

PROJECT MANUAL

PROJECT:

2013 BOND PROGRAM

BARNARD ELEMENTARY SCHOOL DOOR REPLACEMENT (13157G)
BEMIS ELEMENTARY SCHOOL DOOR REPLACEMENT (13158E)
HILL ELEMENTARY SCHOOL WINDOW REPLACEMENT (13161B)
INTERNATIONAL ACADEMY EAST DOOR REPLACEMENT (13175G)

BID PACKAGE NO. 33

OWNER:

TROY SCHOOL DISTRICT
4400 Livernois
Troy, Michigan 48098

TMP PROJECT NO.: 13157G, 13158E, 13161B & 13175G

DATE: November 1, 2021

ISSUED FOR: CONSTRUCTION DOCUMENTS

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LIST OF DRAWINGS

1.1 LIST OF DRAWINGS

- A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the TITLE SHEET page of the separately bound drawing set titled BARNARD ELEMENTARY SCHOOL DOOR REPLACEMENT (13157G), BEMIS ELEMENTARY SCHOOL (13158E), HILL ELEMENTARY SCHOOL WINDOW REPLACEMENT (13161B), INTERNATIONAL ACADEMY EAST DOOR REPLACEMENT (13175G), dated November 1, 2021, and any subsequent Addenda and Contract modifications which may occur.

END OF SECTION

SECTION 00 0400 - AVAILABILITY OF ELECTRONIC FILES

PART 1 – GENERAL

1.1 POLICY

- A. As a service to contractors, subcontractor, vendors, material suppliers and others needing electronic copies of drawing files, the Architect will provide CAD files electronically in accordance with the following policy:
1. By acceptance it is understood and agreed that the data and medium being supplied is to be used only for the project referenced.
 2. It is further understood and agreed that the undersigned will hold TMP Architecture harmless and indemnify TMP Architecture from all claims, liabilities, losses, etc., including attorney's fees arising out of the use or misuse of the transferred items.
 3. It is understood and agreed that the items transmitted are prepared from CAD files current at the time of preparation. All files are AutoCAD version 2009 dwg files.
 4. This information does not waive the need to verify and review current field conditions and the status of Addenda and/or Bulletin documentation.
 5. As a record of information to be transmitted, TMP Architecture will prepare a duplicate electronic back-up for its record.
 6. Compensation for providing this material will be as follows:
 - a. Base Fee of \$250 for 1 to 3 drawings.
 - b. Base Fee of \$500 for 4 to 10 drawings.
 - c. For each additional drawing after 10 the fee is \$40.00 per drawing (i.e., 11 drawings = \$540).
 7. Payment must be provided along with a signed copy of the Release Letter before files will be released.

1.2 REQUEST PROCEDURE

- A. To receive files the attached Release Letter must be completed in full and submitted to the Construction Manager to be forwarded to the Project Manager at TMP Architecture.
1. A signed copy of the Release Letter must be submitted; faxed or emailed copies will be accepted.
 2. Upon remittance of the signed Release Letter and Fee, allow five working days for processing.
 3. Transmission of documents will be provided electronically after the receipt of payment.

Date: _____

Firm Requesting Files:

Name: _____

Company: _____

Address: _____

City, State, Zip: _____

Re: Letter of Authorization for CAD File Transfers

Project Name: _____

TMP Project No. : _____ Bid Pack No. : _____

Dear Sir:

Per your request, TMP Architecture will transmit the requested CAD files in the form of CD-ROM upon receipt of an original signed copy of this letter with conditions of agreement as stated.

1. By acceptance it is understood and agreed that the data and medium being supplied is to be used only for the project referenced.
2. It is further understood and agreed that the undersigned will hold TMP Architecture harmless and indemnify TMP Architecture from all claims, liabilities, losses, etc., including attorney's fees arising out of the use or misuse of the transferred items.
3. It is understood and agreed that the items transmitted are prepared from CAD files current at the time of preparation. All files are AutoCAD 2009.
4. This information does not waive the need to verify and review current field conditions and the status of Addenda and/or Bulletin documentation.
5. As a record of information to be transmitted, we will prepare a duplicate back-up for our files, which may be electronic or hard-copy.
6. Compensation for providing this material will be as follows: Base Fee of \$250 for 1 to 3 drawings and a Base Fee of \$500 for 4 to 10 drawings; for each additional drawing after 10 the fee is \$40.00 per drawing (i.e., 11 drawings = \$540). Payment must be provided along with a signed copy of this form before files will be released. Please remit to TMP Architecture and allow five working days for processing.

Fee: \$_____ Drawings: _____

Signed: _____ Printed Name/Title: _____

Firm Requesting: _____

Phone: _____ Fax: _____

To Be Completed By TMP Architecture, Inc.

Released (signed by): _____	TMP Architecture, Inc.
Printed Name/Title: _____	Date: _____

END OF SECTION

SECTION 01 3219 - SCHEDULE OF REQUIRED SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Specified Herein: General Requirements and schedule tabulating submittals required under the individual Trade Sections.
- B. Related Work: The following submittals are described under other Sections of these Specifications:
 - 1. Division 01 Section "Related Documents Submittal Procedures" for shop drawings.
 - 2. Division 01 Section "Project Record Documents" for project record documents.
 - 3. Division 01 Section "Warranties" for warranties and warranty services.

1.2 SUBMITTALS

- A. Submittals schedule is for reference only and is not necessarily complete. Specific requirements are included in the respective Trade Sections.
- B. Description of submittals and definitions of terms are included under other Sections of Division 01.
- C. Submittal of Materials for Approval:
 - 1. See Division 01 "Product Requirements" for requirements for materials submittals.
 - 2. All materials requiring Manufacturer Services or Warranty shall be submitted in the form specified under "Warranties".
 - 3. Standard materials may be submitted in tabular form. Where necessary to clarify proposed use, submit as a Shop Drawing a schedule of applications or a drawing showing proposed locations.

1.3 SCHEDULE

- A. The Contractor shall prepare a schedule relating and conforming to the Approved Construction Schedule. Said Schedule shall recognize and allow for lead-time, including lead-time required by Subcontractors and Manufacturers, and time required for Architect's review in compliance with the Contract Documents for all submittals.
- B. This Schedule shall be submitted to the Owner and the Architect for approval prior to the second Request for Payment.
- C. Exact procedures and time schedules for submittals will be determined at the time Job Progress Schedule is established. Time schedule for submittals shall be periodically revised and adjusted to coordinate with job progress.

1.4 EQUIPMENT ROOM LAYOUT DRAWINGS

- A. Each Contractor shall prepare and submit equipment room layout drawings, as called for under "Shop Drawings and Samples," for all equipment furnished under its Contract.

- B. Scale (Minimum): 1/4 inch equals 1 foot.

1.5 CERTIFICATE OF COMPLIANCE

- A. Each certificate required for demonstrating proof of compliance of materials with specification requirements, including mill certificates, shall be executed in quadruplicate. It shall be the Contractor's responsibility to review all certificates, before submittal, to ensure compliance with the Contract Documents.
- B. Each certificate shall be signed by an official authorized to certify in behalf of the manufacturing company and shall contain the name and address of the Contractor, the project name and location and the quantity and date or dates of shipment or delivery to which the certificate applies.
- C. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material, if after tests are performed on selected samples, the material is found not to meet the specific requirements.

1.6 SPARE PARTS DATA

- A. The Contractor shall furnish spare parts data for each different item of equipment furnished if and as called for in the Trade Sections.

1.7 SAMPLES

- A. After the award of the Contract, the Contractor shall furnish, for approval, samples required by the Specifications. The Contractor shall prepay all shipping charges on samples.
- B. Materials or equipment for which samples are required shall not be used in the work until approved in writing.

1.8 OPERATION AND MAINTENANCE MANUALS

- A. Where required by the Specifications, Operation and Maintenance Manuals shall be provided by the Contractor as specified under "Project Record Documents".
- B. Provide all manuals, parts information and similar data that the Architect may determine to be necessary for proper operation and maintenance.
- C. The manuals shall cover the operation requirements of each item specified to require operational and maintenance manuals, and shall include standard maintenance procedures and recommended schedules for routine service. The manuals shall be submitted to the Architect ten (10) days prior to final tests of mechanical and electrical system.

1.9 TEST PROCEDURES AND TEST RESULTS

- A. Where required by the Technical Specifications test procedures and test results shall be provided by the Contractor in quadruplicate. Test procedures shall cover all items required by the Technical Provisions and as specified under "Laboratory Testing and Inspection."

END OF SECTION

SECTION 01 3300 - ELECTRONIC SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Specified Herein: General Requirements for preparation, submittal, and distribution of Shop Drawings, Samples, Product Data, and similar information required to be furnished by the Contractors.
- B. Related Work: The following items of work are specified under other Sections of these Specifications:
 - 1. Division 01 Section "Electronic Project Record Documents" for electronic project record documents.

1.2 DEFINITIONS

- A. Samples: See General Conditions.
 - 1. Preliminary Samples: Hand made or simulated examples or proposed materials submitted to demonstrate anticipated finished appearance.
 - 2. Product Samples: Representative examples of materials proposed for use.
 - 3. Range Samples: Samples showing extremes of variations in appearance, texture or color and the limits within which the Contractor agrees to hold the materials used in the work.
 - 4. Sample Installation: Trial run or initial example provided for review and acceptance by the Architect before continuing with the work.
 - 5. Test Samples: Samples provided for purposed of physical or chemical test analysis. If samples are submitted directly to the Testing Laboratory, submit copy of letter of transmittal.
- B. Shop Drawings: See General Conditions
 - 1. Electronic File: Drawings and other data submitted electronically in PDF format only.
 - 2. Preliminary Shop Drawings: Drawings and other data submitted electronically prior to acceptance of systems and only required to show information necessary for evaluation and coordination with other work.
 - 3. Project Shop Drawings: Drawings and other data illustrating materials and assemblies proposed for the Project.
 - 4. Coordination Drawings: Original electronic drawings prepared by the Trades to investigate conflicts and coordinate locations of each with the work of the other.

- C. Identification: All shop drawings, samples and product data shall be identified by the project title, Construction Manager's name, the Architect's name and the Architect's project number or numbers.

1.3 ELECTRONIC SUBMITTAL PROCEDURES

A. Summary:

1. Shop drawing and product data submittals shall be transmitted to the Construction Manager in electronic (PDF) format using Submittal Exchange, a website service designed specifically for transmitting submittals between construction team members.
2. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
3. Physical samples (color samples, color charts, physical material samples, etc.) will be accompanied by an electronic transmittal processed through Submittal Exchange. Refer to Paragraph 1.4E for additional information.

B. Procedures:

1. Submittal Preparation –Subcontractors and Suppliers may use any or all of the following options as directed by the Construction Manger.
 - a. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor via email.
 - b. Subcontractors and Suppliers provide paper submittals to General Contractor who electronically scans and converts to PDF format and submits to the Construction Manager by uploading to Submittal Exchange.
2. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work.
3. Contractor shall transmit each submittal to Construction Manager using the Submittal Exchange website, www.submittalexchange.com.
4. Construction Manager shall transmit each submittal to the Architect using the Submittal Exchange website, www.submittalexchange.com.
5. Architect / Engineer review comments will be made available on the Submittal Exchange website for downloading. Construction Manager will receive email notice of completed review and send notification to the Contractor.
6. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.
7. Submit electronic copies of reviewed submittals at project closeout for record purposes in accordance with Section 017800 – Closeout Submittals

C. Costs:

1. Cost of data management service (Submittal Exchange) shall be paid for by the Project Owner thru the Construction Manager.
2. At Contractor's option, training is available from Submittal Exchange regarding use of website and PDF submittals. Contact Submittal Exchange at 1-800-714-0024.
3. Internet Service and Equipment Requirements:
 - a. Email address and Internet access at Contractor's main office.
 - b. Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

1.4 GENERAL REQUIREMENTS FOR ELECTRONIC SUBMITTALS:

- A. Contractor shall transmit each submittal (shop drawings and product data) to the Construction Manager using the Submittal Exchange website, www.submittalexchange.com. Submittals are to be made in the following form.
 1. Shop drawing: Combined together into one pdf file for each assembly.
 2. Product data: Provide product data in individual pdf file.
- B. File naming shall be in the following format. Specification Section Number; consecutive number of submittal for that section; revision number for that section; school name(s) (where multiple schools are involved only); and description of file being submitted (submittal type).
 1. Example: 079200-01-00_Watt, Wass_Joint Sealants_Product data.pdf.
 2. Example: 123204-07-01_Prefabricated Casework_Shop Drawings.pdf.
- C. Contractor shall fill out the TMP Shop Drawing and Sample Transmittal Form found at the end of this Section and include at the beginning of the file. An electronic version of Transmittal Form is available upon request from the Architect, thru the Construction Manager. Also, an electronic version of this form is part of the upload process in Submittal Exchange.
- D. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer / product, dimensions and coordination of information with other parts of the work prior to notifying the Construction Manager that the submittal is read for review.
- E. Physical Samples must be submitted through the Construction Manager and must be accompanied by an electronic (PDF) copy of the completed TMP Shop Drawing and Transmittal Form. Electronic Transmittal Form must be submitted to the Construction Manager using the Submittal Exchange website.

1.5 SCHEDULES

- A. Prepare Shop Drawing Submittal Schedule as required.

- B. Recognize and allow for lead-time required for manufacture, fabrication, delivery to the site, and for review.
- C. Arrange schedule in orderly sequence in compliance with Project Schedule.
- D. Request for approval of materials, systems, substitutions, or for deviations from the Contract Documents shall be submitted according to Section 016000 – “Product Requirements” and shall be Preliminary submittal with allowances for time for review prior to submittal of Product Samples or Project Shop Drawings.

1.6 SAMPLES - GENERAL

- A. Samples in general, are required for all materials that form an exposed part of the finished Project. Samples of concealed components are not required unless specifically called for.
- B. Typical Samples shall be taken from production run material and shall be representative examples of proposed quality and finish.
- C. Preliminary Samples shall, as far as possible, anticipate the quality and finish of production run material.
- D. Samples will be retained at the job site for comparison purposes. Samples of manufactured items will be returned to the Contractor for installation in the Work after approval of materials. Use in locations where directed.
- E. All materials in the completed installation shall be equal in every respect to the approved product samples and within the limits defined by the approved range samples.

1.7 SAMPLES SUBMITTALS

- A. Size and quantity, unless otherwise specified: Four (4) each; 8 inches by 12 inches, or 12 inches long, as applicable; not over one inch thick for masonry or cementitious materials.
- B. Preliminary or Range Samples shall be resubmitted as directed until an acceptable Sample or Range is established, at which time Project Samples shall be submitted.
- C. Furnish Samples to other trades where required to match color or finish.
- D. Required Samples are scheduled or are listed in the Trade Sections. Optional Samples will be accepted and reviewed by the Architect.
- E. Review will be for shape and appearance only. Physical and chemical properties shall be established by adequate documentation that shall accompany samples.
- F. In all cases where preliminary approval samples have been submitted, final production run, or in-place installation samples will be required for verification.
- G. Notify Construction Manager and Architect in advance and obtain directions for place and time to ship large, heavy or bulky samples. Ship such samples "Prepaid." If return is requested, they will be returned "Collect."

1.8 SHOP DRAWINGS AND PRODUCT DATA - GENERAL

- A. Shop Drawings shall be prepared by a qualified detailer and shall be complete including erection diagrams and shall show the fabrication and construction of all items required for complete assembly.
- B. Provide pertinent information relating to installation and connection to work of other trades, and coordinate with work of other trades as required for proper placing, anchorage and support of the work. Indicate in detail, the precise location and spacing of all embedded anchor bolts, sleeves and other features required to be placed in the concrete, structural steel or masonry or otherwise required to be built into the structure.
- C. Identify details by reference to the Contract Drawings, other Shop Drawings or other information as required to properly identify and locate the portion of the Work covered.
- D. Indicate on the Drawings and explain by covering letter all proposed deviations from the requirements of the Contract Documents.
- E. Manufacturer's Standard Documents:
 - 1. Drawings and similar documents provide in PDF version from original documents: Modify drawings to delete information which is not applicable to the Project, provide additional information where required and submit electronically.
 - 2. Brochures and other pre-printed data, clearly mark PDF information as follows:
 - a. Identify pertinent material, product, and model.
 - b. Number or otherwise reference each item to applicable Contract Document or other Shop Drawing.
 - c. Show dimensions and clearances required.
 - d. Provide all other information required for Shop Drawings including, where applicable, wiring diagrams and controls.
 - e. Delete all options, or variations from the Contract Documents, except where such items are specifically noted as proposed deviations.
- F. Where proper installation of the work requires that other work be set to special detail, held to tolerance, or dimension be established, so indicate on the Shop Drawings.
- G. Where items must fit spaces previously constructed, take measurements at the site, not from drawings.
- H. Where applicable, indicate mechanical and electrical characteristics of, or required to be provided for, the material shown on the Shop Drawings.
- I. Each shop drawing or coordination drawing shall have a blank area (5 x 8 inches), located adjacent to the title block. The title block shall display the following:
 - 1. Number and title of drawing
 - 2. Date of drawing or revision
 - 3. Name or project building or facility

4. Name of Contractor and (if appropriate) name of Subcontractor submitting drawings.
5. Clear identity of contents and location of the work.
6. Project title and contract number.
7. Initials or party preparing drawings.
8. Signature of party responsible and, where applicable, professional engineers seal.

1.9 SHOP DRAWINGS - TYPES

A. Preliminary Shop Drawings:

1. Preliminary Shop Drawings shall be provided for portions of the Work where interpretations or variations from the Contract Documents are proposed, or otherwise required.

B. Project Shop Drawings:

1. Project Shop Drawings shall show all changes to building details to coordinate with required modifications and indicate approval by other trades for required modifications to their work.
2. Where Shop Drawings are based on the use of a particular material, such material shall be submitted for review independently of the Shop Drawing.
3. When Shop Drawings are submitted in the form of brochures indicate all current variations from the information in effect at time documents were issued for bids.

C. Coordination Drawings: Comply with all requirements of Section 013100.

1.10 DELEGATED-DESIGN SUBMITTALS

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to the Architect thru the Construction Manager.

