the applications initially and periodically during the work to assure that the completed work has been accomplished according to the manufacturer's written instructions and the specified requirements.

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9005

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Precompressed foam sealers.

1.02 RELATED REQUIREMENTS

- A. Section 01 3546 - Green Building Project Requirements: VOC Content Restrictions.
- B. Section 07 8400 - Firestopping: Firestopping sealants.
- C. Section 08 6300 - Metal-Framed Skylights: Structural and weatherseal sealants and accessories.
- D. Section 08 8000 - Glazing: Glazing sealants and accessories.
- E. Section 09 2116 - Gypsum Board Assemblies: Acoustic sealant.

1.03 REFERENCE STANDARDS

- A. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.
- C. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Low Emitting Materials - Adhesives and Sealants.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a two year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SEALANTS

- A. Sealants and Primers - General: Provide products having volatile organic compound (VOC) content as specified in Section 01 3546.
- B. SLNT-1: Two-component, non-sag, polyurethane sealant with movement capability of ± 50 percent and conforming to ASTM C920, Type M, Grade NS, Class 25; non-staining. Color to match adjacent materials.
 - 1. Mameco International, "Vulkem 227".
 - 2. Pecora Corporation, "Dynatrol II".
 - 3. Sonneborn Building Products, "Sonolastic NP2".
 - 4. Tremco, "Dymeric."

- C. SLNT-2: Self-leveling, two component, non-staining, non-bleeding poly urea elastomer sealant with movement capability of ± 25 percent. Color: To match, or one shade darker than adjacent materials.
1. Versa Flex SL75: (918) 691-9996; (918) 629-2529; or (808) 232-9129.
 2. Or equivalent with same performance and warranty. Must comply with VOC limits listed in section 07900 1.5 B Sub-contractor takes responsibility for product.
- D. SLNT-3: One part, non-sag, skinning, paintable acrylic latex sealant capable of + 7.5 percent minimum movement and conforming to ASTM C834. Color: To match adjacent materials.
1. Pecora Corporation, "AC-20 Siliconized".
 2. Sonneborn Building Products, "Sonolac".
 3. Tremco, "Acrylic Latex 834".
- E. SLNT-4: Silicone Sanitary Sealant; ASTM C920, Type S, Grade NS; mildew resistant. Color: White.
1. Dow Corning Corporation, "786 Mildew Resistant Silicone Sealant".
 2. General Electric Company, "GE Silicone Sanitary 1700 Sealant".
 3. Sonneborn Building Products, "Omniplus".
- F. SLNT-5: Silicone Building and Glazing Sealant (Non-Structural); ASTM C920, Type S, NS, Class 25, single component; chemical curing. Color: To match adjacent materials.
1. Dow Corning Corp., "Dow Corning 999-A".
 2. General Electric Co., "Silglaze II".
 3. Pecora Corporation; "863".
- G. SLNT-6: Acoustical Sealant; Non-hardening, non-skinning acoustical sealant for concealed joints.
1. Tremco, "Acoustical Sealant".
 2. United States Gypsum, "Acoustical Sealant".
- H. SLNT-7: Expandable Foam Sealer;
1. EM-Seal Corporation, "Gray-Flex".
 2. Illbruck Corporation, "Will-Seal Tape Type 150".
- I. SLNT-8: Foam Sealer:
1. Preformed closed cell polyvinyl chloride or butyl rubber based foam tape, minimum 30% compression. Resistant to weathering, U.V., mildew, fungi and oxidation. Pressure sensitive adhesive on the non-liner side of tape roll. Provide tape width and thickness recommended by manufacturer for joint conditions.
 - a. Norton Performance Plastics, Granville, NY, Tel. 1-800-724-0883, "Norseal V-740".
 - b. Fuller., "Architectural Sealant Tape No 606".
- J. SLNT-9: Setting Bed
1. One-part butyl rubber, aluminum/stone color:
 - a. Pecora "BC-158".
 - b. Tremco "Butyl Sealant".
- K. SLNT-10: EIFS Use Only
1. Tremco, Sealant: "Spectrum 1", "Spectrum 3" or "Spectrum 4"
 - a. Primer: "TREMprime Silicone Porous Primer"
 2. Pecora Corporation, Sealant "Dynatrol II"
 - a. Primer: Type 75 or 150
 3. Pecora Corporation, Sealant "890 Silicone"
 - a. Primer: P75
 4. Sika Corporation, Sealant "Sikaflex 2C"
 - a. Primer: "Sikaflex 429"
 5. Dow Corning, Sealant "Dow Corning 790", "791" or "795"
 - a. Primer: "Dow Corning 1200 Prime Coat"
- L. Type ____ - Acoustical Sealant for Concealed Locations:

2.02 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Install bond breaker where joint backing is not used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- G. Tool joints concave.

3.02 SCHEDULE

- A. SLNT-1:
 - 1. Concrete construction, expansion and contraction joints.
 - 2. Exterior wall joints and control joints.
 - 3. Perimeter of storefront, door frames and louvers.
 - 4. Miscellaneous exterior caulking and sealing.
- B. SLNT-2:
 - 1. Joints in floor tile work.
 - 2. Exterior sidewalks and curbs adjacent to building.
 - 3. Interior exposed joints in slabs in ISC and sales floor.
- C. SLNT-3
 - 1. Miscellaneous interior and exterior joints subject to moderate movement and joints to be painted.
- D. SLNT-4
 - 1. Joints between plumbing fixtures and walls.
 - 2. Joints surrounding vanities and counter tops, fixtures and equipment requiring sanitary sealant.
- E. SLNT-5
 - 1. Where indicated on Drawings, and for interior and exterior sealing of metal to metal.
- F. SLNT-6
 - 1. Joints at sound-proofed partitions.
- G. SLNT-7
 - 1. Backer for exterior wide joints subject to dynamic movement.
- H. SLNT-8
 - 1. Backer for rough substrates on exterior walls.
- I. SLNT-9
 - 1. Use for setting beds at exterior thresholds and sill plates.
- J. SLNT-10

1. Use for EIFS joints. Refer to Section 07 2400 for installation requirements. Coordinate installation of sealant with EIFS sub contractor

END OF SECTION

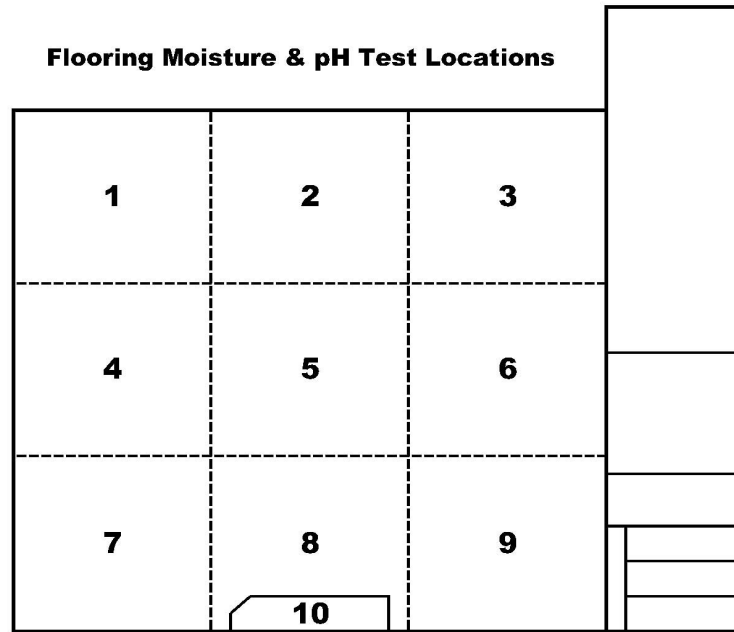
**SECTION 09 0561
MOISTURE TESTING FOR EXISTING CONCRETE SLABS**

**Best Buy Concrete Moisture Testing Guidelines
Related to Flooring Installation**

Concrete moisture testing must be performed prior to installation of any flooring material. This is especially important when the product is constructed with an impervious backing or material substrate. Testing is a key requirement to achieve a warranted installation by the flooring manufacturer. Every flooring manufacturer has a variety of adhesive and sealant offerings, which are required to be used with their products (see **Flooring Adhesive Schedule**), depending upon specific site moisture and pH conditions. The use of these products will ensure the product will adhere to the floor and protect their product from degradation. In the event site conditions are outside of the parameters for normal use of these products, contact Best Buy for alternate solutions which may include some type of moisture or pH mitigation prior to installation.

Best Buy Required Testing

Best Buy requires relative humidity and pH tests to be taken at a **minimum** of 10 locations throughout the store (see diagram). Testing shall be performed in accordance with the protocol cited in the Standards identified below. All relative humidity tests shall be taken using a **Rapid RH relative humidity and temperature sensor kit**, as manufactured by **Wagner Electronics**. Test results shall be recorded per the Standards; with the location of each test marked on a diagram of the store (see sample documents attached). All test results shall be provided to Best Buy upon completion of tests.



Moisture & pH Tests and Standards

Relative Humidity Test - ASTM F2170 - 09 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

pH Testing – ASTM F710 – 08, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

ASTM F2170-09 Checklist

This checklist has been provided as a tool to aid in the compliance of relative humidity testing per ASTM F2170-09.

It is highly recommended that you obtain your own copy of ASTM F2170-09 at
<http://www.astm.org/Standards/F2170.htm>

- Step 1. ☐ Verify relative humidity measuring instrument conforms to section 6 of ASTM F2170-09.
- Verify NIST-traceable calibration certificate is on file.
- Step 2. ☐ Check calibration of measuring instrument per section 8 of ASTM F2170-09.
- For new unused probes, proceed to next step.
 - For re-useable probes: (Not required for RapidRH)
 - A calibration check within 90 days before use is required. Note date on report.
- Step 3. ☐ Verify 48 hour service conditioning of concrete floor slab and the occupied air space above the floor slab per section 9 of ASTM F2170-09.
- Concrete floor slab shall be at service temperature and the occupied air space above the floor slab shall be at service temperature and service relative humidity for at least 48 hours.
- Step 4. ☐ Determine number and location of test holes per section 10.1 of ASTM F2170-09.
- Three test holes for the first 1000 ft² (100 m²) and at least one additional test for each additional 1000 ft² (100 m²).
 - Record total area of concrete slab and number of test holes required on report.
- Step 5. ☐ Determine depth of test holes per section 10.2 of ASTM F2170-09.
- 40% of slab thickness if slab is drying from top only.
 - 20% of slab thickness if slab is drying from top and bottom.
 - Record concrete slab thickness and depth of test holes on report.
- Step 6. ☐ Drill and prepare test holes per section 10.3 of ASTM F2170-09.
- Note location of test holes on site map.
 - For RapidRH, place serial number decal of sensor with corresponding test hole on report.
- Step 7. ☐ Verify 72 hour moisture equilibrium period for each test hole per section 10.3.4 of ASTM F2170-09.
- Step 8. ☐ Perform relative humidity measurements per section 10.5 of ASTM F2170-09.
- Verify that meter reading does not drift more than 1% relative humidity over a 5 minute period.
 - A RapidRH reader can be read immediately after insertion in to each test hole since the sensor has already been equilibrated for at least 72 hours.
 - Re-useable probes should equilibrate at least one (1) hour in each test hole to help ensure an accurate measurement.
- Step 9. ☐ Record and report the results per section 11 of ASTM F2170-09.

Wagner Electronics will not be responsible or liable for the actual recorded data. In addition, because Wagner has no control of the use of any probes, Wagner can not be held responsible for any liability by the use of this document. Wagner Electronics shall not be liable for incidental or consequential damages for the breach of any express or implied warranty with respect to the use of this document. Wagner Electronics shall in no event be liable for any breach of the intent set forth in ASTM F2170-09. This document should not be used alone but in conjunction with the ASTM F2170-09 documentation. Where differences are perceived, the ASTM F2170-09 documentation has precedence over this document.

**Report of Relative Humidity in Concrete
Per ASTM F2170-09**

Name of Structure: _____

Address of Structure: _____

Floor Identification (if more than one floor): _____

Step 1.) Make and model of measuring instrument(s) used: _____
a. Verify NIST-traceable calibration certificate for each probe is on file.

Step 2.) Last calibration date of measuring instrument(s) used: MM/DD/YY _____
a. NOTE: for used probes, calibration or verification date must be within 90 days from current usage.

Step 3.) 48 hour service conditioning verified? Yes or No

Step 4.) Concrete slab area: ft² or m² _____ Number of test holes: _____

Step 5.) Concrete slab thickness: in. or mm _____ Depth of test holes: in. or mm _____

Step 6.) Test holes prepped in accordance to sections 10.3.1 to 10.3.3 of ASTM F2170-09? Yes or No

Step 7.) 72 hour moisture equilibrium period verified for each test hole? Yes or No

Tests Performed By: _____ Date: _____

Name: _____

Title: _____

Company Name: _____

Wagner Electronics will not be responsible or liable for the actual recorded data. In addition, because Wagner has no control of the use of any probes, Wagner can not be held responsible for any liability by the use of this document. Wagner Electronics shall not be liable for incidental or consequential damages for the breach of any express or implied warranty with respect to the use of this document. Wagner Electronics shall in no event be liable for any breach of the intent set forth in ASTM F2170-09. This document should not be used alone but in conjunction with the ASTM F2170-09 documentation. Where differences are perceived, the ASTM F2170-09 documentation has precedence over this document.

**Report of Relative Humidity in Concrete
Per ASTM F2170-09**

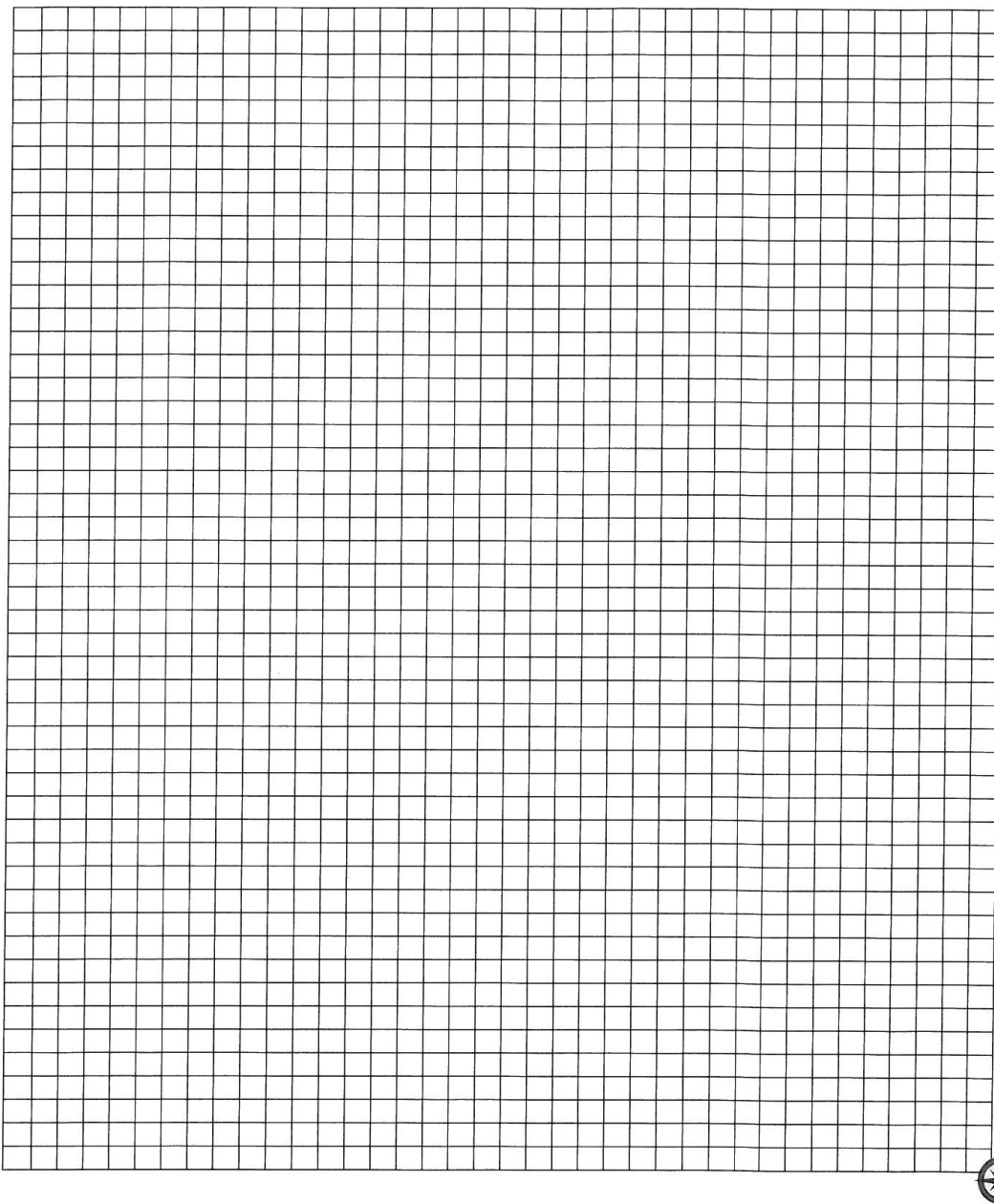
Steps 8 & 9) Measurements and data record (Print as many of these sheets as necessary to complete report.)

Test Hole #					
Test Probe or Sensor Serial #					
Date					
Time					
Equilibrate time of probe in test hole (H:MM)					
CONCRETE Relative Humidity (%)					
CONCRETE Temperature (°F)					
AIR Relative Humidity (%)					
AIR Temperature (°F)					
pH					
Notes					

Wagner Electronics will not be responsible or liable for the actual recorded data. In addition, because Wagner has no control of the use of any probes, Wagner can not be held responsible for any liability by the use of this document. Wagner Electronics shall not be liable for incidental or consequential damages for the breach of any express or implied warranty with respect to the use of this document. Wagner Electronics shall in no event be liable for any breach of the intent set forth in ASTM F2170-09. This document should not be used alone but in conjunction with the ASTM F2170-09 documentation. Where differences are perceived, the ASTM F2170-09 documentation has precedence over this document.









Location Map for Relative Humidity Test Holes





Instructions: Indicate sensor locations with symbol \oplus and number of test hole. Show doors, rooms, columns or other location indicators. Example: \oplus #1



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FLOORING ADHESIVE SCHEDULE

			Relative Humidity Percentage			
Flooring Product	Up to 70% RH	Up to 75% RH	Up to 80% RH	Up to 85% RH	Up to 90% RH	Over 90% RH
Mannington Broadloom Carpet			Mannington Ultra Adhesive, use with pH up to 9	Mannington M Guard 418, use with pH up to 10	Contact Best Buy Project Manager for Guidance	
Mannington Tile Carpet		Mannington RV500 adhesive, use with pH up to 9			XL Brands, Dynamix NPB adhesive, use with pH up to 11	Contact Best Buy Project Manager for guidance
Lees Tile Carpet			Lees EnPress Pressure Sensitive Adhesive, use with pH up to 9		Seal floor with Everseal (with pH up to 11) then use Enpress Pressure Sensitive Adhesive	Contact Best Buy Project Manager for guidance
Bolyu Broadloom Carpet	Bolyu iLoc Solvent Free Adhesive		Nexterra Moisture Resistent Adhesive	Contact Best Buy Project Manager for Guidance		

Flooring Product	Up to 70% RH	Up to 75% RH	Up to 80% RH	Up to 85% RH	Up to 90% RH	Over 90% RH
Armstrong Vinyl Composition Tile (VCT)					Armstrong Adhesive S-515, use with pH between 5 and 9	Contact Best Buy Project Manager for guidance
Armstrong Luxury Vinyl Tile (LVT)					Armstrong Adhesive S-243, use with pH up to 11	Contact Best Buy Project Manager for guidance
Centiva Luxury Vinyl Tile (LVT)		Centiva Adhesive Centi 6000 SP, use with pH up to 9	Contact Best Buy Project Manager for guidance			

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Gypsum sheathing.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing: Exterior wind-load-bearing metal stud framing.
- B. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.
- C. Section 07 9005 - Joint Sealers: Acoustic sealant.

1.03 REFERENCE STANDARDS

- A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2013.
- C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2012.
- D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2013.
- E. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.
- G. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- H. 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. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.
- I. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007 (Reapproved 2013).
- J. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2010a.
- K. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- L. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel; 2007a (Reapproved 2011).
- M. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing; 2013.
- N. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2013.
- O. ASTM C1629/C1629 - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2006 (Reapproved 2011).
- P. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2013.
- Q. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

- R. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- S. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- T. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.
- U. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2012.
- V. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Recycled Content.
 - 2. Low Emitting Materials - Adhesives and Sealants.
 - 3. Low Emitting Materials - Ceiling and Wall Systems.
 - 4. Standards for low emittance as established by California Department of Health Services. Standards that comply with this requirement: The Collaborative for High Performance Schools (CHPS), Greenguard Children and Schools, and Indoor Advantage Gold.

1.05 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire Rated Assemblies: Provide completed assemblies required to provide the fire rating noted in the construction documents.
 - 1. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 - 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.
- D. Adjacent Tenant Demising Wall Assemblies: Provide completed assemblies with the following characteristics:
 - 1. Metal framing: 6" metal studs, staggered installation in a 10" track set in acoustical caulk; stud spacing 16" o.c. at each wall face. Provide deflection track at partition head connection to structure, as outlined in Part 2.02 below.
 - 2. Security Mesh: Carbon steel security mesh, installed full height of wall with 2" laps to the outside face of metal studs on both sides of the wall, fastened to metal studs per manufacturer's recommendations.
 - a. Manufacturers - Security Mesh:
 - 1) Amico Security Mesh: www.amico-securityproducts.com; Product: .75-13F Medium Security
 - 2) Substitutions: See Section 01 6000 Product Requirements
 - 3. Board Materials: Provide 5/8" type "x" gypsum board over security mesh on both sides of wall; seal all openings in wall with fire caulk.
 - 4. Insulation: Fill cavity with 6" unfaced sound batt insulation from floor to underside of roof deck.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clark Western Building Systems: www.clarkwestern.com.
 - 2. Dietrich Metal Framing: www.dietrichindustries.com.
 - 3. Marino: www.marinoware.com.
 - 4. Phillips Manufacturing Company: www.phillipsmfg.com.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 - 1. Studs: "C" shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C shaped.
 - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
 - 5. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through one leg only.
 - a. Manufacturers - Resilient Furring Channels:
 - 1) Same manufacturer as other framing materials.
- C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
- D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
 - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
 - 3. Where required to achieve fire rated assembly, provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
 - 4. Deflection and Firestop Track:
 - a. Provide mechanical anchorage devices as described above that accommodate minimum or - 1/2" deflection while maintaining the fire-rating of the wall assembly, where required.
 - b. Acceptable Products: Deep leg track with 2" legs (gauge as required for height of wall)
 - 1) Slip Track Systems Inc (Anaheim CA 714-761-1921): "SLP-TRK"
 - 5. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.

2.03 BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
 - 4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 5. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.

6. Paper-Faced Products:
 - a. CertainTeed Corporation; ProRoc Brand Gypsum Board.
 - b. Lafarge North America Inc; Regular Drywall and Firecheck Type X and Type C.
 - c. National Gypsum Company; Gold Bond Brand Gypsum Wallboard.
 - d. USG Corporation; Sheetrock Brand Gypsum Panels.
7. Mold-Resistant Paper-Faced Products:
 - a. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board.
 - b. Lafarge North America Inc; Mold Defense Drywall.
 - c. National Gypsum Company; Gold Bond Brand XP Gypsum Board.
 - d. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.
- B. Impact-Rated Wallboard: Tested to Level 3 soft-body and hard-body impact in accordance with ASTM C1629.
 1. Application: High-traffic areas indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
 4. Unfaced Type: Interior fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M.
 5. Type: Fire-resistance rated Type X, UL or WH listed.
 6. Thickness: 5/8 inch.
 7. Edges: Tapered.
 8. Products:
 - a. National Gypsum Company; Gold Bond Hi-Impact Brand XP Wallboard.
 - b. USG Corporation; Fiberock Brand Panels--VHI Abuse-Resistant.
- C. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
 1. Application: Exterior sheathing, unless otherwise indicated.
 2. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 3. Paper-Faced Sheathing: Gypsum sheathing board as defined in ASTM C1396/C1396M, moisture resistant type with water repellent paper faces.
 4. Core Type: Regular and Type X, as indicated.
 5. Type X Thickness: 5/8 inch.
 6. Regular Board Thickness: 1/2 inch.
 7. Edges: Square, for vertical application.
 8. Glass Mat Faced Products:
 - a. CertainTeed Corporation; GlasRoc Brand.
 - b. Georgia-Pacific Gypsum; DensGlass Sheathing.
 - c. National Gypsum Company; Gold Bond Brand eXP Extended Exposure Sheathing.
 - d. Temple-Inland Building Products by Georgia-Pacific, LLC; GreenGlass Exterior Sheathing.
- D. Exterior Soffit Board: Exterior gypsum soffit board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Ceilings and soffits in protected exterior areas, unless otherwise indicated.
 2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X.
 3. Type X Thickness: 5/8 inch.
 4. Edges: Tapered.
 5. Products:
 - a. CertainTeed Corporation; ProRoc Brand Exterior Soffit Board.
 - b. Georgia-Pacific Gypsum; ToughRock Soffit Board.
 - c. National Gypsum Company; Gold Bond Brand Exterior Soffit Board.
 - d. USG Corporation; Sheetrock Exterior Gypsum Ceiling Board.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.

- B. Acoustic Sealant: As specified in Section 07 9005. SLNT-6.
- C. Water-Resistive Barrier: As specified in Section 07 2500.
- D. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated.
 - 1. Types: As detailed or required for finished appearance.
- E. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
 - 2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 3. Ready-mixed vinyl-based joint compound.
 - 4. Chemical hardening type compound.
- F. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- G. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated for exterior locations.
- H. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
- C. Studs: Space studs as permitted by standard.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 - 3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- C. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
 - 1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
- D. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.

- E. Installation on Metal Framing: Use screws for attachment of all gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.
- F. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 - 2. At exterior soffits, not more than 30 feet apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with chemical hardening type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated on the plans.
 - 3. Level 3: Walls to receive textured wall finish and other areas specifically indicated on the plans.
 - 4. Level 2: In utility areas and on backing board to receive tile finish.
 - 5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
 - 6. Level 0: Temporary partitions and surfaces indicated to be finished in later stage of project; surfaces of non-fire rated assemblies concealed from view in the finished work (i.e., above lay-in ceilings).
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Tape joint surfaces behind adhesive applied ceramic tile and fixed cabinetry.
 - 3. Filling and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
 - 4. Taping, filling and sanding is not required at base layer of double layer applications.
 - 5. Where necessary to sand, do so without damaging the face of the gypsum board.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.08 STUD GAUGE/LIMITING HEIGHT SCHEDULE

- A. Table below is based on Universal Industries, Unimast (USG) Corporation's limiting height tables for studs. (System Folder SA-923 - 1990 edition), requirement for 5 psf lateral pressure and 1/240 allowable deflection for flexible finishes, with 1 layer of gypsum board per side of stud.
- B. Adjust gauge and maximum height for other acceptable manufacturers to conform to manufacturer's current printed specifications.

Stud Gauge	Stud Spacing	Maximum Height
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1-5/8 inch

158ST25 25	16"	9'-6"
158ST25 25	24"	7'-3"

2-1/2 inch

212ST25 25	16"	12'-6"
212ST25 25	24"	10'-9"
212ST22 22	16"	13'-0"
212ST22 22	24"	11'-6"
212ST20 20	16"	14'-0"
212ST20 20	24"	12'-3"

3-5/8 inch

358ST25 25	16"	16'-0"
358ST25 25	24"	13'-6"
358ST22 22	16"	17'-3"
358ST22 22	24"	15'-0"
358ST20 20	16"	18'-3"
358ST20 20	24"	16'-0"

4 inch

400ST25 25	16"	17'-3"
400ST25 25	24"	14'-3"
400ST22 22	16	18'-6"
400ST22 22	24"	16'-3"
400ST20 20	16	19'-6"
400ST20 20	24"	17'-3"

6 inch

600ST25 25	16"	20'-0"
600ST25 25	24"	15'-0"
600ST22 22	16"	25'-3"
600ST22 22	24"	22'-0"
600ST20 20	16"	26'-6"
600ST20 20	24"	23'-3"

END OF SECTION

SECTION 09 3000**TILING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Cementitious backer board as tile substrate.
- D. Coated glass mat backer board as tile substrate.
- E. Marble thresholds.
- F. Acid wash of existing tile to remain.
- G. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 07 9005 - Joint Sealers.
- B. Section 09 0561 - Moisture Testing for Concrete Slabs

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile - Version; 2013.1.
 - 1. ANSI A108.1A - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2013.1.
 - 2. ANSI A108.1B - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.
 - 3. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement Mortar; 2013.1.
 - 4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2013.1.
 - 5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2013.1.
 - 6. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 2013.1.
 - 7. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 2013.1.
 - 8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2013.1.
 - 9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2013.1.
 - 10. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2013.1.
 - 11. ANSI A108.12 - American National Standard Specifications for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2013.1.
 - 12. ANSI A108.13 - American National Standard Specifications for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2013.1.
 - 13. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2013.1.
 - 14. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2013.1.

- B. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2013.1.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Certification: Prior to installation of flooring, submit concrete slab moisture test results to Best Buy Project Manager, per spec section 09 0561.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Tile: 5 square feet of each size, color, and surface finish combination.
- G. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Low Emitting Materials - Flooring (Grout and Mortar must not exceed VOC limit of 250 g/L)

1.05 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.
- B. Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

1.06 FIELD CONDITIONS

- A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.01 INTERIOR FLOOR TILES

- A. **(CT-1)** Glazed Porcelain, unpolished, 18" x 18", 5/16" thick with all purpose edge
 - 1. Dal-Tile Corporation, Color as indicated on the drawings.

2.02 INTERIOR WALL TILES

- A. **(CT-2)** Wall Tile Field: Size and color as indicated on the drawings, with cushion edge. Installed in brick pattern.
- B. **(CT-3)** Bullnose Cove Base or Bullnose Trim Tile: size and color as indicated on the drawings

2.03 TRIM AND ACCESSORIES

- A. Non-Ceramic Trim: Brushed stainless steel, style and dimensions as indicated on drawings, for setting using tile mortar or adhesive.
 - 1. Applications: Use in the following locations:
 - a. Wall corners, outside and inside.
 - b. Floor to wall joints.
 - c. Borders and other trim as indicated on drawings.
 - 2. Manufacturer:
 - a. Schluter-Systems: www.schluter.com.
 - 1) Schluter - Dilex EHK
 - 2) Schluter - Rondec
 - b. Locations as indicated on drawings.
- B. Thresholds: Marble, white, honed finish; 4 inches wide by full width of wall or frame opening; 1/2 inch thick; beveled one long edge to meet adjacent floor finish, with radiused corners on top side; 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.

2.04 SETTING MATERIALS

- A. Provide setting materials made by the same manufacturer as grout.

2.05 MORTAR MATERIALS

- A. Manufacturers:
 1. Laticrete International.
 2. Bonsal American, Inc: www.prospec.com
 3. Bostik, Inc: www.bostik-us.com.
 4. Custom Building Products: www.custombuildingproducts.com.
- B. Mortar Bond Coat Materials:
 1. Latex-Portland Cement type: ANSI A118.4.
 2. Epoxy: ANSI A118.3.

2.06 GROUTS

- A. Manufacturers:
 1. Laticrete International.
 2. Bonsal American, Inc: www.prospec.com
 3. Bostik Inc: www.bostik-us.com.
 4. Custom Building Products: www.custombuildingproducts.com.
 5. Mapei Corporation www.mapei.us
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
 1. Applications: Between tile and plumbing fixtures.
- C. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
 1. Composition: Water-based colorless silicone.
- D. Standard Grout: Polymer modified cement grout, sanded or unsanded, as specified in ANSI A118.7.
 1. Colors: As shown on the drawings.
 - a. Unsanded Latex-Portland Cement Grout: ANSI A18.7
 - 1) For wall tiles
 - b. Epoxy Grout (Sanded Grout):
 - 1) For floor tiles

2.07 THIN-SET ACCESSORY MATERIALS

- A. Uncoupling Membrane: 1/8 inch thick polyurethane matting with three-dimensional grid structure with dovetail shaped cavities and fleece webbing laminated to the underside to provide a mechanical bond to the substrate adhesive (DITRA).
 1. Acceptable Product: Schluter Systems "DITRA."
- B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
 1. Type: Fluid-applied.
 2. Non-Reinforced, Fluid-Applied Waterproofing and Crack Isolation Membrane:
 - a. Acceptable Product: Laticrete International, Inc.; Hydro Ban.
- C. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.
- D. Coated Glass Mat Backer Board: ASTM C1178/C1178M, with coated inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.
 1. Standard Type: Thickness 1/2 inch.
 2. Fire-Resistant Type: Type X core, thickness 5/8 inch.

- E. Mesh Tape: 2-inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity per spec section 09 0561; obtain instructions if test results are not within the following limits:

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Form internal angles square and external angles bullnosed.
- E. Install non-ceramic trim in accordance with manufacturer's instructions.
- F. Install thresholds where indicated.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- I. Grout tile joints. Use standard grout unless otherwise indicated.
- J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.
 - 1. Where waterproofing membrane is indicated, install in accordance with TCA Handbook Method F122, with latex-portland cement grout.
 - 2. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.

3.05 INSTALLATION - WALL TILE

- A. Over gypsum wallboard on wood or metal studs install in accordance with TCA Handbook Method 243, unless otherwise indicated.
- B. Over interior concrete and masonry install in accordance with The Tile Council of North America Handbook Method W202, thin-set with dry-set or latex-portland cement bond coat.

3.06 CLEANING

- A. For new installations, clean tile and grout surfaces thoroughly.
- B. Existing tile shall be cleaned per the following guidelines:
 - 1. Products: Acidic tile and grout cleaners containing phosphoric, sulfamic or acetic acids with a Ph between 1.5 and 4.0, diluted with clean water in concentrations recommended by manufacturer . Use only products approved for use on type of tile to be cleaned. Do not use muriatic acid.
 - 2. Execution:
 - a. Follow all manufacturer's instructions for cleaning of tile and grout.
 - b. Test acid cleaner on an inconspicuous area prior to use. If any discoloration or etching occurs do not use product.
 - c. Protect all metal, laminate and porcelain fixtures and accessories from contact with acid cleaners.
 - d. Thoroughly wet tile and grout with clean water prior to acid cleaning. Do not apply acid cleaners to dry tiles or grout.
 - e. Apply acid tile and grout cleaner with brush, sponge or mop. Clean applicators and replace cleaning solution frequently to avoid buildup of particulates that could etch surfaces.
 - f. Allow acid cleaner to set for recommended cleaning time by manufacturer, do not allow acid cleaner to dry on tile.
 - g. Rinse thoroughly with clean water to remove all cleaning solution.
 - h. Use an acid neutralizing solution (alkaline) as recommended by manufacturer to remove remaining acidity prior to installing new joint sealers.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 5100
ACOUSTICAL CEILINGS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Accent clouds (PAC Sales, Magnolia Home Theater (MHT), Geek Squad - where applicable).

1.02 RELATED REQUIREMENTS

- A. Section 07 2100 - Thermal Insulation: Acoustical insulation.
- B. Section 07 9005 - Joint Sealers: Acoustical sealant.

1.03 REFERENCE STANDARDS

- A. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2008.
- B. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2011.
- C. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.
- D. GEI (SCH) - GREENGUARD "Children and Schools" Certified Products; GREENGUARD Environmental Institute; current listings at www.greenguard.org.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.
- D. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Recycled Content.
 - 2. Low Emitting Materials - Adhesives and Sealants.
 - 3. Low Emitting Materials - Ceiling and Wall Systems.
 - 4. California Collaborative for High Performance Schools (CHPS)

1.05 QUALITY ASSURANCE**1.06 FIELD CONDITIONS**

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS**2.01 ACOUSTICAL UNITS**

- A. **(ACT-1)** Non-Directional Fissured: Wet formed, non-directional fissured mineral fiber acoustical panels, standard white painted finish. Size: 24" x 48", square edge, with decorative score joint to give the appearance of 24" x 24" tiles.
 - 1. Armstrong, "Cortega Second Look".
 - 2. USG "Radar - Illusion" Two/24 panels.
 - 3. Or equal, must meet the standards for low emittance as established by California Department of Health Services. Standards that comply with this requirement: The Collaborative for High Performance Schools (CHPS), Greenguard Children and Schools, and Indoor Advantage Gold.
- B. Accent Clouds (PAC Sales, MHT, Geek Squad):

1. Armstrong "Formations" accent clouds
 - a. Length and width of cloud: As indicated on the drawings
 - b. Panel Type: Lay-in
 - c. Grid Type: Suprafine
 - d. Axiom Type and Height: Axiom Classic, 16"
 - e. Axiom and Grid Color: Standard White
2. No substitutions
- C. Magnolia Design Centers (MDC) /Magnolia Home Theater (MHT):
 1. Acoustical Ceiling Panel Schedule:
 - a. **ACT- 20/ACT-41:**
 - 1) Armstrong, Gregorian, Beveled Tegular Edge
 - 2) Size: 24" x 24"
 - 3) Color "White"
 - 4) Grid: Prelude 15/16", Color To Match Tile
 - b. ACT-42:
 - 1) Silk Metal Ceiling Tile for Sound Control (Furnished by Owner, Installed by General Contractor)
 - 2) Size: 24"x24"
 - 3) Color: (By Owner)
 - 4) Grid: Prelude 15/16", color: Silver Satin (SA) with 7/8" Hemmed AngleMolding at perimeter.
 - c. All field cut acoustical ceiling tile to be cut with dado & bevel to match factory edge.
 - D. Manufacturers:
 1. Armstrong World Industries, Inc: www.armstrong.com.
 2. USG: www.usg.com.
 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:
 1. Same as for acoustical units.
- B. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- C. Exposed Suspension System: Formed galvanized steel, commercial quality cold rolled; heavy-duty.
 1. Profile: Tee; 15/16 inch wide face.
 2. Construction: Double web.
 3. Finish: As shown on the drawings.

2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

- C. Install seismic edge restraints, compression struts and splay wire hangers, as required for seismic building classification D.
- D. Locate system on room axis according to reflected plan.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
- G. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- H. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- J. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- K. Do not eccentrically load system or induce rotation of runners.
- L. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Install in bed of acoustical sealant.
 - 2. Use longest practical lengths.
 - 3. Overlap and rivet corners.

3.02 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units with pattern parallel to longest room axis.
- D. Fit border trim neatly against abutting surfaces.
- E. Install units after above-ceiling work is complete.
- F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- G. Cutting Acoustical Units:
 - 1. Cut to fit irregular grid and perimeter edge trim.
 - 2. Make field cut edges of same profile as factory edges.
 - 3. Double cut and field paint exposed reveal edges.
- H. Where round obstructions occur, provide preformed closures to match perimeter molding.
- I. Install hold-down clips on panels within 20 ft of an exterior door.

3.03 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.

END OF SECTION

**SECTION 09 6500
RESILIENT FLOORING**

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Luxury Vinyl Tile.
- B. Laminate Vinyl Tile.
- C. Resilient tile flooring.
- D. Resilient base.
- E. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03 5400 - Cast Underlayment.
- B. Section 09 0561 - Moisture Testing for Concrete Slabs
- C. Section 09 6813 - Tile Carpeting - rubber subfloor leveler at carpet to quartz tile transition

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2010e1.
- B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2010)e1.
- C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
- D. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; www.baaqmd.gov; 2002.
- E. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.
- G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.
- H. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scs-certified.com.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Certification: Prior to installation of flooring, submit concrete slab moisture test results to Best Buy Project Manager, per spec section 09 0561.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 12 square feet of each type and color.
 - 3. Extra Wall Base: 25 linear feet of each type and color.
- F. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Low Emitting Materials - Adhesives and Sealants.
 - 2. Low Emitting Materials - Paints and Coatings.
 - 3. Low Emitting Materials - Flooring.

1.05 FIELD CONDITIONS

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 TILE FLOORING

- A. Luxury Vinyl Tile/Laminate Vinyl Tile (**LVT- # / LAM - #**):
 - 1. Minimum Requirements: Comply with ASTM F 1700 Class III, Type B, embossed surface.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 - 3. Size: As noted on drawings.
 - 4. VOC Content: Certified as Low Emission by one of the following :
 - a. SCS Floorscore; www.scs-certified.com.
 - b. Product listing in the CHPS Low-Emitting Materials Product List at; www.chps.net/manual/lem_table.htm.
 - 5. Thickness: 0.125 inch.
 - 6. Manufacturers: As noted on the drawings
 - a. Substitutions: Not permitted.
 - 7. Cleaning Requirements:
 - a. Clean in accordance with manufacturer's instructions, utilizing specified products. Substitution of products is acceptable for cleaning, based on manufacturer's guidelines.
 - b. Refer to PAC SWAS Floor Care Process guidelines, provided by Best Buy, for cleaning and finish-coat schedule requirements.
 - c. GC shall utilize Best Buy National Vendor for cleaning/finishing of Luxury Vinyl Tile (LVT):

Diversified Maintenance Systems, LLC
Account Director: Syd Shaw
cell: 615-975-6860
sshaw@diveinc.com
www.diveinc.com
- B. Vinyl Composition Tile (**VCT- #**): Homogeneous, with color extending throughout thickness, and:
 - 1. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 - 3. Size: 12 x 12 inch.
 - 4. VOC Content: Certified as Low Emission by one of the following :
 - a. SCS Floorscore; www.scs-certified.com.
 - b. Product listing in the CHPS Low-Emitting Materials Product List at; www.chps.net/manual/lem_table.htm.
 - 5. Thickness: 0.125 inch.
 - 6. Pattern: Solid color.
 - 7. Manufacturers: As noted on the drawings.
 - a. Substitutions: Not permitted.

2.02 RESILIENT BASE

- A. Resilient Base (**RB-1**): ASTM F 1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove, and as follows:
 - 1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.

2. Height: 4 inch.
 3. Thickness: 0.125 inch thick.
 4. Finish: Matte.
 5. Length: Roll.
 6. Accessories: Premolded external corners and end stops.
 7. Manufacturers:
 - a. VPI; Product As noted on the drawings.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Resilient Base (**RB-2**) (to be used with VCT):
1. Height: 4 inch (100 mm).
 2. Thickness: 0.125 inch (3.2 mm) thick.
 3. Finish: Matte.
 4. Length: Roll.
 5. Accessories: Premolded external corners and end stops.
 6. Manufacturers:
 - a. VPI ; Product and color as noted in the drawings

2.03 ACCESSORIES

- A. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.
1. See Flooring Adhesives Schedule, per specification section 09 0561, for adhesive limitations related to moisture content of concrete slab.
 2. Provide only products having lower volatile organic compound (VOC) content than required by the more stringent of the South Coast Air Quality Management District Rule No.1168 and the Bay Area Air Quality Management District Regulation 8, Rule 51.
- B. Moldings, Transition and Edge Strips: as referenced in Section 09 6800, 09 6813 and shown on drawings..

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Conduct moisture and pH testing of concrete, per requirements of spec section 09 0561.
- C. Ensure concrete floors are free from scaling and irregularities and exhibit neutrality relative to acidity and alkalinity.
- D. Beginning of installation means acceptance of existing substrate and site conditions.
- E. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

3.05 RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

- A. Clean in accordance with manufacturer's instructions, utilizing manufacturer recommended products.

END OF SECTION

SECTION 09 6800
CARPETING

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Carpet, stretched-in with integral backing and/or direct glued with cushion underlay, where required per drawings.
- B. Removal of existing carpet, where applicable.
- C. Accessories.
- D. Rubber subfloor leveling product to be utilized to at flooring transitions (between carpet and quartz floor tile, between carpet areas which include a pad and carpet areas where no pad is required, etc.). Refer to finish plans and schedules to verify carpet pad location requirements.

1.02 RELATED REQUIREMENTS

- A. Section 01 3546- Green Building Project Requirements: VOC Limits
- B. Section 01 7419 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet scrap, new cushion scrap, removed carpet, and removed carpet cushion.
- C. Section 03 3000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied carpet.
- D. Section 03 5400 - Cast Underlayment.
- E. Section 09 0561 - Moisture Testing for Concrete Slabs
- F. Section 09 6813 - Tile Carpeting.
- G. Section 12 4813 - Entrance Floor Grid and Entry Carpet
- H. Section 26 0520 - Undercarpet Electrical Power Cables: Undercarpet flat wiring.

1.03 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- C. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.
- D. CRI (GLC) - Green Label Testing Program - Approved Product Categories for Carpet; Carpet and Rug Institute; Current Edition.
- E. CRI (GLCC) - Green Label Testing Program - Approved Product Categories for Carpet Cushion; Carpet and Rug Institute; Current Edition.
- F. CRI (GLP) - Green Label Plus Carpet Testing Program - Approved Products; Carpet and Rug Institute; Current Edition.
- G. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Certification: Prior to installation of flooring, submit concrete slab moisture test results to Best Buy Project Manager, per spec section 09 0561.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 6000 - Product Requirements, for additional requirements.
2. Extra Carpet: ____ sq ft of each type, color, and pattern installed.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing carpet with minimum three years experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carpet: Manufacturer's, patterns, and colors as indicated on the drawings. Refer to section 00 2713 National Accounts Vendors for applicable supplier contact information. No substitutions for specified carpet products are permitted.

2.02 CARPET

- A. Manufacturers, colors and patterns as indicated on the drawings.

2.03 CUSHION

- A. For Bolyu Carpeting in Magnolia Design Center only, where carpet is not obtained from Manufacturer with integral backing, the cushion requirements are as follows:
 1. Density: 12 lbs/cu ft.
 2. Thickness: 1/4" max

2.04 ACCESSORIES

- A. Sub-Floor Filler: Concrete Slabs-on-Grade (Potentially damp locations): Premixed cementitious paste. Ardex, K-15 self-leveling underlayment, Tamms Industries Co., "Thin Patch".
- B. Transition Strips:
 1. Carpet to Concrete: Johnsonite Wheeled Traffic Transitional Mouldings - CTA-40-J, color: black, 1/4-inch-to-zero-inch carpet transition.
 2. Carpet to Vinyl: Johnsonite Wheeled Traffic Transitional Mouldings - CTA-40-H, color: black, 1/4-inch-to-1/8-inch carpet transition.
 3. Carpet to Entrance Floor Grid: Schluter Stainless Steel transition strip - Reno U, 1/2" high by 1-3/4" wide
 4. Carpet to LVT: Johnsonite Transitional Mouldings - CTA - 130, color: Sisal
- C. Adhesives - General:
 1. Refer to Flooring Adhesives Schedule, per spec section 09 0561, for appropriate adhesives based on moisture content and pH level in concrete slab.
 2. Compatible with materials being adhered
 3. Maximum VOC content of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- D. Contact Adhesive: Compatible with carpet material; releasable type.
- E. Subfloor Leveling Product: Rubber carpet shim to be utilized at transition between carpet and quartz floor tiles and other materials of dissimilar thicknesses (in locations indicated on drawings) to eliminate height differential between the two products.
 1. Manufacturer: Roppe Corporation
1-800-537-9527
sales@roppe.com
 2. Gauge: 1/2"
 3. Width: 18"
 4. Length: 48"
 5. Color: Black
 6. Adhesive: ROP375, per Manufacturer's instructions
 7. Subfloor/Substrate Inspection and Preparation: All Manufacturer's guidelines must be followed. Concrete floor shall be tested for moisture and pH levels, in accordance spec section 09 0561. Moisture emissions shall not exceed 5lbs/1000 sf per 24 hours. A pH

test with a reading of higher than 10 requires concrete neutralization, per Manufacturer's instructions.

8. Adjustments to thickness of carpet shims should be made in the field, as necessary, to provide level transition between dissimilar materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive carpet.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesives to sub floor surfaces.
- C. All concrete slabs shall be tested for moisture and pH level regardless of age or grade level, per spec section 09 0561.

3.02 PREPARATION

- A. Remove existing carpet and carpet cushion.
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- D. Clean substrate.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet and cushion in accordance with manufacturer's instructions and CRI Carpet Installation Standard.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Lay out carpet :
 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
 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.
- E. Install carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance.

3.04 DIRECT-GLUED CARPET

- A. Beaulieu Commercial (Bolyu Manufacturer) recommends using an attached polyurethane backing system versus the double-glue installation method. If double-glue installation is absolutely necessary, then the following requirements must be met without exception:
 1. Cushion must meet requirements noted above.
 2. A premium permanent adhesive must be used between both pad to floor and carpet to pad.
 3. Use a 1/8"x 1/8" x 1/8" V notch trowel in adhering the pad to floor and a 1/8" x1/16" x1/8" U notch trowel when adhering the carpet to pad, renotching as necessary.
 4. Carpet seams must be at right angles to cushion seams or offset at least 6" to either side.
 5. Apply latex seam sealer to both edges and let dry completely before hot melting seams.
 6. Use a silicone free, low profile, double glue hot melt tape (Orcon, W.F. Taylor or Capitol).
 7. Roll carpet with a maximum 30-50 lb. roller.
 8. Absolutely no traffic for a minimum of 48 hours.

3.05 CLEANING

- A. Remove excess adhesive from floor and wall surfaces without damage.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 6813
TILE CARPETING

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Carpet tile, fully adhered; transition strips, and accessories.
- B. Removal of existing carpet tile, where applicable.
- C. Rubber subfloor leveling product to be utilized at flooring transitions, as noted on drawings.

1.02 RELATED REQUIREMENTS

- A. Section 00 2713 - National Accounts Vendor List: Carpet supplier
- B. Section 01 3546 - Green Building Project Requirements: VOC limits
- C. Section 01 7419 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap.
- D. Section 12 4813 - Entrance Floor Grid and Entry Carpet
- E. Section 09 0561 - Moisture Testing for Concrete Slabs
- F. Section 09 6800 - Carpeting: Broadloom carpet.

1.03 REFERENCE STANDARDS

- A. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- B. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Certification: Prior to installation of flooring, submit concrete slab moisture test results to Best Buy Project Manager, per spec section 09 0561.
- D. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Low Emitting Materials - Adhesives and Sealants.
 - 2. Low Emitting Materials - Paints and Coatings.
 - 3. Low Emitting Materials - Flooring.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing carpet with minimum 3 years experience.

PART 2 PRODUCTS**2.01 CARPET AND MATS**

- A. Manufacturers, patterns, and colors as indicated on the drawings. Refer to Section 00 2713 National Accounts Vendors for applicable supplier contact information. No substitutions for specified carpet products are permitted.

2.02 ACCESSORIES

- A. Transition Strips:
 - 1. Carpet to Concrete: Johnsonite Wheeled Traffic Transitional Mouldings - CTA-40-J, color: black, 1/4-inch-to-zero-inch carpet transition.
 - 2. Carpet to Vinyl: Johnsonite Wheeled Traffic Transitional Mouldings - CTA-40-H, color: black, 1/4-inch-to-1/8-inch carpet transition.
- B. Sub-Floor Filler:
 - 1. Concrete Slabs-on-Grade (Potentially damp locations): Premixed cementitious paste. Ardex, K-15 self-leveling underlayment, Tamms Industries Co., "Thin Patch".
- C. Adhesives: See Flooring Adhesives Schedule in spec section 09 0561 for acceptable adhesives based on concrete slab moisture and pH content. Additionally, adhesives must be acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- D. Subfloor Leveling Product: Rubber carpet shim to be utilized at transition between carpet and quartz floor tiles and other materials of dissimilar thicknesses (in locations indicated on drawings) to eliminate height differential between the two products.
 - 1. Manufacturer: Roppe Corporation
1-800-537-9527
sales@roppe.com
 - 2. Gauge: 1/2"
 - 3. Width: 18"
 - 4. Length: 48"
 - 5. Color: Black
 - 6. Adhesive: ROP375, per Manufacturer's instructions
 - 7. Subfloor/Substrate Inspection and Preparation: All Manufacturer's guidelines must be followed. Concrete floor shall be tested for moisture and pH levels, in accordance spec section 09 0561. Moisture emissions shall not exceed 5lbs/1000 sf per 24 hours. A pH test with a reading of higher than 10 requires concrete neutralization, per Manufacturer's instructions.
 - 8. Adjustments to thickness of carpet shims should be made in the field, as necessary, to provide level transition between dissimilar materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- C. All concrete slabs shall be tested for moisture and pH level regardless of age or grade level, per spec section 09 0561. Concrete slabs shall be prepared according to ASTM F 710. Concrete slabs shall have a functioning vapor retarder.
- D. Refer to paragraph 2.02, part D, item 7 for floor preparation requirements associated with carpet shim.

3.02 PREPARATION

- A. Remove existing carpet tile.
- B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- C. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.

- B. Install carpet tile in accordance with manufacturer's instructions and CRI Carpet Installation Standard.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Refer to finish plans for patterns for laying carpet, specific to area and carpet in question.
- F. Fully adhere carpet tile to substrate.
- G. Adhere carpet tile as base finish up vertical surfaces to form base. Terminate top of base with cap strip.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Applications: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Gypsum board walls and exposed columns.
 - 2. Painting for Magnolia Home Theater or Magnolia Design Center, where applicable.
 - 3. Exposed surfaces of steel lintels and ledge angles.
 - 4. Interior exposed structure including roof deck, joists, and beams.
 - 5. Mechanical and Electrical:
 - a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Non-metallic roofing and flashing.
 - 6. Stainless steel, anodized aluminum, bronze, terne, and lead items.
 - 7. Floors, unless specifically so indicated.
 - 8. Ceramic and other tiles.
 - 9. Glass.
 - 10. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 3546 - Green Building Project Requirements: VOC content restrictions

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Low Emitting Materials - Paints and Coatings.
 - 2. Low Emitting Material - Wall and Ceiling Systems.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Coatings: 1 gallon of each color; store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. 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.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Benjamin Moore & Co.
- B. Glidden Professional (also includes paints formerly under ICI Paint Stores, Inc.)
 - 1. National Account Executive: Kevin Lastacy; kevin_lastacy@ici.com ; 616-335-3259
- C. Sherwin-Williams Company, Stores Division
 - 1. National Account Executive: Ed Stein; ed.stein@sherwin.com; 509-465-8426 or 1-800-321-8194
- D. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- E. Substitutions: See Section 01 6000 - Product Requirements. Substitutions must comply with VOC level restrictions per Section 01 3546 - Green Building Project Requirements and as noted below in 2.02.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. Supply each coating material in quantity required to complete entire project's work from a single production run.
 - 4. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 - 1. Provide coatings that comply with the most stringent requirements specified in Section 01 3546 - Green Building Project Requirements.