B. Shop Drawings: Submit shop drawings for each component of work identified, signed and sealed by the qualified professional engineer responsible for their preparation licensed in the State of Michigan.

C. Engineering Analysis: Submit comprehensive engineering analysis for each component of work identified, signed and sealed by the qualified professional engineer responsible for their preparation licensed in the State of Michigan.

1. Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

- D. Product Data: Submit product data for each product and system specifically assigned to the Contractor to be designed or certified by a design professional, signed and sealed by the responsible design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads and other factors used to certify the product.
- E. Submittals: Shop drawings, engineering analysis, product data and other required submittals will be digitally signed and sealed and submitted electronically. The design professional's seal, license number, and signature shall be clear and legible and shall appear on each shop drawing sheet, each product data coversheet, and engineering analysis coversheet.

1.11 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor shall obtain, review, stamp with his approval and submit for review all Shop Drawings and Samples required by the Contract Documents. The Contractor shall be required to utilize the "Shop Drawing Transmittal Form attached to this section. Submittal materials for only one (1) specification section trade shall be submitted per each transmittal form. Do not combine submittals for multiple specification sections on one transmittal form. Use a separate transmittal form for each specification section.
- B. By approving and submitting Shop Drawings and Samples, the Contractor thereby represents that he has determined and verified all field measurements and field construction criteria at the site, and all materials, catalog numbers and similar data, or will do so, and that he has checked and coordinated each Shop Drawing and Sample with the requirements of the work and of the Work and of the Contract Documents.
- C. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Owner's, Construction Manager's, or the Architect's acceptance of Shop Drawings, Product Data or Samples, unless the Contractor has informed the Owner, Construction Manager and the Architect, in writing, of such deviation at the time of submission and the Architect has given written acceptance to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the acceptance thereof.
- D. The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples to revisions other than those requested on previous submittals.
- E. No portion of the Work requiring submission of Shop Drawings, Product Data or Sample shall be commenced until the submittal has been accepted as provided herein. All such portions of the Work shall be in accordance with accepted submittals.

1.12 ARCHITECT'S REVIEW

- A. The Architect will complete review of Shop Drawings within fifteen (15) working days, and of Samples within twenty-one (21) working days of receipt thereof except that:
 - 1. Shorter time limits will be negotiated on a basis of need for each specific case for "fast track" or critical path items.

2. With respect to those areas with special architectural finishes and coordination of various material sources the parties shall agree upon a mutually satisfactory time schedule.
 3. Review time will be considered as starting when Drawings and Samples are substantially correct and so submitted.
 4. Incomplete or incorrect submittals will be returned without review, for proper submission.
- B. Shop Drawings, Samples and Product Data will be reviewed only for conformance with the design concept, compliance with the information given in the Contract Documents, arrangement and appearance. Deviations from the Contract Documents will be noted with comments and required corrections or changes will be noted on the returned submittal.
- C. Delegated Design Submittals will be reviewed only for conformance with the general design concept, compliance with performance and design criteria, and for loads transmitted to the building structure. Engineering analysis and calculations will not be reviewed and will be retained for record only. The Contractor is responsible for the design and performance of the delegated design systems and components. The review of a delegated design submittal shall not relieve the Contractor of the responsibility for proper and safe design.
- D. Contractor will be notified through the data management service when review is completed.
- E. Architect will retain electronic file of Product Data and A-E "mark-ups" or corrections of mark-ups.
- F. The Architect will **not** accept physical copies (hard copies) of shop drawings or product data submittals. Physical submittals will be accepted for Samples only. Physical Samples must be submitted through the Construction Manager and must be accompanied by an electronic (PDF) copy of the completed TMP Shop Drawing and Sample Transmittal Form.
- G. One sample from each set will be returned to the Contractor, one filed at the office of the Architect, one at the office of the Construction Manager or and one at the jobsite. If the Contractor intends that samples such as hardware or fixtures be installed on the project or returned at completion of the Project, he shall indicate at time of submittal, otherwise the Owner, Construction Manager and the Architect assume no responsibility for protection or return of such samples.

1.13 EQUIPMENT ROOM LAYOUT DRAWINGS

- A. The Contractor shall prepare and submit equipment room layout drawings as required by the technical specifications and additionally for areas where equipment proposed for use could present interface or space difficulties. Such drawings shall be prepared in the same manner as coordination drawings.

1.14 MATERIALS, EQUIPMENT AND FIXTURE LISTS

- A. Where required by the Technical Provisions, lists of materials, equipment and fixtures shall be submitted by the Contractor. The lists shall be supported by sufficient descriptive material, such as catalogs, cuts, diagrams, and other data published by the manufacturer, as well as evidence of compliance with safety and performance standards, to demonstrate conformance to the specification requirements; catalog numbers alone will not be acceptable.
- B. The data shall include the name and address of the nearest service and maintenance organization that regularly stocks repair parts. No consideration will be given to partial lists submitted from time to time.
- C. Materials, equipment and fixtures will not be approved for use at capacity ratings in excess of manufacturer's published data.
- D. Approval of materials and equipment will be tentative subject to submission of complete shop drawings indicating compliance with the Contract Documents.

END OF SECTION

TMP SHOP DRAWING AND SAMPLE TRANSMITTAL FORM

CONTRACTOR/CONST. MANAGER: _____ _____ _____	PROJECT TITLE AND LOCATION: _____ _____ _____	DATE SUBMITTED: _____ CHECKER: _____ TMP PROJECT NO. _____	NEW _____ RESUB. _____	SUB. NO. _____ RESUB. NO. _____
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SPEC SECTION NO.	NO. PR	NO. SEPIA	NO. CAT.	NO. SAMPLES	SUBCONTRACTOR/MFR.	ITEM DESCRIPTION	*ACTION CODE	DATE CHECKED	DATE RETURNED	NO. COPIES

The undersigned certifies that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract documents except as otherwise noted. NOTE: Approval of items submitted does not relieve contractor from complying with all requirements of the contract documents.		* ACTION DEFINITION R = REVIEWED – NO EXCEPTIONS NOTED RN = REVIEWED WITH CORRECTIONS NOTED RR = REVISE AND SEND RECORD COPY X = NOT APPROVED – RESUBMIT NA = NO ACTION REQ'D
CONTRACTOR'S COMMENTS: ARCHITECT'S COMMENTS:	_____ CONTRACTOR'S NAME _____ SIGNATURE cc: Owner Consultant	

SECTION 01 4213 - ABBREVIATIONS

PART 1 - GENERAL

1.1 The following is a list of abbreviations utilized throughout the Contract Documents.

A	B	C
ABV. Above	B/B Back-to-Back	CAB. Cabinet
A.F.F. Above Finish Floor	B.F.P. Back Flow Preventer	C.U.H. Cabinet Unit Heater
ABR. Abrasive	B.D.D. Back Draft Damper	CAP. Capacity
ABS. Absorbing	B.F. Barrier Free	CPT. Carpet
ACC. Access	B.B.R. Base Board	CSMT. Casement
A.C.C. Air Cooled Condenser	B.PL. Base Plate	CSWRK. Casework
ACC.PNL. Access Panel	BSMT. Basement	CSG. Casing
A.V. Acid Vent	B. Bath Room	C.I. Cast Iron
A.W. Acid Waste	BM. Beam	C.I.F. Cast Iron Frame
AC. Acoustic/Acoustical	BRG Bearing	C.I.P. Cast Iron Pipe
AC.T. Acoustic Tile	BR. Bedroom	CSTG. Casting
AC.INSUL. Acoustical Insulation	B.M. Bench Mark	CAT.NO. Catalog Number
A.D.A. Americans with Disability Act.	BT. Bent	C.B. Catch Basin
ADD. Addendum	BETW. Between	CLG. Ceiling
ADDN. Addition	BEV. Bevel	C.D. Ceiling Diffuser
ADDNL. Additional	BIT. Bituminous	CLG.HT. Ceiling Height
ADH. Adhesive	B.I. Black-iron	CEM. Cement
ADJ. Adjacent/ Adjustable	BLK. Block	CEM.PLAS. Cement Plaster
AGGR. Aggregate	BD. Board	CTR. Center
A.C.B. Air Circuit Breaker	BLR. Boiler	C.L. Center Line
A/C Air Conditioning	BLR.F. Boiler Feed	C/C Center-to-Center
A.C. Air Conditioner	BLR.H. Boiler House	CER. Ceramic
A.C.C. Air Conditioning Compressor	B.S. Both Side	CER.T. Ceramic Tile
A.C.U. Air Conditioning Unit	B.W. Both Ways	CBD. Chalkboard
A.H.U. Air Handling Unit	BOT. Bottom	CHAM. Chamfer
ALT. Alternate	B.O.D. Bottom of Duct	CHG. Change
ALUM./AL. Aluminum	B.O.P. Bottom of Pipe	C/CHAN. Channel
AMT. Amount	BOT.EL. Bottom Elevation	CHKD. PL. Checkered Plate
AMP. Ampere	BLVD. Boulevard	CH.W.R. Chilled Water Return
AMPL. Amplifier	BDRY. Boundry	CH.W.S. Chilled Water Supply
ANCH. Anchor/Anchorage	BRKT. Bracket	CHD. Chord
A.B. Anchor Bolt	B.HP. Brake Horsepower	CIRCUM. Circumference
& And	BR. Brass	CIR. Circle/Circular
L/AN. Angleg	BRKR. Breaker	CIRC. Circuit
ANOD. Anodized	BRK. Brick	CIRC. Circulation
APT. Apartment	B.T.U. British Thermal Unit	C.B.R. Circuit Breaker
APR. Approved	BRZ. Bronze	C- Civil Drawing Number
APPR. Approximate	BLDG. Building	CL. Class
ARCH. Architect	B.L. Building Line	CLRM. Classroom
A- Architectural Architectural Drawing Number	B.M.S. Building Management System	C.O. Clean Out
A.T. Ash Tray	B.U.R. Built-up Roofing	CLR. Clear
ASPH. Asphalt	BN. Bullnose	CLR. GL. Clear Glass
ASSY. Assembly	BLKHD. Bulkhead	CLR. W.GL. Clear Wire Glass
@ At	BULL. Bulletin	COEF. Coefficient
AUTO. Automatic	B.A. Burglar Alarm	C.W. Cold Water
A.S.R. Automatic Sprinkler Riser	BUZZ. Buzzer	COL. Column
AUX. Auxiliary		CO. Company
AVG. Average		COMPT. Compartment
		COMPO. Composition
		C.A. Compressed Air
		COMPR. Compressor
		CONC. Concrete

SECTION 014213
ABBREVIATIONS

C.M.U. Concrete Masonry Unit
C.W.R. Condensing Water Return
C.W.S. Condensing Water Supply
COND. Condensate
COND. Conduit
CONF. Conference
CONN. Connect
C.A.V. Constant Air Volume
CONST. Construction
C.J. Control Joint
CONT. Continue/Continuous
CONTR. Contractor
C.P. Control Panel
CONV. Convector
CNVYR. Conveyor
COR. Corner
C.G. Corner Guard
CORR. Corridor/Corrugated
CPR. Copper
CNTR. Counter
CTSK. Countersink/Countersunk
CRS. Course
COV. Cover
COV.PL. Cover Plate
C.C.T. Cubical Curtain Track
CU.FT. Cubic Feet/Cubic Foot

C.F.M. Cubic Feet Per Minute
C.Y. Cubic Yard
CULV. Culvert
C.D. Cup Dispenser
CYL. Cylinder
CYC. Cycles

D

DMPR. Damper
DMPFG. Dampproofing
D.L. Dead Load
DB. Decibel
D. Deep
DEG. Degree
DMT. Demountable
PARTN. Partition
DEPT. Department
DEPR. Depressed
DES. Design
DET. Detail
D.E.CO. Detroit Edison Co.
DIAG. Diagonal
DGM. Diagram
DIA. Diameter
DIFF. Diffuser
DIM. Dimension
D.R. Dining Room
DIR. Directory

D.D.C. Direct Digital Control
DISC. Disconnect
DISCONT. Discontinuous
DW. Dishwasher
DISP. Dispenser
DIST. Distance
D.P. Distribution Panel
DO. Ditto
DIV. Divider/Division
DR. Door
D.O. Door Opening
DR.OP. Door Operator
DBL. Double
D.A. Double Acting
D.H. Double Hung
DWL. Dowel
DN. Down
D.S. Downspout
D.S.B. Downspout Boot
DRN. Drain
D.T. Drain Tile
D.T.C. Drain Tile Connector
DWR. Drawer
DWG. Drawing
D.F. Drinking Fountain
D.B. Dry Bulb
D.S.P. Dry Stand Pipe
DBWTR. Dumbwaiter
DUP. Duplicate
D.DR. Dutch Door

E

EA. Each
E.F. Each Face
E.W. Each Way
E. East
ELAST. Elastomeric
FLASH. Flashing
ELAST W.P. Elastomeric Waterproofing
E.S.R. Elastomeric Sheet Roofing
E.D.H. Electric Duct Heater
ELEC. Electric/Electrical
ELEC. CL. Electric Closet
ELEC.CAB. Electrical Cabinet
E.C. Electrical Contractor
E- Electrical Drawing Number
E.P. Electrical Panel
E.R.P. Electric Radiant Panel
E.U.H. Electric Unit Heater
EWC. Electric Water Cooler
E.W.H. Electric Water Heater
ELEC.OPER. Electrically Operated
EL. Elevation
ELEV. Elevator
EMERG. Emergency

ENCL. Enclosure
ENGR. Engineer
E/E End-to-End
E.A.T. Entering Air Temperature
ENTR. Entrance/Entry
EP. Epoxy
EQ. Equal
EQUIP. Equipment
EQUIV. Equivalent
ESC. Escalator
EST. Estimate
EXC. Excavated
EXH. Exhaust
E.D. Exhaust Duct
E.F. Exhaust Fan
E.G. Exhaust Grille
E.R. Exhaust Register
EXIST. Existing
EXP. Expansion
EXP.B. Expansion Bolt
E.J. Expansion Joint
EXPL.P. Explosion Proof
EXP'D. Exposed
EXT'N. Extension
EXT. Exterior
E.H. Extra Heavy
EXTR. Extruded
E.S.P. External Static Pressure

F

FAB. Fabricated/Fabric
F/F Face-to-face
F. FIN. Factory Finish
F.C.U. Fan Coil Unit
F.S. Far Side
FAS. Fastener
FDR. Feeder
FT. Feet/Foot
F.P.M. Feet Per Minute
FN. Fence
FBD. Fiberboard
FIG. Figure
FIN. Finish/Finished
FIN.FLR/ F.F. Finish Floor
F.T.R. Finned Tube Radiation
F.A. Fire Alarm
F.A.C.P. Fire Alarm Control Panel
F. BRK. Fire Brick
F.D. Fire Damper
F.E. Fire Extinguisher
F.E.C. Fire Extinguisher Cabinet
F.H.C. Fire Hose Cabinet
F.H. Fire Hydrant

SECTION 014213
ABBREVIATIONS

F.L.	Fire Line			INCL.	Include/ Including
F.R.	Fire Retardant/ Fire Rated		H	I.W.	Indirect Waste
F.V.C.	Fire Valve Cabinet			INFO.	Information
FP.	Fireplace	HNDCP.	Handicapped	I.D.	Inside Diameter
FPRFG.	Fireproofing	H.R.	Handrail	I.F.	Inside Face
FIXT.	Fixture	H.BD.	Hardboard	INST'L.	Install/ Installation
FLG.	Flange	HDWE.	Hardware	INSUL.	Insulate/ Insulation
FLASH.	Flashing	HDWD.	Hardwood	I.H.	Intake Hood
F.H.M.S.	Flat Head Machine Screw	HD.	Head	INT.	Interior
F.H.W.S.	Flat Head Wood Screw	HDR.	Header	INTER.	Intermediate
F.C.	Flexible Connection	H.O.A.	Hands-Off-Auto	INV.	Invert
FLR.	Floor	HD.	Head	I.E.	Invert Elevation
F.CO.	Floor Cleanout	H.A.GL.	Heat Absorbing Glass		
F.D.	Floor Drain	H.R.U.	Heat Recovery Unit		J
FLR.FIN.	Floor Finish	HTR.	Heater		
FLUOR.	Fluorescent	HTG.	Heating		
FLDG.	Folding	H/V	Heating And Ventilating	J.C.	Janitor Closet
FTG.	Footing	H.V.A.C.	Heating, Ventilating, and Air Conditioning	JT.	Joint
FMBD.	Formboard	H.H.W.R.	Heating Hot Water Return	JST.	Joist
FDN.	Foundation	H.H.W.S.	Heating Hot Water Supply	J.B.	Junction Box
FR.	Frame	HGT.	Height	JR.	Junior
FRMG.	Framing	HEX.	Hexagon		K
F.A.I.	Fresh Air Intake	H.	High		
FRZR.	Freezer	H.I.D.	High Intensity Discharge	K.P.	Kick Plate
F.L.A.	Full Load Amperes	H.P.	High Point	KV.	Kilovolt
F.S.	Full Size	H.PR.	High Pressure	KV.A.	Kilovolt Ampere
FURN.	Furnish/ Furnished	H.S.	High Strength	KW.	Kilowatt
		H.S.B.	High Strength Bolt	K.	Kip (1000#)
	G	H.V.	High Voltage	KIT.	Kitchen
		HWY.	Highway	K.D.	Knock Down
GA.	Gauge	HSTWY.	Hoistway	K.O.P.	Knock-Out Panel
GAL.	Gallon	H.C.	Hollow Core		L
G.P.H.	Gallons Per Hour	H.M.	Hollow Metal		
G.P.M.	Gallons Per Minute	HK.	Hook		
GALV.	Galvanized	HORIZ.	Horizontal/ Horizontally	LBL.	Label
GALV.I.	Galvanized Iron	HP.	Horsepower	LAB.	Laboratory
G.	Gas	H.B.	Hose Bibb	LAD.	Ladder
GKT.	Gasket	H.S.P.	Hose Stand Pipe	L.B.	Lag Bolt
G.V. & B.	Gate Valve And Box	H.V.C.	Hose Valve Cabinet	LAM.	Laminate/ Laminated
GA.	Gauge	HOSP.	Hospital	LDG.	Landing
GEN'L.	General	H.W.	Hot Water	L-	Landscape Drawing Number
GL.	Glass	H.W.R.	Hot Water Return	LGE.	Large
GLZ.	Glazing	H.W.S.	Hot Water Supply	LDRY.	Laundry
G.H.T.	Glazed Hollow Tile	HR.	Hour	LAV.	Lavatory
G.B.	Grab Bar	H.O.	Hub Outlet	L.A.T.	Leaving Air Temperature
GR.	Grade/Grille	HYD.	Hydrant/Hydraulic		
GB	Grade Beam	H.	Hydrogen	L.H.	Left Hand
GRAT.	Grating			L.H.R.B.	Left Hand Reverse Bevel
G.L.	Grid Line		I		
GRN.	Granite			LGTH.	Length
G.S.	Grease Separator			LEV.	Level
G.T.	Grease Trap			LIB.	Library
GND.	Ground			LT.	Light
G.F.	Ground Fault	I.D.	Identification	LPRF.	Lightproof
GT.	Grout	IN. or "	Inch/ Inches	LTG.	Lighting
GYP.	Gypsum	INCIN.	Incinerator	L.P.	Lighting Panel
GYP.BD.	Gypsum Board				