PAINTS, COATINGS AND PRIMERS	VOC g/L
Flat	50
Non-Flat	150
Anti-Corrosive/Anti-Rust paints applied to metal substrates	250

FLOOR COATING, SEALER, SHELLAC	
Floor Coating	100
Waterproofing Sealer	250
Sanding Sealer	275
All other sealer	200
Clear Shellac	730
Pigmented Shellac	550
Stains	250

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Chemical Content: The following compounds are prohibited:
 1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.
- E. Flammability: Comply with applicable code for surface burning characteristics.

2.03 INTERIOR PRIMERS

- A. Aluminum Primer (for coating interior side of existing red storefront system, where applicable):
 1. PPG, Amercoat - Amerlock 2 VOC
- B. Inhibitive Metal Primer:
 1. Benjamin Moore, Acrylic Metal Primer P04.
 2. Glidden Professional, Devflex DTM Interior/Exterior Waterborne Primer 4020PF.
 3. Sherwin-Williams, Pro-Cryl Universal Water Based Primer B66-310.
- C. Latex Block Filler:
 1. Benjamin Moore, Moorcraft Super Craft Latex Block Filler 285.
 2. Sherwin-Williams, PrepRite Block Filler B25W25.
 3. Glidden Professional: Concrete Coatings Block Filler 3010-1200.
- D. Galvanized Metal Primer:
 1. Benjamin Moore, Acrylic Metal Primer P04.
 2. Glidden Professional, Devflex DTM Interior/Exterior Waterborne Primer 4020PF
 3. Sherwin-Williams Pro-Cryl Universal Primer B66-310.
- E. Interior Primer/Sealer:
 1. Glidden Professional, High Hide Wall Primer 1000-1200 or Lifemaster No VOC Interior Primer 9116
 2. Benjamin Moore, Fresh Start Acrylic Primer
 3. Sherwin-Williams, PrepRite 200 Latex Primer, B28W200 (Non-flat)
- F. Interior Wood/MDO Primer:
 1. Benjamin Moore, Fresh Start Acrylic Primer
 2. Glidden Professional, Stain Jammer Latex primer 1010-1200
 3. Sherwin-Williams. Premium Wall and Wood Primer

2.04 EXTERIOR PRIMERS

- A. Aluminum Primer (for re-coating exterior side of existing red storefront system, where applicable):
 1. PPG, Corafon ADS Epoxy Intermediate Primer ADS573/ADS574 White
- B. Exterior Primer:

1. Benjamin Moore Moorcraft Latex Exterior Primer 169.
2. Glidden Professional, Gripper Multi-Purpose Primer 3210-1200
3. Sherwin-Williams A-100 Ext. Latex Wood Primer B42W08041

2.05 INTERIOR FINISH PAINTS

- A. Acrylic Polyurethane (for re-coating interior side of existing red storefront system, where applicable):
 1. MPC MAP-LV MPC187, color/finish to match Corafon ADS 9150030 "Arcadia Silver"
- B. Interior Eggshell (Satin) Latex Enamel:
 1. Benjamin Moore, Moorcraft Super Spec Latex Eggshell Enamel C274
 2. Glidden Professional, Ultra-Hide 150 Latex Eggshell 1412
 3. Sherwin-Williams Pro-Mar 200 Latex Low Sheen ES B20w/200 series.
 4. Or equivalent with same performance and warranty. Must comply with LEED requirements listed above in 2.02. Sub-contractor takes responsibility for product performance.
- C. Interior Waterborn Acrylic Semi-Gloss:
 1. Benjamin Moore Waterborn Satin Inpervo 314
 2. Glidden Professional, Ultra Hide 250 Acrylic Semi-Glass 1406
 3. Sherwin-Williams, Pro Classic Waterborne Acrylic Semi-Gloss B3 Series.
 4. Or equivalent with same performance and warranty. Must comply with LEED requirements listed above in 2.02. Sub-contractor takes responsibility for product performance.
- D. Interior Waterborn Acrylic High-Gloss:
 1. Benjamin Moore Advance High Gloss 794
 2. Or equivalent with same performance and warranty. Must comply with LEED requirements listed above in 2.02. Sub-contractor takes responsibility for product performance.
- E. Dry Fallout Spray:
 1. Benjamin Moore, Sweep-Up Spray Latex Flat V 153.
 2. Glidden Professional, Interior Waterborne Dryfall Flat 1280-1200
 3. Sherwin-Williams, Waterborne Acrylic Eggshell Dryfall B42W00082.
 4. Or equivalent with same performance and warranty. Must comply with LEED requirements listed above in 2.02. Sub-contractor takes responsibility for product performance.
- F. Epoxy Floor Coating:
 1. Benjamin Moore, Super Spec HP 100% Solids Floor Epoxy P40.
 2. Or equivalent with same performance and warranty. Must comply with LEED requirements listed above in 2.02. Sub-contractor takes responsibility for product performance.

2.06 MAGNOLIA DESIGN CENTER (WHERE APPLICABLE)

- A. Gypsum Board - Latex System:
 1. 1st coat:
 - a. Sherwin-Williams, Preprime 200 latex primer, B28W200 (4 mils wet, 1.2 mils dry)
 2. 2nd and 3rd coat:
 - a. Sherwin-Williams, Promar 200 latex semi-gloss, B31W02251 series (4 mils wet, 1.5 mils dry).
 3. Primer System:
 - a. Utilize Sherwin-Williams color prime system for saturated and accent colors.
 4. Sheen:
 - a. Walls - Eggshell (B20 series), unless otherwise indicated.
 - b. Ceilings - Flat (B30 series), unless otherwise indicated.
 - c. Use Semi-Gloss (B31 series) where indicated.
- B. Misc wood and solid wood doors (semi-transparent stains when indicated):
 1. 1st and 2nd coats: S-W Wood Classics Interior Oil Stain, A49 Series
 2. 3rd coat: S-W Wood Classics Polyurethane Varnish, Gloss A67V1
 3. 4th coat: S-W Wood Classics Polyurethane Varnish, Satin A67V1 Series (4 mils wet, 1.4 mils dry per coat)

- C. Misc wood and solid wood doors (solid color stains when indicated):
 - 1. 1st coat: S-W Woodscapes Exterior Acrylic Solid Stain, Tinted
 - 2. 2nd coat: S-W Wood Classics Polyurethane Varnish, Gloss A67V1
 - 3. 3rd coat: S-W Wood Classics Polyurethane Varnish, Satin A67V1 Series (4 mils wet, 1.4 mils dry per coat)
- D. Special Gypsum Board Finishes - Monterey Stucco Finish (where indicated):
 - 1. 1st coat: S-W Conflex XL (Medium Texture). Knockdown (Handtrowel) for stucco appearance.
 - 2. 2nd coat: S-W Conflex XL (Medium Texture) Tinted. Knockdown (Handtrowel) for stucco appearance.
 - 3. 3rd coat: S-W Promar 200 Latex Semi-Gloss (4 mils wet, 1.5 mils dry per coat)
 - 4. Sheen: B20 Series EG-Shel, unless otherwise indicated.
- E. Special Gypsum Board Finishes - Venetian Plaster Finish (where indicated):
 - 1. 1st coat: S-W Duration Home Latex Matte Finish (Base), roller applied
 - 2. 2nd coat: S-W Faux Impressions Venetian Plaster (Tinted), spatula applied
 - 3. 3rd coat: S-W Faux Impressions Venetian Plaster (Tinted), spatula applied
 - 4. 4th coat: Burnish with spatula
 - 5. Contractor to follow faux impressions technique manual for "High Polish Fresco" finish.
- F. Special Gypsum Board Finishes - Textured Fresco Finish (where indicated):
 - 1. 1st coat: S-W Faux Impressions Dimensional Basecoat (textured roller)
 - 2. 2nd and 3rd coats: S-W Duration Home Latex Matte (tinted), roller applied.
 - 3. 4th coat: S-W Faux Impressions Latex Glaze (tinted), sponge applied.
 - 4. Contractor to follow faux impressions technique manual for "Textured Fresco Finish".

2.07 EXTERIOR FINISH PAINTS

- A. Fluoropolymer Finish (for re-coating exterior side of existing red storefront system, where applicable):
 - 1. PPG Corafon ADS 9150030 "Arcadia Silver"
- B. Exterior Gloss Alkyd Enamel:
 - 1. Benjamin Moore, Impervo Enamel C 133.
 - 2. Sherwin-Williams All Surface Enamel Gloss A41 series.
 - 3. Glidden Professional, Lifemaster Oil Interior/Exterior Gloss 1508
- C. Exterior Traffic Marking Paint:
 - 1. Benjamin Moore, Super Spec, HP Safety & Zone Marking Latex, P58/KP58
 - 2. Glidden Professional, Acrylic Water Reduced Traffic Paint 4800
 - 3. Sherwin-Williams, "Traffic & Zone Products" Setfast Acrylic Waterborne Traffic Paint, TM227/TM226

2.08 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. 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. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete 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.
- G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Concrete Floors and Traffic Surfaces to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Aluminum Surfaces to be Painted: Follow manufacturer's requirements for surface preparation, including cleaning with manufacturer recommended solvents and or abrasion.
- J. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- K. Uncorroded 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 wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- L. 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.
- M. Interior Wood Surfaces 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.
- N. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

- D. Apply each coat to uniform appearance.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

3.06 INTERIOR PAINT SYSTEM SCHEDULE

- A. Interior walls and columns, etc., below ceiling:
 - 1. 1 coat Interior Primer/Sealer
 - 2. 2 coats Interior Egg Shell Latex Enamel.
- B. Interior exposed structure, roof deck (including bar joists, steel beams, sprinkler pipe, electric conduit, electric boxes, HVAC equipment, columns)
 - 1. Primer Spot prime with rust inhibitive metal primer as required
 - 2. 1 coat Dryfall Paint
- C. Interior gypsum board ceilings:
 - 1. 1 coat Interior Primer/Sealer
 - 2. 2 coats Acrylic Interior Eggshell Latex Enamel
- D. Hollow Metal Doors, Hollow metal door and window frames and other Interior un-galvanized Ferrous Metal.
 - 1. 1 coat Rust Inhibiting Primer (if unprimed).
 - 2. 2 coats Waterborn Acrylic High-Gloss
- E. Interior Galvanized Ferrous Metal:
 - 1. 1 coat Galvanized Metal Primer.
 - 2. 2 coats Waterborn Acrylic Semi-Gloss
- F. Interior Concrete Block Walls:
 - 1. 1 coat Latex Block Filler.
 - 2. 2 coats Acrylic Interior Eggshell Latex Enamel
- G. MDO doors:
 - 1. 1 coat Interior Latex Wood/MDO Primer
 - 2. 2 coats Waterborn Acrylic Semi-Gloss
- H. Interior Floor Striping:
 - 1. 1 coat Seal Source SS line stripe.

3.07 COLOR SCHEDULE

- A. Colors as indicated in the drawings.

END OF SECTION

SECTION 10 2113.13
METAL TOILET COMPARTMENTS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Metal toilet compartments.
- B. Urinal screens.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of floor and ceiling supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Metal Toilet Compartments:
 - 1. General Partitions Mfg. Corp: www.generalpartitions.com.
 - 2. Global Steel Products Corp: www.globalpartitions.com.
 - 3. Metpar Corp: www.metpar.com.
 - 4. Sanymetal, A Crane Plumbing Company: www.sanymetal.com.
 - 5. Ampco Products, Inc. .
 - 6. Accurate Materials: www.accuratepartitions.com
 - 7. Substitutions: Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Stainless Steel Sheet: ASTM A666, Type 304.

2.03 COMPONENTS

- A. Toilet Compartments: Stainless steel, floor and ceiling anchored.
- B. Doors, Panels, and Pilasters: Sheet steel faces, pressure bonded to sound deadening core, formed and closed edges; corners made with corner clips or mitered, welded, and ground smooth.
- C. Door and Panel Dimensions:
 - 1. Thickness: 1 inch.
 - 2. Door Width: 26 inch.
 - 3. Door Width for Handicapped Use: 36 inch .
 - 4. Height: 58 inch.
- D. Pilasters: 1-1/4 inch thick, of sizes required to suit compartment width and spacing.
- E. Urinal Screens: Wall mounted with two panel brackets, and vertical upright consisting of pilaster anchored to floor.

2.04 ACCESSORIES

- A. Pilaster Shoes: Formed ASTM A 666, Type 304 stainless steel with No. 4 finish, 3 inch high, concealing floor and ceiling fastenings.
 - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
 - 2. Provide ceiling attachment using two adjustable hanging studs, attached to above-ceiling framing.
- B. Brackets: Satin stainless steel.

- C. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- D. Hardware: Satin stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Nylon bearings.
 - 3. Thumb turn or sliding door latch with exterior emergency access feature.
 - 4. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 5. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 6. Provide door pull for outswinging doors.

2.05 FINISHING

- A. Stainless Steel Compartments: No. 4 brushed satin finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that field measurements are as indicated.
- C. Verify correct spacing of and between plumbing fixtures.
- D. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in full closed position when unlatched. Return out swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 2601
WALL AND CORNER GUARDS

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Corner guards.
- B. Impact-resistant wall coverings.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Anchors for attachment of work of this section, concealed in wall.
- B. Section 09 2116 - Gypsum Board Assemblies: Flat straps and wall backing.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.
- C. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Low Emitting Materials - Adhesives and Sealants.

PART 2 PRODUCTS**2.01 NATIONAL ACCOUNTS VENDORS**

- A. Provide products specified in this Section by Best Buy's National Accounts Vendors. Refer to Section 00 2713.

2.02 STAINLESS STEEL CORNER GUARDS

- A. Stainless Steel Corner Guards: 16 gauge, Type 430, satin finish stainless steel corner guards, size as noted on drawings, with 1/8" bend radius and return to wall. Cement on application. Refer to architectural details.
 - 1. Anderson & Dahlen, Inc., 6850 Sunwood Drive NW, Ramsey MN 55303, (763) 852-4700, FAX (763) 852- 4790.
 - 2. InPro Corp. (www.inprocorp.com).

2.03 IMPACT-RESISTANT WALL PANELS

- A. Impact-Resistant Wall Panels: Rigid wall panels consisting of non-PVC impact-resistant plastic sheet wall covering material and accessories.
 - 1. Manufacturers and Products:
 - a. Inpro Corp.: Color as indicated on the drawings
 - 2. Size: as noted on drawings
 - 3. See Evaluations for manufacturer's recommendations of sheet thickness for different levels of abuse.
 - 4. Sheet Thickness: 0.040 inch (1.0 mm).
 - 5. Trim and Joint Moldings: Extruded rigid plastic that matches sheet wall covering color.
 - 6. Mounting: Adhesive.

2.04 MAGNOLIA DESIGN CENTER (WHERE APPLICABLE)

- A. Refer to drawings for locations and type of corner guards to be used within extents of this Department only.

2.05 FABRICATION

- A. Fabricate components with tight joints, corners and seams.

- B. Pre-drill holes for attachment.
- C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
- B. Verify that field measurements are as indicated on Drawings.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.
- B. Position corner guard 4 inches above finished floor to 50 inches high above finished floor.
- C. Impact-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

3.03 TOLERANCES

- A. Maximum Variation From Required Height: 1/4 inch.
- B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

END OF SECTION

SECTION 10 2800
TOILET/HUB ACCESSORIES

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Accessories for toilet rooms and HUB.
- B. Lavatory Replacement Counter

1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Concealed supports for accessories, including in wall framing and plates and above ceiling framing.

1.03 REFERENCE STANDARDS

- A. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2013.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.
- C. Comply with requirements specified in Section 01 3546 - Green Building Project Requirements.
 - 1. Low Emitting Materials - Adhesives and Sealants.

PART 2 PRODUCTS**2.01 MATERIALS**

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Keys: Provide 2 keys for each accessory to Owner; master key all lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269, Type 304 or 316.
- E. Adhesive: Two component epoxy type, waterproof.
- F. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.
- G. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.02 TOILET/HUB ROOM ACCESSORIES

- A. Reuse existing accessories where applicable. Clean to "like-new" condition prior to reinstallation.
- B. Framed Mirrors Glass: Stainless steel framed mirror with 1/4" float glass with wall hanger. Size of mirror to be: As shown on drawings (24" wide by 60" high).
 - 1. American Specialties, Inc. - Model 0600.
 - 2. Bobrick Washroom Equipment, Inc. - Model B-165.
 - 3. Bradley Corporation Model 780.
- C. Lavatory Replacement Counter
 - 1. Manufacturer: Bradley, 800-272-3539
 - 2. Color: TBD, coordinate with Best Buy Construction Project Manager for color.
 - 3. Model: OmniDeck - 3000 Series
 - 4. Hardware: SLOAN Optima Systems Faucet EAF-275 Model.

- D. Stainless Steel Clothes Hook:
 - 1. Manufacturer: Bobrick B-233
 - 2. Materials: 18-8 S, type-304, 11-gauge, stainless steel with satin finish.
 - 3. Mounting height: As noted on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

PART 2 PRODUCTS**2.01 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. (FE-1) Multi-Purpose Dry Chemical Type: UL-rated 4A-60B:C, 10 lb. nominal capacity, enameled steel tank with pressure gauge.
 - 1. Buckeye Fire Extinguishers,
 - 2. J.L. Industries, Cosmic 10.
 - 3. Walter Kidde, Pro 10 MP (Pro Line 466204)
 - 4. Larsen's Manufacturing Company, MP10.
 - 5. Modern Metal Products, Wing 10H K.
 - 6. Or equivalent with same performance and warranty. Sub-contractor takes responsibility for product.
- C. (FE-2) Carbon Dioxide Type: UL-rated 10B:C, 10 lb. nominal capacity, aluminum tank with pressure gauge.
 - 1. Buckeye Fire Extinguishers,
 - 2. J.L. Industries, Sentinel 10.
 - 3. Walter Kidde, Pro 10 CD (Pro Line 466181)
 - 4. TCZ.4.Larsen's Manufacturing Company, CD10.
 - 5. Modern Metal Products, Coach 10HH K.

2.02 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.

PART 3 EXECUTION**3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Install Best Buy furnished equipment and fixtures in accordance with manufacturer's printed instructions, and as directed by the Best Buy Construction Project Manager

END OF SECTION

SECTION 220523**GENERAL-DUTY VALVES FOR PLUMBING PIPING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 22 subcontractor shall refer to 230500 for common work that applies to this Division.

1.2 SUMMARY

- A. This Section includes the following general-duty valves:
 - 1. Bronze ball valves.
 - 2. Bronze check valves.
 - 3. Iron Body check valves

1.3 DEFINITIONS

- A. The following are standard abbreviations for valves:
 - 1. CWP: Cold working pressure.
 - 2. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 3. NBR: Acrylonitrile-butadiene rubber.
 - 4. PTFE: Polytetrafluoroethylene plastic.
 - 5. TFE: Tetrafluoroethylene plastic.

1.4 SUBMITTALS

- A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.5 QUALITY ASSURANCE

- A. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set ball and plug valves open to minimize exposure of functional surfaces.
4. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by the following manufacturers:

1. Nibco
2. Crane
3. Powell
4. Apollo
5. Milwaukee

2.2 VALVES, GENERAL

- A. Bronze Valves: NPS 2 and smaller with threaded ends, unless otherwise indicated.
- B. Ferrous Valves: NPS 2-1/2 and larger with flanged ends, unless otherwise indicated.
- C. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- D. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
- E. Valve Actuators:
1. Handwheel: For valves other than quarter-turn types.
 2. Lever Handle: For quarter-turn valves NPS 6 and smaller, except plug valves.
- F. Extended Valve Stems: On insulated valves.
- G. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.
- H. Valve Grooved Ends: AWWA C606.
1. Solder Joint: With sockets according to ASME B16.18.

- a. Caution: Use solder with melting point below 840 deg F for angle, check, gate, and globe valves; below 421 deg F for ball valves.

2. Threaded: With threads according to ASME B1.20.1.

- I. Valve Bypass and Drain Connections: MSS SP-45.

2.3 COPPER-ALLOY BALL VALVES

- A. Copper-Alloy Ball Valves, General: MSS SP-110.
- B. Two-Piece, Copper-Alloy Ball Valves: Bronze body with full -port, chrome-plated bronze ball; PTFE or TFE seats; and 600-psig minimum CWP rating and blowout-proof stem.

2.4 BRONZE CHECK VALVES

- A. Bronze Check Valves, General: MSS SP-80.
- B. Type 3, Class 200, Bronze, Swing Check Valves: Bronze body with bronze disc and seat.

2.5 GRAY-IRON SWING CHECK VALVES

- A. Gray-Iron Swing Check Valves, General: MSS SP-71.
- B. Type I, Class 250, gray-iron, swing check valves with metal seats.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.
- D. Install valves in horizontal piping with stem at or above center of pipe.
- E. Install valves in position to allow full stem movement.
- F. Install check valves for proper direction of flow, horizontal, with hinge pin level.

3.3 JOINT CONSTRUCTION

- A. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.4 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION

SECTION 220529**HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

PART 2 - PRODUCTS**2.1 MISCELLANEOUS MATERIALS**

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

2.2 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes ½ to 1½ inch: Malleable Iron adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.
- D. Wall Support: Welded steel bracket and wrought steel clamp.
- E. Vertical Support: Steel riser clamp.
- F. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- G. Shield for Insulated Piping 2 inches and smaller: 18 gauge galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.
- H. Shield for Insulated Piping 2½ Inches and Larger: Pipe covering protective saddles.
- I. Gas and condensate piping on roof shall be supported on polyethylene high-density U.V. resistant quick "pipe" block with foam pad, manufactured by Nelson-Olson Inc., distributed by Bongard Corporation, 651.982.9802, or Erico Pipe Piers, (888) 333-0852, Model No. 647. Recommended installation is for all quick "pipe" blocks to be freestanding. (When gas and

condensate piping are run on the roof, coordinate height of quick "pipe" blocks at cross over points.

2.3 FINISH

- A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed. Any finish regulated under 07900 1.5 B LEED VOC limits must be followed.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure. Do not suspend piping from the roof deck.
- B. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- C. Install hangers and supports to allow controlled thermal and seismic 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.
- D. Install lateral bracing with pipe hangers and supports to prevent swaying.
- E. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- F. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- G. Support horizontal piping as follows:

PIPE SIZE (in.)	Max Hanger STEEL	Spacing (ft.) COPPER	HANGER DIA (in.)
1/2.....	5.....	5.....	3/8
3/4.....	6.....	6.....	3/8
1.....	7.....	6.....	3/8
1-1/4.....	7.....	7.....	3/8
1-1/2.....	9.....	8.....	3/8
2.....	10.....	9.....	3/8
2-1/2.....	11.....	10.....	1/2
3.....	12.....	10.....	1/2
4.....	14.....	12.....	5/8
6.....	14.....	12.....	3/4
8.....	14.....	14.....	7/8
10.....	14.....	14.....	7/8
12.....	14.....	14.....	7/8

- H. Install hangers to provide minimum ½-inch space between finished covering and adjacent work.
- I. Place a hanger within 12 inches of each horizontal elbow.
- J. Use hangers with 1½-inch minimum vertical adjustments.
- K. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- L. Support riser piping independently of connected horizontal piping.

3.2 METAL FABRICATIONS

- A. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- B. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.3 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.4 HANGER AND SUPPORT SCHEDULE

- A. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- B. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- C. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

END OF SECTION

SECTION 220553**IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

PART 2 - PRODUCTS**2.1 PIPE LABELS**

- A. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- B. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. Near major equipment items and other points of origination and termination.
 - 5. Spaced at maximum intervals of 50 feet along each run.

END OF SECTION

SECTION 220719**PLUMBING PIPING INSULATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
 - 3. Domestic recirculating hot-water piping.
 - 4. Storm-water piping exposed to freezing conditions.
 - 5. Roof drains and rainwater leaders.
 - 6. Supplies and drains for handicap-accessible lavatories and sinks.
 - 7. Condensate Waste Piping.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).
- B. LEED: Submit product data per division 1 requirements. All mechanical insulation installed in the building interior shall meet the California Department of Health Services, Standard for the Testing of Volatile Organic Emissions from Various Sources using Small Scale Environmental Chambers, including 2004 addenda. Programs that offer verification of the standards include Indoor Advantage Gold, GREENGUARD Children and Schools, and the Collaborative for High Performance Schools product list.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields.
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Indoor Piping Insulation Schedule," articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Mineral fiber preformed pipe insulation, Type 1: Heavy density, sectional, ANSI/ASTM C547, "k" value of 0.24 at 75F, non-combustible. Provide with Kraft reinforced foil vapor barrier with self-sealing adhesive joints.
- E. Closed cell flexible tubing insulation: ASTM C-177; "k" value of 0.28 at 75F, non-combustible.
- F. Molded cover insulating kit: In accordance with ICC A117.1.
- G. Manufacturers: Subject to compliance with requirements, price product by one of the following:
 - 1. Owens Corning
 - 2. Manville
 - 3. Knauf.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - 1. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with

adhesive recommended by insulation material manufacturer.

- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated):
Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - 1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - 6. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 - 7. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, and where not located in a return air plenum, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape. In return air plenums, insulate fittings with insulating cement and finish with canvas jacket.
 - 8. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating

cement and finish with finishing cement, mastic, and flashing sealant.

- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

3.7 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.8 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold, Hot, and Recirculating Hot Water:
1. Insulation shall be one of the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - b. Closed cell flexible tubing insulation: 1 inch thick.

- B. Horizontal Stormwater and Overflow and Drain Bodies: Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick
- C. Exposed Sanitary Drains Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Molded cover insulating kit.
- D. Floor Drains, Traps, and Sanitary Drain Piping within 25 feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:
 - 1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - b. Closed cell flexible tubing insulation: 1 inch thick.
- E. Under-floor domestic water piping: Closed cell flexible tubing insulation: 1 inch thick.
- F. Condensate Waste Piping
 - 1. Insulation shall be one of the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - b. Closed cell flexible tubing insulation: 1 inch thick.

3.9 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Concealed: None.
- D. Piping, Exposed: None.

END OF SECTION

SECTION 221116**DOMESTIC WATER PIPING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
 - 2. Flexible connectors.
 - 3. Water meters furnished by utility company for installation by Contractor.
- B. Exterior work beyond 5'-0" will be by site utility contractor.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS**2.1 PIPING MATERIALS**

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
 - 1. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure

- fittings.
- 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

- 1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

- 1. Standard-Pattern, Push-on-Joint Fittings: AWWA C110, ductile or gray iron with AWWA C111 rubber gaskets.