SECTION 014213
ABBREVIATIONS

L.R.P. Lighting Receptacle Panel
 LTWT. Lightweight
 LTWT. Lightweight Concrete CONC.
 LMS. Limestone
 LTL. Lintel
 L.D. Linear Diffuser
 L.C.D. Linear Ceiling Diffuser
 L.F. Linear Feet/Foot
 LIQ. Liquid
 L.L. Live Load
 L.R. Living Room
 LOC. Location
 LKR. Locker
 LG. Long
 L.L.H. Long Leg Horizontal
 L.L.V. Long Leg Vertical
 LVR. Louver
 L.O. Louver Opening
 L.P. Low Point
 L.PR. Low Pressure
 LBR. Lumber
 LBS. Pounds

M

MACH. Machine
 M.B. Machine Bolt
 MACH.RM. Machine Room
 M.U.A. Make-Up Air
 M.A.U. Make-up Air Unit
 M.D.P. Main Distribution Panel
 M.S.B. Main Switch Board
 MAINT. Maintenance
 MH. Manhole
 M.V.D. Manual Volume Damper
 MFR. Manufacturer
 MAR. Marble
 MK. Mark
 MAS. Masonry
 M.O. Masonry Opening
 MATL. Material
 MAX. Maximum
 MECH. Mechanical
 M- Mechanical Drawing Number
 M.C. Medicine Cabinet
 MED. Medium
 MEMB. Membrane
 MET. Metal/ Metallic
 M.C.S. Metal Carpet Strip
 M.D.S. Metal Divider Strip
 M.E.S. Metal Edge Strip
 M.L. Metal Lath
 M.L.& PLAS. Metal Lath And Plaster

MET.W.P. Metallic Waterproofing
 MEZZ. Mezzanine
 M.D.O.T. Michigan Department of Transportation
 MWK. Millwork
 MIN. Minimum
 MIR. Mirror
 M. & S. Mirror And Shelf
 MISC. Miscellaneous
 M.I. Miscellaneous Iron
 MOD. Model
 MON. Monument
 M.S. & S. Mop Strip And Shelf
 M.O. Motor Operated
 M.O.D. Motor Operated Damper
 MLDG. Molding
 MTD. Mounted
 MTG. Meeting/Mounting
 MTD. Mounted
 MOV. Moveable
 MOV. Moveable Partition
 PARTN.
 MULL. Mullion
 M Thousand
 MBH 1000BTU/Hour

N

NAT. Natural
 N.S. Near Side
 NK. Neck
 NEUT. Neutral
 N.R.C. Noise Reduction Coefficient
 NOM. Nominal
 N.C. Non-Corrosive
 NOR. Normal
 N.C. Normally Closed
 N.O. Normally Open
 N North
 NOS. Nosing
 N.I.C. Not In Contract
 N.T.S. Not To Scale
 NO. or # Number

O

OBS. Obscure
 OBS.GL. Obscure Glass
 OFF. Office
 O.C. On Center
 OPQ. Opaque
 OPG. Opening
 OPER. Operator
 O.B.V.D. Opposed Blade Volume Damper
 OPP. Opposite

OPP.HD Opposite Hand
 ORIG. Original
 ORN. Ornamental
 OZ. Ounce
 O/O Out-to-Out
 O.A. Outside Air
 O.D. Outside Diameter
 O.F. Outside Face
 O.H.S. Oval Head Screw
 OA. Overall
 OHD. Overhead
 OHD.DR. Overhead Door
 OXY. Oxygen

P

PRD. Painted
 PR. Pair
 PNL. Panel
 P.T.D. Paper Towel Dispenser
 P.T.W.R. Paper Towel Waste Receptacle
 PARA. Paragraph
 PRL. Parallel
 PGK. Parking
 P.BD. Particle Board
 PRTN. Partition
 PASS. Passage
 PAT. Patent
 PVMT. Pavement
 PVG. Paving
 PED. Pedestal
 PERF. Perforated
 PERIM. Perimeter
 PERM. Permanent
 PERP. Perpendicular
 PHOTO. Photograph
 P.H. Physically Handicapped
 PC. Piece
 PCS. Pieces
 PLAS. Plaster
 PL.LAM. Plastic Laminate
 PL. Plate
 PL.GL. Plate Glass
 PLAT. Platform
 PLBG. Plumbing
 PLYWD. Plywood
 PT. Point
 P.T. Point of Tangency
 P.C. Point of Curvature
 POL. Polish/ Polished
 PVC. Polyvinylchloride
 PORC. Porcelain
 PORC. ENAM. Porcelain Enamel
 POR. Porous
 PORT. Portable
 POS. Position
 P.I.V. Post Indicator Valve

SECTION 014213
ABBREVIATIONS

LBS. or #	Pounds	RH.C.	Reheat Coil	S.D.R.	Shower Door
P.L.F.	Pounds Per Linear Foot	REINF.	Reinforce/Reinforcing Reinforcement	SW.	Sidewalk
P.S.F.	Pounds Per Square Foot	R.H.	Relief Hood	SIM.	Similar
P.S.I.	Pounds Per Square Inch	REM.	Remove/ Removable	SGL.	Single
P.C.F.	Pounds Per Cubic Foot	REP.	Repair	SK.	Sink
P.P.	Power Panel	REQ'D.	Required	S.D.	Soap Dispenser
P/C	Precast	RESIL.	Resilient	S.C.	Solid Core
P.T.C.	Precast Terrazzo Receptor	RET.	Return	S.T.C.	Sound Transmission Class
PREFAB.	Prefabricated	R.A.	Return Air	S	South
PFN.	Prefinished	R.A.A.D.	Return Air Duct	SP.	Space
P.C.T./C.M.	Pressure Control Terminal/Control Module	R.A.F.	Return Air Fan	SPR.	Spare
P.G.	Pressure Gauge	REV.	Revised/Revision	SPKR.	Speaker
P.R.G.	Pressure Relief Grille	R.P.M.	Revolutions Per Minute	SPEC.	Specifications
P.R.V.	Pressure Reducing Valve	R.	Riser	S.D.	Splitter Damper
PRIM.	Primary	R.H.	Right Hand	SPRYD.	Sprayed
PROJ.	Project/ Projection	R.H.R.B.	Right Hand Reverse Bevel	SPKLR.	Sprinkler
PROP.	Property/ Proposed	R.O.W.	Right Of Way	SQ.	Square
P.L.	Property Line	RVT.	Rivet	S.F.	Square Feet/ Square Foot
P.A.	Public Address	RD.	Road	STAG.	Staggered
P.S.	Purse Shelf	R.S.C.	Rolling Steel Curtain	ST.STL	Stainless Steel
P.B.	Push Button	RF.	Roof	STD.	Standard
Q		R.C.	Roof Conductor	SP.	Standpipe
		R.D.	Roof Drain	S.P.	Static Pressure
		RF.H.	Roof Hatch	STA.	Station
		R.T.U.	Roof Top Unit	STM.	Steam
		R.S.	Roof Sump	STL.	Steel
		R.V.	Roof Ventilator	STL.PL.	Steel Plate
		RFG.	Roofing	STIFF.	Stiffener
		R.W.C.	Rain Water Conductor	STO.FR.	Storefront
		RM.	Room	STOR.	Storage
		R.O.	Rough Opening	ST.	Storm
QTY.	Quantity	RND. or O	Round	STR.	Straight
Q.T.	Quarry Tile	R.H.M.S.	Round Head Machine Screw	ST.	Street
QTR.	Quarter	R.H.W.S.	Round Head Wood Screw	STRUCT.	Structural Drawing Number
QTR.RD.	Quarter Round	R.T.	Rubber Tile	S.G.F.T.	Structural Glazed Facing Tile
R				S.STL.	Structural Steel
				SS.D.	Subsoil Drain
				SS.D.C.	Subsoil Drain Connection
		S		SUB.	Substation
RBT.	Rabbet			S.A.G.	Supply Air Grille
R.C.P.	Radiant Ceiling Panel			S.D.	Supply Diffuser/ Duct
RAD. or R.	Radius			SUBST.	Substitute
R.W.C.	Rain Water Conductor	SAN.	Sanitary	S.A.R.	Supply Air Register
R.R.	Railroad	S.N.D.	Sanitary Napkin Dispenser	S.F.	Supply Fan
RECV.	Receive/ Receiving	S.N.R.	Sanitary Napkin Receptacle	S.A.	Supply Air
RECP.T.	Receptacle	SCHED.	Schedule	S.A.D.	Supply Air Diffuser
R.P.	Receptacle Panel	SCN.	Screen	SUPP.	Support
REC.	Recess	STG.	Seating	SURF.	Surface/Surfacing
RECIRC.	Recirculation	SECT.	Section	SUSP.	Suspend/Suspension
RECT.	Rectangle / Rectangular	SERV.	Service	SW.	Switch
RED.	Reducer	S.S.	Service Sink	SWBD.	Switchboard
RWD.	Redwood	SHTHG.	Sheathing	SWGR.	Switchgear
REF.	Refer/Reference	SHT.	Sheet	SYM.	Symbol/Symmetrical
REFL.	Reflected/Reflective	SHT.MET.	Sheet Metal	SYS.	System
REFRIG.	Refrigerant	SH. & P.	Shelf And Pole		
REFR.	Refrigerator	SHWR.	Shower		
REG.	Register	S.C.R.	Shower Curtain Rod		
					T

SECTION 014213
ABBREVIATIONS

T.BD.	Tackboard	U.H.	Unit Heater	WP.	Waterproofing
TAN.	Tangent	U.SUB.	Unit Substation	W.P.	Weatherproof
TECH.	Technical	U.V.	Unit Ventilator	W.STPG.	Weatherstripping
TEL.	Telephone	U.S.G.S.	United States Geological Survey	WT.	Weight
TEL.CAB.	Telephone Cabinet			W.W.F	Welded Wire Fabric
TV	Television	U.O.N.	Unless Otherwise Noted	W	West
TV.M.	Television Monitor	U.S.A.	Untempered Supply Air	W.B.	Wet Bulb
TEMP.	Temperature			W.	Wide/Width
TEMP.GL.	Tempered Glass	UR.	Urinal	W-x-	Wide Flange Section
T.W.	Tempered Water			WT	Wide Flange Tee Section
T.U.	Terminal Unit		V	W.O.	Window Opening
TERR.	Terrazzo			W.GL.	Wire Glass
T.B.	Test Boring			W.M.	Wire Mesh
T.	Thermostat	VAC.	Vacuum	W/	With
THK.	Thick/Thickness	V.B.	Vacuum Breaker	W/O	Without
T.S.	Thickened Slab	V.C.O.	Vacuum Cleaner Outlet	WD.	Wood
M (1000)	Thousand	V.BARR.	Vapor Barrier	W.L.	Working Line
K (KIP)	Thousand Pounds	VAR.	Variable	W.PT.	Working Point
THD.	Thread/Threaded	V.A.V.	Variable Air Volume	W.I.	Wrought Iron
THRESH.	Threshold	VARN.	Varnish		Y
THRU.	Through	VNR	Veneer		
T.	Tile	V. PLAS.	Veneer Plaster		
T./TOIL.	Toilet	V.	Vent	YD.	Yard
T.P.D.	Toilet Paper Dispenser	V.T.R	Vent Thru Roof	Y.P.	Yield Point
T.P.H.	Toilet Paper Holder	VENT.	Ventilate/ Ventilation	Y.S.	Yield Strength
T & G	Tongue And Groove	V.I.F.	Verify In Field	YR.	Year
T & B	Top & Bottom	VS.	Versus		Z
T/C	Top Of Cover/Curb	VERT.	Vertical/Vertically		
T/EL.	Top Elevation	VERT.C.	Vertical Curve		
T/F	Top Of Footing	VEST.	Vestibule		
T/M	Top Of Masonry	V.I.	Vibration Isolator		
T/P	To Of Pavement	VNY.	Vinyl	Z.C.	Zinc-Coated
T/R	Top of Rail	V.C.T.	Vinyl Composition Tile		
T/R	Top of Rim	VIN.FAB.	Vinyl Fabric		
T/S	Top of Steel	V.R.S.	Vinyl Reducer Strip		
T/W	Top of Wall	VIT.	Vitreous		
T.B.	Towel Bar	V.C.P.	Vitrified Clay Pipe		
T.D.	Towel Dispenser	VOL.	Volume		
T.D. & W.R.	Towel Dispenser & Waste Receptacle	V.D.	Volume Damper		
T.G.	Transfer Grille	V	Volts		
TRFR.	Transformer				
TRAN.	Transom				
T	Tread		W		
T.D.	Trench Drain				
T.S.	Tube Section	WAINS.	Wainscot		
T.V.	Turning Vane	W.CAB.	Wall Cabinet		
T.T.	Twin Tee	W.CO.	Wall Cleanout		
TYP.	Typical	W.H.	Wall Hydrant		
		W/W	Wall-to-wall		
		W.V.	Wall Vent		
	U	WHSE.	Warehouse		
		W.F.	Wash Fountain		
		W.	Waste/Watts		
		W & V	Waste And Vent		
		W.R.	Waste Receptacle		
		W.C.	Water Closet		
		W.G.	Water Gauge		
		W.H.	Water Heater		
U.C.	Undercut				
U.G.	Underground				
U.L.	Underwriters' Laboratories, Inc.				
ULT.	Ultimate				
UNFIN.	Unfinished				

SECTION 01 4216 - STANDARDS AND DEFINITIONS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Specified Herein: Standards and Definitions
Definitions
Specification Content
Quality Standard of the Industry

1.2 DEFINITIONS

- A. Certain terms used in the Contract Documents are defined generally in this article. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the work to extent not stated more explicitly in another provision of the Contract Documents.
- B. Indicated: A cross-reference to details, notes or schedules on the drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in the Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.
- C. Furnish: Supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- D. Install: Perform operations at project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing protecting, cleaning and similar operations, as applicable in each instance.
- E. Provide: Furnish and install, complete and ready for intended use, as applicable in each instance.
- F. Installer: The entity (person or firm) engaged by the Contractor or its subcontractor or sub-subcontractor for the performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.

1.3 FORMAT AND SPECIFICATION EXPLANATIONS

- A. Specification Production: None of these explanations will be interpreted to modify substance of requirements. Portions of these Specifications have been produced by Architect's/Engineer's standard methods of editing master Specifications, and may contain minor deviations from traditional writing formats. Such deviations are a normal result of this production technique, and no other meaning will be implied or permitted.

- B. Format Explanation: The format of principal portions of these Specifications can be described as follows; although other portions may not fully comply and no particular significance will be attached to such compliance or non-compliance:
1. Sections and Divisions: For convenience, basic unit of Specification text is a "section", each unit of which is named and numbered. These are organized into related families of sections, and various families of sections are organized into "divisions", which are recognized as the present industry-consensus on uniform organization and sequencing of Specifications. The section title is not intended to limit meaning or content of section, nor to be fully descriptive of requirements specified therein, nor to be an integral part of text.
 2. Each section of specifications has been subdivided into 3 (or less) "parts" for uniformity and convenience (Part 1 - General, Part 2 - Products, and Part 3 - Execution). These do not limit the meaning of and are not an integral part of text that specifies requirements.
 3. Imperative Language: Requirements expressed imperatively shall be performed by Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by Contractor, or when so noted, by others.
 4. Section Numbering: Used to facilitate cross-reference in Contract Documents. Sections are placed in Project Manual in numeric sequence; however, numbering sequence is not complete, and listing of sections at beginning of project Manual must be consulted to determine numbers and names of specification sections in the Contract Documents.
 5. Page Numbering: Numbered independently for each section; recorded in listing of sections (Index or Table of Contents) in Project Manual. Section number is shown with page number at bottom of each page, to facilitate location of text in Project Manual.

1.4 SPECIFICATION CONTENT

- A. Specifying Methods: The techniques or methods of specifying to record requirements varies throughout text, and may include "prescriptive", "open generic-descriptive", "compliance with standards", "performance", "proprietary", or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit or work.
- B. Overlapping and Conflicting Requirements: Where compliance with 2 or more industry standards or sets of requirements is specified, and overlapping of these different standards or requirements establishes different or conflicting minimums of levels of quality, most stringent requirement (which is generally recognized to be also most costly) is intended and will be enforced, unless specifically detailed language written into the Contract Documents (not by way of reference to an industry standard) clearly indicated that a less stringent requirement is to be fulfilled. Refer apparently equal but different requirements, and uncertainties as to which level of quality is more stringent, to Architect for a decision before proceeding.
1. Contractor's Options: Except for overlapping or conflicting requirements, where more than one set of requirements are specified for a particular unit of work, option is intended to be Contractor's regardless of whether specifically indicated as such.
- C. Specified Quality Standards: The fact that a specified product or model number is in conflict with specified quality requirements such as "concealed fasteners" or "special colors" such specification shall be construed to mean that acceptance is contingent upon manufacturer or fabricator modifying the product to comply with the Specifications.

- D. **Minimum Quality/Quantity:** In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or a appropriate for context of requirements. Refer instances of uncertainty to Architect for decision before proceeding.
- E. **Specialists; Assignments:** In certain instances, specification text requires (or at least implies) that specific work be assigned to specialists or expert entities, who must be engaged for performance of those units of work. These must be recognized as special requirements over which Contractor has no choice or option. These assignments must not be confused with (and are not intended to interfere with) normal application of regulations, union jurisdictions and similar conventions. One purpose of such assignments is to establish which party or entity involved in a specific unit of work is recognized as "expert" for indicated construction processes or operations. Nevertheless, final responsibility for fulfillment or entire set of requirements remains with Contractor.
- F. **Abbreviations:** The language of Specifications and other Contract Documents is of the abbreviated type in certain instances, and implies word and meanings that will be appropriately interpreted. Actual work abbreviations of a self-explanatory nature have been included in the text. Specific abbreviations have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on drawings and in schedules. These are frequently defined in sections at first instance of use. Trade association names and titles of general standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of the Contract Documents so indicates.

1.5 QUALITY STANDARDS OF THE INDUSTRY

- A. **General Applicability of Standards:** Applicable standards of construction industry have same force and effect (and are made a part of Contract Documents by reference) as if copied directly into Contract Documents, or as if published copies were bound herewith.
1. Reference standards (referenced directly in Contract Documents or by governing regulations) have precedence over non-referenced standards.
 2. Non-referenced standards have no particular applicability except as a measure of compliance with standards recognized in construction industry.
- B. **Copies of Standards:**
1. Where copies of standards are needed for proper performance of the work, the Contractor is required to obtain such copies directly from the publication source.
 2. The Architect reserves the right to reasonably require the Contractor to submit, or maintain at the jobsite, copies of all applicable standards as needed for enforcement of the requirements.
- C. **Publication Dates:** Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of Contract Documents.

- D. Abbreviations and Names: Acronyms or abbreviations used in Contract Documents mean the industry recognized name applicable to context of text provision.

1.6 DRAWINGS, DETAILS, SCHEDULES

- A. Large scale details are provided to show arrangement, attachment, and otherwise indicate relationships of component materials and for purposes of clarify often do not show all materials. The fact that a material is, or is not indicated on such details shall not act to relieve the Contractor of responsibility for providing a specified item.
- B. Schedules are provided for convenience of reference only. In the event of an omission or conflict between schedules and other documents, the more restrictive document shall govern as directed by the Architect.

1.7 CODES AND STANDARDS

- A. Comply with latest revisions to date of all Governing Codes and with all other legal provisions relating to the Work. Other standards and references shall be current edition as of date of issue of Bidding Documents.
- B. Conform to all laws, ordinances and regulations affecting the erection, sequence of erection, and completion of the whole or any part of the work; and conform to the requirements of the Owner and of public authorities having lawful or customary jurisdiction.
- C. These requirements shall take precedence over the Contract Documents except where the Contract Documents require higher standards also acceptable to the authorities.

1.8 PERMITS, CODES, ORDINANCES AND NOTICES

- A. See General Conditions for permits.
- B. Obtain and keep available at the job, copy of building ordinances pertinent to the work.
- C. Inform the Owner and the Architect, in writing, of the manner and time in which each of the requirements of the General Conditions concerning permits are complied with.
- D. Make all necessary arrangements and obtain permits for blockage of streets and for all interference with the public right of way.
- E. Special Inspections: All special inspections required to be made under provisions by building code of utility company regulations shall be arranged and paid for by the Contractor whose work requires such inspection.

END OF SECTION

SECTION 01 6000 - PRODUCT REQUIREMENTS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS:**

- A. DRAWINGS AND GENERAL PROVISIONS of Contract, including General and Supplementary Conditions and other Division 01 Specification sections, apply to work of this section.

1.2 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if presented to the Architect at least 10 days in advance of bid due date.
1. Identify the product, or the fabrication to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
 - e. A Statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - f. Cost information, including all related costs under this Contract and excluding Architect's redesign costs, net change, if any, in the Contract Sum, and waiving all claims for additional costs related to the substitution which subsequently became apparent.
 - g. Certification by the Contractor that the substitution proposed is appropriate in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
- B. Product Presentation: Conduct a presentation at the Architect's office if required by the Architect to prove appropriateness to the specified product.
- C. Architect's Action: Within one (1) week of receipt of Bids, the Architect may request additional information or documentation necessary for evaluation of the request. Within two (2) weeks of receipt of the request, or one (1) week of receipt of the additional information or documentation, which ever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute is not made or obtained within the time allocated, use the product specified by name. If acceptance is made prior to award, it will be included in the Contract Amount. If acceptance is made after Award, it will be in the form of a Change Order.

1.3 GENERAL REQUIREMENTS FOR SUBSTITUTIONS

A. Substitutions During Bidding:

1. Substitutions shall be included in the proposal under the following conditions only and shall follow all requirements of "Acceptance of Substitutions."
 - a. When the Contractor is unable to obtain competitive prices from more than one of the specified manufacturers.
 - b. When the Contractor knows of another product of equal or better quality and performance.
 - c. When the Contractor has had unsatisfactory experience with one or more of the specified products or has reason to believe that the specified Manufacturer will not provide the necessary guarantees or assume responsibility for performance.

B. Substitutions After Contract:

1. Substitutions proposed after Award of the contract will only be considered for the following reasons.
2. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

C. Acceptance of Substitutions:

1. Substitutions will be considered for any manufacturer except those followed by the words "No Substitutions" in the Specifications.
2. In all cases where substitutions are proposed by the Contractor, it shall be the sole responsibility of the Contractor to provide adequate data and samples as required by the Architect to evaluate the substitution.
3. The Architect shall not be obliged to justify his reason for rejecting a proposed substitution.
4. In the event that a substitution is accepted conditionally on the Contractor's agreement to assume full responsibility for equality and performance, the Contract shall provide a full value warranty and agree to make good all damages resulting from the failure of the substitute product.

1.4 ACCEPTANCE OF MATERIALS AND MANUFACTURERS

A. Standard Materials:

1. Architect's acceptance applies to the Manufacturer only and shall not act to permit any deviation from other requirements of the Specifications.
2. Acceptance will be based on the Manufacturer's specifications at time of issuance of Bidding Documents. Deviations from such specifications shall be considered as a substitution.

3. Requests for acceptance shall be in tabular form stating Specification paragraph and material selected, except as otherwise provided.
 4. Shop Drawings shall not indicate any material for which acceptance has not been received, unless accompanied by a separate request for approval. In no case shall Architect's review and return of Shop Drawings constitute and acceptance of either specified or substitute manufacturers or materials.
- B. Materials Involving Supplementary Warranty of Maintenance Contract:
1. These materials shall be submitted as a request for acceptance over the signature of a qualified technical representative in the direct employ of the Manufacturer of such other person as the manufacturer may authorize in writing. Request for acceptance shall contain the following information:
 - a. Name of project.
 - b. Name of Contractor, Subcontractor or other party to whom material is furnished.
 - c. Reference to Specification Section and Article where material is specified and other Contract Documents necessary for identification.
 - d. Statement of acceptance of documents, conditions, and performance requirements:
 - 1) Statement that documents as issued are in accordance with manufacturer's recommendations for use of specified materials, or
 - 2) Recommended modification of detail, use, application or for substitution of different product by same manufacturer as being more suitable for the performance requirements of the warranty.
 - e. Statement that detailed installation instructions will be provided.
 - f. Extent of job site technical services, consultants or instructors proposed, if any.
 - g. Statement that warranty will be provided.
 - h. Special provisions required to keep warranty in force.
 2. Requests for acceptance may be in the form of a letter including the above items and addressed to the subcontractor responsible for installation of the material, or may be according to a sample form of Material Proposal, provided by the Architect.
 3. Upon receipt of the manufacturer's proposal, the subcontractor shall add his own statement agreeing to comply with the manufacturer's requirements and warranting his own workmanship.
 4. The Contractor shall submit letter of endorsement of copies of all documents, including letters of comment, to the Architect for approval. In the event that the request for approval recommends a change in the work, modification of detail, or substitution of material, the Contractor shall indicate his concurrence with the change as being within the scope of the Contract or indicate the change in the Contract Sum for making such change, or state his objections to the change.

END OF SECTION

SECTION 01 7300 - EXECUTION REQUIREMENTS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Specified Herein: General Requirements for standards of construction operations and procedures of a repetitive or general nature.

1.2 MANUFACTURER'S REVIEW

- A. Manufacturer's review of documents and conditions of use is a statement by the manufacturer or a representative or agent thereof that it has reviewed the documents pertaining to the work and verified the proposed use of the material including details and instructions for applications or installation, is suitable for the intended purpose, and under similar conditions of use.
- B. Obtain and submit a statement from the manufacturer indicating that they have no objection to the proposed details or method of installation, and that instructions for applications or installation are in conformance with manufacturer's recommendations. Statement shall include any additional precautions or protective measures that should be taken.
- C. Manufacturer's review shall recognize adjacent materials and state if there is, in its opinion, a serious question of compatibility including possibility of damage to other materials, or damage to the material or assembly by other materials. Such conditions shall be reconsidered and adjustments made, previous approvals notwithstanding.

1.3 APPROVED APPLICATOR

- A. An approved applicator or installer is one whom the manufacturer has reason to believe is experienced and qualified in the work and is familiar with the product and with the manufacturer's recommendations for use and installation.
- B. Obtain and submit a statement from the manufacturer that the proposed applicator or installer is approved and indicate whether or not this approval is subject to review and observation of the work by the manufacturer's representative.
- C. Manufacturer shall not approve an installer or applicator if, because of past history of performance or other reasons, there is a reasonable doubt that it can be relied upon to perform in accordance with the Contract Documents.
- D. Upon completion of the work, manufacturer shall certify that approved material in the proper quantities have been delivered to the approved applicator for use on the Project.
- E. In the event that manufacturer declines to approve proposed applicator, submit a statement as to whether or not on-site instruction or manufacturer's supervision is recommended.

1.4 MATERIAL HANDLING, STORAGE AND DELIVERY

- A. Where applicable, deliver all packaged materials to the site in manufacturer's original unopened containers.

- B. Properly pack all materials in appropriate containers for shipment. Identify contents with piece marks referenced to shop drawings and as far as possible in some sequence as erection. Provide packing, wrapping and other protection as required to insure satisfactory condition of materials and finishes at time of erection.
- C. Inspection and acceptance will be made on the basis of materials as delivered to the job site.
- D. Provide adequate quantities to allow for damage and breakage during shipment and delivery and for replacement of all materials damaged prior to final acceptance. All such replacement of damaged materials shall be at no additional cost to the Owner.
- E. Store materials and equipment that are subject to degradation by outside exposure in a weathertight enclosure.

1.5 MIXING, THINNING AND STORAGE

- A. Store and mix paints only in areas designated, and provide proper protection for walls and floors.
- B. Mix and thin paints in strict accordance with recommendations of the manufacturer.
- C. Deliver and store paints and flammable materials in the manufacturer's original unopened containers, as far as practicable. Keep partially used materials in tightly closed containers.
- D. Do not store oil or paint soaked rags inside the building. Do not store materials in any room containing a direct-fired heating unit.

1.6 ON SITE INSTRUCTION

- A. On-site instruction shall consist of inspection and instruction performed by a qualified representative of the manufacturer.
- B. Obtain and submit a statement from the manufacturer that its authorized representative will provide the specified inspection and instruction and submit a record of the date on which specified services were provided.
- C. Service shall consist of:
 - 1. Preliminary inspection of substrates and all other conditions that would affect the performance of the work.
 - 2. Give notice of all unacceptable conditions and recommend remedial action.
 - 3. Recommend proper procedures for conditions as encountered at the site.
 - 4. Verify that workers are qualified and have received proper instructions.

1.7 MANUFACTURER'S SUPERVISION

- A. Manufacturer's supervision, in addition to all services specified for on- site instruction, consists of continuing inspection and verification that the work has been performed in accordance with the Contract.
- B. Obtain and submit a statement from the manufacturer that complete supervision will be provided.

- C. Where supervision is specified, all costs shall be included in the Base Bid. Where supervision is recommended as a modification, submit a proposal indicating the extent and additional cost, if any, of such service.
- D. Upon completion submit a report giving dates of inspections and include pertinent information as applicable to the particular trade such a procedures, coats, coverages, tests as necessary to verify conformance and certify that the proper types and quantities of materials were installed.

1.8 WORKMANSHIP

- A. Employ skilled mechanics and fabricate all work in the best and most workman-like manner and in strict accordance with the detail drawings, by fabricating contractors regularly engaged in the particular type or work.
- B. Conform to the acceptable fabrication and erection standards of the manufacturer and to the applicable rulings of Code Authorities.

1.9 FABRICATION

- A. Fabricate and install all items plumb, true, straight, square, level and in proper elevations, plane, locations and alignment with other work. Design all work for adjustment to field connection, fitted with proper joints and intersections, adequately anchored in place. Complete work in every detail.
- B. Design and anchor work so that work will not be distorted not fasteners overstressed from expansion and contraction due to temperature change.
- C. All fasteners for exposed surface where not otherwise indicated shall be concealed.
- D. Fabricated Items:
 - 1. Model numbers of Manufacturers as listed herein are intended to indicate design and detail for each item. Variations affecting function or appearance will not be accepted.
 - 2. Identifying Markings: Where the manufacturer's name, patent number, model number or similar identifying marks are required, locate such markings in as inconspicuous as possible location. In no case will such marks be acceptable as part of the basic design.
 - 3. Hardware for all Units: Concealed fasteners and hardware. Butt hinges are not acceptable as a substitute where item scheduled in Specification is manufactured with concealed pivots or piano hinges.

1.10 INSTALLATION

- A. Accurately locate, carefully plumb and level, and securely attach all accessories.
- B. Provide concealed grounds and backing or other anchorages devices, properly located, as required for fastening.
- C. Use manufacturer's standard mounting devices as best suited to installation conditions and as accepted by the Architect. Make all attachments by positive mechanical fastening devices, except where other installation methods are indicated.

- D. Where so recommended by the manufacturer, install the work under direct supervision of the authorized representative of the manufacturer. Employ workers experienced and qualified in the trade.
- E. Install units true and plumb in the opening maintaining proper contact with frames or adjacent materials and fitting closely to detail at intersection with other materials to provide for proper operation.
- F. Connect and properly adjust all operating devices and equipment to operate smoothly and perfectly.
- G. Upon completion or when directed, conduct careful inspection and correct defective work. Perform necessary adjustments as required to leave the completed installation in efficiently operable condition.

1.11 PREPARATION OF SURFACES FOR COATINGS AND COVERINGS

- A. Inspect all surfaces and verify that all required cants and chamfers are provided, and that all surfaces are free from irregularities of projections that would interfere with proper application.
- B. Thoroughly clean surfaces; remove all loose materials, grease, oil and foreign matter.
- C. Allow surfaces to completely dry before applying materials.
- D. Report all unsatisfactory surface to contractor for correction before proceeding. Otherwise proceeding will constitute acceptance of surface by Contractor.
- E. Note: Interior application of solvent type adhesives and systems require special ventilation or special solvents if ventilation is not possible.

1.12 BUILDING-IN, ANCHORS, INSERTS

- A. Unless otherwise stipulated, each trade generally shall promptly furnish anchorage and insert devices, together with adequate setting information, where necessary for building into the work by other trades.
- B. Verify the accuracy of all built-in anchors and inserts.
- C. Delays and errors shall be corrected by the trade responsible therefor.
- D. Power driven anchors of equivalent capacity and function may be accepted, subject to written acceptance, where approved by local jurisdictional authorities.
- E. Do not endanger or alter the work of any other trade without obtaining prior written consent.
- F. Furnish all supports necessary for proper installation of equipment.

END OF SECTION

SECTION 01 7329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 02 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
 - 2. Divisions 02 through 35 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 15 and 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Roofing: When modifying an existing roof and adding new penetrations comply with the following requirements:
 1. Notify original roof manufacturer prior to beginning any work and comply with all manufacturer guidelines and requirements.
 2. Provide original roof manufacturer with a brief description of the proposed work, including any required submittals.
 3. Work shall not begin until written approval is received from original roof manufacturer.
 4. Work must be done by an approved roofing manufacturer's contractor.
 5. Original roof manufacturer shall inspect all modifications to the original roof system.
- B. Structural Elements: Do not cut and patch the following structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Foundation construction.
 - b. Bearing and retaining walls.
 - c. Structural concrete.
 - d. Structural steel.
 - e. Lintels.
 - f. Timber and primary wood framing.
 - g. Structural decking.
 - h. Stair systems.
 - i. Miscellaneous structural metals.
 - j. Shoring, bracing and sheeting.
 - k. Structural systems of special construction in Division 13 Sections.
- C. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related elements:
 - a. Primary operational systems and equipment.
 - b. Air or smoke barriers.
 - c. Fire-protection systems.
 - d. Control systems.
 - e. Communication systems.
 - f. Conveying systems.
 - g. Electrical wiring systems.
 - h. Operating systems of special construction in Division 13 Sections.

- D. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain-wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.
 6. Noise- and vibration-control elements and systems.
- E. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.
 - a. Processed concrete finishes.
 - b. Stonework and stone masonry.
 - c. Ornamental metal.
 - d. Matched-veneer woodwork.
 - e. Preformed metal panels.
 - f. Roofing.
 - g. Firestopping.
 - h. Window wall system.
 - i. Stucco and ornamental plaster.
 - j. Terrazzo.
 - k. Finished wood flooring.
 - l. Fluid-applied flooring.
 - m. Aggregate wall coating.
 - n. Wall covering.
 - o. Swimming pool finishes.
 - p. HVAC enclosures, cabinets, or covers.
 - q. Acoustical Ceilings
 - r. Carpeting
- F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.
 - 1. Existing Roof: The existing roof is a roof system which is still under warranty. Comply with the requirements stated in the "Quality Assurance" paragraph above.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION

SECTION 01 7836 - WARRANTIES**PART 1 - GENERAL****1.1 SUMMARY**

- A. Specified Herein: Warranties and continuing services required to be provided by manufacturers of materials and systems where required for proper performance.
- B. The word "Guarantee" when appearing in any Contract Document or construction correspondence shall be defined as warranty in accordance with Article 9.4 of the General Conditions.