2.4 PVC PIPE AND FITTINGS

A. DR-Pressure Class 150 (PVC DR 18)

B. Fittings: PVC conforming to AWWA C900 and applicable plumbing code.

C. Gaskets: Comply with ASTM D3139, rubber gaskets must comply with ASTM F477.

D. Tracer Strip: Bright colored, plastic coated metallic, placed continuously over the pipe

E. Where allowed by code.

2.5 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

E. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.6 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of

the following:

1. Metraflex, Inc.
 2. Universal Metal Hose; a Hyspan company
- B. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
1. Working-Pressure Rating: Minimum 200 psig.
 2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
 3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance.
- E. Install shutoff valve immediately upstream of each dielectric fitting.
- F. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.
- G. Install seismic restraints on piping.
- H. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- I. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

- K. Install piping adjacent to equipment and specialties to allow service and maintenance.
- L. Install piping to permit valve servicing.
- M. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- N. Install piping free of sags and bends.
- O. Install fittings for changes in direction and branch connections.
- P. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- Q. Install thermometers on outlet piping from each water heater and in hot water circulation piping.
- R. Install sleeves for piping penetrations of walls, ceilings, and floors.
- S. Install sleeve seals for piping penetrations of concrete walls and slabs.
- T. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- F. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE INSTALLATION

- A. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

3.5 WATER METER INSTALLATION

- A. Rough-in domestic water piping , and install water meters according to utility company's requirements.
- B. Install water meters according to AWWA M6, and utility company's requirements.

3.6 HANGER AND SUPPORT INSTALLATION

- A. Refer to Section 220529.

3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code.

3.8 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill system with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work

progresses.

3.9 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Under-building-slab, domestic water, building service piping, NPS 3 and smaller, shall be the following:
 - 1. Soft copper tube, ASTM B 88, Type K ; wrought-copper solder-joint fittings; and brazed joints.
- D. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 and larger, shall be the following:
 - 1. Push-on-joint, ductile-iron pipe; standard- pattern push-on-joint fittings; and gasketed joints.
- E. Aboveground domestic water piping, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L ; wrought- copper solder-joint fittings; and soldered joints.

3.10 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use butterfly, ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
 - 2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.

END OF SECTION

SECTION 221316**SANITARY WASTE AND VENT PIPING AND STORM DRAIN PIPING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe, tube, and fittings.
 - 2. Specialty pipe fittings.

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS**2.1 PIPING MATERIALS**

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI, Hubless-Piping Couplings:
 - 1. Standards: ASTM C 1277 and CISPI 310.
 - 2. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Cast-Iron, Hubless-Piping Couplings:
 - 1. Standard: ASTM C 1277.
 - 2. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 GALVANIZED-STEEL PIPE AND FITTINGS

- A. Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Standard Weight class. Include square-cut-grooved or threaded ends matching joining method.
- B. Galvanized-Cast-Iron Drainage Fittings: ASME B16.12, threaded.
- C. Steel Pipe Pressure Fittings:
 - 1. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Schedule 40, seamless steel pipe. Include ends matching joining method.
 - 2. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
 - 3. Galvanized-Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- D. Cast-Iron Flanges: ASME B16.1, Class 125.
 - 1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.4 PVC PIPE AND FITTINGS

- A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
- B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- C. Solvent Cement: ASTM D 2564.
 - 1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Unshielded, Nonpressure Transition Couplings:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Fernco Inc.
 - b. Standard: ASTM C 1173.
 - c. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - d. Sleeve Materials:
 - 1) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - 2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 3) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

PART 3 - EXECUTION

3.1 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.

- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Install seismic restraints on piping.
- K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- L. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- M. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- N. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- O. Install PVC piping according to ASTM D 2665 or ASTM D2321.
- P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- Q. Install sleeves for piping penetrations of walls, ceilings, and floors.
- R. Install sleeve seals for piping penetrations of concrete walls and slabs.
- S. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and

Fittings Handbook" for hubless-piping coupling joints.

- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
- E. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in OD's.
 - 2. In Drainage Piping: Unshielded , nonpressure transition couplings.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger and support devices and installation specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
 - 3. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 4. Install individual, straight, horizontal piping runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 6. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support horizontal piping and tubing within 12 inches of each fitting, valve, and coupling.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
 - 5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
 - 6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 - 3. NPS 2: 10 feet with 3/8-inch rod.
 - 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 - 5. NPS 3: 12 feet with 1/2-inch rod.
 - 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
 - 7. NPS 6 and NPS 8: 12 feet with 3/4-inch rod.
 - 8. NPS 10 and NPS 12: 12 feet with 7/8-inch rod.
- H. Install supports for vertical steel piping every 15 feet.
- I. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 - 2. NPS 3: 48 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 - 4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
 - 5. NPS 10 and NPS 12: 48 inches with 7/8-inch rod.
- J. Install supports for vertical PVC piping every 48 inches.
- K. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- C. Make connections according to the following unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final

connection to each piece of equipment.

3.7 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.8 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping shall be the following:
 - 1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
 - 2. Dissimilar Pipe-Material Couplings: Unshielded , nonpressure transition couplings.
- C. Aboveground, vent piping shall be any of the following:
 - 1. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
 - 2. Galvanized-steel pipe, drainage fittings, and threaded joints.
 - 3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
 - 4. Dissimilar Pipe-Material Couplings: Unshielded , nonpressure transition couplings.
- D. Underground, soil, waste, and vent piping shall be any of the following:
 - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
 - 2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
 - 3. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
- E. Condensate Drain (on roof): Condensate from rooftop units to approved receptacle or on roof where code allows.
 - 1. Hard drawn DWV copper pipe with red brass or wrought copper DWV fittings incorporating 1/8" pitch per foot for drain lines from cooling drain pans, modular cooling units and other miscellaneous drains except steam condensate drains.
 - 2. Schedule 40 PVC pipe fittings may be used for traps only where code allows.
- F. Condensate Drain (Inside building): Hard drawn DWV copper pipe with red brass or wrought copper DWV fittings incorporating 1/8" pitch per foot for drain lines from cooling drain pans, modular cooling units and other miscellaneous drains except steam condensate drains. Pressed fittings are not acceptable.

END OF SECTION

SECTION 224000
PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section applies to the plumbing fixtures listed in the Plumbing Fixture Schedule.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- D. FRP: Fiberglass-reinforced plastic.
- E. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

- A. Required LEED submittals: Required information must be inserted into the LEED submittal binder found on site. Best Buy's Construction Project Managers or Development Managers can be contacted for more information.
- B. This Contractor shall provide the Engineer with a minimum of five (5) certified copies of product data and shop drawings for equipment as noted in the Specifications for his approval, three of which will be returned to the Contractor for his files and maintenance and operating instruction brochures. Regardless of the number of shop drawings submitted, only two will be retained by the Engineer for his use. If the Contractor needs more than three (3) copies of certain shop drawings for his use, he/she shall submit as many additional sets of the particular drawings as he/she requires in addition to the minimum number listed above. The Contractor shall examine, mark up as required and approve all shop drawings prior to their submission to the Engineer. Shop drawings shall be processed with a minimum delay and shall be transported between offices by first class mail.

- C. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities for plumbing fixtures for people with disabilities.
- D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Stainless-Steel Commercial, Handwash Sinks: NSF 2 construction.
 - 2. Vitreous-China Fixtures: ASME A112.19.2M.
 - 3. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
- H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - 1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
 - 2. Faucets: ASME A112.18.1.
 - 3. Hose-Connection Vacuum Breakers: ASSE 1011.
 - 4. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
 - 5. NSF Potable-Water Materials: NSF 61.
 - 6. Pipe Threads: ASME B1.20.1.
 - 7. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 - 8. Supply Fittings: ASME A112.18.1.
 - 9. Brass Waste Fittings: ASME A112.18.2.
- I. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
 - 1. Atmospheric Vacuum Breakers: ASSE 1001.

2. Brass and Copper Supplies: ASME A112.18.1.
3. Brass Waste Fittings: ASME A112.18.2.
4. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.

J. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Flexible Water Connectors: ASME A112.18.6.
2. Hot-Water Dispensers: ASSE 1023 and UL 499.
3. Off-Floor Fixture Supports: ASME A112.6.1M.
4. Plastic Toilet Seats: ANSI Z124.5.
5. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to **10** percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to **5** percent of amount of each type and size installed.
3. Flushometer, Repair Kits: Equal to **10** percent of amount of each type installed.

PART 2 - PRODUCTS

A. Refer to Plumbing Fixture Schedule for all plumbing fixture and trim types and equipment specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.

3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.
- F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.
- G. Install counter-mounting fixtures in and attached to casework.
- H. Install fixtures level and plumb according to roughing-in drawings.
- I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- K. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- L. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- M. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
- N. Install toilet seats on water closets.
- O. Install trap-seal liquid in dry urinals.
- P. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- Q. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- R. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- S. Install shower flow-control fittings with specified maximum flow rates in shower arms.
- T. Install traps on fixture outlets.
 1. Exception: Omit trap on fixtures with integral traps.
 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

- U. Install hot-water dispensers in back top surface of sink or in countertop with spout over sink.
- V. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."
- W. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
- E. Install fresh batteries in sensor-operated mechanisms.

3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Operate and adjust hot-water dispensers. Replace damaged and malfunctioning units.
- C. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
- D. Replace washers and seals of leaking and dripping faucets and stops.
- E. Install fresh batteries in sensor-operated mechanisms.

3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 4000

SECTION 260500**COMMON WORK RESULTS FOR ELECTRICAL****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The work included in this section of the specifications consists of furnishing labor, equipment, supplies, and materials, and in performing operations necessary for the installation of electrical work as listed in the Instruction to Bidders and as required by these specifications and shown on the drawings, subject to the terms and conditions of the contract. The work shall also include the completion of details of electrical work not mentioned or shown which are necessary for the successful operation of electrical systems described on the drawings or required by these specifications.
- B. Section Includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Common electrical installation requirements.
 - 3. Substitutions.
 - 4. Shop Drawings.
 - 5. Operating and Maintenance Manuals.
 - 6. Commissioning and Testing.
 - 7. Basic Requirements for Utility Service.
 - 8. Project Record Drawings.
 - 9. Project Conditions.
 - 10. Permits.
 - 11. Inspections.
 - 12. Insurance.
 - 13. Guarantee.
 - 14. Common electrical installation requirements.
 - 15. Penetration Firestopping.
 - 16. Excavation and backfill.
 - 17. Cutting and Patching for electrical construction.
 - 18. Refinishing and Touchup painting.
 - 19. Cleaning and Protection.
 - 20. Interruption of Existing Electric Service.
 - 21. Building Structure Penetrations.

1.3 DEFINITIONS

- A. Basic Contract definitions are as follows:
 - 1. Provide: The term "provide" means "to furnish and install, ready for the intended use and

- in complete operating condition."
2. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
 3. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Engineer," "requested by the Engineer," and similar phrases.
 4. Approve: The term "approved," where used in conjunction with the Engineer's action on the Contractor's submittals, applications and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contracts.
 5. Indicated: The term "indicated" refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.
 6. Contractor: The term "Contractor" shall carry the same meaning as "Electrical Contractor" or "Division 26 Contractor".
 7. Or Equal: The term "Or equal" shall carry the same meaning as "approved as equal by the Engineer"
 8. Owner: All references here-in and on drawings to "Owner" shall be the same as "Best Buy Co. Inc."

1.4 REFERENCES

- A. See Section 01 3546 – LEED Guidelines.
- B. See Section 01 3547 – LEED Appendix – Quality Control Submittal Binder (LEED submittal binder templates).

1.5 BEST BUY NATIONAL ACCOUNTS PROGRAM

- A. See section 00 2713 for Best Buy's National Accounts Vendor program.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. All Electrical workers on this project shall be thoroughly knowledgeable of all applicable codes related to all electrical systems for this project. All installations shall be performed by skilled electrician tradesmen fully aware of the latest techniques, practices, and standards of the industry. Haphazard or poor installation practice as determined by the Architect or Engineer will be cause for rejection of work.
- C. Good workmanship and appearance shall be required. Carefully lay out all work in advance to install in a neat and good workmanship-like manner all in accordance with recognized practices and standards of the industry.

1.7 COORDINATION

- A. All drawings, specifications and documents for this project shall be taken as a whole. Prior to installation, the Contractor shall be familiar with this project by carefully reviewing and comparing all documents that pertain to this project.
- B. In preparation of the contract documents, a reasonable effort has been made to provide layouts and connections based on selected and specified manufacturer's equipment. Since physical space, electrical connections, equipment arrangements and other requirements may vary according to each manufacturer, the final responsibility for connections, initial access and proper fit is the responsibility of the Contractor.
- C. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
 - 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
 - 2. Sleeves through fire rated floors and walls shall be non combustible.
- D. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- E. Prior to roughing in for electrical equipment furnished by others, verify the voltage and current characteristics and control connections of this equipment. Notify the Engineer where equipment connection requirements do not match the provisions indicated on the documents.
- F. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 08.
- G. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- H. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, complete installation of these items prior to ceiling tile installation.
- I. The drawings indicate only the approximate locations of rough-ins and may not indicate complete connection requirements. Prior to proceeding with any work or rough-ins the Contractor shall obtain all equipment rough-in requirements and information from the equipment supplier, manufacturer or from the respective trades furnishing the equipment or with Architect, to complete the installation in a neat and workmanship-like manner.
- J. Scaled and calculated locations are approximate only. Before proceeding with work, carefully check and verify with building dimensions on architectural drawings, and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.
- K. Drawings are essentially diagrammatic and indicate the general arrangement of equipment. Many offsets, bends, pull boxes, special fittings, etc. will be required which are not indicated. Carefully study drawings and premises in order to determine best methods, exact locations, conduit routes, building obstructions, etc., to install apparatus and equipment. Install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, maintain code required clearances, and keep openings and passageways clear.
- L. Where outlet boxes are located adjacent and opposite side of the same wall, the outlet boxes

shall not be placed back to back, nor shall extension rings be used in place of double boxes, all to limit sound transmission between rooms. Provide short horizontal nipple between adjacent outlet boxes, which shall have depth sufficient to maintain wall coverage in rear by masonry material.

- M. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
 - 5. To maintain access to user serviceable equipment.
- N. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- O. Drawings and specifications are to be considered as supplementing each other. Work specified but not shown on drawings, or shown on drawings but not specified, shall be performed or furnished as though mentioned in both specifications and drawings. If not otherwise directed, installation of all systems and equipment shall be in accordance with applicable codes and in accordance with manufacturer's installation instructions. Where work described in the specifications is in conflict with the work shown on the drawings, the contractor shall supply the greater quantity, quality and cost via the bid and contact the Engineer for clarification on direction prior to installation

1.8 SUBMITTALS

- A. General: Follow the procedures specified in Division 1 Sections.
- B. REQUIRED LEED SUBMITTALS: Required information must be inserted into the LEED submittal binder found on site. Best Buy's Construction Project Managers or Development Managers can be contacted for more information.
- C. Substitutions:
 - 1. For a period of up to seven days prior to bid date, Engineer will consider written requests from bidders, manufacturers, and suppliers for substitution of products.
 - 2. Submit a separate request for each product, supported with descriptions, drawings and samples as appropriate, including:
 - a. Comparison of the qualities of the proposed substitution with that specified. Standard features and options of the proposed substitution shall be clearly identified on the submittal.
 - b. Changes required in other elements of the work because of the substitution.
 - c. Availability of maintenance service, and source of replacement materials.
 - 3. A request for a substitution constitutes a representation that person submitting request:
 - a. Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.
 - b. Will provide the same warranties or bonds for the substitution as for the product

- specified.
- c. Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects.
- d. Waives all claims for additional costs, under his responsibility which may subsequently become apparent.
- 4. The Engineer shall be the judge of the acceptability of the proposed substitution.
- 5. The Engineer will review requests for substitutions with reasonable promptness, and notify bidders by addendum the decision to accept the requested substitution.
- 6. Requests for substitution received after bidding will not be considered except in such cases where it is necessary to make a substitution due to strikes, lockouts, bankruptcy, discontinuing of a product, etc. Requests for such substitutions of materials after award of contract shall be made in writing to Engineer and shall be made within ten days of date that Contractor ascertains he cannot obtain material or equipment specified.
- 7. The Engineer's acceptance of a substituted item applies only to the general quality and arrangement of the items substituted. Substituted items are still subject to the shop drawing review process.

D. Shop Drawings:

- 1. Before ordering any equipment not specified in drawing set and not ordered through Best Buy National Account vendors, stamp with approval, and submit to the Engineer, as required by each individual section, the number of copies required for the contractor's use, plus (1) one copy to be retained by the Engineer.
- 2. The review of shop drawings by the Architect/Engineer shall not constitute agreement of any deviations from the plans and specifications and shall not relieve the Contractor from responsibility for errors or omissions.
- 3. All shop drawings listed below shall be bound neatly in hard cover, 3-ring binders. Submit the following and refer to each Section for specific requirements. Tab and index each Section, sequenced in order of section. The binders shall consist of the following:
 - a. Section 26 0519 Low-Voltage Electrical Power Conductors and Cables
 - b. Section 26 0520 Undercarpet Electrical Power Cables
 - c. Section 26 0523 Control-Voltage Electrical Power Cables
 - d. Section 26 0529 Hangers and Supports for Electrical Systems
 - e. Section 26 0533 Raceway and Boxes for Electrical Systems
 - f. Section 26 0533 Identification for Electrical Systems
 - g. Section 26 0534 Ampinenergy System Wiring Connections
 - h. Section 26 0544 Sleeves and Sleeve Seals for Electrical Raceways and Cabling
 - i. Section 26 0913 Electrical power Monitoring and Control
 - j. Section 26 0943 Network Dimming Controls
 - k. Section 26 2200 Low-Voltage Transformers
 - l. Section 26 2413 Switchboards
 - m. Section 26 2416 Panelboards
 - n. Section 26 2726 Wiring Devices
 - o. Section 26 2813 Fuses
 - p. Section 26 2816 Enclosed Safety Switches and Circuit Breakers
 - q. Section 26 2913 Enclosed Controllers
 - r. Section 26 4313 Transient Voltage Suppression for Low Voltage Electrical Power Circuits
 - s. Section 26 5100 Interior Lighting
 - t. Section 26 5600 Exterior Lighting
 - u. Lighting Fixtures (including replacement ballasts and lamps combined together in sequence per Lighting Fixture Schedule).

4. Refer to drawings for the additional required equipment that is to be submitted as part of the shop drawing submittals.

E. Project Record Documents:

1. Prepare 'Record' documents in accordance with the requirements in Division 1 Sections.
2. Maintain a separate set of electrical drawings at the job site and keep them updated by neatly marking all changes and deviations made during construction. Use a color that contrasts with the drawings. This same set of drawings shall be made available at all times during construction for review at any time by the Architect, Engineer, or Construction Manager.
3. In addition to the requirements specified in Division 1, indicate actual installed and 'as-built' conditions for:
 - a. Major raceway systems(feeders, service conductors, etc.), size and location, for both exterior and interior (exposed and concealed), dimensioned from prominent building lines.
 - b. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 - c. Approved changes and actual equipment and materials installed.
 - d. Contract modifications, including deviation of branch circuit numbering where circuit breaker arrangements have been adjusted.

F. Operating and Maintenance Manuals:

1. At the completion of the contract submit to the Engineer three sets of operating and maintenance manuals including parts lists bound into hard covered manuals for the electrical equipment. Manuals shall be labeled with the local supplier's name and address. Information not definitely applying to these particular pieces of equipment shall be crossed out or deleted from the submission. Information shall be included for equipment for which shop drawings have been provided.
2. Approved shop drawings or product data sheets alone are not to be considered as acceptable maintenance material. Most items of equipment are shipped with installation/maintenance sheets included in the shipping package which shall also be included into the maintenance manual.

1.9 BASIC REQUIREMENTS FOR UTILITY SERVICES

- A. Raceways and conductors for the underground electric service shall meet the requirements of their respective specification sections.
- B. Installation:
1. New 480/277V Wye Secondary Services by <Insert Power Company Name>. See plans for Division of Responsibility.
 2. The low voltage systems shall be installed in strict accordance with the rules of the Owner's requirements. Provide empty conduit system and cabling as defined on the Plan Drawings and associated specifications.

1.10 PROJECT CONDITIONS

- A. Exterior Environmental Conditions: Electrical systems shall withstand the following environ-

mental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: <Enter low temperature> to <Enter high temperature> deg F
2. Relative Humidity: <Enter Low Humidity Percent> to <Enter High humidity Percent> percent.
3. Altitude: <Enter Altitude> feet

- B. Interior Environmental Conditions: Electrical systems shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 72 to 75 deg F (conditioned spaces), 55 deg F to ambient (unconditioned spaces)
2. Relative Humidity: 0 to 95 percent.
3. Altitude: <Enter Altitude> feet

1.11 PERMITS

- A. Obtain and pay fees for all licenses, required permits, and charges for use of outside services (i.e. inspecting agencies or delivery services) and use of property other than the site of the Work for storage of materials or other purposes.

1.12 INSPECTIONS

- A. Secure regular inspections as required by State and local regulations. Pay charges by regulating agencies for Drawings, Specifications, review of Drawings and Specifications, and the inspections of installations.

1.13 INSURANCE

- A. Procure and maintain such insurance required by law and additional insurance as specified in Division 0 or 1.

1.14 GUARANTEE/WARRANTY

- A. The electrical system installed under this contract shall be left in proper working order. Replace, without additional charge, new work or material which develops defects from ordinary use within one year unless a longer period is specified elsewhere, from date of acceptance by the Owner, except materials not furnished by the Contractor.
- B. All HID and Fluorescent lamps and all ballasts shall be guaranteed for one full year from the date of date of acceptance by the Owner.
- C. New materials and equipment shall be guaranteed against defects in composition, design or workmanship. Guarantee certificates shall be furnished on special equipment, indicated.

PART 2 - Not Applicable

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- B. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- D. Right of Way: Do not install electrical system components in conflict with plumbing systems installed at a required slope.

3.2 PENETRATION FIRESTOPPING

- A. General Requirements:
 - 1. Provide penetration fire stopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration fire stopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 2. Penetrations in Fire-Resistance-Rated Walls: Provide penetration fire stopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch w.g.
 - a. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
 - b. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
 - 3. Penetrations in Horizontal Assemblies: Provide penetration fire stopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch w.g.
 - a. Horizontal assemblies include floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
 - b. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated. T-rating in subparagraph below indicates resistance to excessive thermal transmission.
 - c. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 - 4. Penetrations in Smoke Barriers: Provide penetration fire stopping with ratings determined per UL 1479.
 - 5. Accessories: Provide components for each penetration fire stopping system that are

needed to install fill materials and to maintain ratings required. Use only those components specified by penetration fire stopping manufacturer and approved by qualified testing and inspecting agency for fire stopping indicated.

- a. Permanent forming/damming/backing materials, including the following:
 - 1) Slag-wool-fiber or rock-wool-fiber insulation.
 - 2) Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - 3) Fire-rated form board.
 - 4) Fillers for sealants.
- b. Temporary forming materials.
- c. Substrate primers.
- d. Collars.
- e. Steel sleeves.

B. Fill Materials:

- 1. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- 2. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- 3. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- 4. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- 5. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- 6. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- 7. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- 8. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- 9. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- 10. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions

C. Mixing:

- 1. For those products requiring mixing before application, comply with penetration fire stopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

D. Installation:

1. General: Install penetration fire stopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
2. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - a. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
3. Install fill materials for fire stopping by proven techniques to produce the following results:
 - a. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - b. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
4. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.3 EXCAVATION AND BACKFILL

- A. Where excavation and trenching disturb existing conditions, the contractor shall be responsible to restore the surroundings to their original condition or better, so that the appearance, landscaping, quality and condition of surfaces or finishes match adjacent areas.
- B. Comply with requirements of other Divisions, including Division 31 and 32 sections. If conflicts exist between division sections, the most stringent requirements apply.
- C. Establish requirements for trench shoring and bracing to comply with codes, authorities and safety. Maintain shoring and bracing in excavations regardless of time period the excavations will be open. Remove shoring and bracing when no longer required.
- D. Excavate by hand at areas within drip-line of large trees. Protect the root system from damage and dry-out. Maintain moist conditions for root system and cover exposed roots with burlap. Paint root cuts of 1 inch in diameter and larger with emulsified asphalt tree paint.
- E. Trenches: Excavate trenches for electrical installations as follows:
 1. Excavate trenches to the uniform width, sufficiently wide to provide ample working space and a minimum of 6 to 9 inches clearance on both sides of raceways and equipment.
 2. Excavate trenches to depth indicated or required.
 3. Limit the length of open trenches to which conduit installations can be made and the trench backfilled within the same day.
 4. Where rock is encountered, carry excavation below required elevation and backfill with a layer of sand prior to installation of raceways and equipment. Provide a minimum of 6 inches of sand cushion between rock bearing surface and electrical installations.
- F. Backfill: Place soil materials in layers to required subgrade elevations for each area classification listed below, using materials specified in Division 02 of the Specifications.
 1. Under walks and pavements, use a combination of subbase materials and excavated or

- borrowed materials.
 - 2. Under building slabs, use drainage fill materials.
 - 3. Under piping and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation.
 - 4. For raceways less than 30 inches below surface of roadways, provide 4-inch-thick concrete base slab support. After installation of raceways, provide a 4-inch thick concrete encasement (sides and top) prior to backfilling and placement of roadway subbase.
 - 5. Other areas, use excavated or borrowed materials.
- G. Compaction: Control soil compaction during construction, providing minimum percentage of density specified for each area classification indicated below.
- 1. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification specified below. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Place backfill and fill materials evenly adjacent to structures, piping, and equipment to required elevations. Prevent displacement of raceways and equipment by carrying material uniformly around them to approximately same elevation in each lift.
 - 3. Areas under Structures, Building Slabs and Steps, Pavements: Compact top 12 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.
 - 4. Areas Under Walkways: Compact top 6 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.
 - 5. Other Areas: Compact top 6 inches of subgrade and each layer of backfill or fill material to 85 percent maximum density for cohesive soils, and 90 percent relative density for cohesionless soils.
 - 6. Subsidence: Where subsidence occurs at electrical installation excavations during the period 12 months after Substantial Completion, remove surface treatment (i.e., pavement, lawn, or other finish), add backfill material, compact to specified conditions, replace surface treatment, and restore to its original condition.
 - 7. Conditions Affecting Excavations:
 - a. Existing conduits, pipes, utility lines, tanks, equipment, or other obstructions which are to remain, whether underground, concealed, or exposed may not be indicated on drawings. Locate such obstructions prior to start of work so as to route and install all new work to avoid these obstructions.
 - b. Maintain and protect existing building utilities and services. Repair or replace these utilities and services at no cost to Owner where damage has been done during course of construction.
 - c. Protect structures, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation operations.
 - 8. Site Information: Subsurface conditions were investigated by other Divisions during the design of the Project. Reports of these investigations are available for information only; data in the reports are not intended as representations or warranties of accuracy or continuity of conditions. The Owner will not be responsible for interpretations or conclusions drawn from this information.