1.2 SUBMITTALS

- A. Submit warranties in accordance with Article 9.4 of the General Conditions as modified by Supplementary Conditions and additional requirements specified under the individual Trade Sections.
- B. Required types of warranties and additional services are scheduled and listed in the Trade Sections.
- C. In all cases where "Special Warranties" or "Service Contracts" are required, the request for approval of materials will be accepted by the Owner and the Architect on the understanding that manufacturer agrees to provide the specified warranty or other service unless stated otherwise in the request.
- D. The Owner will not be bound to accept any limitations or variations from the specified warranty that was not filed with the request for acceptance and accepted prior to purchase of materials.
- E. Warranties shall be submitted prior to request for payment for 100% completion in each case, shall acknowledge the responsibilities defined under Supplementary Conditions and shall include:
 - 1. Manufacturer's warranty that all materials comply with its published standards, comply with the requirements of the Specifications and where specified, are adequate for the proposed use.
 - 2. Subcontractor's warranty that all workmanship complies with the requirements of the Specifications and of the manufacturer
 - 3. Contractor's warranty covering the entire work and accepting responsibility for all limitations imposed by the manufacturer or sub- contractor except where such limitations have been previously accepted by the Architect.
 - 4. Certification and verification of previously submitted information including statement of all limitations, required maintenance and similar conditions of the warranty.

1.3 STANDARD WARRANTIES

- A. A standard warranty is a warranty whose terms are essentially the same as normally offered by the manufacturer of standard with the industry.

- B. General Conditions require that standard warranties apply as a minimum requirement notwithstanding the fact that submittal of a copy of the warranty is not required.
- C. Unless otherwise specified a standard warranty shall be for a period on one (1) year from Date of Substantial Completion.
- D. Contractor shall obtain and furnish to the Owner from each manufacturer of materials or equipment incorporated into the Work a warranty at least as favorable to Owner as that customarily given by such manufacturer to others. Contractor shall inform itself as to any conditions precedent to the effectiveness of each manufacturer's warranty and comply with all such conditions (or obtain waivers thereof from the manufacturer) so that such warranty shall be fully effective. If any event occurs which might invalidate any manufacturer's warranty, Contractor shall promptly notify the Owner and the Architect.
- E. All warranty periods shall commence on the Date of Substantial Completion except that, if it is discovered after said date that certain work or materials were not in fact in conformance with the requirements of the Contract Documents, the applicable warranty period shall recommence from the completion of the repair or replacement of such Work to make it so conform.
- F. The fact that a manufacturer's warranty differs in its terms from those of the Contractor or any Subcontractor, the acceptance by the Owner of any warranty of a manufacturer or Subcontractor, or the fact that the Owner has claimed initially on such warranty, shall not in any way release Contractor from his warranty obligations under the Contract.

1.4 SPECIAL WARRANTIES

- A. A special warranty is one whose terms, in addition to the standard coverage offered by the manufacturer, contain other special provisions, including:
 - 1. Acknowledgment of specified list of items that shall be specifically noted as being covered by the warranty.
 - 2. Acknowledgment of specific conditions for use or exposure.
 - 3. Extension of warranty to waive standard exceptions or to extend limits including time.
 - 4. Requirements for specific performance by other trades including method of separation and protection from, or assurance of compatibility with, adjacent materials.
 - 5. Assemblies and systems that may include products of other manufacturers.
 - 6. Conditions where certain performance criteria are specified and must be either acknowledged or actual limits are required to be determined by performance testing subject to Owner's review and acceptance.
 - 7. Conditions where manufacturer's continuing involvement such as maintenance or advisory service is required.
- B. Maintenance Service During Warranty Period:
 - 1. Reference to routine maintenance required to be performed by the Owner during the warranty period shall be listed in the original submittal of proposed warranty.

2. All other administration and maintenance service required during the warranty period, including installation of items repaired or replaced under the terms of the warranty shall be included in the original Contract.

1.5 SERVICE CONTRACTS

- A. Required types of Service Contract Proposals are scheduled under Schedule of Required Submittals and are listed in the Trade Sections.
- B. Where specified, the Subcontractor or Manufacturer originally supplying services and skills required for proper maintenance and agreeing to maintain availability of replacement parts and materials.
- C. The Service Contract is in addition to, and independent of, the Warranty and shall not act to either extend the Warranty or to reduce the Contractor's responsibilities thereunder.
- D. Unless otherwise specified or agreed, Service Contracts shall be written for a period of five (5) years starting with the termination of similar services included under the warranty and shall include cancellation privilege annually when exercised at least 60 days prior to anniversary date.
- E. The Contractor shall:
 1. Prior to submittal of Manufacturer of Subcontractor for approval, verify that specified service is available and will be offered.
 2. Secure from the Manufacturer of Subcontractor a bona fide proposal to perform the specified services.
 3. When so directed, assist the Architect in obtaining proposals for the performance of the specified services by other competent parties.

1.6 ADVISORY AND INSPECTION SERVICE

- A. Advisory and Inspection Service consists of:
 1. Periodic inspection on a regular scheduled basis. Include schedule of proposed inspections in the agreement.
 2. All necessary information, including special training, where required to adequately instruct Owner's maintenance personnel in preventative maintenance procedures, and periodic inspection to verify that such procedures are adequate.
 3. Providing recommendations for additional preventative maintenance repairs and treatments. If such maintenance work is recommended:
 - a. Obtain or submit price quotations for recommended work.
 - b. When so instructed by the Owner, make all necessary arrangements for the performance of the Work.
- B. Parts and Materials Agreement:
 1. Where standard commercially available parts of materials are suitable for maintenance or repair, inform Owner concerning trade name or description and location where they may be obtained.

2. Where parts or materials are not readily available maintain replacement stocks at a location as required to prevent undue delay in repairs or loss of use of equipment pending delivery.

1.7 MAINTENANCE SERVICE

- A. A Maintenance Service Contract is an agreement that in addition to Advisory and Inspection Service, the Manufacturer will provide, or otherwise make available through his agent, a regular maintenance service program scheduled during normal working hours.
- B. Proposals shall schedule proposed times for servicing and list the services to be performed.
- C. Maintenance service of equipment shall be performed solely by the original Equipment Contractor and shall not be assigned or transferred to any agent or subcontractor without the approval of the Owner.
- D. Repairs:
 1. Permanent repairs shall be started within seven (7) days after notification by the Owner.
 2. In the event that emergency and permanent repairs are not started within the specified time limits, or if the work is stopped without the Owner's consent, the Owner shall have the same options to have repairs performed by others as specified under Warranties without invalidating this agreement.
- E. Equipment maintenance shall include systematic examinations, and adjustments and lubrication of all equipment. The Equipment Maintenance Contractor shall repair and replace electrical and mechanical parts whenever required using only genuine standard parts recommended or produced by the manufacturer of the equipment.
- F. Addition work when so directed by the Owner shall be included under the work of the Maintenance Contract and the Contractor shall be reimbursed at the then prevailing rate for the cost of materials, labor and services. Such additional work shall include:
 1. Repairs or replacement required as a result of negligence, abuse, or other actions contrary to the Equipment Contractor's operating instructions.
 2. Improvement or additional equipment required by the Owner, Insurance Companies, or Governmental Authorities.
 3. Except for emergency service, the additional cost for overtime work based on the difference between regular and overtime labor when the Owner requests that such work be performed outside of regular working and so authorized in writing.
- G. Additional requirements for specific maintenance contracts are specified in the various Trade Sections.

1.8 CERTIFICATION

- A. Product Certification: See Division 1.
- B. Workmanship Certification is a statement by the applicator or installer that all materials and workmanship in connection with the system have been furnished and installed in complete conformance with Contract Documents, and with the manufacturer's specifications and requirements for the particular type of use specified.

- C. A product certification where specified as a requirement shall be in a form similar to the following:

"We, the (Manufacturing Company), certify that the complete system as detailed and specified can be installed and will perform in accordance with the requirements of the specifications and the ASTM Standards referenced therein for the guarantee period of one year or such longer period as may be negotiated between the Owner and the (Manufacturing Company).

Upon completion of the Project we will inspect the work and certify to the Owner that the system as installed is in accordance with the Manufacturer's requirements or indicated in writing what remedial action is necessary in order that it does so conform."

END OF SECTION

SECTION 01 7839 - ELECTRONIC PROJECT RECORD DOCUMENTS**PART 1 - GENERAL****1.1 SUMMARY**

- A. Specified Herein: General Requirements for preparation and submittal of Project Record Documents.

1.2 DEFINITIONS

- A. Record Documents: Copies of the Contract Documents, Shop Drawings, Product Data and Samples maintained at the site for purpose of recording changes and other project information.
- B. Maintenance and Parts Manuals: Annotated PDF file format Brochures, instructions, parts lists and similar documents, published by manufacturers and suppliers of materials and equipment for purpose of providing information necessary to maintenance, repair and replacement.
- C. "As-Built" Drawings: Except for "as-built" corrections to the Shop Drawings the only record of architectural as-built conditions required will be clean copy of the Contractor's notations on the Record Drawings in Annotated PDF file format, unless otherwise specified.
- D. "As-Built" drawings for Mechanical, Electrical and Life Safety or Security Systems shall be fully dimensioned and detailed drawings, in Annotated PDF file format, showing all systems as they exist at the completion of Work.

1.3 SCHEDULES

- A. Prepare schedule listing required Record Drawings and Maintenance Manual submittals in accordance with "Submittals" Section of this Division 01.
- B. Keep schedule up to date listing record drawings and other documents as they are received from Manufacturers, Suppliers and Subcontractors.
- C. Hold all such material until completion of the project and submit when directed.

1.4 DRAWINGS AND SPECIFICATIONS AT THE SITE

- A. Each Contractor shall maintain at the site and available for reference by the Owner and the Architect one copy of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders and other Modifications applicable to their portion of the Work, in good order and marked to record all changes made during construction.
- B. The Drawings, marked to record all changes made during construction, shall be delivered to the Owner upon completion of the Work in Annotated PDF file format.

- C. Record Documents: At the date of Final Completion and as condition precedent to Final Payment, each Contractor shall furnish the following documents to the Owner:
1. Record Drawings in PDF file format showing the field changes affecting the general construction, mechanical, electrical, and all other Work, and indicating the Work as actually installed in the building.
 - a. These shall consist of carefully drawn markings on a set of black and white prints of the Construction Documents obtained especially for the purpose unless otherwise specified. The prints can be scanned into a PDF file when project is completed or the contractor can keep a Annotated PDF file on site.
 - b. The Contractor shall maintain at the job site one set of Construction Documents and indicate thereon each field change as it occurs.
 2. A neatly arranged searchable PDF file containing the wiring and control diagrams, operating and maintenance instructions, cuts of all mechanical and electrical equipment and fixtures, as installed including catalogues or parts lists from the prime manufacturer. Said lists shall not be based on local dealer stock number systems.

1.5 RECORD DRAWINGS

- A. Record Drawings are required to establish the location of concealed work deviations from details or dimensions indicated on the construction drawings. Where location or dimensions of portions of the work is indicated by note or line drawings or otherwise indicated to be at the option of the Contractor, the final determination of such options shall be indicated in the Record Drawings.
- B. Record Drawings are required for information only but are intended to provide complete information for as-built drawings.
- C. Final PDF file record copy of all Shop Drawings shall be submitted showing all corrections made and also indicating all field changes or other variations from the details as originally reviewed by the Contractor and the Architect.

1.6 OPERATING AND MAINTENANCE MANUALS

- A. Prior to completion of work in this Contract, each Contractor shall submit for review by the Architect searchable PDF file of manufacturer's catalog data covering all fixtures, equipment and finish materials incorporated into the project. Manufacturer's catalog data shall include full identification of the equipment or fixture capacities, current characteristics, dimensions, and identification of all replacement parts. Operating instructions for all installed equipment, including supplier's names and telephone numbers shall be placed on or lettered on the front page of each catalog or manual.
- B. Maintenance procedure descriptions shall be submitted for all materials requiring special treatments or continued maintenance work and for all assemblies, which may require parts replacement during the life of the installation. Manuals shall indicate recommended schedule for routine service and shall provide complete instructions for performing such service.
- C. Manuals and catalogs shall be searchable PDF format. Each item shall be tab and shall have an index. All material shall be grouped together by specification number.

- D. Contractor shall arrange and provide for the services of factory representatives or other authorized qualified specialists to provide operating and maintenance instruction sessions directly with Owner's related operating and maintenance personnel for the systems, equipment and materials involved.
- E. These requirements are in addition to other similar requirements stated elsewhere in the Contract Documents including those of "Warranties" Section of Division 01.
- F. Equipment Operation manuals and operating instructions for each item of mechanical and electrical equipment:
 - 1. Operation and Maintenance Charts: Searchable PDF and one (1) hard copy of an operating and maintenance instruction chart which will incorporate applicable comprehensive descriptive instructions, lay-outs, diagrams or any other information that will necessary and/or of value to the operating and maintenance personnel. Hard copy of the charts shall be framed and glazed and mounted at a designated location, and the other three sets shall be included in the operation and maintenance manuals.
 - 2. Operation and Maintenance Manuals: Searchable PDF file of an operation and maintenance manual which shall contain complete instructions for overall operation and maintenance of the facility and its component parts. The manual shall also contain the operating and maintenance instruction charts as specified.

END OF SECTION

SECTION 02 4120 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of a building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Repair procedures for selective demolition operations.
- B. Related Sections include the following:
 - 1. Division 1 Section "Cutting and Patching" for cutting and patching procedures for selective demolition operations.
 - 2. Division 23 Sections for demolishing, cutting, patching, or relocating mechanical items.
 - 3. Division 26 Sections for demolishing, cutting, patching, or relocating electrical items.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.
- B. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Proposed Dust-Control and Noise-Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Locations of temporary partitions and means of egress.
 - 6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- E. Predemolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.
- F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.

- E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1. Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.7 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. Owner assumes no responsibility for condition of areas to be selectively demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site will not be permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.
 - 1. If possible, retain original Installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage original Installer or fabricator, engage another recognized experienced and specialized firm.
 - a. Ornamental metal.
 - b. Preformed metal panels.
 - c. Roofing.
 - d. Firestopping.
 - e. Window wall system.
 - f. Terrazzo.
 - g. Finished wood flooring.
 - h. Swimming pool finishes.
 - i. HVAC enclosures, cabinets, or covers.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 - 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 2. Use materials whose installed performance equals or surpasses that of existing materials.
- B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
 - 1. Provide at least 72 hours' notice to Owner if shutdown of service is required during changeover.
- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - 4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - 5. Refer to Divisions 23 and 26 for other applicable requirements and limitations.

3.3 PREPARATION

- A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 3. Protect existing site improvements, appurtenances, and landscaping to remain.

4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- C. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- D. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- E. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- F. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
 2. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

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

3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - a. Remove debris from elevated portions by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 9. Dispose of demolished items and materials promptly.
 - 10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
 - 11. Explosives: Use of explosives is not permitted.
- B. Existing Facilities: Comply with building manager's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.
- C. Removed and Salvaged Items: Comply with the following:
 - 1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area on-site .
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items: Comply with the following:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- F. Concrete: Demolish in small sections. Cut concrete to a depth of at least **3/4 inch (19 mm)** at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- G. Structural Steel: Dismantle field connections without bending or damaging steel members. Do not use flame-cutting torches unless otherwise authorized by Architect.
1. Transport steel trusses and joists as whole units without dismantling them further.
- H. Below-Grade Construction: Demolish in sections. Remove below-grade construction, including basements, foundation walls and footings, completely to at least 12 inches below grade unless otherwise indicated on Drawings.
- I. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- J. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- K. Building Components: Remove metal gratings, metal ladders, doors, windows, door hardware, cabinets, mirrors, chalkboards and marker boards, tackboards, toilet accessories, plumbing fixtures, and light fixtures, as whole units, intact and undamaged.
- L. Elevators: Remove as whole units as much as practical.
- M. Equipment: Disconnect equipment at nearest fitting connection to services, complete with service valves. Remove as whole units, complete with controls.
- N. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

- O. Carpet and Pad: Remove in large pieces and roll tightly after removing demolition debris, trash, adhesive, and tack strips.
 - P. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
 - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
 - Q. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 7 Section for new roofing requirements.
 - R. Existing Utilities: Unless otherwise indicated on Drawings, demolish existing utilities and below-grade utility structures that are within 5 feet (1.5 m) outside of footprint indicated for new construction. Abandon utilities outside this area.
 - 1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Division 2 Section "Earthwork."
 - 2. Piping: Disconnect piping at unions, flanges, valves, or fittings.
 - 3. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.
- 3.6 PATCHING AND REPAIRS
- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.
 - B. Patching: Comply with Division 1 Section "Cutting and Patching."
- 3.7 DISPOSAL OF DEMOLISHED MATERIALS
- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 - B. Burning: Do not burn demolished materials.
 - C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
- 3.8 SELECTIVE DEMOLITION SCHEDULE
- A. Existing Items and Construction to Be Removed: As indicated on Drawings.
 - B. Existing Items to Be Removed and Salvaged: As indicated on Drawings.
 - C. Existing Items to Be Removed and Reinstalled: As indicated on Drawings.
 - D. Existing Items to Remain: As indicated on Drawings.

END OF SECTION

SECTION 06 1000 - ROUGH CARPENTRY

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. Framing with dimension lumber.
- 2. Wood sleepers.
- 3. Plywood backing panels.

B. Related Requirements:

- 1. Section 061063 "Exterior Rough Carpentry."
- 2. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Engineered wood products.
 4. Power-driven fasteners.
 5. Post-installed anchors.
 6. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, **[mark grade stamp on end or back of each piece] [or] [omit grade stamp and provide certificates of grade compliance issued by grading agency]**.
 3. Dress lumber, S4S, unless otherwise indicated.