3.4 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to

permit electrical installations. Perform cutting by skilled craftsmen of trades involved.

- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing fire stopping has been disturbed. Repair and refinish materials and other surfaces by skilled craftsmen of trades involved.

3.5 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Sections.
 - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
 - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
 - 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.
 - 5. Paint exposed conduits to match painted surfaces.

3.6 CLEANING AND PROTECTION

- A. Thoroughly clean electrical materials, equipment and apparatus to be free of dust, dirt, rust, and foreign materials before acceptance at Substantial Completion. Clean electrical materials in conformance with manufacturer's instructions.
- B. Clean panelboards, switchboards, motor controls, etc. Take special care to remove dirt, mortar, wire scraps, etc, from equipment interiors.
- C. Clean accessible elements of disconnecting and protective devices of equipment, coils of dry type transformers, etc. with compressed air (less than 15 psi) and vacuum clean enclosure prior to being energized.
- D. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- E. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

3.7 INTERRUPTION IF EXISTING ELECTRIC SERVICE

- A. Schedule and carry out the Work in such a manner as to cause the Owner a minimum of inconvenience due to service interruption. Temporary services (feeder, branch circuit and signal systems) shall be installed if one area or phase of construction disrupts service to another area of the building(s) or if equipment, conduits, or feeders have to be relocated to allow construction to progress. Service interruptions shall be confined to the smallest area possible at any one time and interruptions shall be scheduled in advance with the Owner's site representative. All interruptions shall be conducted and shall be limited to after hours (9:00 pm – 6:00am) and weekends, or as directed by the owner. After service has been restored following an interruption, inspect areas affected by the interruption and be responsible for returning automatically controlled equipment to the same operating condition which existed prior to the interruption.

3.8 BUILDING STRUCTURE PENETRATIONS

- A. Where existing or temporary raceway systems are being demolished, which leave openings in the existing building structure, the building structure shall be patched to match the existing construction and maintain the existing building fire ratings.

END OF SECTION 260500

SECTION 260519**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control test reports.
- C. Record installed feeder lengths and submit on record drawings.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Southwire Company.
- B. Copper Conductors: Comply with NEMA WC 70.
- C. Aluminum Conductors: Prohibited.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN, THWN and XHHW. Conductor insulation rated for 90 degree C.
- E. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC, Type SO and SJO with ground wire.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Hubbell Power Systems, Inc.
 - 2. O-Z/Gedney; EGS Electrical Group LLC.
 - 3. 3M; Electrical Products Division.
 - 4. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN, THWN or XHHW, single conductors in raceway
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW or THWN, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway or Metal-clad cable, Type MC.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW or THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO/SJO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- I. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- J. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Record installed feeder lengths and submit on record drawings.
- C. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - a. Continuity and resistivity of installed conductors.
 - b. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- D. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used and test results that comply with requirements.
 - 2. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units or conductors and retest as specified above.

END OF SECTION 260519

SECTION 260523**CONTROL-VOLTAGE ELECTRICAL POWER CABLES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. UTP cabling.
 - 2. RS-232 cabling.
 - 3. RS-485 cabling.
 - 4. Low-voltage control cabling.
 - 5. Control-circuit conductors.
 - 6. Identification products.

1.3 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel section.
- C. EMI: Electromagnetic interference.
- D. IDC: Insulation displacement connector.
- E. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- F. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- G. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- H. RCDD: Registered Communications Distribution Designer.
- I. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.
- J. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
 - 1. Vertical and horizontal offsets and transitions.
 - 2. Clearances for access above and to side of cable trays.
 - 3. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
 - 4. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- B. Source quality-control reports.
- C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: replacement wire, cable and connectors to included in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 45 or less.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site. Test each pair of UTP cable for open and short circuits.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install UTP and optical fiber cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.
- B. Cable Trays:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cable Management Solutions, Inc.
 - b. Cablofil Inc.
 - c. Cooper B-Line, Inc.
 - d. Cope - Tyco/Allied Tube & Conduit.
 - 2. Cable Tray Materials: Metal, suitable for indoors and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than 0.000472 inch thick
 - a. Basket Cable Trays: 12 inches wide and 2 inches deep. Wire mesh spacing shall not exceed 2 by 4 inches.
 - b. Trough or Ventilated Cable Trays: Nominally 12 inches wide.
 - c. Ladder Cable Trays: Nominally 18 inches wide, and a rung spacing of 12 inches.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."
 - 1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.

2.2 BACKBOARDS

- A. Description: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry."

2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Belden CDT Inc.; Electronics Division.
 2. Berk-Tek; a Nexans company.
 3. CommScope, Inc.
 4. Draka USA.
 5. Genesis Cable Products; Honeywell International, Inc.
 6. KRONE Incorporated.
 7. Mohawk; a division of Belden CDT.
 8. Nordex/CDT; a subsidiary of Cable Design Technologies.
 9. Superior Essex Inc.
 10. SYSTIMAX Solutions; a CommScope, Inc. brand.
 11. 3M.
 12. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. Description: 100-ohm, four-pair UTP, formed into 25-pair binder groups covered with a white thermoplastic jacket.
1. Comply with ICEA S-90-661 for mechanical properties.
 2. Comply with TIA/EIA-568-B.1 for performance specifications.
 3. Comply with TIA/EIA-568-B.2, Category 6.
 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types: Communications, Plenum Rated: Type CMP, complying with NFPA 262

2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. American Technology Systems Industries, Inc.
 2. Dynacom Corporation.
 3. Hubbell Premise Wiring.
 4. KRONE Incorporated.
 5. Leviton Voice & Data Division.
 6. Molex Premise Networks; a division of Molex, Inc.
 7. Nordex/CDT; a subsidiary of Cable Design Technologies.
 8. Panduit Corp.
 9. Simon Co. (The).
 10. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.

2.5 RS-232 CABLE

- A. Plenum-Rated Cable: NFPA 70, Type CMP.
1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.

2. Plastic insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. Plastic jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned-copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

2.6 RS-485 CABLE

A. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.7 LOW-VOLTAGE CONTROL CABLE

A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Plastic jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.8 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN Type XHHN, in raceway, complying with UL 83 UL 44.
- B. Class 2 Control Circuits: Stranded copper, power-limited cable, concealed in building finishes, complying with UL 83,
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.

2.9 IDENTIFICATION PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Brady Corporation.
2. HellermannTyton.
3. Kroy LLC.
4. Panduit Corp.

- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.
- E. Cable will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows if possible.
- E. Pathway Installation in Equipment Rooms:
 1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed or in the corner of room if multiple sheets of plywood are installed around perimeter walls of room.
 2. Install cable trays to route cables if conduits cannot be located in these positions.
 3. Secure conduits to backboard if entering room from overhead.
 4. Extend conduits 4 inches above finished floor.
 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- F. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Install 110-style IDC termination hardware unless otherwise indicated.
3. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Installation of Control-Circuit Conductors:

1. Install wiring in raceways. Comply with requirements specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
2. .

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
4. Inches long shall be neatly coiled not less than 12 inches in diameter below each feed point.

F. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.

2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.3 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No 14 AWG.
2. Class 2 low-energy, remote-control, and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits, No 12AWG.

3.4 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

- A. For data communication wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.6 IDENTIFICATION

- A. Identify system components, wiring, and cabling according to TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Visually inspect UTP and optical fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Replace defective cables and retest.
- G. Prepare test and inspection reports.

END OF SECTION 260523

SECTION 260526**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.
- B. Section includes grounding systems and equipment, plus the following special applications:
 - 1. Overhead-line grounding.
 - 2. Underground distribution grounding.
 - 3. Ground bonding common with lightning protection system.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Ground rods.
 - 2. Grounding arrangements and connections for separately derived systems.
 - 3. Grounding for sensitive electronic equipment.
- B. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Bare Grounding Conductor and Conductor Protector for Wood Poles:
 - 1. No. 4 AWG minimum, soft-drawn copper.
 - 2. Conductor Protection: PVC.
- D. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 2 inches in cross section, length to be 12" minimum or as shown on plans, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad, sectional type; 3/4 inch by 10 feet in diameter.
- B. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
 - 1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches long.
 - 2. Backfill Material: Electrode manufacturer's recommended material.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No.6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
 - 1. Bury at least 24 inches below grade.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- E. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Structural Steel: Non reversible connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.

4. Single-phase motor and appliance branch circuits.
 5. Three-phase motor and appliance branch circuits.
 6. Flexible raceway runs.
 7. Armored and metal-clad cable runs.
 8. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater, Heat-Tracing: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- G. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on the grounding bus.
 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- H. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service

grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

- C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- G. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
- H. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70; use a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.
 - 1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
 - 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 - 4. Prepare dimensioned Drawings locating each ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 - 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.
- B. Related Sections include the following:
 - 1. Division 26 Section "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Nonmetallic slotted channel systems. Include Product Data for components.
 - 4. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.

- f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 5. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch diameter holes at a maximum of 8 inches o.c., in at least 1 surface.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. Fabco Plastics Wholesale Limited.
 - d. Seasafe, Inc.
 - 2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 - 3. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
 - 4. Rated Strength: Selected to suit applicable load criteria.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
- 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

- 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted [or other] support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03.
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 09 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533**RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY**A. Section Includes:**

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.
7. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Division 27 Section "Pathways for Communications Systems" for conduits, wireways, surface pathways, innerduct, boxes, faceplate adapters, enclosures, cabinets, and handholes serving communications systems.
2. Division 28 Section "Pathways for Electronic Safety and Security" for conduits, surface pathways, innerduct, boxes, and faceplate adapters serving electronic safety and security.

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. LEED Submittals:
 1. Product Data for Credit IEQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.
 2. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of

Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.
- C. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions including those for internal components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - 4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
- D. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 3. Anamet Electrical, Inc.
 - 4. Electri-Flex Company.
 - 5. O-Z/Gedney; a brand of EGS Electrical Group.
 - 6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
 - 7. Republic Conduit.
 - 8. Robroy Industries.
 - 9. Southwire Company.
 - 10. Thomas & Betts Corporation.
 - 11. Western Tube and Conduit Corporation.
 - 12. Wheatland Tube Company; a division of John Maneely Company.

- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. ARC: Comply with ANSI C80.5 and UL 6A.
- E. IMC: Comply with ANSI C80.6 and UL 1242.
- F. PVC-Coated Steel Conduit: PVC-coated IMC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch minimum.
- G. EMT: Comply with ANSI C80.3 and UL 797.
- H. FMC: Comply with UL 1; zinc-coated steel.
- I. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew or compression.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- K. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.
 - 3. Arnco Corporation.
 - 4. CANTEX Inc.
 - 5. CertainTeed Corp.
 - 6. Condux International, Inc.
 - 7. Electri-Flex Company.
 - 8. Kraloy.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Niedax-Kleinhuis USA, Inc.
 - 11. RACO; a Hubbell company.

12. Thomas & Betts Corporation.

- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. ENT: Comply with NEMA TC 13 and UL 1653.
- D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- E. LFNC: Comply with UL 1660.
- F. Rigid HDPE: Comply with UL 651A.
- G. Continuous HDPE: Comply with UL 651B.
- H. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.
- I. RTRC: Comply with UL 1684A and NEMA TC 14.
- J. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- K. Fittings for LFNC: Comply with UL 514B.
- L. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- M. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman; a Pentair company.
 - 3. Mono-Systems, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged with Screw-cover type unless otherwise indicated.

- E. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

- A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Mono-Systems, Inc.
 - b. Panduit Corp.
 - c. Wiremold / Legrand.
- C. Tele-Power Poles:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Mono-Systems, Inc.
 - b. Panduit Corp.
 - c. Wiremold / Legrand.
 - 2. Material: Galvanized steel with ivory baked-enamel finish
 - 3. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Adalet.
 - 2. Cooper Technologies Company; Cooper Crouse-Hinds.
 - 3. EGS/Appleton Electric.
 - 4. Erickson Electrical Equipment Company.
 - 5. FSR Inc.
 - 6. Hoffman; a Pentair company.
 - 7. Hubbell Incorporated; Killark Division.
 - 8. Kraloy.
 - 9. Milbank Manufacturing Co.
 - 10. Mono-Systems, Inc.
 - 11. O-Z/Gedney; a brand of EGS Electrical Group.
 - 12. RACO; a Hubbell Company.
 - 13. Robroy Industries.
 - 14. Spring City Electrical Manufacturing Company.

15. Stahlin Non-Metallic Enclosures; a division of Robroy Industries.
 16. Thomas & Betts Corporation.
 17. Wiremold / Legrand.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy or aluminum, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Metal Floor Boxes:
1. Material: Cast metal or sheet metal.
 2. Type: Fully adjustable.
 3. Shape: Rectangular.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- H. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.
1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- I. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- K. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- L. Gangable boxes are allowed.
- M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- N. Cabinets:
1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed Conduit: GRC or IMC.
 2. Concealed Conduit, Aboveground: EMT.
 3. Underground Conduit: RNC, Type EPC-40-PVC or Type EPC-80-PVC.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed and Subject to Severe Physical Damage: GRC or IMC. Raceway locations include the following:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 5. Damp or Wet Locations: GRC or IMC.
 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 [stainless steel] [nonmetallic] in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface raceways only where indicated on Drawings.

- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. A. Support conduit within 12 inches of enclosures to which attached.
- I. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 - 5. Change from ENT to IMC before rising above floor.
- J. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- L. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

- N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- Q. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- S. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Where otherwise required by NFPA 70.
- V. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- W. Expansion-Joint Fittings:
 - 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
 - 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.

- b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
- 3. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
- 4. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- X. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC in damp or wet locations not subject to severe physical damage.
- Y. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- Z. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- BB. Locate boxes so that cover or plate will not span different building finishes.
- CC. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- DD. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- EE. Set metal floor boxes level and flush with finished floor surface.
- FF. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than 6 inches in nominal diameter.
 - 2. Install backfill as specified in Division 31 Section "Earth Moving."
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31.
 - 4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Underground Warning Tape: Comply with requirements in Division 26 Section "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544**SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY**A. Section Includes:**

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Division 07 Section "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS**A. Product Data:** For each type of product.**B. LEED Submittals:**

1. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 - PRODUCTS**2.1 SLEEVES****A. Wall Sleeves:**

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.

2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sleeves for Rectangular Openings:
 1. Material: Galvanized sheet steel.
 2. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 - e. Proco Products, Inc.
 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 3. Pressure Plates: Stainless steel.
 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Presealed Systems.

2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
 - 2. Sealant shall have VOC content as specified in general conditions or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 260548**VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Isolation pads.
- 2. Spring isolators.
- 3. Restrained spring isolators.
- 4. Channel support systems.
- 5. Restraint cables.
- 6. Hanger rod stiffeners.
- 7. Anchorage bushings and washers.

- B. Related Sections include the following:

- 1. Division 26 Section "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

1.3 DEFINITIONS

- A. The IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:

- 1. Site Class as Defined in the IBC: A B C D E F.
- 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: I II III.
 - a. Component Importance Factor: 1.0 1.5.
 - b. Component Response Modification Factor: 1.5 2.5 3.5 5.0.
 - c. Component Amplification Factor: 1.0 2.5 Insert value.
- 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): <Insert percent>.
- 4. Design Spectral Response Acceleration at 1.0-Second Period: <Insert percent>.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by [an evaluation service member of ICC-ES] [OSHPD] [an agency acceptable to authorities having jurisdiction].
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For [vibration isolation and] seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
 - a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other Division 26 Sections for equipment mounted outdoors.
2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
3. Field-fabricated supports.
4. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacing. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.[Indicate association with vibration isolation devices.]
 - c. Preapproval and Evaluation Documentation: By [an evaluation service member of ICC-ES] [OSHPD] [an agency acceptable to authorities having jurisdiction], showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.
- B. Qualification Data: For [professional engineer] [and] [testing agency].
- C. Welding certificates.

- D. Field quality-control test reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- E. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control.
 - 6. Mason Industries.
 - 7. Vibration Eliminator Co., Inc.
 - 8. Vibration Isolation.
 - 9. Vibration Mountings & Controls, Inc.
- B. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - 1. Resilient Material: Oil- and water-resistant [neoprene] [rubber] [hermetically sealed compressed fiberglass].
- C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 - 1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.

2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- D. Restrained Spring Isolators <Insert drawing designation>: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.2 SEISMIC-RESTRAINT DEVICES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 4. Hilti Inc.
 5. Loos & Co.; Seismic Earthquake Division.
 6. Mason Industries.
 7. TOLCO Incorporated; a brand of NIBCO INC.
 8. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by [an evaluation service member of ICC-ES] [OSHDP] [an agency acceptable to authorities having jurisdiction].
1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least [four] <Insert number> times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

- D. Restraint Cables: [ASTM A 603 galvanized] [ASTM A 492 stainless]-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- E. Hanger Rod Stiffener: [Steel tube or steel slotted-support-system sleeve with internally bolted connections] [Reinforcing steel angle clamped] to hanger rod. Do not weld stiffeners to rods.
- F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
- G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.
- H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
- J. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive [vibration isolation and]seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

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

3.2 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by [an evaluation service member of ICC-ES] [OSHPD] [an agency acceptable to authorities having jurisdiction].
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment and Hanger Restraints:
 - 1. Install restrained isolators on electrical equipment.
 - 2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 - 3. Install seismic-restraint devices using methods approved by [an evaluation service member of ICC-ES] [OSHPD] [an agency acceptable to authorities having jurisdiction] providing required submittals for component.
- B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- D. Drilled-in Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least seven days' advance notice.
 - 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - 4. Test at least [four] <Insert number> of each type and size of installed anchors and fasteners selected by Architect.
 - 5. Test to 90 percent of rated proof load of device.
 - 6. Measure isolator restraint clearance.
 - 7. Measure isolator deflection.
 - 8. Verify snubber minimum clearances.
 - 9. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Adjust isolators after isolated equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.7 ELECTRICAL VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE SCHEDULE

- A. Supported or Suspended Equipment: <Insert name and drawing designation>.

1. Equipment Location: <Insert room number>.
2. Pads:
 - a. Material: [Neoprene] [Rubber] [Hermetically sealed compressed fiberglass].
 - b. Thickness: <Insert inches>.
 - c. Durometer: <Insert number>.
 - d. Number of Pads: <Insert number> thick.
3. Isolator Type: <Insert generic name or designation used in Part 2>.
4. Component Importance Factor: [1.0] [1.5].
5. Component Response Modification Factor: [1.5] [2.5] [3.5] [5.0].
6. Component Amplification Factor: [1.0] [2.5].

END OF SECTION 260548

SECTION 260553**IDENTIFICATION FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.2 FLOOR MARKING TAPE

- A. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.3 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.

2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.
3. Inscriptions for Orange-Colored Tapes: COMMUNICATIONS CABLE.

C. Product Description:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 5 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 28 lb/1000 sq. ft.
5. 3-Inch Tensile According to ASTM D 882: 70 lbf, and 4600 psi.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.5 EQUIPMENT IDENTIFICATION LABELS

A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be.

2.6 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.

3. Temperature Range: Minus 40 to plus 185 deg F .
4. Color: Black except where used for color-coding.

B. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench.

3.2 IDENTIFICATION SCHEDULE

- A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes use color-coding conductor tape to identify the phase.
1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit:
 - a. Colors for 208/120-V Circuits:

- 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - b. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in all junction boxes and at device. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
 2. Label all phase and neutral conductors with panel number and circuit number in all pull boxes, junction boxes, device boxes and in equipment enclosures.
- B. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- C. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- D. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- E. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- F. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label
 - c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Switchboards.
- e. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- f. Enclosures.
- g. Enclosed switches.
- h. Enclosed circuit breakers.
- i. Enclosed controllers.
- j. Push-button stations.
- k. Contactors.
- l. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION 260553

SECTION 260943**NETWORK LIGHTING CONTROLS****PART 1 - GENERAL****1.1 SUMMARY**

- A. The work covered in this section is subject to all of the requirements in the General Conditions of the Specifications. Contractor shall coordinate all of the work in this section with all of the trades covered in other sections of the specification to provide a complete and operable system. All Labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section.
- B. Related Sections:
 - 1. Division 26 Section 26 5100 - Interior Lighting.
 - 2. Division 26 Section 26 5600 – Exterior Lighting.

1.2 DESCRIPTION OF WORK

- A. Furnish and install a complete system for the control of lighting and other equipment as indicated on the plans, detailed in the manufacturer submittal and as further defined herein. Contractor is solely responsible to verify quantity, installation locations and wiring requirements for this project. Specific manufacturers catalog numbers, when listed in this section are for reference only. It is the responsibility of the contractor to verify with lighting control manufacturer all catalog information and specific product acceptability.
- B. The system shall include but not be limited by the following list: Unison (supplier of lighting control system) shall supply all equipment required and deliver to the contractor for installation. Unison shall provide any required connections to the new EMS or connections and reprogramming of the existing EMS systems for lighting control interface per Owner requirements. Electrical Contractor to install components and wire per final Unison shop drawings. 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. They are not the work of this section.

1.3 REFERENCES

- A. See Section 01 3546 – LEED Guidelines.
- B. See Section 01 3547 – LEED Appendix – Quality Control Submittal Binder (LEED submittal binder templates).

1.4 BEST BUY NATIONAL ACCOUNTS PROGRAM

- A. See section 00 2713 for Best Buy's National Accounts Vendor program.

1.5 SUBMITTALS

- A. Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL.
- B. Shop Drawings: Submit dimensioned drawings of lighting control system and accessories including, but not necessarily limited to, relays, switches, DTC, photocells and other interfaces. Shop drawings shall indicate exact location of each device or a RFI to confirm location. Plans are diagrammatical. EC to verify all lighting control material requirements from approved shop drawings. "Cut Sheet" submittal not acceptable.
- C. One Line Diagram: Submit a one-line diagram of the system configuration indicating the type, size and number of conductors between each component if it differs from that illustrated in the riser diagram shown on the drawings. Submittals that show typical riser diagrams are not acceptable.

1.6 QUALITY ASSURANCE

- A. Products shall be supplied by Unison Comfort Technologies, 708 North 1st Street Suite 341, Minneapolis, MN 55401. Contact Brian Ranney (800) 789-8550.
- B. Control wiring shall be in accordance with the NEC requirements for Class 2 remote control systems, Article 725 and manufacturer specification.
- C. A licensed electrician shall functionally test each system component after installation, verify proper operation and confirm that all relay and switch wiring conform to the wiring documentation. The Electrical Contractor (EC) is required to phone Unison a minimum of 14 days before turnover for system checkout. At time of Unison contact, all components must be installed and wired per Unison shop drawings.
- D. Comply with NEC and all local and state codes as applicable to electrical wiring work.
- E. Lighting control system shall be UL Listed. Electrical contractor is responsible for verifying compliance.
- F. The lighting control system shall be listed, approved and comply as required with all national, state and local energy codes to include but not limited to California Title 24 and ASHRAE 90.1-2009.

1.7 MAINTENANCE MATERIALS

- A. Division 1 - Execution Requirements: Spare parts and maintenance products.
- B. Provide 2 extra sets of as-built and operating manuals.

1.8 SUBSTITUTIONS

- A. No substitutions are allowed.

1.9 SYSTEM DESCRIPTION

- A. The lighting control system is to be integrated to work with the building EMS system, with additional interface elements as required to make a complete and functioning system such as 0-10VDC signal interfaces for control of the fluorescent dimming system, control and power relays for on/off control of all lighting, open and closed loop light sensors. System shall include all operational software per Best Buy requirements. The intent of the specification is to integrate all lighting control into one system, except for emergency fixtures designed to operate 24/7. Software to integrate with the building EMS system.
- B. System software shall provide real time status of each relay, each zone and each group.
- C. All programs, schedules, time of day, etc, shall be held in non-volatile memory for a minimum of 10 years at power failure. At restoration of power, lighting control system shall implement programs required by current time and date.
- D. System shall be capable of flashing lights Off/On for any relay or any zone prior to the lights being turned Off. The warning interval time between the flash and the final lights off signal shall be definable for each zone. Occupant shall be able to override any scheduled Off sweep using wall switches. Occupant override time shall be locally and remotely programmable and not exceed 2-hours.
- E. The lighting control system shall provide the ability to control each relay and each relay group per this specifications requirement. All programming and scheduling shall be able to be done locally at the master LCP and remotely via the Internet. Remote connection to the lighting control system shall provide real time control and real time feedback.

PART 2 - PRODUCTS

2.1 MATERIAL AND COMPONENTS

- A. Control Panels:
 - 1. NEMA rated enclosure with screw cover or hinged door. Other NEMA types optional.
 - 2. 16 AWG steel barrier shall separate the high voltage and low voltage compartments of the panel and separate 120v and 277v.
 - 3. LCP input power shall be capable of accepting 120v or 277v without rewiring.
- B. Contactor Panels
 - 1. Contactor panels shall have minimum 20 amp, 5,000 SCCR rated lighting relays and shall control all lighting in the designated area indicated on the plans..
- C. Standard Output Relays

1. UL Listed, 20 Amp, 5,000 SCCR, 277VAC Ballast, HID and 20 Amp Tungsten at 120VAC.
 2. Relays shall be individually replaceable. Relay terminal blocks shall be capable of accepting two (2) #8AWG wires on both the line and the load side.
 3. Relays to be rated for 250,000 operations minimum at a full 20 amp lighting load.
 4. Relays shall be low noise, any relays with objectionable noise levels will need to be replaced.
- D. DTC – Digital Electronic Time Clock
1. An electronic time clock shall control and program the entire lighting control system and supply all time functions and accept interface inputs. The time clock to be certified to comply with the current energy code covering this project at time of submittal of plans for building permit.
- E. PHOTOCELL:
1. Photocells to be mounted in location indicated on the plans. Photocells used for exterior lights shall provide multiple trips point from 1 roof mounted unit. All trips points shall be able to be changed remotely via Internet. Photocells requiring manual trip point adjustment are not acceptable. Photocell used for interior lighting control shall have multiple settings such as start-point, mid-point, off-point, fade-up, fade-down, etc. All settings shall be remotely accessible and adjustable. Systems providing local adjustment only are not acceptable. Photocells to be certified to comply with the current energy code covering this project at time of submittal of plans for building permit.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Mount relay control cabinets adjacent to respective lighting panelboard. Cabinet shall be surface or flush mount, per plans. Wiring between relay control cabinet and panelboards to be per local codes and acceptable industry standards. Under no circumstances will any extra be authorized for payment to the EC or GC due to the EC's lack of knowledge or understanding of any and all prevailing codes or specified manufacturer's installation requirements. Neatly lace and rack wiring in cabinets. During construction process, protect all interior components of each panel and each digital switch from dust and debris. Any damage done to electronic components due to non-protection shall be the sole responsibility of the installing contractor.
- B. Comply with all local codes and landlord requirements for low voltage wiring in conduit requirements.
- C. Wiring
 1. Do not mix low voltage and high voltage conductors in the same conduit unless allowed by all local codes, Best Buy and manufacturer recommendations. No exceptions.

2. Ensure low voltage conduits or control wires do not run parallel to current carrying conduits unless allowed by all local codes, Best Buy and manufacturer recommendations.
3. Neatly lace and rack wiring in cabinets.
4. The specified lighting control system shall be installed as called for on drawings by the electrical contractor who shall make all necessary wiring connections to external devices. EC to wire per supplier instructions.

3.2 INSTALLATION AND SET-UP

- A. Verify that conduit for line voltage wires enters panel in line voltage areas and conduit for low-voltage control wires enters panel on low-voltage areas. Refer to manufacturer's plans and approved shop drawings for location of line and low-voltage areas. It is the responsibility of the contractor to verify with lighting control Supplier all catalog information and specific product acceptability.
- B. Contractor to test all low voltage cable for integrity and proper operation prior to turn over. Verify with system supplier all wiring and testing requirements.
- C. Before Substantial Completion, Electrical Contractor and Unison shall arrange and provide a one-day Owner instruction period to designated Owner personnel. Set-up, commissioning of the lighting control system, and Owner instruction includes:
 1. Confirmation of entire system operation and communication to each device.
 2. Confirmation of operation of individual relays, switches, occupancy sensors and daylight sensors.
 3. Confirmation of system Programming, photocell settings, override settings, etc.
 4. Provide training to cover installation, maintenance, troubleshooting, programming, and repair and operation of the lighting control system.
- D. Panels shall be located so that they are readily accessible and not exposed to physical damage.
- E. Panel locations shall be furnished with sufficient working space around panels to comply with the National Electric Electrical Code.
- F. Panels shall be securely fastened to the mounting surface by at least 4 points.
- G. Unused openings in the cabinet shall be effectively closed.
- H. Cabinets shall be grounded as specified in the National Electrical Code.
- I. Lugs shall be suitable and listed for installation with the conductor being connected.
- J. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.

- K. Maintain the required bending radius of conductors inside cabinets.
- L. Clean cabinets of foreign material such as cement, plaster and paint.
- M. Distribute and arrange conductors neatly in the wiring gutters.
- N. Follow the manufacturer's torque values to tighten lugs.
- O. Before energizing the panelboard, the following steps shall be taken:
 - 1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been furnished/
 - 2. Remove shipping blocks from component devices and the panel interior.
 - 3. Remove debris from panelboard interior.
- P. Follow manufacturers' instructions for installation and all low voltage wiring.
- Q. Service and Operation Manuals:
 - 1. Submit operation and service manuals. Complete manuals shall be bound in flexible binders and data shall be typewritten or drafted.
 - 2. Manuals shall include instructions necessary for proper operation and servicing of system and shall include complete wiring circuit diagrams of system, wiring destination schedules for circuits and replacement part numbers. Manuals shall include as-built cable Project site plot plans and floor plans indicating cables, both underground and in each building with conduit, and as-built coding used on cables. Programming forms of systems shall be submitted with complete information.
- R. Comply with energy code lighting control system "Acceptance Requirements". Acceptance tests are used to verify that lighting controls were installed and calibrated correctly. These tests may require that a responsible party certify that controls are installed and calibrated properly. This is the installing contractors responsibility. Verify requirements with building authority.

3.3 DOCUMENTATION

- A. Each relay shall have an identification label indicating the originating branch circuit number and panelboard name as indicated on the drawings. Each line side branch circuit conductor shall have an identification tag indicating the branch circuit number.

3.4 SERVICE AND SUPPORTS

- A. Start Up: EC shall contact Unison at least 14 days before turnover of project. Unison will finish their work, run diagnostics and confirm system programming. EC shall be available at a time coordinated with unison to perform any corrections required by Unison.
- B. Provide a factory technician for on-site training of the owners' representatives and maintenance personnel. Coordinate timing with General Contractor. Provide one day of factory on-site training.

3.5 CLEANING

- A. Division 1 - Execution Requirements: Final cleaning.
- B. Clean photocell lens as recommended by manufacturer.
- C. Clean all switch faceplates.

3.6 SEQUENCE OF OPERATION FOR LIGHTING CONTROL SYSTEM

- A. STORE INTERIOR: Manager enters store and enters code disarming security system. Dry contact in security system causes the following:

Sales Floor and Vestibule:

- 1. Night lighting ends.
- 2. Lighting to come on to low employee only levels. Daylight harvesting will occur if available.
- 3. 15 minutes prior to store opening, lights will adjust to store open setpoint. Daylight harvesting will occur if available.
- 4. 15 minutes after store closing, lights will flash and in 5 minutes will adjust to predetermined employee only levels unless over-ride switch is pushed which will start this process over in 30 minutes. Daylight harvesting will occur if available.
- 5. Store open/close times to be determined by BEMS system.

Receiving and ISC:

Lighting turns on.

HUB, Sales, Admin Office, and LP Equip. Rm.:

Power to room lighting is energized allowing occupancy sensor control. Rooms also have bi-level manual controls for off, 1/3, 2/3 and full-on control. In office and LP Equip. Rm., hot wire needed to bypass relay to emergency ballast in local fixture.

Electrical, Comm. Rm., Corridor and Bathrooms:

Power to room lighting is energized allowing occupancy sensor control. In bathrooms, hot wire needed to bypass relay to emergency ballasts in local fixtures.

- B. Manager leaves store and enters code arming security system. Dry contact in security system causes the following:
 - 1. Night lighting starts, all other lights in building to turn off.
- C. Security system or fire system alarm:
 - 1. When fire or security system goes into alarm, all lights to come on full bright.
- D. Photocell control for daylight harvesting using 0-10V dimming in sales.

- E. Fade rates from off to 100% light output to be a 5 minute interval. Fade rate to be constant throughout.
- F. Daylight harvesting will include a 1 minute time delay before the start of lighting change.
- G. All fade rates, set points, delay intervals, etc. to be fully adjustable remotely.
- H. Interface to work with building energy management system so BEMS can collect and interpret data from the lighting control system.
 - 1. Photocell in sales records current footcandle levels to be reported by BEMS.
 - 2. BEMS to report dimming levels of light fixtures by zone.
 - 3. BEMS to report on/off status of light fixtures by zone.
- I. Override switch will turn all interior lights to store “open” levels.
- J. All lighting control relays to fail to on position.

B. Store Exterior Control:

- A. Photocell on Roof to turn all exterior lighting on at dusk. Backup control to be astronomical time clock function override switch.
- B. 15 minutes after store closing, all exterior lighting not designated as security lighting to turn off.
 - 1. Can be over-ridden for 0-2 hour by override switch.
- C. All signs to turn off at store closing time.
- D. Photocell on Roof to turn designated security lighting off at dawn
- E. BEMS to report on/off status of customer site lighting fixtures and signage.
- F. BEMS to report on/off status of security lighting.

C. Dimming Levels by Zone:

Zone 1 (Checkout/Customer Service): Dimming threshold to be set at store design foot candles levels when lights are at 100% light output. Zone shall dim to off.

Zone 2 (General Sales Floor): Dimming threshold to be set at store design foot candles levels when lights are at 100% light output. Zone shall dim to off.

END OF SECTION 260943

SECTION 262726**WIRING DEVICES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Twist-locking receptacles.
 - 3. Receptacles with integral surge-suppression units.
 - 4. Isolated-ground receptacles.
 - 5. Tamper-resistant receptacles.
 - 6. Weather-resistant receptacles.
 - 7. Snap switches and wall-box dimmers.
 - 8. Solid-state fan speed controls.
 - 9. Pendant cord-connector devices.
 - 10. Cord and plug sets.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Service/Power Poles: One for every 10, but no fewer than one.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand (Pass & Seymour).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide the following:

- a. Cooper; 5351 (single), CR5362 (duplex).
- b. Hubbell; HBL5351 (single), HBL5352 (duplex).
- c. Leviton; 5891 (single), 5352 (duplex).
- d. Pass & Seymour; 5361 (single), 5362 (duplex).

- B. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide the following:

- a. Cooper; IG5362RN.
- b. Hubbell; IG5362.
- c. Leviton; 5362-IG.
- d. Pass & Seymour; IG5362.

2. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

- C. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.

1. Products: Subject to compliance with requirements, provide the following:

- a. Cooper; TR8300.
- b. Hubbell; HBL8300SGA.
- c. Leviton; 8300-SGG.
- d. Pass & Seymour; TR63H.

2.4 GFCI RECEPTACLES

- A. General Description:

1. Straight blade, non-feed through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, provide the following:

- a. Cooper; VGF20.
- b. Hubbell; GFR5352L.
- c. Pass & Seymour; 2095.
- d. Leviton; 7590.

C. Isolated-Ground, Duplex Convenience Receptacles:

1. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:

- a. Cooper; IG5362BLS.
- b. Hubbell; IG5362SA.
- c. Leviton; 5380-IG.
- d. Pass & Seymour; IG5362BLSP.
- e. <Insert manufacturer's name; catalog number(s)>.

2. Description:

- a. Straight blade, 125 V, 20 A; NEMA WD 6 Configuration 5-20R.
- b. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

2.5 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.

1. Products: Subject to compliance with requirements, provide the following:

- a. Cooper; CWL520R.
- b. Hubbell; HBL2310.
- c. Leviton; 2310.
- d. Pass & Seymour; L520-R.

2.6 PENDANT CORD-CONNECTOR DEVICES

A. Description:

- 1. Matching, locking-type plug and receptacle body connector.
- 2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
- 3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
- 4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.7 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.8 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide the following:

a. Single Pole:

- 1) Cooper; AH1221.
- 2) Hubbell; HBL1221.
- 3) Leviton; 1221-2.
- 4) Pass & Seymour; CSB20AC1.

b. Two Pole:

- 1) Cooper; AH1222.
- 2) Hubbell; HBL1222.
- 3) Leviton; 1222-2.
- 4) Pass & Seymour; CSB20AC2.

c. Three Way:

- 1) Cooper; AH1223.
- 2) Hubbell; HBL1223.
- 3) Leviton; 1223-2.
- 4) Pass & Seymour; CSB20AC3.

d. Four Way:

- 1) Cooper; AH1224.
- 2) Hubbell; HBL1224.
- 3) Leviton; 1224-2.
- 4) Pass & Seymour; CSB20AC4.

C. Key-Operated Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide the following:

a. Cooper; AH1221L.

- b. Hubbell; HBL1221L.
 - c. Leviton; 1221-2L.
 - d. Pass & Seymour; PS20AC1-L.
 - 2. Description: Single pole, with factory-supplied key in lieu of switch handle.
- D. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.
- 1. Products: Subject to compliance with requirements, provide the following:
 - a. Cooper; 1995.
 - b. Hubbell; HBL1557.
 - c. Leviton; 1257.
 - d. Pass & Seymour; 1251.
- E. GFCI, Tamper-Resistant and Weather-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A.
- 1. Products: Subject to compliance with requirements, provide the following:
 - a. Cooper; TWRVGF15.
 - b. Hubbell; GFTR15.
 - c. Pass & Seymour; 1594TRWR.
 - 2. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.

2.9 WALL-BOX DIMMERS

- A. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
- B. Control: Continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.
- C. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.
 - 1. 600 W minimum; dimmers shall require no derating when ganged with other devices.
- D. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.10 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces 0.035-inch-thick, satin-finished, Type 302 stainless steel.
3. Material for Unfinished Spaces: 0.035-inch-thick, satin-finished, Type 302 stainless steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.11 SERVICE POLES

A. Description:

1. Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
2. Poles: Nominal 2.5-inch- square cross section, with height adequate to extend from floor to at least 6 inches above ceiling, and with separate channels for power wiring and voice and data communication cabling.
3. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
4. Finishes: Manufacturer's standard painted finish and trim combination. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, four-pair, Category 3 or Category 5 voice and data communication cables.
5. Power Receptacles: Two duplex, 20-A, straight-blade receptacles complying with requirements in this Section.
6. Voice and Data Communication Outlets: See plans.

2.12 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: Gray unless otherwise indicated or required by NFPA 70 or device listing.
2. Isolated-Ground Receptacles: Orange.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtail existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 262726

SECTION 262813**FUSES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches and enclosed controllers.
2. Plug fuses rated 125-V ac and less for use in plug-fuse-type fuseholders.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
3. Current-limitation curves for fuses with current-limiting characteristics.
4. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
5. Coordination charts and tables and related data.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.
2. Current-limitation curves for fuses with current-limiting characteristics.

3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
4. Coordination charts and tables and related data.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Comply with UL 248-11 for plug fuses.

1.7 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.8 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Cooper Bussmann, Inc.
 2. Edison Fuse, Inc.
 3. Ferraz Shawmut, Inc.
 4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

2.3 PLUG FUSES

- A. Characteristics: UL 248-11, nonrenewable plug fuses; 125-V ac.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Cartridge Fuses:
 - 1. Motor Branch Circuits: Class RK5, time delay.
 - 2. Other Branch Circuits: Class J, time delay.
 - 3. Control Circuits: Class CC, fast acting.
- B. Plug Fuses:
 - 1. Branch Circuits: Edison-base type, single-element time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install plug-fuse adapters in Edison-base fuseholders and sockets. Ensure that adapters are irremovable once installed.

3.4 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816**ENCLOSED SWITCHES AND CIRCUIT BREAKERS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Receptacle switches.
 - 4. Shunt trip switches.
 - 5. Molded-case circuit breakers (MCCBs).
 - 6. Molded-case switches.
 - 7. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.

2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Manufacturer's field service report.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 2. Fuse Pullers: One for each size and type.

1.9 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Comply with NFPA 70.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet.
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Architect no fewer than seven days in advance of proposed interruption of electric service.
 - 2. Indicate method of providing temporary electric service.
 - 3. Do not proceed with interruption of electric service without Architect's written permission.
 - 4. Comply with NFPA 70E.

1.11 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 800 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 5. Auxiliary Contact Kit: one NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 - 6. Lugs: Mechanical type, suitable for number, size, and conductor material.
 - 7. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.

- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 - 5. Hookstick Handle: Allows use of a hookstick to operate the handle.
 - 6. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 - 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 - 5. Alarm Switch: One NO contact that operates only when circuit breaker has tripped.

2.4 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.
- E. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Acceptance Testing Preparation:
 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

SECTION 262913**ENCLOSED CONTROLLERS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following enclosed controllers rated 600 V and less:
 - 1. Full-voltage manual.
 - 2. Full-voltage magnetic.
 - 3. Reduced-voltage magnetic.
 - 4. Reduced-voltage solid state.
 - 5. Multispeed.
- B. Related Section:
 - 1. Division 26 Section "Variable-Frequency Motor Controllers" for general-purpose, ac, adjustable-frequency, pulse-width-modulated controllers for use on variable torque loads in ranges up to 200 hp.

1.3 DEFINITIONS

- A. CPT: Control power transformer.
- B. MCCB: Molded-case circuit breaker.
- C. MCP: Motor circuit protector.
- D. N.C.: Normally closed.
- E. N.O.: Normally open.
- F. OCPD: Overcurrent protective device.
- G. SCR: Silicon-controlled rectifier.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed controllers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed controller. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes.
- B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.
 1. Show tabulations of the following:
 - a. Each installed unit's type and details.
 - b. Factory-installed devices.
 - c. Nameplate legends.
 - d. Short-circuit current rating of integrated unit.
 - e. Listed and labeled for integrated short-circuit current (withstand) rating of OCPDs in combination controllers by an NRTL acceptable to authorities having jurisdiction.
 - f. Features, characteristics, ratings, and factory settings of individual OCPDs in combination controllers.
 2. Wiring Diagrams: For power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Certificates: For enclosed controllers, accessories, and components, from manufacturer.
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.
- D. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
- E. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Routine maintenance requirements for enclosed controllers and installed components.
 - 2. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
 - 3. Manufacturer's written instructions for setting field-adjustable overload relays.
 - 4. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage solid-state controllers.

1.8 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.

1.9 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NFPA 70.
- D. IEEE Compliance: Fabricate and test enclosed controllers according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.11 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.

2. Altitude: Not exceeding 6600 feet.
- B. Interruption of Existing Electrical Systems: Do not interrupt electrical systems in facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 1. Notify Architect no fewer than two days in advance of proposed interruption of electrical systems.
 2. Indicate method of providing temporary utilities.
 3. Do not proceed with interruption of electrical systems without Architect's written permission.
 4. Comply with NFPA 70E.

1.12 COORDINATION

- A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

- A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.
- B. Motor-Starting Switches: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.
 2. Configuration: Nonreversing.
 3. Surface mounting.
 4. Red pilot light.
- C. Fractional Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.
 2. Configuration: Nonreversing.
 3. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type.
 4. Surface mounting.
- D. Magnetic Controllers: Full voltage, across the line, electrically held.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.
 2. Configuration: Nonreversing.
 3. Contactor Coils: Pressure-encapsulated type with coil transient suppressors.
 - a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 4. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 5. Control Circuits: 120V ac; obtained from integral CPT, with primary and secondary fuses, with CPT of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 6. Melting Alloy Overload Relays:
 - a. Inverse-time-current characteristic.
 - b. Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 7. Bimetallic Overload Relays:
 - a. Inverse-time-current characteristic.
 - b. Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - c. Ambient compensated.
 - d. Automatic resetting.
 8. External overload reset push button.

- E. Combination Magnetic Controller: Factory-assembled combination of magnetic controller, OCPD, and disconnecting means.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - c. Rockwell Automation, Inc.; Allen-Bradley brand.
 - d. Siemens Energy & Automation, Inc.
 - e. Square D; a brand of Schneider Electric.
 2. Configuration: Nonreversing.
 3. Fusible Disconnecting Means:
 - a. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class R fuses.
 - b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 4. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
 5. Nonfusible Disconnecting Means:
 - a. NEMA KS 1, heavy-duty, horsepower-rated, nonfusible switch.
 - b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - c. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
 6. MCP Disconnecting Means:
 - a. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - c. Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
 - d. [N.C.] [N.O.] alarm contact that operates only when MCP has tripped.
 - e. Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.
 7. MCCB Disconnecting Means:
 - a. UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 - b. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - c. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - d. Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
 - e. [N.C.] [N.O.] alarm contact that operates only when MCCB has tripped.

2.2 ENCLOSURES

- A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.
 - 1. Dry and Clean Indoor Locations: Type 1.
 - 2. Outdoor Locations: Type 3R.
 - 3. Other Wet or Damp Indoor Locations: Type 4.
 - 4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.

2.3 ACCESSORIES

- A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 - 1. Push Buttons, Pilot Lights, and Selector Switches: Standard duty type.
 - a. Push Buttons: Shrouded maintained contact as indicated.
 - b. Pilot Lights: LED type.
 - c. Selector Switches: Rotary type.
- B. N.C. and N.O. auxiliary contact(s).
- C. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.
- D. Breather and drain assemblies, to maintain interior pressure and release condensation in Type 4 enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
- E. Cover gaskets for Type 1 enclosures.
- F. Terminals for connecting power factor correction capacitors to the line side of overload relays.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems."
- B. Seismic Bracing: Comply with requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in each fusible-switch enclosed controller.
- E. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses."
- F. Install heaters in thermal overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
- G. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- H. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.

3.4 CONTROL WIRING INSTALLATION

- A. Install wiring between enclosed controllers and remote devices and facility's central control system. Comply with requirements in Division 26 Section "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control selection devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 - 2. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- D. Tests and Inspections:
 - 1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
 - 2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
 - 3. Test continuity of each circuit.
 - 4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Architect before starting the motor(s).
 - 5. Test each motor for proper phase rotation.
 - 6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Enclosed controllers will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

- A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
- B. Adjust overload-relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.
- C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA

Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Architect before increasing settings.

3.7 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until enclosed controllers are ready to be energized and placed into service.
- B. Replace controllers whose interiors have been exposed to water or other liquids prior to Substantial Completion.

END OF SECTION 262913

SECTION 264313**SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes field-mounted SPDS for low-voltage (120 to 600 V) power distribution and control equipment.
- B. Related Sections:
 - 1. Division 26 Section "Switchboards" for factory-installed SPDs.

1.3 DEFINITIONS

- A. ATS: Acceptance Testing Specifications.
- B. VPR: Voltage protection rating.
- C. SPDs: Surge Protection Device(s), both singular and plural; also, transient voltage surge suppression.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating weights, electrical characteristics, furnished specialties, and accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Certificates: For SPDs devices, from manufacturer.
- C. Field quality-control reports.
- D. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For SPDs devices to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. If SPD comes with replaceable protection modules or other replaceable parts, furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Replaceable Protection Modules: One of each size and type installed.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member Company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.
- C. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45.
- D. Comply with UL 1449.
- E. Comply with NFPA 70.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed electrical service interruptions.
 - 2. Do not proceed with interruption of electrical service without Architect's written permission.
- B. Service Conditions: Rate SPDs devices for continuous operation under the following conditions unless otherwise indicated:
 - 1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
 - 2. Operating Temperature: 30 to 120 deg F.
 - 3. Humidity: 0 to 85 percent, noncondensing.
 - 4. Altitude: Less than 6600 feet above sea level.

1.10 COORDINATION

- A. Coordinate location of field-mounted SPDs devices to allow adequate clearances for maintenance.
- B. Coordinate SPDs devices with Division 26 Section "Electrical Power Monitoring and Control."

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Warranty for Cord-Connected, Plug-in Surge Suppressors: Manufacturer's standard form in which manufacturer agrees to repair or replace electronic equipment connected to circuits protected by surge suppressors.

PART 2 - PRODUCTS

2.1 SERVICE ENTRANCE SUPPRESSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Current Technology Inc.; Danaher Power Solutions.
 - 2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 3. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 4. Liebert Corporation; a division of Emerson Network Power.
 - 5. Siemens Energy & Automation, Inc.
 - 6. Square D; a brand of Schneider Electric.
- B. Surge Protection Devices:
 - 1. Comply with UL 1449.
 - 2. Modular design with field-replaceable modules Non-modular design.
 - 3. Fuses, rated at 200-kA interrupting capacity.
 - 4. Fabrication using bolted compression lugs for internal wiring.
 - 5. Integral disconnect switch.
 - 6. Redundant suppression circuits.
 - 7. Arrangement with copper bus bars and for bolted connections to phase buses, neutral bus, and ground bus.
 - 8. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
 - 9. LED indicator lights for power and protection status.
 - 10. Audible alarm, with silencing switch, to indicate when protection has failed.
 - 11. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
 - 12. Six-digit transient-event counter set to totalize transient surges.

13. Type 1 or 2.
14. Nominal discharge current of 20KA.

- C. Peak Surge Current Capacity: 125 kA per mode/250 kA per phase.
- D. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V, 3-phase, 4-wire circuits shall be as follows:
 1. Line to Neutral: 1200 V for 480Y/277 V.
 2. Line to Ground: 1200 V for 480Y/277 V.
 3. Neutral to Ground: 1200 V for 480Y/277 V.

2.2 ENCLOSURES

- A. Indoor Enclosures: NEMA 250 Type 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install SPDs devices at service entrance on load side, with ground lead bonded to service entrance ground.
- B. Install SPDs devices for panelboards and auxiliary panels with conductors or buses between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
 1. Provide bus bar or circuit breaker sized as required by the manufacturer for SPDS unless otherwise indicated.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
 1. Verify that electrical wiring installation complies with manufacturer's written installation requirements.
- C. Perform tests and inspections.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
 1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.

2. After installing SPDs devices but before electrical circuitry has been energized, test for compliance with requirements.
 3. Complete startup checks according to manufacturer's written instructions.
- E. SPDs device will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

3.3 STARTUP SERVICE

- A. Do not energize or connect service entrance equipment to their sources until SPDs devices are installed and connected.
- B. Do not perform insulation resistance tests of the distribution wiring equipment with the SPDs installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

END OF SECTION 264313

SECTION 265100
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior lighting fixtures, lamps, and ballasts.
2. Emergency lighting units.
3. Exit signs.
4. Lighting fixture supports.
5. Retrofit kits for fluorescent lighting fixtures.

B. Related Sections:

1. Division 26 Section "Network Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.
2. Division 26 Section "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.3 BEST BUY NATIONAL ACCOUNTS PROGRAM

- A. See section 00 2713 for Best Buy's National Accounts Vendor program.

1.4 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. HID: High-intensity discharge.
- E. LER: Luminaire efficacy rating.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
1. Physical description of lighting fixture including dimensions.
 2. Emergency lighting units including battery and charger.
 3. Ballast, including BF.
 4. Energy-efficiency data.
 5. Air and Thermal Performance Data: For air-handling lighting fixtures. Furnish data required in "Action Submittals" Article in Division 23 Section "Diffusers, Registers, and Grilles."
 6. Sound Performance Data: For air-handling lighting fixtures. Indicate sound power level and sound transmission class in test reports certified according to standards specified in Division 23 Section "Diffusers, Registers, and Grilles."
 7. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 8. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
 - b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Shop Drawings: For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work.
1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Installation instructions.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Lighting fixtures.
 2. Suspended ceiling components.
 3. Ceiling-mounted projectors.
 4. Structural members to which suspension systems for lighting fixtures will be attached.
 5. Other items in finished ceiling including the following:
 - a. Air outlets and inlets.
 - b. Speakers.
 - c. Sprinklers.
 - d. Smoke and fire detectors.

- e. Occupancy or Daylight sensors.
 - f. Access panels.
 - B. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
 - C. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.
 - D. Field quality-control reports.
 - E. Warranty: Sample of special warranty.
- 1.7 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.
- 1.8 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. Ballasts: One for every 100 of each type and rating installed. Furnish at least one of each type.
- 1.9 QUALITY ASSURANCE
- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
 - B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.
 - C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - D. Comply with NFPA 70.
 - E. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

1.10 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.11 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
 - 2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products indicated on the Drawings.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- C. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.
- D. Metal Parts: Free of burrs and sharp corners and edges.
- E. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- G. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

- a. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
 - b. UV stabilized.
- 2. Glass: Annealed crystal glass unless otherwise indicated.
- H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - 1. Label shall include the following lamp and ballast characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
 - c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
 - d. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
 - e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
 - f. CCT and CRI for all luminaires.
- I. Electromagnetic-Interference Filters: Factory installed to suppress conducted electromagnetic interference as required by MIL-STD-461E. Fabricate lighting fixtures with one filter on each ballast indicated to require a filter.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

- A. General Requirements for Electronic Ballasts: Subject to compliance with requirements, provide products indicated on the Drawings.

2.4 EMERGENCY FLUORESCENT POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.
 - 1. Emergency Connection: Operate [one] <Insert number> fluorescent lamp(s) continuously at an output of [1100] <Insert value> lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 - 2. Nightlight Connection: Operate one fluorescent lamp continuously.
 - 3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 4. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - 5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 - 6. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in

tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.

7. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

- B. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from lighting fixture. Comply with UL 924.

1. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
2. Nightlight Connection: Operate one fluorescent lamp in a remote fixture continuously.
3. Battery: Sealed, maintenance-free, nickel-cadmium type.
4. Charger: Fully automatic, solid-state, constant-current type.
5. Housing: NEMA 250, Type 1 enclosure.
6. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
7. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
8. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.5 BALLASTS FOR HID LAMPS

- A. Electromagnetic Ballast for Metal-Halide Lamps: Subject to compliance with requirements, provide products indicated on the Drawings.