- B. Maximum Moisture Content of Lumber: [15 percent] [19 percent] [15 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness] [15 percent for 2-inch nominal (38-mm actual) thickness or less; no limit for more than 2-inch nominal (38-mm actual) thickness] [19 percent for 2-inch nominal (38-mm actual) thickness or less; no limit for more than 2-inch nominal (38-mm actual) thickness] unless otherwise indicated.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2[for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground].
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.[Do not use inorganic boron (SBX) for sill plates.]
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, [mark end or back of each piece] [or] [omit marking and provide certificates of treatment compliance issued by inspection agency].
- D. Application: Treat [all rough carpentry unless otherwise indicated.] [items indicated on Drawings, and the following:]
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, [furring,] [stripping,] and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than **10.5 feet (3.2 m)** beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat **items indicated on Drawings, and the following:**
 - 1. Framing for raised platforms.
 - 2. Framing for stages.
 - 3. Concealed blocking.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: **Construction or No. 2** grade.
 - 1. Application: **Interior partitions not indicated as load bearing.**
 - 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine or mixed southern pine; SPIB.
 - c. Spruce-pine-fir; NLGA.
 - d. Hem-fir; WCLIB, or WWPA.
 - e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 - f. Northern species; NLGA.
 - g. Eastern softwoods; NeLMA.
 - h. Western woods; WCLIB or WWPA.

- B. Load-Bearing Partitions: **Construction or No. 2** grade.
1. Application: **interior load-bearing partitions**.
 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.
 - d. Southern pine or mixed southern pine; SPIB.
 - e. Spruce-pine-fir; NLGA.
 - f. Douglas fir-south; WWPA.
 - g. Hem-fir; WCLIB or WWPA.
 - h. Douglas fir-larch (north); NLGA.
 - i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
 7. Utility shelving.
- B. Dimension Lumber Items: **Construction or No. 2** grade lumber of **any of the following species**:
1. Hem-fir (north); NLGA.
 2. Mixed southern pine or southern pine; SPIB.
 3. Spruce-pine-fir; NLGA.
 4. Hem-fir; WCLIB or WWPA.
 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 6. Western woods; WCLIB or WWPA.
 7. Northern species; NLGA.
 8. Eastern softwoods; NeLMA.
- C. Concealed Boards: **[15] [19]** percent maximum moisture content and **[any of]** the following species and grades:
1. Mixed southern pine or southern pine; No. **[2] [3]** grade; SPIB.
 2. Hem-fir or hem-fir (north); **Construction or No. 2 Common** grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or spruce-pine-fir; **Construction or No. 2 Common** grade; NeLMA, NLGA, WCLIB, or WWPA.
 4. Eastern softwoods; No. **[2] [3]** Common grade; NeLMA.
 5. Northern species; No. **[2] [3]** Common grade; NLGA.
 6. Western woods; **Construction or No. 2 Common** grade; WCLIB or WWPA.

- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 PLYWOOD PANELS

- A. Exposed plywood panels to be painted: Plywood, DOC PS 1, Interior A-C in thickness indicated

2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners **with hot-dip zinc coating complying with ASTM A153/A153M.**
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.8 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; **1-inch (25-mm)** nominal thickness, compressible to **1/32 inch (0.8 mm)**; selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, **1/4 inch (6.4 mm)** thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- C. Adhesives for Gluing **Sleepers** to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- D. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, **[grounds,**] and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. **Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.**
- E. Install shear wall panels to comply with manufacturer's written instructions.
- F. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- H. Do not splice structural members between supports unless otherwise indicated.
- I. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than **16 inches (406 mm)** o.c.
- J. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than **96 inches (2438 mm)** o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than **96 inches (2438 mm)** o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and **2-inch nominal (38-mm actual)** thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than **100 sq. ft. (9.3 sq. m)** and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than **20 feet (6 m)** o.c.
- K. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- L. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.

- M. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- N. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.
- O. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- P. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with **approved** fastener patterns where applicable.
 - 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
 - 3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for **[screeding or]** attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than **1-1/2 inches (38 mm)** wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 INSTALLATION OF WALL AND PARTITION FRAMING

- A. General: Provide single bottom plate and double top plates using members of **2-inch nominal (38-mm actual)** thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions **[and for load-bearing partitions where framing members bearing on partition are located directly over studs]**. Fasten plates to supporting construction unless otherwise indicated.
 - 1. For interior partitions and walls, provide **2-by-4-inch nominal- (38-by-89-mm actual-)** size wood studs spaced **16 inches (406 mm)** o.c. unless otherwise indicated.
 - 2. Provide continuous horizontal blocking at midheight of partitions more than **96 inches (2438 mm)** high, using members of **2-inch nominal (38-mm actual)** thickness and of same width as wall or partitions.

- B. Construct corners and intersections with three or more studs[, **except that two studs may be used for interior non-load-bearing partitions**].
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than **4-inch nominal (89-mm actual)** depth for openings **48 inches (1200 mm)** and less in width, **6-inch nominal (140-mm actual)** depth for openings **48 to 72 inches (1200 to 1800 mm)** in width, **8-inch nominal (184-mm actual)** depth for openings **72 to 120 inches (1800 to 3000 mm)** in width, and not less than **10-inch nominal (235-mm actual)** depth for openings **10 to 12 feet (3 to 3.6 m)** in width.
 - 2. For load-bearing walls, provide double-jamb studs for openings **60 inches (1500 mm)** and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated[**or, if not indicated, according to Table R502.5(1) or Table R502.5(2), as applicable, in ICC's International Residential Code for One- and Two-Family Dwellings**].

3.4 INSTALLATION OF STAIR FRAMING

- A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
 - 1. Size: **2-by-12-inch nominal (38-by-286-mm actual)** size, minimum.
 - 2. Material: **solid lumber**.
 - 3. Notching: Notch rough carriages to receive treads, risers, and supports; leave at least **3-1/2 inches (89 mm)** of effective depth.
 - 4. Spacing: At least three framing members for each **36-inch (914-mm)** clear width of stair.
- B. Provide stair framing with no more than **3/16-inch (4.7-mm)** variation between adjacent treads and risers and no more than **3/8-inch (9.5-mm)** variation between largest and smallest treads and risers within each flight.

3.5 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes **wet enough that moisture content exceeds that specified**, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 07 9200 - JOINT SEALANTS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes joint sealants for the following locations:
1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below:
 - a. Control and expansion joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints of stonework set without mortar.
 - d. Joints between different materials listed above.
 - e. Perimeter joints between materials listed above and frames of doors and windows.
 - f. Control and expansion joints in ceiling and overhead surfaces.
 - g. Other joints as indicated.
 2. Exterior joints in horizontal traffic surfaces as indicated below:
 - a. Control and expansion joints in brick pavers.
 - b. Control, expansion, and isolation joints in cast-in-place concrete slabs.
 - c. Tile control and expansion joints.
 - d. Joints between different materials listed above.
 - e. Other joints as indicated.
 3. Interior joints in vertical surfaces and horizontal nontraffic surfaces as indicated below:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - e. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 - f. Perimeter joints of toilet fixtures.
 - g. Other joints as indicated.
 4. Interior joints in horizontal traffic surfaces as indicated below:
 - a. Control and expansion joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - c. Other joints as indicated.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

- B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.
- C. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For sealants and sealant primers used inside the weatherproofing system, 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. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in **1/2-inch- (13-mm-)** wide joints formed between two **6-inch- (150-mm-)** long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

E. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Field-Adhesion Test Reports: For each sealant application tested.
- H. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.8 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
 2. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.9 SEQUENCING AND SCHEDULING

- A. Sequence installation of joint sealants to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

1.10 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants that comply with ASTM C 920 and other requirements indicated on each Elastomeric Joint Sealant Data Sheet at end of this Section, including those requirements referencing ASTM C 920 classifications for Type, Grade, Class, and Uses.
- B. Products: Subject to compliance with requirements, provide one of the products specified in each Elastomeric Joint Sealant Data Sheet.
- C. GLAZING SEALANT shall be Dow Corning silicone sealant No. 795 or Tremco "Spectrem 2" or General Electric "Silglaze", in a standard color designated by the Architect.
- D. CONSTRUCTION SEALANT shall be Tremco "Spectrem 3" silicone Type S, Grade-NS. Class 50 or approved equal from Dow Corning or General Electric, in standard color designated by architect.
- E. ACRYLIC LATEX SEALANT shall be one-part conforming to ASTM C-834-76 as manufactured by TREMCO "Tremflex 834", PECORA or PTI. Color shall be selected by the Architect from standard colors. This material shall be used at interior areas around windows, doors, frames, precast concrete slabs, and interior masonry walls.
- F. ACOUSTICAL SEALANT shall conform to ASTM-D-217 and be a synthetic rubber base, as manufactured by TREMCO. This material shall be used wherever interior partitions butt up against exterior walls or drywall ceilings.
- G. ON-GRADE JOINT SEALANT shall be one or two-part, self-leveling pouring grade polyurethane as manufactured by Tremco THC 900/901", Pecora "NR-200", Sonaborn SL-2 or Master Mechanics "Vulkem #245".

2.3 JOINT SEALANT BACKINGS

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Open-cell polyurethane foam.
 - 2. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
 - 3. Proprietary, reticulated, closed-cell polymeric foam, nonoutgassing, with a density of 2.5 pcf and tensile strength of 35 psi per ASTM D 1623, and with water absorption less than 0.02 gms/cc per ASTM C 1083.
 - 4. Any material indicated above.
- C. PRIMER: Provide type as recommended by the sealant manufacturer for the varied joint surfaces.

2.4 COMPRESSION SEALS

- A. Performed Foam Sealant: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to degree specified by manufacturer. Provide products which are permanently elastic, mildew-resistant, non-migratory, nonstaining, compatible with joint substrates and other joint sealers, and comply with the following requirements:
1. Impregnating Agent: Neoprene rubber suspended in chlorinated.
 2. Density: 9-10 lb./cu. ft.
 3. Backing: Pressure sensitive adhesive, factory applied to one side, with protective wrapping.
 4. Color: Manufacturers standard gray at building expansion joint, black at all other locations.
 5. Acceptable Manufacturers/Products: Subject to compliance with requirements, provide one of the following or approved equal:
 - a. [Dayton Superior Specialty Chemicals](#); Polytite Standard.
 - b. [EMSEAL Joint Systems, Ltd.](#); Emseal 25V.
 - c. [Sandell Manufacturing Co., Inc.](#); Polyseal.
 - d. [Schul International, Inc.](#); Sealtite
 - e. [Willseal USA, LLC](#); Willseal 150

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - APPLICATION

3.1 SEALANT TYPE DETERMINATION

- A. USE EXTERIOR CONSTRUCTION SEALANT at above-grade exterior joints. Use same sealant at interior side of joint if exterior material is the same through the wall, such as a metal frame or single-wythe block wall.
- B. USE INTERIOR ACRYLIC LATEX SEALANT at all other above-grade interior joints, such as at interior hollow metal frames, wood, stone, brick or drywall, in any combination.
- C. USE PAVING SEALANT at all sealed joints on traffic bearing surfaces and at grade.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 3. Remove laitance and form release agents from concrete.
 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Solvent-Release-Curing Sealant Installation Standard: Comply with requirements of ASTM C 804 for use of solvent-release-curing sealants.
- D. Latex Sealant Installation Standard: Comply with requirements of ASTM C 90 for use of latex sealants.
- E. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 19 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

- F. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
 2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
- G. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- H. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
1. Provide concave joint configuration per Figure 5A in ASTM C 62, unless otherwise indicated.
 2. Provide flush joint configuration, per Figure 5B in ASTM C 962, where indicated.
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
 3. Provide recessed joint configuration, per Figure 5C in ASTM C 962, of recess depth and at locations indicated.
- I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 08 2250 - FRP DOORS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS/DESCRIPTION**

- A. Drawings and General provision of Contract, including General and Supplementary Conditions and Division 01 Specification sections, are a part of this Section for the Base Bid and applicable alternates.
- B. This Section includes:
 - 1. FRP doors - provide FRP doors as specified, shown or scheduled, with components and accessories for a complete and proper installation.
 - 2. Factory glazing of FRP door lites.
 - 3. Manufacturer hardware.
 - 4. Factory installation of finish hardware.
- C. The following sections contain requirements that relate to this Section:
 - 1. Division 07 Section "Joint Sealants" for sealants and gaskets.
 - 2. Division 08 Section "Glazing" for glass and glazing.
 - 3. Division 08 Section "Door Hardware" for door hardware.
- D. System Performance:
 - 1. Provide exterior and interior doors assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below as demonstrated by testing manufacturer's corresponding stock systems according to test methods designated.
 - a. Thermal Transmittance (exterior doors): U-value of not more than 0.09 Btu/(hr x sf x Degrees F.) per AAMA 1503.1.

1.2 QUALITY ASSURANCE

- A. Comply with fire-resistance, flammability, regulations as interpreted by governing authorities and as follows:
 - 1. Face Sheets tested in accordance with ASTM E84-79A shall have the following ratings; Standard Face sheets:
 - a. Smoke Developed: not greater than 345.
 - b. Flame Spread: not greater than 145.
 - 2. Class A Face Sheets (Required on interior face of all exterior doors):
 - a. Smoke Developed not greater than 340.
 - b. Flame Spread: not greater than 15.

- B. Manufacturer Qualifications: Shall have produced fiberglass reinforced doors for at least five years.
- C. Field Measurement:
 - 1. Take field measurements prior to fabrication of doors and frames to insure proper fitting of assemblies. Successful bidders are expected to field verify all dimensions, sizes, quantities and the material required to complete this project. Failure to do so will not relieve the successful contractor from the necessity of furnishing any and all materials that may be required, without any additional cost to the Owner.

1.3 COORDINATION

- A. Door manufacturer shall be responsible for coordinating all necessary information from hardware supplier in order that doors shall be properly prepared to receive hardware and fit frames properly. Contractor shall provide manufacturer with copies of approved schedules necessary to complete manufacturing of doors. This information shall be in the possession of the door manufacturer 60 days prior to desired delivery date of doors.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.
 - 1. Substitutions for products as specified MUST be submitted in accordance with Division 01. Substitute products not submitted in accordance with Division 01 Section "Product Requirements" will NOT be considered.
- B. Product Data: Submit manufacturer's specifications, standard details, and installation recommendations for components of FRP (fiberglass reinforced polyester) doors required for project, including test reports certifying that products have been tested and comply with performance requirements.
- C. Shop Drawings: Submit shop drawings for fabrication and installation of FRP (fiberglass reinforced polyester) doors, including elevations, detail sections of typical composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.
- D. Samples: Submit 6" samples of each type and color of FRP (fiber reinforced polyester) finish, and 12" long sections of extrusions or formed shapes. Where normal color and texture variations are to be expected, include 2 or more units in each set of samples showing limits of such variations.

1.5 PRODUCT DELIVERY, HANDLING, AND STORAGE

- A. All materials supplied shall be delivered to the jobsite in their original, unopened packages with labels intact. Materials shall be inspected for damage, and the manufacturer informed of any discrepancies. Unsatisfactory materials shall not be used.
- B. All materials supplied shall be packaged in individual corrugated cartons. Doors shall "floated" within cartons, with no portion of door in contact with outer shell.
- C. All doors to be marked with individual opening numbers to correlate with the designation system used on the shop drawings for doors, frames and hardware. Markings shall be temporary, removable, or concealed.

1.6 WARRANTY

- A. Provide written warranty signed by Manufacturer, Installer, and Contractor, agreeing to replace FRP (fiberglass reinforced polyester) doors which fail in materials or workmanship within time period indicated below of acceptance. Failure of materials or workmanship includes excessive deflections, faulty operation of entrances, and deterioration of finish or construction in excess of normal weathering.
 - 1. Time Period: Five years from date of substantial completion.
- B. Provide written warranty signed by Manufacturer guaranteeing hardware attachment of factory installed finish hardware.
 - 1. Time Period: Five years from date of substantial completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide SL17 FRP Flush Doors as manufactured by Special-Lite, Inc., and Aluminum Frames for FRP Doors as specified herein.

2.2 MATERIALS AND ACCESSORIES

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate, minimum wall thickness of 1/8".
- B. Fasteners: Aluminum, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum components.
 - 1. For exposed fasteners, provide Phillips head flat head screws with finish matching item to be fastened.
- C. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
 - 1. Provide manufacturer's standard reinforcement for each type of hardware required, not less than .125" thick.
 - 2. Provide manufacturer's recommended fastener reinforcement.
- D. Door Face Material: Fiberglass reinforced polyester, SpecLite 3, 0.120" minimum thickness, with pebble-like embossed finish.
 - 1. Acceptable Product: Subject to compliance with the following requirements:
 - a. Impact Strength of Face Sheets: ASTM D256, Izod Impact Strength, 13.5 footpounds per inch of notch.
 - b. Abrasion Resistance of Face Sheets: ASTM D1242, 1000 cycles of Model 503 Taber Abraser with a 1000 gram load, not to exceed 0.23% weight loss.
 - c. Hardness of Face Sheets: ASTM D2583, Barcol Meter Hardness Test, not more than 50.

- d. Humidity Resistance of Face Sheets: ASTM D570, water absorption not greater than 0.40% after 24 hour immersion.
 - e. Ultra-Violet Degradation: Only slight color change, and negligible change in surface gloss and other physical properties after exposure to 500,000 Langley's.
- E. Weatherstripping: Provide manufacturer's standard replaceable weathering pile.
- 1. Factory installed concealed adjustable bottom brush SL301 with double nylon brush weatherstripping.
- F. Sealants and Gaskets: Provide sealants and gaskets in the fabrication, assembly and installation of the work, which are recommended by the manufacturer to remain permanently elastic, non-shrinking, non-migrating, and weatherproof.