2.6 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

- B. Internally Lighted Signs:

1. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.
2. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.

- e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
- f. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
- g. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.7 EMERGENCY LIGHTING UNITS

- A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.
 - 1. Battery: Sealed, maintenance-free, lead-acid type.
 - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - 4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - 5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
 - 7. Integral Time-Delay Relay: Holds unit on for fixed interval of [15] <Insert period> minutes when power is restored after an outage.
 - 8. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 - 9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.8 FLUORESCENT LAMPS

- A. Fluorescent Lamps: Subject to compliance with requirements, provide products indicated on the Drawings.

2.9 HID LAMPS

- A. HID Lamps: Subject to compliance with requirements, provide products indicated on the Drawings.

2.10 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.

- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.
- E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures:
 - 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - 2. Install lamps in each luminaire.
- B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.
- C. Remote Mounting of Ballasts: Distance between the ballast and fixture shall not exceed that recommended by ballast manufacturer. Verify, with ballast manufacturers, maximum distance between ballast and luminaire.
- D. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.
 - 1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches from lighting fixture corners.
 - 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
 - 4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- E. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.
- F. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Verify that self-luminous exit signs are installed according to their listing and the requirements in NFPA 101.
- C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.4 STARTUP SERVICE

- A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

END OF SECTION 265100

SECTION 267500**COMMUNICATIONS AND SYSTEMS ROUGH-IN REQUIREMENTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including but not limited to, General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Division 26 Specification Sections include, but are not limited to:
 - 1. Section 260533 "Raceways and Boxes for Electrical Systems"
 - 2. Section 260936 "Network Dimming Controls"

1.2 SUMMARY

- A. The intent of this Section is to outline the responsibility of the Electrical Contractor for Communications and Systems furnished and installed by the Owner or the Owner's designated subcontractors. The Electrical contractor responsibility for including the installation of a complete empty raceway and backbox system that supports the functional requirements for the following systems:
 - 1. Voice, Data, Fiber Backbone and Horizontal Cabling Systems: Systems provided by Owner's subcontractor.
 - 2. Telecommunications Grounding Backbone System. Conductors and bus bar for the backbone grounding system shall be provided and installed by Division 26. Grounding and bonding of telecommunications equipment within telecommunications equipment spaces shall be the responsibility of the Owner's subcontractor
 - 3. Audio/Video Systems: Systems provided by Owner's subcontractor.
 - 4. Intrusion Detection, Access Control, and Video Surveillance Systems: Systems provided by Owner's subcontractor.
 - 5. Antenna and Cable Television Systems: Systems provided by Owner's subcontractor.
 - 6. Fire Alarm System: Systems provided by Owner's subcontractor.
- B. The complete cabling and equipment installation shall be provided by the Owner's subcontractor
- C. It shall be required that the Electrical Contractor to review and coordinate with the Owner and Owner's installation subcontractor for requirements for the above listed systems.
- D. Where conduit and backbox requirements are indicated on drawings, those requirements shall supersede the minimum requirements given in this section. Where no conduit or backbox requirements are indicated on drawings, the requirements of this section shall be used.

1.3 SEQUENCING AND SCHEDULING

- A. Prior to the start of construction and throughout the entire construction period, the Electrical Contractor shall be responsible to coordinate with the Construction Manager and the Owner's

Subcontractors as necessary for questionable items of size or to locate installation of all system components required on this project.

- B. The Owner's subcontractors shall furnish all required special and non-standard backboxes to the Electrical Contractor at the start of construction. The Electrical Contractor shall coordinate this requirement so that all the special and non-standard backboxes are delivered to the job site in a timely manner.
- C. Upon completion of the raceway and conduit system and during construction of this project, the Owner's subcontractors will provide all equipment, devices / wall plates, wire / cabling and all final terminations.

PART 2 - PRODUCTS

- A. Common Electrical components specified in Division 26 specification sections.

PART 3 - EXECUTION

3.1 VOICE, DATA, FIBER BACKBONE AND HORIZONTAL CABLING ROUGH-IN INSTALLATION

- A. The Electrical Contractor shall comply with the following:
 - 1. Provide all required outlet boxes, backboxes and junction boxes.
 - 2. Provide all raceways, conduits (minimum 3/4") for installation of cabling systems by others. Install pull string in all raceways and conduits, 1-1/4" or less. For conduits larger than 1-1/4", use #14 AWG zinc-coated steel or monofilament plastic line having not less than 200 lb. tensile strength. Leave not less than 12 inches of slack at each end of the pull string or pull wire inside boxes.
 - 3. Provide 3/4" minimum conduit from each type of voice, data outlet or handset outlet, each data/voice outlet and each TV outlet into nearest accessible ceiling space as noted. Install non-metallic threadless insulating bushings on end of all conduits.
 - 4. Conduit Stub-ups from Floor: All locations other than in a wall provide IMC conduits with threaded steel couplings set flush with finish floor. Extend 6" above finish floor with IMC before any conversion. If conduit(s) do not extend up into equipment enclosures, etc. the IMC conduit(s) shall extend a minimum 6" above finished floor and be provided with non-metallic insulating bushings.
 - 5. Except in concrete or masonry walls, use of PVC conduits through floor slabs and above floor level will be unacceptable and will require the contractor to demolish and replace conduits through slab.
 - 6. Raceways 2-inch and smaller installed in interior spaces shall not exceed 150 feet in length. All raceways installed shall not contain more than two 90-degree bends or the equivalent. Provide pullboxes or junction boxes as necessary to comply with these requirements, whether or not indicated.
 - 7. Bends in conduits shall be long sweep radius bends and in no instance shall the inside radius of bends be less than ten times the internal diameter for all conduit sizes.
 - 8. Provide all mounting boards sized as indicated, minimum 3/4" thick AC plywood. Paint all mounting boards on the smooth side with two (2) coats white alkyd enamel.
 - 9. Provide equipment grounding connections and grounding requirements at all equipment terminal systems and mounting boards.

10. Typical voice/data outlet conduit requirements: Outlets with 4 or fewer cables indicated provide 3/4" conduit minimum. Increase conduit by 1/4" trade size for each additional 2 cables above four (i.e. six cables require 1" conduit minimum.).
11. All device outlet boxes shall be minimum 4" square x 2-1/2" deep, with single or two gang plaster ring. Provide single-gang plaster ring for voice/data locations with less than six cables indicated. Provide two-gang rings for outlets with over six cables indicated.

3.2 TELECOMMUNICATIONS GROUNDING BACKBONE SYSTEM

- A. The Electrical Contractor shall provide the following for the Telecommunications Grounding Backbone System:
 1. Telecommunications grounding bus bars installed in electrical and telecommunications equipment spaces as shown on the Drawings.

3.3 AUDIO/VIDEO ROUGH-IN INSTALLATION

- A. The Electrical Contractor shall comply with the following:
 1. Provide all required outlet boxes and junction boxes. Install blank coverplates for all boxes.
 2. Provide all raceways, conduits (minimum 3/4") and connections for installation of cabling systems by others. Install pull string in all raceways and conduits, 1-1/4" or less. For conduits larger than 1-1/4", use #14 AWG zinc-coated steel or monofilament plastic line having not less than 200 lb. tensile strength. Leave not less than 12 inches of slack at each end of the pull string or pull wire inside boxes.
 3. Provide 3/4" minimum conduit from each type of device outlet into nearest accessible ceiling space or to bottom of structural steel as noted as noted. Install non-metallic threadless insulating bushings on end of all conduits.
 4. Conduit Stub-ups from Floor: All locations other than in a wall, provide conduits with threaded steel couplings set flush with finish floor. Extend 6" above finish floor with IMC before any conversion. If conduit(s) do not extend up into equipment enclosures, etc. the IMC conduit(s) shall extend a minimum 6" above finished floor and be provided with non-metallic insulating bushings or bushings acceptable to the Sound Reinforcement Contractor.
 5. Except in concrete or masonry walls, use of PVC conduits through floor slabs and above floor level will be unacceptable and will require the contractor to demolish and replace conduits through slab.
 6. Raceways 2-inch and smaller conduit runs inside the buildings shall not exceed 150 feet in length. All raceways installed shall not contain more than two 90-degree bends or the equivalent. Provide pullboxes or junction boxes as necessary to comply with these requirements, whether or not indicated.
 7. Bends in conduits shall be long sweep radius bends and in no instance shall the inside radius of bends be less than ten times the internal diameter for all conduit sizes.
 8. Provide equipment grounding connections and grounding requirements at all equipment terminal systems and mounting boards.
 9. The Electrical Contractor shall install all backboxes for speakers and any special backboxes furnished by the A/V contractor.
 10. All device outlet boxes shall be minimum 4" square x 2-1/2" deep, with single or two gang plaster ring and blank coverplate. Verify plaster ring openings with device(s) being provided by A/V contractor.

3.4 INTRUSION DETECTION, ACCESS CONTROL, AND VIDEO SURVEILLANCE ROUGH-IN INSTALLATION

A. The Electrical Contractor shall comply with the following:

1. Provide all required outlet boxes and junction boxes with blank coverplates.
2. Provide all raceways and conduits (minimum 3/4"). Install pullstring in all conduits, raceways and across non-accessible ceiling areas.
3. Stub 3/4" conduit from all exterior door frame magnetic switches to accessible ceiling or to structural deck above in non accessible ceiling.
4. Provide equipment grounding connections and grounding requirements for all equipment and terminal systems.
5. Install all special and non-standard backboxes furnished by the Owner's subcontractor.
6. All device outlet boxes shall be minimum 4" square x 2-1/2" deep, with single or two gang plaster ring and blank coverplates. Verify plaster ring with devices being provided by the Owner's subcontractor.
7. Upon the completion of the rough-in installation the Owner's subcontractor will provide all equipment, devices/covers, wire/cablings, and all final connections unless otherwise indicated.

3.5 ANTENNA AND CABLE TELEVISION SYSTEMS

A. The Electrical Contractor shall comply with the following:

1. Provide all required outlet boxes, backboxes and junction boxes.
2. Provide 2" PVC coated rigid conduit antenna mount, sleeves and weather head at locations shown on plan and per plan details.
3. Provide all raceways, conduits (minimum 3/4") and connections for installation of cabling systems by others. Install pull string in all raceways and conduits, 1-1/4" or less. For conduits larger than 1-1/4", use #14 AWG zinc-coated steel or monofilament plastic line having not less than 200 lb. tensile strength. Leave not less than 12 inches of slack at each end of the pull string or pull wire inside boxes.
4. Provide 3/4" minimum conduit from each type of TV and Antenna outlet into nearest accessible ceiling space or to bottom of structural steel as noted. Install non-metallic threadless insulating bushings on end of all conduits.
5. Conduit Stub-ups from Floor: All locations other than in a wall, provide IMC conduits with threaded steel couplings set flush with finish floor. Extend 6" above finish floor with IMC before any conversion. If conduit(s) do not extend up into equipment enclosures, etc. the IMC conduit(s) shall extend a minimum 6" above finished floor and be provided with non-metallic insulating bushings or bushings acceptable to the Owner's subcontractor.
6. Except in concrete or masonry walls, use of PVC conduits through floor slabs and above floor level will be unacceptable and will require the contractor to demolish and replace conduits through slab.
7. Raceways 2-inch and smaller installed in interior spaces shall not exceed 150 feet in length. All raceways installed shall not contain more than two 90-degree bends or the equivalent. Provide pullboxes or junction boxes as necessary to comply with these requirements, whether or not indicated.
8. Bends in conduits shall be long sweep radius bends and in no instance shall the inside radius of bends be less than ten times the internal diameter for all conduit sizes.
9. Provide equipment grounding connections and grounding requirements at all equipment terminal systems and mounting boards.

10. Antenna and Video (TV) outlets: Provide and install ¾" conduit to dedicated video (TV) locations and stub to nearest accessible ceiling space. Provide 4" square x 2-1/2" deep outlet box with single-gang plaster ring.

3.6 FIRE ALARM SYSTEM ROUGH-IN INSTALLATION

- A. The Electrical Contractor shall comply with the following in addition to equipment and system wiring specified in Specification Section 267523:
 1. Provide all required outlet boxes and junction boxes. Install blank coverplates for all boxes.
 2. Install flush mounted backboxes and conduit to accessible ceiling space. Installation of speaker/strobes and fire alarm appliances provided and installed by Owner's subcontractor.
 3. Provide 120v connections to power supplies and lighting relays for Station Alert control. Refer to plans for lighting interface.
 4. Provide all raceways, conduits (minimum 3/4"), cable tray connections and cable supports for installation of cabling systems.
 5. Provide 3/4" minimum conduit from each type of device outlet into nearest accessible ceiling space or to bottom of structural steel as noted. Install non-metallic threadless insulating bushings on end of all conduits.
 6. Conduit Stub-ups from Floor: All locations other than in a wall, provide conduits with threaded steel couplings set flush with finish floor. Extend 6" above finish floor with IMC before any conversion. If conduit(s) do not extend up into equipment enclosures, etc. the IMC conduit(s) shall extend a minimum 6" above finished floor and be provided with non-metallic insulating bushings or bushings acceptable to the Sound Reinforcement Contractor.
 7. Except in concrete or masonry walls, use of PVC conduits through floor slabs and above floor level will be unacceptable and will require the contractor to demolish and replace conduits through slab.
 8. Raceways 2-inch and smaller conduit runs inside the buildings shall not exceed 150 feet in length. All raceways installed shall not contain more than two 90-degree bends or the equivalent. Provide pullboxes or junction boxes as necessary to comply with these requirements, whether or not indicated.
 9. Bends in conduits shall be long sweep radius bends and in no instance shall the inside radius of bends be less than ten times the internal diameter for all conduit sizes.
 10. Provide equipment grounding connections and grounding requirements at all equipment terminal systems and mounting boards.
 11. The Electrical Contractor shall install all backboxes for flush mounted equipment and any special backboxes furnished by the Fire Alarm System Contractor.
 12. All device outlet boxes shall be minimum 4" square x 2-1/2" deep, with single or two gang plaster ring and blank coverplate as required. Verify plaster ring openings with device(s) being provided by A/V contractor.

END OF SECTION 267500

SECTION 283112 - FIRE-ALARM SYSTEM

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. At the time of bid the contractor shall list exceptions taken to these Specifications, variances from these Specifications and substitutions of operating capabilities or equipment called for in these Specifications and forward said list to the Engineer. Final determination of compliance with this Specification shall rest with the Engineer and will require proof of performance.

1.2 RESPONSIBILITIES

- A. This section of the specification includes the provision and installation of the Fire Alarm and/or Supervisory System. The Electrical Contractor shall contact the Best Buy National Account Vendor s for Checkpoint, Notifier or Silent Knight for system pricing. The Electrical Contractor shall include in his bid all moneys required to contract the services and equipment of the approved Fire Alarm Contractor.
- B. Approved Fire Alarm Vendors:
 - 1. Checkpoint Security
(952) 946-4376 office
(775) 416-2388 fax
 - 2. Notifier (division of Honeywell)
John Brady
203-484-7161 x5708
john.j.brady@honeywell.com
 - 3. Silent Knight (division of Honeywell)
John Brady
203-484-7161 x5708
john.j.brady@honeywell.com
- C. The Electrical Contractor will provide materials and labor to pipe, pull wire, and install mounting and equipment enclosures as specified in Part 3 - Execution of this specification. This installation will reflect the fire alarm shop drawings as much as practically possible. The Electrical Contractor shall provide the Fire Alarm Contractor with an accurate point to point plan indicating conduit and cable routing, pipe fill, wire identification, and junction points.
- D. The Electrical Contractor is responsible for contracting and scheduling the work of the Fire Alarm Contractor; including coordination between the F.A. contractor and contact person(s) for alarm monitoring. The Electrical Contractor shall notify the project manager of the Fire Alarm Contractor's scheduled date(s) on-site, not less than two (2) weeks in advance.
- E. The Fire Alarm Contractor or Electrical Contractor shall contact the Fire Alarm Consultant with comments, exceptions, and/or reservations to the drawings and specifications prior to bid.
- F. Conduit, boxes (unless noted otherwise), fittings, couplings, connectors, straps, supports, pull-lines, bushings, etc., shall be provided by the Electrical Contractor.
- G. The Electrical Contractor shall provide line voltage (120 V. max.) and low-voltage (up to 50 VAC/VDC) circuiting in separate conduit. Low-voltage circuiting shall be run exposed using NEC-FPL cable per NEC article 760, unless otherwise noted by local authority having jurisdiction. Exposed cable below

the top bar joist or other roof structure protruding lower, or other locations where the cable may become exposed and/or damaged, shall be within a steel conduit by Electrical Contractor.

- H. System operation, testing, turnover, warranty, compliance, and after market service shall be provided by the Fire Alarm Contractor.
- I. A written report shall be prepared by the Fire Alarm Contractor and submitted to the Owner's representative and Best Buy Construction Project Manager at the completion of the project, not less than one (1) week prior to the opening date. This report shall outline the walk-test results and identify items not completed or fully operable. An item that is identified in this report must be corrected and the system must be fully operable prior to the date of the final building Certificate of Occupancy Inspection.
- J. Work relative to the Fire Alarm System to be performed by the Electrical Contractor must be complete prior to Fire Alarm Contractors scheduled date(s) on site.

1.3 SCOPE

- A. Control equipment described herein and provided and installed under this section shall be the standard product of one of the accepted manufacturers listed in Section 1.5 – Quality Assurance.
- B. Reference to *device, component, unit, module, or system* shall be understood to mean the Fire Alarm System, or associated manufactured product thereof.
- C. The work covered by this Section of the Specification shall include labor, equipment, materials and services to furnish and install a complete fire alarm and/or supervisory system of the addressable, non-coded general alarm type. It shall be complete with necessary hardware, software and memory specifically tailored for this installation. It shall be possible to permanently modify the software on site by using a plug-in programmer, laptop or from the panel display. The system shall consist of, but not be limited to, the following:
 - 1. Fire Alarm Control Panel listed for intended applications.
 - 2. Remote Annunciator/s.
 - 3. Addressable manual fire alarm pull stations.
 - 4. Addressable or Analog area smoke detectors.
 - 5. Addressable or Analog duct smoke detectors
 - 6. Addressable or Analog heat detectors.
 - 7. Monitored Sprinkler waterflow alarm switches.
 - 8. Audible notification appliances; bells, horns
 - 9. Visual notification appliances; strobes
 - 10. Digital Alarm Communicator Transmitter (DACT)
 - 11. Central station alarm connection
 - 12. Air handling systems control, fans, dampers, etc..
 - 13. Dry pipe sprinkler release valve supervision.
 - 14. Smoke exhaust systems startup control.
 - 15. Sprinkler supervisory and tamper switch supervision.
 - 16. Fire pump supervision.
 - 17. Battery standby.
 - 18. Delay egress system.
 - 19. Elevator control.
- D. The Fire Alarm Contractor is to provide a contact point to allow the EMS system to monitor the status of the fire alarm. Contacts are to be normally closed and will open on alarm. See EMS drawing sheets for additional information.

1.4 QUALITY ASSURANCE

A. Manufacturer: The system and components shall be supplied by a Checkpoint, Notifier, or Silent Knight qualified Engineered Systems Distributor (ESD – referred to as the Fire Alarm Contractor).

1. The equipment described in this section represents the function and type of some of the materials required and herein specified. The equipment that is indicated in this section does not intend to be a complete list of components required for an operational and approved system but only as guidelines. Additional equipment not herein specifically indicated but is a necessary part of an operational and approved system shall be provided as required.

B. Submittals

1. Shop drawings, equipment submittals and permits shall be provided by the Fire Alarm Contractor.
2. Shop drawings & equipment submittals shall
 - a. Provide sufficient information, clearly presented, to determine compliance with drawings and specifications.
 - b. Provide a complete riser diagram including manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete point-to-point wiring diagrams, and conduit layouts.
 - c. Provide also a scaled floor plan(s) with devices/equipment located and with conduit/wiring shown. Drawings provided shall be in AutoCad format.
 - d. Provide battery calculations and voltage drop calculations, as they compare to the floor plan(s).
 - e. Provide input/output sequence of operations Matrix.
 - f. Upon completion of the project, prepare "As-built" drawings indicating locations of equipment, conduit, junction boxes, wiring, etc. Included in the "As-built" shall be color coding of conductors.
 - g. As part of the shop drawing submittal, include the name(s), address(es), and telephone number(s) of the following:
 - 1) Proposed supervisor of installation.
 - 2) Proposed performer of the maintenance contract.
 - 3) The System Designer shall be a minimum of NICET Level 3 fire alarm systems certified. The NICET certification shall be furnished with the System submittal.
 - 4) The Technician testing the System shall be a minimum of a NICET Level 2 fire alarm systems certified. The NICET certification shall be furnished with the System submittal. These people shall be authorized representatives of the approved manufacturer.

C. Manuals

1. Submit simultaneously with the shop drawings, complete operating and maintenance manual listing the manufacturer's name(s) including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Applicable Codes and Standards

1. The International Building Code (IBC) - (Latest edition or that edition which has been accepted by the local authority having jurisdiction)
2. National Fire Protection Association (NFPA) Standards:
 - a. NFPA 72 - National Fire Alarm Code
 - b. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems
 - c. NFPA 101 - Life Safety Code

3. Underwriter's Laboratory, Inc. (U.L.) Publications: Fire Protection Equipment Directory. (Latest edition)
 - a. *UL 864/UOJZ, APOU - Control Units for Fire Protective Signaling Systems.
 - b. *UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
 - c. *UL 268A - Smoke Detectors for Duct Applications.
 - d. *UL 217 - Smoke Detectors Single Station.
 - e. *UL 521 - Heat Detectors for Fire Protective Signaling Systems.
 - f. *UL 228 - Door Holders for Fire Protective Signaling Systems.
 - g. *UL 464 - Audible Signaling Appliances.
 - h. *UL 1971 - Signaling Devices for the Hearing Impaired (includes ADA strobes)
 - i. *UL 38 - Manually Activated Signaling Boxes.
 - j. *UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.
 - k. *UL 1481 - Power Supplies for Fire Protective Signaling Systems.
 - l. *UL 1711 - Amplifiers for Fire Protective Signaling Systems.
 - m. *UL 1076 Control Units for Burglar Alarm Proprietary Protective Signaling Systems.
4. Americans with Disabilities Act (ADA) Accessibility Guidelines.
5. Local and State Building Codes.
6. Requirements of the Authority Having Jurisdiction.
7. The system shall have proper listing and/or approval from the following nationally recognized agencies:
 - a. *UL - Underwriters Laboratories Inc.
 - b. *FM - Factory Mutual
 - c. *ULC - Underwriters Laboratories Canada
 - d. *CSFM - California State Fire Marshal Approved
 - e. *MEA/BSA - City of New York
 - f. *COC - City of Chicago
 - g. *IBC – International Building Code (Latest edition or that edition which has been accepted by the local authority having jurisdiction)
 - h. *IFC – International Fire Code (Latest edition or that edition which has been accepted by the local authority having jurisdiction)

E. Related Documents

1. Permits will be the responsibility of the Fire Alarm Contractor.
2. The Fire Alarm Contractor will notify the local Authorities Having Jurisdiction prior to commencement and after completion of work..
3. The Fire Alarm Contractor shall submit a letter of completion before requesting acceptance of system.

F. Related Work

1. The Electrical Contractor shall coordinate work in this Section with related trades. Work and/or equipment provided in other Sections and related to the fire alarm system shall include, but not be limited to:
 - a. Sprinkler waterflow and supervisory switches, and low air supervisory switches shall be furnished and installed by the Fire Sprinkler Contractor (Division 15). The Electrical Contractor is responsible for piping to an accessible junction box, pull wire and provide a flexible raceway to the final termination at the device. Module and sprinkler system monitoring device terminations by Electrical Contractor.
 - b. The Fire Alarm Contractor shall furnish duct smoke detectors. The Electrical Contractor shall be responsible for wiring to the detector and from Fire Alarm System N.O. dry contacts (i.e.

addressable control relay module) to respective HVAC unit fan motor starter control circuit terminations. The Duct Detector housing and sampling tube shall be installed by the Mechanical Contractor (Division 15).

- c. Air handling and smoke exhaust system fan control circuits, dampers and status contacts to be furnished by the HVAC control equipment supplier.
- d. Dry pipe sprinkler system valve control circuit and supervision contacts shall be provided by the dry pipe sprinkler system control equipment supplier.
- e. Emergency generator supervision contacts to be provided by the emergency generator control equipment supplier.
- f. Fire Pump supervision contacts, as required on the drawings, to be provided by the fire pump control equipment supplier.

G. Warranty

1. The Fire Alarm Contractor shall guarantee the system equipment for a period of one (1) year from date of final acceptance by the local authority having jurisdiction.
2. The Electrical Contractor shall guarantee wiring and raceways to be free from inherent mechanical or electrical defects for one (1) year from date of final acceptance.

1.5 SYSTEM OPERATION

A. General

1. The fire detection and alarm system shall detect changes in status of monitored points and shall initiate appropriate actions to alert and/or evacuate occupants, provide event annunciation and actuate auxiliary controls as specified herein.
2. The system shall accept, process and evaluate the following types of signals;
 - a. Automatic fire detectors
 - b. Manual alarm pull stations
 - c. Sprinkler waterflow switches
 - d. Sprinkler tamper switches
 - e. Other supervisory type inputs
 - f. Control relay response confirmations
 - g. Detector sensitivity data
 - h. Dry pipe canopy sprinkler system inputs
 - i. Low battery
3. Addressable or Analog type smoke detectors shall have their sensitivity continuously monitored. The control equipment shall evaluate the sensitivity data for determination of sensitivity change and shall automatically provide environmental compensation to maintain constant detector sensitivity. It shall be possible to automatically or manually adjust analog detection sensitivity if analog system is installed.
4. Walk test mode shall test initiating devices and circuits, and indicating devices and circuits from the field without returning to the panel to reset the system.
5. When an alarm condition is detected on a signaling line circuit that has been programmed for alarm verification, the system shall automatically enter the alarm verification mode. If the alarm condition is still present after a pre-set, field adjustable time period the system will automatically enter the alarm mode.
6. The Fire Alarm Control Panel (FACP) shall communicate with field devices over one or more Style 4 analog-addressable signaling line circuits (SLC).
7. Sub-circuits from addressable input/output modules, used to interface input/output devices (i.e. waterflow & tamper switches, conventional fire detectors, etc.) shall be supervised. Initiating Device Circuits (IDC) shall be wired for Style B (Class B) operation and Indicating Appliance Circuits (IAC) wired for Style Y (Class B) operation. Supervision shall include open circuit, short circuit and ground fault. Modules requiring external power for operation of two-wire conventional

- detector sub-circuits and Initiating Device Circuits shall supervise the presence of external power.
8. The system shall provide summary logs displayed via the LCD Display, initiated by operator command, that includes the following information:
 - a. Point status
 - b. Points isolated
 - c. Points tested/failed test
 - d. Points out of sensitivity compensation
 - e. Event log contents
 9. The FACP shall be on site programmed.
 10. The system shall provide point isolation by single point or group of points. The system shall ignore signals from input devices when disabled. The system shall annunciate and remain in a trouble state while any device is disabled.
 11. The system shall provide identification of point type, location and status. Each addressable or analog device shall have a field assigned zone identification message and a unique device location message.
 12. The system shall provide standby batteries for complete system operation during AC power outages.
 - a. A fault condition shall be indicated when the system is operating on standby battery. When AC power is restored the system shall revert back to AC power without operator intervention or manual restart.
 - b. The FACP shall be equipped with a battery charging circuit sufficient to recharge depleted batteries to within 70% of maximum capacity within 12 hours. Standby batteries shall be capable of supplying the system under full supervision for 24 hours. Following the 24-hour period, the system shall supply 100% general evacuation alarm output for a minimum of 5 minutes.