2.3 FIBERGLASS REINFORCED POLYESTER (FRP) DOORS

- A. FRP Doors are to be constructed as follows:
- 1. Doors are to be 1 3/4" thick.
 - 2. Constructed of aluminum alloy rails and stiles, joined with steel tie rods, and have an inner core consisting of foamed-in-place Urethane.
 - 3. Stiles to be tubular shape to accept hardware as specified.
 - 4. Top and bottom rails to be extruded with internal legs for interlocking rigid weather bar.
 - 5. Face Sheets to be secured with extruded interlocking edges. (No snap-on trim will be accepted).
 - 6. Joinery to be 3/8" tie rods, top and bottom, bolted through an extruded spline and 3/16" riveted reinforcing angles, and secured with hex nuts.
 - 7. Core to be of Urethane foam of 3 pounds per cubic ft. density. All doors are to be properly reinforced for hardware prior to Urethane core foaming in door.
 - 8. Face Sheets:
 - a. Fiberglass Reinforced Plastic Sheets to be polyester SpecLite 3, 0.120" thick, with pebble-like finish.
 - 9. Pairs of Doors: Meeting stiles to beveled.
 - 10. All doors shall be machined for finish hardware at the factory in accordance with the templates from the hardware supplier and the Approved Hardware Schedule. For surface applied hardware, doors shall have necessary reinforcement, including the attachment of RIVNUT blind bolt fasteners. With the exception of door holders, which require field application, doors are to be shipped with surface hardware factory applied.
 - 11. Door Lites: Provide door lites factory glazed as indicated, with manufacturer's standard aluminum moldings and stops, with removable stops on inside only. Glass to be 1" insulated safety glass.

2.4 FLUSH INSULATED PANELS

- A. Flush insulated panels shall be constructed as follows:
 - 1. Panels shall be 1" thick.
 - 2. Panel stiles shall be formed of hardwood.
 - 3. Core to be Urethane of 3 pounds per cubic foot density.
 - 4. Face Skins to be as follows:
 - a. Fiberglass Reinforced polyester panel faces to be SpecLite 3, 0.120" thick, with pebble-like embossed finish.

2.5 ALUMINUM CAPPING SYSTEM

- A. Where indicated, provide a Frame capping system fabricated of .062" Aluminum, as manufactured by Special-Lite, Inc. Finish capping to match finish as supplied on other framing sections.

2.6 INSERT FRAMING

- A. Where indicated, provide insert frames fabricated of extruded 6063T5 Aluminum alloy fitted with .34 inch high by .36 inch wide wool-poly-propylene blend pile. Corner joints are to be mitered and secured with prefabricated aluminum clips. Framing as manufactured by Special-Lite, Inc., and finished to match other framing sections.

2.7 FINISH HARDWARE

- A. Hardware supplied by the door manufacturer and factory installed:
 - a. Pull: Special-Lite SL-86.
 - b. Bottom brush SL301
- B. Supplier: Refer to Section 08710 of these specifications for the Finish Hardware requirements for this project. Refer to approved Finish Hardware Schedule for items to be supplied to the door and frame manufacturer to install.
- C. Receive Hardware supplied in accordance with Section 08710, and Hardware Schedule, and coordinate with the Hardware requirements of this section. Report discrepancies (in writing) to the Architect immediately.
- D. Ship hardware, to be installed by manufacturer, to manufacturer with cartons marked with door numbers correlating with designation system used on shop drawings.
- E. Install all Hardware, except door holders at the fabrication plant. Remove only Hardware as required for final finishing or delivery to jobsite. Package and identify such Hardware and ship with doors and frames for installation at the project site.

2.8 FINISHES AND COLORS

- A. Fiberglass Reinforced Polyester Colors: (2) colors as selected by Architect from manufacturer's complete range.

- B. Aluminum Stiles and Rails: Comply with the following:
1. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
 2. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
 3. Dark Bronze: AA-M10C12C22A44, Class I, 0.7 mils thick or Class I Clear Anodized Finish: AA-M12C22A41 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 607.1.
 - a. Dark bronze at Barnard and Bemis
 - b. Clear anodized at International Academy East (IAE)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's recommendations and specifications for the installation of the doors and frames.
- B. Set units plumb, level and true to line, without warp or rack of doors, frames or panels. Anchor securely in place. Separate aluminum, and other corrodible metal surfaces, from sources of corrosion or electrolytic action at points of contact with other materials, with bituminous coatings, or other means as approved by Architect.
- C. Set saddles in a bed of compound.
- D. Clean Aluminum surfaces promptly after installation of doors and frames, exercising care to avoid damage to the protective coating (if any). Remove excess glazing and sealant compounds, dirt and other substances.
- E. Provide protective treatment and other precautions required through the remainder of the construction period, to ensure that the doors and frames will be without damage or deterioration (other than normal weathering) at the time of acceptance.
- F. Adjusting: Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight seal.
- G. Caulking: Refer to Section 07900 "Joint Sealants."

END OF SECTION

SECTION 08 4113 - ALUMINUM ENTRANCES AND STOREFRONTS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 SUMMARY

A. Section Includes:

1. Exterior storefront framing.
2. Storefront framing for window walls.
3. Exterior manual-swing entrance door-frame units.

B. Related Sections:

1. Division 08 Section "FRP Doors" for requirements for FRP entrance doors installed in aluminum entrance and storefront framing.
2. Division 08 Section "Glazing" for glass and glazing included as part of the aluminum entrance and storefront systems.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
4. Dimensional tolerances of building frame and other adjacent construction.
5. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d. Glazing-to-glazing contact.
 - e. Noise or vibration created by wind and thermal and structural movements.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
 - h. Failure of operating units to function properly.

- B. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. Provide sealant that fails cohesively before sealant releases from substrate when tested for adhesive compatibility with each substrate and joint condition required.
1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
- C. Structural-Sealant Joints: Designed to produce tensile or shear stress in structural-sealant joints of less than 20 psi (138 kPa).
- D. Structural Loads:
1. Show design loads determined by Project's structural engineer on Drawings or insert loads in two subparagraphs below. Verify requirements of authorities having jurisdiction. See Evaluations.
 2. Thermal Movement: Provide systems capable of withstanding thermal movements resulting from an ambient temperature range of 120°F (67°C), that could cause a metal surface temperature range of 180°F (100°C) within the framing system.
 3. Wind Loading: Provide assemblies capable of withstanding a uniform test pressure of 25 psf inward and 25 psf outward when tested in accordance with ASTM E 330.
- E. Deflection of Framing Members:
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is the smaller amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below to less than 1/8 inch (3.2 mm) and clearance between members and operable units directly below to less than 1/16 inch (1.5 mm).
- F. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity but not less than 10 seconds.
- G. Aluminum Entrance Transmission Characteristics: Provide entrance doors with jamb and head frames that comply with requirements indicated for transmission characteristics.

1. Air Infiltration: Provide doors with an air infiltration rate of not more than 0.50 CFM for single doors and 1.0 for pairs of doors when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.567 psf.
2. Condensation Resistance: Provide entrance door units tested for thermal performance in accordance with AAMA 1502 showing a condensation resistance factor (CRF) of not less than 48.

1.4 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 1. Substitutions for products as specified MUST be submitted in accordance with Division 1. Substitute products not submitted in accordance with Division 1 Section "Product Requirements" will NOT be considered.
- B. Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product required. Include the following information:
 1. Fabrication methods.
 2. Finishing.
 3. Accessories.
- C. Shop Drawings: Submit shop drawings for fabrication and installation of entrances and storefronts, including the following:
 1. Elevations.
 2. Detail sections of typical composite members.
 3. Hardware, mounting heights.
 4. Anchorages and reinforcements.
 5. Glazing details.
- D. Samples: Submit pairs of samples of each type and color of aluminum finish, on 12" long sections of extrusions or formed shapes and on 6" square sheets. Where color or texture variations are anticipated, include 2 or more units in each set of samples indicating extreme limits of variations.
- E. Certification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.

1.5 QUALITY ASSURANCE:

- A. Installer's Qualifications: Entrances and storefront shall be installed by a firm that has not less than 5-years successful experience in the installation of systems similar to those required.
- B. Design Criteria: Drawings are based on one manufacturer's entrance and storefront system. Another manufacturer's system of a similar and equivalent nature will be acceptable when, in the Architect's sole judgment, differences do not materially detract from the design concept or intended performance.

1.6 PROJECT CONDITIONS:

- A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work. Where necessary, proceed with fabrication without field measurement, and coordinate fabrication tolerances to ensure proper fit.

1.7 WARRANTY:

- A. Special Product Warranty: Submit a written warranty, executed by the Contractor, Installer and Manufacturer, agreeing to repair or replace units (including reglazing) which fail in materials or workmanship within the specified warranty period. Failures include, but are not necessarily limited to structural failures including excessive deflection, excessive leakage or air infiltration, faulty operation, and deterioration of metals, metal finishes and other materials beyond normal weathering. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.
 - 1. Warranty period for aluminum entrances and storefront is 3 years after the date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturer: Subject to compliance with requirements, provide the following products (refer to drawings for locations of each framing system):
 - 1. Basis-of-Design 2" x 4-1/2" Thermal Storefront Framing: EFCO Corporation, Series 403.
 - 2. Basis-of-Design 2" x 6-1/2" Thermal Storefront Framing: EFCO Corporation, Series 406T
- B. Equivalent Manufacturers: Subject to compliance with requirements provide equivalent products of one of the following manufacturers: (Variations in specified and detailed Basis-of-Design framing dimensions are not acceptable.)
 - 1. Kawneer Co.
 - 2. Tubelite Division of Indal Inc.
 - 3. Vistawall Architectural Products.
 - 4. YKK AP America, Inc.

2.2 MATERIALS:

- A. Aluminum Members: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.
- B. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
 - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125" thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
- C. Concealed Flashing: Provide 26 gage minimum dead-soft stainless steel, or 0.026" minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
- D. Brackets and Reinforcements: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.
- E. Concrete/Masonry Inserts: Provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.
- F. Compression Weatherstripping: Provide the manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
- G. Sliding Weatherstripping: Provide the manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.
- H. Glass and Glazing Materials: Glass and glazing materials shall comply with requirements of "Glazing" section of these specifications.

2.3 COMPONENTS:

- A. Storefront Framing System: Provide inside-outside matched resilient flush-glazed storefront framing system with provisions for glass replacement. Shop-fabricate and pre-assemble frame components where possible.
 - 1. Thermal-Break Construction: Fabricate storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Use manufacturer's standard construction that has been in use for similar projects for period of not less than 3 years.
- B. Aluminum Perimeter Door Framing:
 - 1. Fabricate tubular frame assemblies from the size and type shown. 0.125" minimum wall thickness and type 6063-T5 aluminum alloy. 0.625" x 1.25" applied door stops with screws and weatherstripping.
 - 2. Where wide strikes or electric strikes are used, a 0.625" x 1.75" stop with screws and weatherstripping shall be applied.

3. Where surface applied hardware (exit device strikes, closer shoes, overhead stops, etc.) is to be mounted to the frame stop, provide solid bar stock reinforcement under the stop.
4. Frame members are to be box type with four (4) enclosed sides. Open back framing will not be accepted. Frames must be anchored by removing the door stop, drilling a 0.5" pilot hole on the door side of the frame, and anchoring the frame from the wall side of the frame.

2.4 HARDWARE

- A. General: Refer to hardware section in Division-8 for requirements for hardware items other than those indicated to be provided by the aluminum entrance manufacturer.

2.5 FABRICATION

- A. General: Sizes of door and frame units, and profile requirements, are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.
- B. Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation.
 1. Pre-glaze door and frame units to greatest extent possible.
 2. Do not drill and tap for surface-mounted hardware items until time of installation of project site.
 3. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- C. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.
- D. Reinforcing: Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity.
 1. Attachments of all hardware shall be made using machine screws which are supplied by the manufacturer.
 2. All holes shall be drilled and tapped using the recommended drill size for the tap required.
 3. Frame stops shall be applied stop. Minimum 5/8" high x minimum 1¼" wide.
 4. Frame tubes sections should be closed back, minimum of 1/8" wall thickness.
 5. Door skins should be minimum of 1/8" wall thickness.
 6. Where hardware is to be attached to frame stop (i.e., exit device strike, door closer shoe), a piece of solid bar stock aluminum sized to fill the frame stop void x 18" long shall be securely attached to the frame tube.

7. Where it is not practical to have solid bar stock reinforcement at attachment points, use Riv-Nuts for attachment.
- E. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.
- F. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
 1. Uniformity of Finish: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.
- G. Fasteners: Conceal fasteners wherever possible.
- H. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops; at other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.
 1. Provide EPDM or vinyl blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
 2. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.
 3. Provide finger guards of collapsible neoprene or PVC gasketing securely anchored into frame at hinge-jamb of center-pivoted doors.

2.6 FINISHES:

- A. Clear Anodic Finish: AAMA 611-98, AA-M12-C22-A41, Class 1.
 1. Finish for schools: International Academy East (IAE)
- B. Color Anodic Finish: AAMA 611-98, AA-M12-C22-A44, Class 1.
 1. Color: Dark bronze
 2. Finish for schools: Barnard, Bemis and Hill Elementary Schools

2.7 GLAZING:

- A. Glazing: Comply with requirements indicated in Division 08 Section "Glazing".

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Comply with manufacturer's instructions and recommendations for installation.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide proper support and anchor securely in place.
 - 1. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101-85.
- C. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- D. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealant, fillers, and gaskets.
- E. Refer to Division 8 Section "Glazing" for installation of glass and other panels indicated to be glazed into doors and framing, and not pre-glazed by manufacturer.

3.2 ADJUSTING:

- A. Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

3.3 CLEANING:

- A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation, complying with requirements contained in the "Glazing" section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.4 PROTECTION:

- A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

SECTION 08 7100 – DOOR HARDWARE**PART 1 – GENERAL****1.01 SUMMARY**

- A. Section includes furnishing, installation and commissioning of door hardware for doors specified in “Hardware Sets” and required by actual conditions: including screws, bolts, expansion shields, electrified door hardware, and other devices for proper application of hardware.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- C. Related Divisions:
 - 1. Division 07 Joint Sealants
 - 2. Division 26 Electrical

1.02 REFERENCES

- A. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI):
 - 1. ANSI/BHMA A156.1 Butts & Hinges (2016)
 - 2. ANSI/BHMA A156.3 Exit Devices (2014)
 - 3. ANSI/BHMA A156.4 Door Controls – Closers (2013)
 - 4. ANSI/BHMA A156.6 Architectural Door Trim (2015)
 - 5. ANSI/BHMA A156.7 Template Hinge Dimensions (2016)
 - 6. ANSI/BHMA A156.8 Door Controls – Overhead Stops and Holders (2015)
 - 7. ANSI/BHMA A156.13 Mortise Locks & Latches (2012)
 - 8. ANSI/BHMA A156.16 Auxiliary Hardware (2013)
 - 9. ANSI/BHMA A156.17 Self-Closing Hinges & Pivots (2014)
 - 10. ANSI/BHMA A156.18 Materials & Finishes (2016)
 - 11. ANSI/BHMA A156.21 Thresholds (2014)
 - 12. ANSI/BHMA A156.22 Door Gasketing Systems (2012)
 - 13. ANSI/BHMA A156.25 Electrified Locks (2013)
 - 14. ANSI/BHMA A156.26 Continuous Hinges (2012)
 - 15. ANSI/BHMA A156.28 Keying Systems (2013)
- B. International Code Council/American National Standards Institute (ICC/ANSI)/ADA:
 - 1. ICC/ANSI A117.1 Standards for Accessible and Usable Buildings and Facilities 2006
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL 10C Positive Pressure Fire Test of Door Assemblies.
 - 2. UL 1784 Air Leakage Test of Door Assemblies.
 - 3. UL 294 Access Control System Units
- D. Door and Hardware Institute (DHI):
 - 1. DHI Publications – Keying Systems and Nomenclature (1989).
 - 2. DHI Publication – Abbreviations and Symbols.
 - 3. DHI Publication – Installation Guide for Doors and Hardware.
 - 4. DHI Publication – Sequence and Format of Hardware Schedule (1996).
- E. National Fire Protection Agency (NFPA):
 - 1. NFPA 70 National Electrical Code 2008
 - 2. NFPA 80 Standard for Fire Doors and Other Opening Protectives 2007
 - 3. NFPA 101 Life Safety Code 2006
 - 4. NFPA 105 Standard for the Installation of Smoke Door Assemblies 2007

PART 1 - GENERAL

1.1 Refer to "General and Special Conditions", and "Instructions to Bidders", Division 1 of Specifications. Requirements of these Sections and the project drawings shall govern work in this section.

1.2 Work Included:

A. Furnish all items of Finish Hardware specified, scheduled, shown or required herein except those items specifically excluded from this section of the specification.

B. Related work:

1. Division 00 00 00 – Procurement and Contracting Requirements
2. Division 01 00 00 – General Requirements
3. Division 06 00 00 – Wood, Plastics, and Composites
4. Division 08 00 00 – Openings
5. Division 10 00 00 – Specialties
6. Division 11 00 00 – Equipment
7. Division 26 00 00 – Electrical
8. Division 27 00 00 – Communications
9. Division 28 00 00 – Electronic Safety and Security

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere, unless specifically listed in the hardware sets:

1. Cabinet Hardware.
2. Signs, except as noted.
3. Folding partitions, except cylinders where detailed.
4. Sliding aluminum doors
5. Chain link and wire mesh doors and gates
6. Access doors and panels
7. Overhead and Coiling doors

1.3 Quality Assurance

A. Requirements of Regulatory Agencies:

1. Furnish finish hardware to comply with the requirements of laws, codes, ordinances, and regulations of the governmental authorities having jurisdiction where such requirements exceed the requirements of the Specifications.
2. Furnish finish hardware to comply with the requirements of the regulations for public building accommodations for physically handicapped persons of the governmental authority having jurisdiction and to comply with Americans with Disabilities Act.
3. Provide hardware for fire-rated openings in compliance with NFPA 80 and state and local building code requirements. Provide only hardware that has been tested and listed by UL for types and sizes of doors required and complies with requirements of door and door frame labels.

B. Hardware Supplier:

1. Shall be an established firm dealing in contract builders' hardware. He must have adequate inventory, qualified personnel on staff and be located within 100 miles of the project. The distributor must be a factory-authorized dealer for all materials required. The supplier shall be or have in employment an Architectural Hardware Consultant (AHC).