B. System Alarm Operation

1. Activation of an initiating device shall initiate the following system alarm response:
2. Activate connected visual alarm strobes that are specified on the drawings. Upon operation of system silence, audible signals shall silence while visual signals shall continue to operate until the system is reset.
3. The alarm condition shall be visually and audibly indicated at the FACP as follows:
 - a. Illuminate a red system fire "alarm" LED indicator.
 - b. Continuously sound an audible piezo at the FACP that shall sound until the system is acknowledged.
 - c. Display specific information about the alarm condition on the LCD as follows;
 - 1) Type of event
 - 2) Numeric identification of point and zone in alarm
 - 3) Zone identification message and unique device location message.
 - 4) An indication of the number of outstanding events in the system.
4. The system shall display the alarm condition at remote operations and display panels shown on the shop drawings. These panels shall contain the identical controls and indicators as contained on the FACP.
5. Activate the digital communicator (DACT) to the central station service. This communicator is supplied by the Security System Contractor and shall report Fire, Trouble, and Supervisory Alarms separately. It shall also report alarm points as required by the local authority having jurisdiction.
6. Operation of the system silence switch shall silence connected audible appliances with the exception of appliances designated as not to be silenced in response to an alarm from a waterflow alarm. Displays shall remain illuminated until the system has been cleared and reset. In the event

of a subsequent alarm after system silence, the FACP shall resound the building alarm signals. Audible appliances that had been previously silenced shall resound and audible appliances programmed to respond to the new alarm condition shall activate.

7. Each event shall be individually acknowledged before the system can be returned to normal operation. Access to the acknowledged function shall be secured by key or pass code entry such that only authorized personnel may operate.
8. If applicable the system shall direct the HVAC system fans, dampers, and other equipment as indicated in the site plans and attached schedules and in accordance with relevant local, state and national codes and standards.
9. If applicable, egress doors equipped with time-delay hardware will automatically release upon power loss at the mechanism, the fire alarm system, or upon alarm initiation.

C. Trouble Operation - Activation of a trouble condition shall cause the following system response:

1. The trouble condition shall be visually and audibly indicated at the FACP as follows:
 - a. Illuminate a yellow system "trouble" LED indicator.
 - b. Pulse an audible piezo at the FACP that shall sound until the system is acknowledged.
 - c. Display specific information (about the alarm condition on the LCD as follows):
 - 1) Type of event
 - 2) Zone and point numeric identification
 - 3) Zone identification message and unique location message
 - 4) An indication of the number of outstanding events in the system.
2. The system shall display the trouble condition at remote operations and display panels shown on the shop drawings. These panels shall contain the identical controls and indicators as contained on the FACP.

D. Supervisory Operation - The system shall activate a supervisory condition when a sprinkler tamper or other supervision input is activated. The supervisory condition shall cause the following system response:

1. The supervisory condition shall be visually and audibly indicated at the FACP as follows;
 - a. Illuminate a yellow system "supervisory" LED indicator.
 - b. Pulse an audible piezo at the FACP that shall sound until the system is acknowledged.
 - c. Display specific information about the supervisory condition on the LCD as follows;
 - 1) Type of event
 - 2) Zone and point numeric identification
 - 3) Zone identification message and unique location message
 - 4) An indication of the number of outstanding events in the system.
2. The system shall display the supervisory condition at remote operations and display panels shown on the shop drawings. These panels shall contain the identical controls and indicators as contained on the FACP.

E. Degrade Operation

1. In the event that the FACP main processor fails; the system shall operate in a predetermined manner activating evacuation signals when an alarm-initiating device has detected an alarm condition.
2. The system shall operate an alarm relay that shall be used to annunciate an alarm condition at a designated monitoring location.

PART 2 – PRODUCTS

2.1 FIRE ALARM AND/OR SUPERVISORY CONTROL PANEL

- A. The Fire Alarm Control Panels shall incorporate control electronics, relays, and necessary modules and components in a surface or semi-flush mounted cabinet. The operating controls and zone/supervisory indicators shall be located behind locked door with viewing window. Control modules shall be labeled, and zone locations shall be identified. The cabinet shall be 16 GA. steel, with a permanent finish. The assembly shall contain a base panel, system power supply and battery charger with optional modules suitable to meet the requirements of these specifications.
- B. System circuits shall be capable of configuration as follows: Signaling Line Circuits (SLC), Style 4 (Class B) or 6 (Class A); Initiating Device Circuits (IDC), Style B (Class B) or D (Class A); and Indicating/Notification Appliance Circuits (IAC/NAC), Style Y (Class B) or Z (Class A).
- C. The system shall be supervised, site programmable, and of modular design with expansion modules.
- D. The system shall store basic system functionality and job specific data in non-volatile memory. The system shall survive a complete power failure intact.
- E. The system shall allow down loading of a job specific custom program created by system application software. It shall support programming of any input point to any output point. It shall allow authorized customization of fundamental system operations using initiating events to start actions, timers, sequences and logical algorithms.
- F. The system shall support distributed processor intelligent detectors with the following operational attributes; integral multiple differential sensors, electronic addressing, environmental (drift) compensation, pre-alarm, dirty detector identification, dual normal/alarm LED's, relay bases, and isolator bases.
- G. The system shall use full digital communications to supervise addressable loop devices for placement, correct device, and operation. It shall allow swapping of 'same type' devices.
- H. The system shall have a UL Listed Detector Sensitivity test feature, which will be a function of the smoke detectors and performed automatically.
- I. The system shall support 100% of remote devices in alarm.
- J. Panel modules shall be supervised for placement and return trouble if damaged or removed.
- K. The system shall have a CPU watchdog circuit to initiate trouble should the CPU fail.
- L. The system evacuation signal shall be ANSI S3.41, Audible Evacuation Signal (Temporal 3).
- M. Audible notification appliances shall be affected by signal silence features. Signal silence features shall not affect visual signal appliance.
- N. The system program shall meet the requirements of this project, current codes and standards, and satisfy the local Authority Having Jurisdiction.
- O. Passwords shall protect changes to system operations.

- P. The power supply shall be a high efficiency switch mode type with line monitoring to automatically switch to batteries for power failure or brown out conditions. Input power shall be 120 VAC, 60 HZ. The automatic battery charger shall have low battery discharge protection. The power supply shall provide internal power and 24 VDC at 4 or 6 Amps continuous for notification appliance circuits. The power supply shall be capable of providing 4A or 8A to output circuits for a maximum period of 50ms. Auxiliary power shall be 24 VDC at 500mA. Outputs shall be power limited. The battery shall be sized to support the system for 24 hours of supervisory and trouble signal current plus general alarm for 5 minutes.
- Q. Auxiliary Power Supply: Provide where required a switching power supply that provides auxiliary 24 VDC power for system devices (conventional detectors and indicating appliances).
1. Brownout and loss of AC power shall cause automatic changeover to connected standby battery supply sized to provide for the attached load in accordance with control equipment specifications.
 2. AC line, battery condition and output wiring ground faults shall be monitored by the power supply and signaled to the FACP via the signaling line circuit. A Ground Fault LED shall be provided on the power supply unit. Battery condition monitoring shall include low voltage, missing batteries, reverse connection and shorted battery connection. Reverse and shorted battery connections shall not damage the power supply.
 3. The power supply assembly shall consist of the power supply/battery charger mounted within a dedicated and locked enclosure designed for surface wall mounting.
 4. The power supply shall provide a regulated 24 VDC output at 4 or 6 Amps. Power supply outputs shall meet NFPA standards for power limited/class 2 circuits.
- R. The LCD Display Module shall be of membrane style construction with a Liquid Crystal Display. The LCD shall use backlighting for high contrast visual clarity. In the normal mode display the time, the total number of active events and the total number of disable points. In the alarm mode display the total number of events and the type of event on display. The module shall have visual indicators for the following common control functions; AC Power, alarm, supervisory, monitor, trouble, disable, ground fault, CPU fail, and test. There shall be common control keys and visual indicators for: reset, alarm silence, trouble silence, drill and forward/backward scrolling through event listings. The operation of these keys shall be integrated with the related common control indicators to flash the indicators when undisplayed events are available for display and turn on steady when all events have been displayed. Allow the first event of the highest priority to capture the LCD for display so that arriving fire fighters can view the first alarm event "hands free." Provide system function keys; status, reports, enables, disable, activate, restore, program, and test.
- S. The panel shall have:
1. An interface module for remote site monitoring. The module shall have a local energy municipal loop and reverse polarity connections for each of alarm, supervisory and trouble.
 2. LCD display shall annunciate points per the Fire Alarm System zoning schedule.
 3. The following conditions shall be indicated on the alphanumeric display mounted on the face of the Fire Alarm Control Panel and Remote Annunciator:
 - a. AC Power
 - b. System Alarm
 - c. Supervisory Device Alarm
 - d. System Trouble
 - e. Signals Silenced
 - f. Module Failure
 - g. Power Trouble
 - h. Initiating Device Alarm
 - i. Initiating Device Trouble
 - j. Indicating Circuits Trouble

4. The following switches shall be provided on the FACP:
 - a. Acknowledge
 - b. Signal Silence
 - c. System Reset
 - d. Disable/Enable
 - e. Indicating Circuits ON/OFF
 - f. Alarm Relay ON/OFF
5. Fire Alarm Control Panel shall be provided as follows:
 - a. Selectable alarm verification and acknowledged.
 - b. Selectable trouble acknowledged.
 - c. Self contained audible alarm system.
 - d. Self contained audible trouble system.
 - e. Municipal master box and reverse polarity connection circuit.
 - f. Transient suppression module for municipal connections and power supply.
 - g. Alarm/trouble one-man walk test.
 - h. Alarm resound.
 - i. Battery, ground, and AC power supervision.
 - j. Control relay module.

2.2 REMOTE ANNUNCIATION

- A. Remote Operations and Display Units shall be provided as shown on the shop drawings. Each Fire Alarm Control Panel (FACP) shall be capable of supporting multiple remote units.
- B. Each remote unit shall be equipped with identical controls and displays as found on the FACP.
- C. Remote Operations and Display Units may be powered locally or from the FACP and shall be fully supervised by the FACP. In the event of loss of local power or a failure in communications to a remote unit, both the FACP and remote unit(s) shall audibly and visually annunciate the fault condition.
- D. Annunciator switches may be programmed for system control such as, global acknowledge, global signal silence, and global system reset.
- E. The alphanumeric display annunciator shall be a supervised, locally or remotely located backlit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.
- F. The LCD annunciator shall display alarm and trouble conditions in the system.
- G. LCD display annunciators shall mimic the main control panel display and shall not require special programming.

2.3 FIRE ALARM NOTIFICATION APPLIANCES AND EQUIPMENT

- A. General Notification Appliances
 1. Appliances shall be UL Listed for Fire Protective Service.
 2. Strobe appliances or combination appliances with strobes shall be capable of providing the 'Equivalent Facilitation' that is allowed under the Americans with Disabilities Act (ADA) and shall be UL 1971, UL 1638, and ULC S526 Listed.
- B. Furnish and install the above devices where shown on the plans.

- C. Addressable Indicating/Notification Circuit Control Module: The Contractor shall furnish and install addressable indicating/notification circuit control modules used to activate indicating/notification appliances connected to its sub-circuit in response to command from the control equipment.
1. The module shall interface to the alarm signaling appliances via a supervised, Style Y sub-circuit and shall be rated for 2 AMP output. Signaling appliances attached to the sub-circuit shall report their status and be activated as a single identity. The module shall be UL compatibility listed for use with the conventional 24 VDC type bells, horns and strobes used in this project.
 2. The Fire Alarm Contractor shall provide line voltage drop calculations that shall demonstrate that the voltage supplied at indicating appliances are above the UL specified minimum for the indicating appliances employed. These calculations shall assume operation on standby batteries after the required standby period. Therefore, a battery output of 20.4VDC shall be used in these calculations. The design shall provide sufficient quantities of addressable indicating circuit modules and 24 VDC power supplies, in the proper locations, to insure that the UL specified minimum voltage is present at indicating appliances.
- D. Visual Indication and Audible Notification Appliances
1. Strobe appliances or combination appliances with strobes shall be capable of meeting the requirements of UL 1971, UL 1638, and ULC S526 Listed.
 2. Strobes shall operate on 24 VDC nominal.
 3. Strobes shall meet the requirements as defined in UL standard 1971 and shall meet the following criteria:
 - a. The maximum pulse per UL 1971.
 - b. Candela intensity shall meet the requirements of UL 1971/NFPA 72 per the Authority Having Jurisdiction.
 - c. The flash rate shall meet the requirements of UL 1971.
 - d. The 75 cd appliance shall be placed 80 inches above the highest floor level within the space, or 6 inches below the ceiling, which ever is lower unless otherwise indicated, as allowed by the Authority Having Jurisdiction.
 4. Indoor devices shall be mounted on 4 inch square outlet boxes, surface or ceiling mounted on columns in the sales area, flush mounted in the office or the interior side of tilt walls or block as allowed by Authority Having Jurisdiction.
 5. Outdoor devices shall be mounted on 4 inch square cast weatherproof outlet boxes (2 gang Bell box). Strobes shall have outlet boxes with weatherproof covers. Horns shall be of the weatherproof type.

2.4 INITIATING DEVICES, EQUIPMENT, AND FIELD MODULES

A. General - Addressable Devices

1. Furnish and install where indicated on the plans.
2. Each detector shall continually monitor the environmental impact of temperature, humidity, barometric pressure and air-born contaminants. The process shall adapt the detector to long term environmental changes and signal the loop controller when the detector approaches 50% and 100% of the allowable environmental compensation value.
3. Differential sensing algorithms shall maintain a constant sensitivity setting between the alarm threshold and a compensated base line sensitivity. .
4. Detectors shall be suitable for wall mount applications.

B. Ceiling Mounted Fire Sensors

1. Addressable smoke and thermal detectors shall provide alarm and power/polling LED. The LED shall flash under normal conditions, indicating that the detector is operational and in

- regular communication with the control panel, and shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected.
2. Analog smoke detector (if analog system installed) sensitivity shall be adjustable in the field through the field programming of the system. The sensitivity may be automatically adjusted by the panel on a time-of-day basis.
 3. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
 4. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.
 5. Addressable devices shall provide address-setting means and shall also store an internal identifying code that the control panel shall use to identify the type of device. LED(s) shall be provided that shall flash under normal conditions, indicating that the device is operational and is in regular communication with the control panel.
 6. Addressable Photo Detector shall use a light scattering type photo sensor. The detector shall be suitable for area protection and direct insertion into air ducts up to 3 feet high and 3 feet wide with air velocities up to 5000 ft./min. without requiring specific duct detector housings or supply tubes. The detector shall be rated for ceiling installation at a minimum of 30 foot centers.
 7. Addressable Ion Detector shall be a unipolar ionization smoke sensor. The detector shall operate in constant air velocities from 0 to 75 ft./min. and in intermittent air gusts up to 300 ft./min. for up to 1 hour. The ion detector shall be rated for ceiling installation at a minimum of 30-foot centers.
 8. Fixed Temperature/Rate-of-Rise Heat Detector shall have a low mass thermistor and operate at a normal fixed temperature of 135° or 190° F and at a temperature rise at or exceeding 15° F per minute. It shall have a minimum linear space rating of 70 foot centers.
 9. Addressable Fixed Temperature Heat Detector shall have a low mass thermistor and operate at a fixed temperature of 135° or 190° F. It shall have a minimum linear space rating of 70 foot centers.
 10. Detector bases shall mount to North American 1 gang, 3 1/2 inch or 4 inch octagon boxes, and a 4 inch square box. Removal of the respective detector shall not affect communications with other detectors. Terminal connections shall be made on the room side of the base. Detectors shall be compatible with any base.

C. Addressable Duct Smoke Detectors

1. The in-duct smoke detector housing shall accommodate an addressable photoelectric detector, which provides continuous analog monitoring and alarm verification from the panel.
2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system. An auxiliary relay will interrupt fan motor starter control voltage thereby rendering the fan motor inoperable, and if applicable, damper controls.
3. Provide and install LED source, addressable air duct photoelectric smoke detectors and integral twist-lock bases at locations as indicated on the drawings. Air duct smoke detector shall utilize same detector head as ceiling mounted photoelectric detector.
4. Detector sampling tubes and housings shall be provided by the Fire Alarm /Life Safety System Contractor to the mechanical contractor for installation in the supply duct and or the return duct of roof top HVAC units 2,000 CFM or more as required by the Authority Having Jurisdiction.
5. The electrical contractor with the mechanical contractor shall coordinate sampling tube length and tube openings. Detectors shall be installed where indicating LED can be visually inspected from the sales floor below, but as high in the ductwork as possible. Provide remote test station per the Authority Having Jurisdiction.

D. Addressable Pull Station (manual alarm initiation)

1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. Operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual station covers shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters.
4. Stations shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches, nor more than 48 inches above the finished floor.

E. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect supervised IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to one of the Fire Alarm Control Panel SLC loops.
2. The monitor module shall mount in a 4 inch square, 2-1/8 inch deep electrical box.
3. The IDC zone may be wired for Style B (Class B) or D (Class A) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

F. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of conventional NACs of compatible, 24 VDC powered polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.
2. The control module shall mount in a standard 4 inch square, 2-1/8 inch deep electrical box, or to a surface mounted back box.
3. The control module NAC may be wired for Style Y (Class B) or Y (Class A) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of auxiliary relay or NACs may be energized at the same time on the same pair of wires.
4. Audio/visual power shall be provided by a separate supervised power loop from the main Fire Alarm Control Panel or from a supervised, UL listed remote power supply.

G. Isolator Module

1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.

H. Fire Protection System Alarm and Supervisory Equipment.

1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.
2. Waterflow Switches shall have an alarm transmission delay time that is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.
3. Waterflow switches, gate valve supervisory switches, post indicator valve supervisory switches,

and waterflow alarm gongs (if required) shall be provided and installed by the Sprinkler System Contractor (Division 15). The electrical waterflow alarm-signaling appliance (as indicated on drawings) shall be provided by the fire alarm contractor and installed and wired by the Electrical Contractor.

4. Conduit and wiring for the sprinkler switches and alarm bell(s) shall be provided by the Electrical Contractor. Provide 4 inch square junction box on closest structural wall to device. The Electrical Contractor shall provide flexible conduit with circuit conductors. The Electrical Contractor shall provide final connection.
5. Each sprinkler system water supply control valve riser and zone control valve shall be equipped with a supervisory switch.
6. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
7. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
8. The supervisory switch shall be contained in a weatherproof housing, which shall provide a 3/4 inch conduit entrance and incorporate the necessary facilities for attachment to the valves.
9. The switch housing shall be finished in red baked enamel.
10. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
11. Valve supervisory switches shall be connected under this section and furnished and installed by sprinkler contractor.
12. Dry pipe sprinkler systems shall be comprised of a control valve tamper switch, a low air pressure switch, and an alarm pressure switch and located as indicated on the drawings.

2.5 OFF PREMISES REPORTING EQUIPMENT

- A. Fire Alarm Contractor shall provide a minimum of three (3) or as required by local jurisdiction, Dry Contact closure points for reporting alarm, trouble and supervisory conditions to a remote Digital communicator, that is supplied under the Security Contractor's scope of work, for off-site reporting..
 1. The DACT location shall be designated within or adjacent to the FACP enclosure.
 2. The DACT shall include a built-in 0-90 second programmable delay.
 3. The DACT shall monitor both telephone lines for trouble.
 4. The DACT shall have a programmable delay for reporting of AC power loss.
 5. The DACT shall have battery reserve capacity per NFPA 72.

2.6 MAGNETIC DOOR HOLDERS

- A. When required, provide magnetic door holder as 24 V DC interconnected to FACP.

PART 3 EXECUTION

3.1 GENERAL

- A. Installation of the fire alarm system shall be in strict compliance with manufacturer's recommendations. Consult the manufacturers control panel and peripheral equipment installation manuals for wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the riser/connection diagram for specific system installation/ termination/ wiring data.
- B. Fastening and supports of equipment shall be adequate to support the required load, and provide a safety factor of five.
- C. As indicated on the Fire Alarm System shop drawings, each system alarm point or zone in the system shall be uniquely labeled within the Fire Alarm Control Panel. Names of the system point (s) / zone (s) shall be as defined by or in consultation with the Architect.

- D. Fire sprinkler water flow switch activation shall each be indicated on a separate point in the Fire Alarm Control Panel.
- E. Fire Alarm Control Panel will be mounted with the center of the panel 60 inches above floor level.
- F. Coordinate, before rough-in, device locations with final approved fixture construction documents; including but not limited to final locations of signage, banners, etc...

3.2 CABLE AND WIRING

- A. The Fire Alarm Control Panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the emergency panel, as FIRE ALARM and the circuit breaker shall be effectively locked out with an approved, listed breaker lock device. The control panel cabinet shall be grounded securely to the main building ground. Conduit shall enter into the Fire Alarm Control Panel only at those areas of the back box that have factory conduit knockouts.
- B. Provide line voltage (120 VAC max.) and low-voltage (up to 50 VAC/VDC) circuiting in separate conduit. Low-voltage circuiting shall be run exposed using NEC-FPL cable per NEC article 760 unless otherwise noted by local jurisdictional authorities.
- C. Branch wiring from control and monitor modules to controlled and monitored points shall be minimum #14 AWG-CU paired cable (not necessarily twisted) or as per manufacturers recommendations. Wiring for addressable and data transmission connections shall be minimum #16 AWG-CU, low capacitance, shielded twisted pair or as per manufacturers recommendations. Control panel to annunciator cable shall be one pair RS-485 (communication) and one-pair #16 AWG-CU (24 VDC Power) or as per manufacturers recommendations. Notification and auxiliary power wiring shall be minimum #14 AWG-CU. Cable jackets shall be red in color to readily identify it as fire alarm cable.
- D. Wire terminations shall be stripped, landed, and devices installed by the Electrical Contractor. The Electrical Contractor will provide not less than 18 inches slack wire at devices, and 6 feet of slack wire at the control panel for final termination by Electrical Contractor.
- E. Field wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, removal of an internal module, or an open circuit in the field wiring; an audible and visual trouble signal will be activated until the system and its associated field wiring are restored to normal condition.

3.3 CONDUITS AND BOXES

- A. Conduit shall be provided by the Electrical Contractor.
- B. Exposed cable below the top bar joist or other roof structure protruding lower, or other locations where the cable may become exposed and/or damaged, must be within a steel conduit.
- C. The Electrical Contractor shall provide junction boxes and cover plates per manufacturer's instructions and details. Electrical junction boxes shall be labeled as fire alarm system with decal or other approved markings.

3.4 END OF LINE RESISTORS

- A. The Fire Alarm Contractor shall provide end-of-line resistors to match impedance of circuit served per manufacturer's instructions.

3.5 IDENTIFICATION

- A. The Electrical Contractor shall number code conductors appropriately and permanently, as indicated

on the Fire Alarm Contractor shop drawings, for identification, device installation by the Fire Alarm Contractor, and servicing of the system. Labeling shall clearly identify the circuit, zone, and/or device served.

3.6 FINAL SYSTEM ACCEPTANCE

- A. The system will be accepted only after a satisfactory test of the entire system has been accomplished by the installing electrician and a factory-trained representative from the Fire Alarm Contractor in the presence of a representative of the local authority having jurisdiction and the Best Buy Construction Project Manager. At the completion of the project, full documentation shall be presented to the Best Buy Construction Project Manager indicating acceptance testing has been approved per NFPA 72 Chapter 7 and a Certificate of Compliance per NFPA 72.1-7.2.1 or most current adopted NFPA 72 testing standard.
- B. Final acceptance will require the contractor to deliver to the Engineer the following:
 - 1. Three (3) copies of the operating instructions and system maintenance manuals.
 - 2. Three (3) sets of record drawings (as built drawings).
 - 3. Three (3) copies of the final test reports.
 - 4. Three (3) copies indicating the name and phone number of person to contact in the event of equipment failure, and date when system warranty will terminate.
 - 5. Three (3) sets of data sheets for each piece of equipment supplied.
- C. The Fire Alarm Contractor shall provide the customer with a minimum of two (2) inspection and test visits during the first year. At least one of the visits shall be after approximately 11 months of operation. During this time, each field device shall be tested at least once, and the control panel shall be tested during each inspection. A written report shall be submitted to the customer indicating what devices and how they were tested. Problems with system other than equipment, such as customer owned equipment, blocking detection, manual stations or indicating devices shall be listed in the written report to the customer.
- D. The Fire Alarm Contractor shall provide a proposal for one-year maintenance contract. It would begin after the warranty period, with an alarm service company. The alarm service company shall provide maintenance and documentation in accordance with standards established for U.L. listed alarm service companies. The contract is to include maintenance of required system documentation, periodic system testing, and system repairs. The maintenance of the required system documentation is to include "as-built" drawings, records of the "Initial Acceptance Test", and "Re-Acceptance Tests", reports of the periodic equipment, circuit tests, system service calls and maintenance. Selection of the service company shall be approved by the Owner (See Section 01000 for Definition of Owner). Include also a quote for unscheduled maintenance/repair, including hourly rates for technicians and response travel costs. Rates and costs shall be valid for the period set in the Maintenance Contract Agreement.

3.7 ON-SITE SERVICES

- A. The Fire Alarm Contractor shall provide the on-site services of an authorized, factory trained technical representative to supervised connections and fully test devices and components of the system during installation.
- B. The Fire Alarm Contractor shall provide a min. of four (4) hours of training on the operation, proper use, and testing of the installed fire alarm system to the Owner's representative (and the local authorities having jurisdiction, when required).

3.8 MONITORING

- A. Prior to Turnover of the Building to Best Buy the General Contractor is required to coordinate with the

Best Buy Construction Project Manager concerning the Monitoring of the fire alarm. Best Buy's Construction Project Manager will coordinate with Best Buy Loss Prevention Department and their vendor to complete this operation.

3.9 WARRANTY

- A. The fire alarm system as specified above shall be warranted by the Fire Alarm Contractor for a period of one year from date of acceptance. The warranty shall cover parts, labor and travel to and from site. This warranty shall be void if work is performed on the system, by anyone other than an individual who has attended a manufacturer's seminar for testing and installing the system specified above.

END OF SECTION 283112