C. Electrified Door Hardware Supplier:

1. Shall be an experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.
2. Shall prepare data for electrified door hardware, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this project.
3. Shall have experience in providing consulting services for electrified door hardware installations.

D. Pre-installation Meeting:

1. Before hardware installation, General Contractor/Construction Manager will request a hardware installation meeting be conducted on the installation of hardware; specifically that of locksets, closers, exit devices, overhead stops and coordinators. Manufacturer's representatives of the above products, in conjunction with the hardware supplier for the project, shall conduct the meeting. Meeting to be held at job site and attended by installers of hardware for aluminum, hollow metal and wood doors. Meeting to address proper coordination and installation of hardware, per finish hardware schedule for this specific project, by using installation manuals, hardware schedule, templates, physical product samples and installation videos.
2. When any electrical or pneumatic hardware is specified this meeting shall also include the following trades/installers: Electrical, Security, Alarm systems and Architect.
3. Convene one week or more prior to commencing work of this Section.
4. The Hardware Supplier shall include the cost of this meeting in his proposal.

E. Manufacturer:

1. Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
2. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.

1.4 Submittals:

A. Hardware Schedule

1. Submit number of Hardware Schedules as directed in Division 1.
2. Follow guidelines established in Door & Hardware Institute Handbook (DHI) Sequence and Format for the Hardware Schedule unless noted otherwise.
3. Schedule will include the following:
 - a. Door Index including opening numbers and the assigned Finish Hardware set.
 - b. Preface sheet listing category only and manufacturer's names of items being furnished as follows:

CATEGORY	SPECIFIED	SCHEDULED
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Hinges	Manufacturer A	Manufacturer B
Lock sets	Manufacturer X	Manufacturer X
Kick Plates	Open	Manufacturer Z

- c. Hardware Locations: Refer to Article 3.1 B.2 Locations.
- d. Opening Description: Single or pair, number, room locations, hand, active leaf, degree of swing, size, door material, frame material, and UL listing.
- e. Hardware Description: Quantity, category, product number, fasteners, and finish.
- f. Headings that refer to the specified Hardware Set Numbers.
- g. Scheduling Sequence shown in Hardware Sets.
- h. Product data of each hardware item, and shop drawings where required, for special conditions and specialty hardware.
- i. Electrified Hardware system operation description.
- j. "Vertical" scheduling format only. "Horizontal" schedules will be returned "Not Approved."
- k. Typed Copy.
- l. Double-Spacing.
- m. 8-1/2 x 11 inch sheets
- n. U.S. Standard Finish symbols or BHMA Finish symbols.

B. Product Data:

- 1. Submit, in booklet form Manufacturers Catalog cut sheets of scheduled hardware.
- 2. Submit product data with hardware schedule.

C. Samples:

- 1. Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, submit one sample, if required, of each type of exposed hardware unit, finished as required and tagged with full description for coordination with schedule.
- 2. Samples will be returned to the supplier. Units, which are acceptable and remain undamaged through submittal, review and field comparison procedures may, after final check of operation, be used in the work, within limitations of keying coordination requirements.

D. Key Schedule:

- 1. Submit detailed schedule indicating clearly how the Owner's final keying instructions have been followed.
- 2. Submit as a separate schedule.

E. Electrified Hardware Drawings:

- 1. Submit elevation drawings showing relationship of all electrical hardware components to door and frame. Indicate number and gage of wires required.
 - a. Include wiring drawing showing point to point wire hook up for all components.
 - b. Include system operations descriptions for each type of opening; describe each possible condition.

F. Submit to General Contractor/Construction Manager, the factory order acknowledgement numbers for the various hardware items to be used on the project. The factory order acknowledgement numbers shall help to facilitate and expedite any service that may be required on a particular hardware item. General Contractor/Construction Manager shall keep these order acknowledgement numbers on file in the construction trailer.

1.5 Product Delivery, Storage, and Handling:

- A. Label each item of hardware with the appropriate door number and Hardware Schedule heading number, and deliver to the installer so designated by the contractor.

1.6 Existing Conditions:

- A. Where existing doors, frames and/or hardware are to remain, conditions, preparations and functions shall be field verified to confirm compatibility with specified hardware. Where any incompatibility is discovered, notify the contractor or construction manager immediately and provide a suggested solution based on industry standard business practices.

1.7 Warranties:

- A. Refer to Division 1 for warranty requirements.
- B. Special Warranty Periods:
 - 1. Closers shall carry manufacturer's 30-year warranty against manufacturing defects and workmanship.
 - 2. Locksets shall carry manufacturer's 10-year warranty against manufacturing defects and workmanship.
 - 3. Exit Devices shall carry manufacturer's 3-year warranty against manufacturing defects and workmanship.
 - 4. Continuous gear hinges shall carry manufacturer's lifetime warranty to be free from defects in material and workmanship.
 - 5. Balance of items shall carry a manufacturer's 1-year warranty against manufacturing defects and workmanship.
- C. During the warranty period, replace defective work, including labor, materials and other costs incidental to the work.

PART 2 - PRODUCT

2.1 Furnish each category with the products of only one manufacturer unless specified otherwise; this requirement is mandatory whether various manufacturers are listed or not.

2.2 Provide the products of manufacturer designated or if more than one manufacturer is listed, the comparable product of one of the other manufacturers listed. Where only one manufacturer or product is listed, it is understood that this is the owner's Building Standard and "no substitution" is allowed.

A. Hinges:

- 1. Furnish hinges of class and size as listed in sets.
- 2. Numbers used are Ives (IVE).
- 3. Products of a BHMA member are acceptable.

B. Locksets and Latchsets - Mortise Type:

1. Function numbers are Corbin-Russwin.
 - a. Corbin-Russwin ML2000 series
 - b. Falcon MA series
 - c. Hager 3800 series
2. Provide strikes with extended lips where required to protect trim from being marred by latch bolt. Provide strike lips that do not project more than 1/8" beyond door frame trim at single doors and have 7/8" lip to center at pairs of 1-3/4" doors.

C. Exit Devices:

1. Exit devices shall be touchpad style, fabricated of brass, bronze, stainless steel, or aluminum, plated to the standard architectural finishes to match the balance of the door hardware.
2. End-cap will be sloped to deflect any impact from carts and they shall be flush with the external mechanism case. End caps that overlap and project above the mechanism case are unacceptable. End cap shall utilize a two-point attachment to the mounting bracket.
3. Strikes shall be roller type and come complete with a locking plate to prevent movement.
4. All devices shall have passed a 5 million(5,000,000) cycle test based on ANSI A156.3, 1994, Grade 1 test standards and certified by an independent testing lab.
5. Provide cylinder dogging on panic exit hardware where noted in hardware sets.
6. Exit devices shall be UL listed panic exit hardware. All exit devices for fire rated openings shall be UL labeled fire exit hardware.
7. Numbers used in sets are Von Duprin.
 - a. Von Duprin 98 series
 - b. Falcon 25 Series
 - c. Hager 4500 series

D. Removable Mullion:

1. Numbers used in sets are Von Duprin.
 - a. Von Duprin KR4900/KR4800 series
 - b. Hager 4900 series

E. Closers:

1. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder. Cylinder body shall be 1 1/2" in diameter, and double heat treated pinion shall be 11/16" in diameter with double D slab drive arm connection.
2. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed, and backcheck.
4. All closers shall have solid forged steel main arms (and forged forearms for parallel arm closers).
5. All surface mounted mechanical closers shall be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory.
6. Closers will have Powder coating finish certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.
7. Refer to door and frame details and furnish accessories such as drop plates, panel adapters, spacers and supports as required to correctly install door closers. State degree of door swing in the hardware schedule.
8. Numbers used in sets are LCN.
 - a. LCN 4000 series
 - b. Hager 5100 series

F. Electric Strike:

1. Electric strikes shall provide remote release of latchbolts. They shall be designed for use with the type locks shown at each opening where required. Strikes will be UL Listed for Burglary-Resistant Electric Door Strike, and where required, shall be UL listed as electric strikes for Fire Doors or Frames. Faceplates shall be stainless steel with finish as specified for each opening. The locking components shall be stainless steel to resist damage and abuse.
2. Solenoids shall be of the continuous duty type for the voltage specified. Plug connectors will be furnished. Strikes shall have an adjustable backbox to compensate for misalignment of door and frame.
3. Numbers used in sets are Von Duprin.
 - a. Von Duprin 6000 series
 - b. HES 9600 series

G. Overhead Holders and Stops:

1. Type, function and fasteners must be same as Glynn-Johnson specified. Size per manufacturer's selector chart. Plastic end caps, hold open mechanisms and shock blocks are not allowed. End caps must be finished same as balance of unit.
2. Manufacture products using base material of Brass/Bronze for US3, US4, & US10B finished products and 300 Stainless Steel for US32 & US32D finished products.
3. Type, function, and fasteners must be the same as Glynn-Johnson specified. Size per manufacturer's selector chart.
 - a. Glynn-Johnson 100 series
 - b. Hager 7000 series

H. Thresholds:

1. 1/2" high - 6" wide. Cope at jambs.
2. Furnish full wall opening width when frames are recessed.
3. Cope in front of mullions if thresholds project beyond door faces.
4. Furnish with non-ferrous Stainless Steel Screws and Lead Anchors.
 - a. Zero as listed in sets
 - b. Equal of NGP or Reese

I. Miscellaneous:

1. Furnish items not categorized in the above descriptions but specified by manufacturer's names in Hardware Sets.

J. Fasteners:

1. Furnish fasteners of the proper type, size, quantity and finish. Use machine screws and expansion shields for attaching hardware to concrete or masonry, and wall grip inserts at hollow wall construction. Furnish machine screws for attachment to reinforced hollow metal doors and frames and reinforced aluminum doors and frames. Furnish full thread wood screws for attachment to solid wood doors and frames. "TEK" type screws are not acceptable.
2. **Sex bolts will not be permitted on reinforced metal doors or wood doors where blocking is specified.**

2.3 Finishes:

- A. Provide finish for each item as indicated in sets.

2.4 Templates and Hardware Location:

- A. Furnish hardware made to template. Supply required templates and hardware locations to the door and frame manufacturers.
- B. Furnish metal template to frame/door supplier for continuous hinge.
- C. Refer to Article 3.1 B.2, Locations, and coordinate with templates.

2.5 Cylinders and Keying:

- A. All cylinders for this project will be supplied by one supplier regardless of door type and location.
- B. The Finish Hardware supplier will meet with Architect and/or Owner to finalize keying requirements and obtain keying instructions in writing.
 - 1. Supplier shall include the cost of this service in his proposal.
- C. Provide a cylinder for all hardware components capable of being locked.
- D. Provide cylinders master and grand master keyed to existing system according to Owner's instructions. Provide change keys, master keys and grand master keys as required by Owner.
- E. Provide cylinders with construction cores or keying for use during the construction period. When so directed, and in the presence of the Owner's security department or representative, convert construction cores or keying to the final system.
 - 1. Supplier shall include the cost of this service in his proposal.

PART 3 - EXECUTION

3.1 Installation

- A. General:
 - 1. Install hardware according to manufacturer's installations and template dimensions. Attach all items of finish hardware to doors, frames, walls, etc. with fasteners furnished and required by the manufacture of the item.
 - 2. Provide blocking/reinforcement for all wall mounted Hardware.
 - 3. Reinforced hollow metal doors and frames and reinforced aluminum door and frames will be drilled and tapped for machine screws.
 - 4. Solid wood doors and frames: full thread wood screws. Drill pilot holes before inserting screws.
 - 5. Continuous gear hinges attached to hollow metal doors and frames and aluminum doors and frames: 12-24 x 1/2" #3 Phillips Keenform self-tapping. Use #13 or 3/16 drill for pilot.
 - 6. Continuous Gear Hinges require continuous mortar guards of foam or cardboard 1/2" thick x frame height, applied with construction adhesive.
 - 7. Install weather-strip gasket prior to parallel arm closer bracket, rim exit device or any stop mounted hardware. Gasket to provide a continuous seal around perimeter of door opening. Allow for gasket when installing finish hardware. Door closers will require special templating. Exit devices will require adjustment in backset.

B. Locations:

1. Dimensions are from finish floor to center line of items.
2. Include this list in Hardware Schedule.

<u>CATEGORY</u>	<u>DIMENSION</u>
Hinges	Door Manufacturer's Standard
Levers	Door Manufacturer's Standard
Exit Device Touchbar	Per Template

C. Field Quality Inspection:

1. Inspect material furnished, its installation and adjustment, and instruct the Owner's personnel in adjustment, care and maintenance of hardware.
2. Locksets and exit devices shall be inspected after installation and after the HVAC system is in operation and balanced, to insure correct installation and proper operation.
3. Closers shall be inspected and adjusted after the HVAC system is in operation and balanced, to insure correct installation and proper operation.
4. A written report stating compliance, and also locations and kinds of noncompliance shall be forwarded to the Architect with copies to the Contractor, hardware distributor, hardware installer and building owner.

D. Technical and Warranty Information:

1. At the completion of the project, the technical and warranty information coalesced and kept on file by the General Contractor/Construction Manager shall be given to the Owner or Owner's Agent. In addition to both the technical and warranty information, all factory order acknowledgement numbers supplied to the General Contractor/Construction Manager during the construction period shall be given to the Owner or Owner's Agent. The warranty information and factory order acknowledgement numbers shall serve to both expedite and properly execute any warranty work that may be required on the various hardware items supplied on the project.
2. Submit to General Contractor/Construction Manager, two copies each of parts and service manuals and two each of any special installation or adjustment tools. Include for locksets, exit devices, door closers and any electrical products.

3.2 Hardware Sets:

Hardware Group No. 01

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	98-NL-OP-110MD	626	VON
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)	626	
1	EA	CONCEALED PULL	(BY DOOR MFR)		
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
1	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	568A-223	A	ZER

Hardware Group No. 02

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	710	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	695	VON
1	EA	PANIC HARDWARE	98-EO	313	VON
1	EA	PANIC HARDWARE	98-NL-OP-110MD	313	VON
2	EA	CYLINDER	(MATCH EXISTING SYSTEM)	613	
2	EA	CONCEALED PULL	(BY DOOR MFR)		
2	EA	SURFACE CLOSER	4111 SCUSH	695	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
2	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	568D-223	D	ZER

Hardware Group No. 03

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	98-EO	626	VON
1	EA	PANIC HARDWARE	98-NL-OP-110MD	626	VON
2	EA	CYLINDER	(MATCH EXISTING SYSTEM)	626	
2	EA	CONCEALED PULL	(BY DOOR MFR)		
2	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
2	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	568A-223	A	ZER

Hardware Group No. 04

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	710	IVE
1	EA	STOREROOM LOCK	ML2057 LWA L/O.S.TRIM	613	C-R
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)	613	
1	EA	CONCEALED PULL	(BY DOOR MFR)		
1	EA	SURFACE CLOSER	4111 SHCUSH SRI	695	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
1	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	568D-223	D	ZER

Hardware Group No. 05

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	REMOVABLE MULLION	KR4854B STAB	689	VON
1	EA	PANIC HARDWARE	98-EO	626	VON
1	EA	PANIC HARDWARE	98-NL-OP-110MD	626	VON
2	EA	CYLINDER	(MATCH EXISTING SYSTEM)	626	
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC	630	VON
2	EA	CONCEALED PULL	(BY DOOR MFR)		
2	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
2	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	568A-223	A	ZER
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC	LGR	SCE
		-	ACCESS CONTROL BY OTHERS		

PRESENTING AN AUTHORIZED CREDENTIAL WILL ENERGIZE THE ELECTRIC STRIKE TO ALLOW ACCESS. FREE EGRESS IS ALWAYS ALLOWED.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 06

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	STOREROOM LOCK	ML2057 LWA L/O.S.TRIM	626	C-R
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)	626	
1	EA	CONCEALED PULL	(BY DOOR MFR)		
1	EA	OH STOP & HOLDER	100H	630	GLY
1	EA	SURFACE CLOSER	4011	689	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
1	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	545A-V3-223	A	ZER
1	EA	VIEWER	698	626	IVE

INSTALL CONCEALED PULL ON PUSH SIDE (OUTSIDE) FACE OF DOOR.

Hardware Group No. 07

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	STOREROOM LOCK	ML2057 LWA L/O.S.TRIM	626	C-R
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)	626	
1	EA	CONCEALED PULL	(BY DOOR MFR)		
1	EA	SURFACE CLOSER	4111 SHCUSH SRI	689	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
1	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	568A-223	A	ZER

Hardware Group No. 08

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
2	EA	SURFACE BOLT	SB453 8" TB	652	IVE
1	EA	STOREROOM LOCK	ML2057 LWA L/O.S.TRIM	626	C-R
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)	626	
1	EA	CONCEALED PULL	(BY DOOR MFR)		
1	EA	OH STOP & HOLDER	100H	630	GLY
1	EA	SURFACE CLOSER	4111 SHCUSH SRI	689	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
2	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	568A-V3-223	A	ZER

Hardware Group No. 09

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	710	IVE
1	EA	PANIC HARDWARE	98-NL-OP-110MD	313	VON
1	EA	CYLINDER	(MATCH EXISTING SYSTEM)	613	
1	EA	CONCEALED PULL	(BY DOOR MFR)		
1	EA	SURFACE CLOSER	4111 SCUSH	695	LCN
1	SET	WEATHER SEAL	(BY FRAME MFR)		
1	EA	DOOR SWEEP	(BY DOOR MFR)		
1	EA	THRESHOLD	568D-223	D	ZER

END OF SECTION

SECTION 08 8000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
 - 2. Doors.
 - 3. Storefront framing.
 - 4. Glazed entrances.
 - 5. Interior borrowed lites.
- B. Safety Glass Where Required: Meet or exceed applicable current requirements of ANSI Z97.1 "Safety Glazing" and CPSC 16 CFR, Category II.

1.3 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
- F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: Not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."
 - b. Specified Design Snow Loads: Not less than snow loads applicable to Project as required by ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 7.0, "Snow Loads."
 - c. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
 - 1) For monolithic-glass lites heat treated to resist wind loads.
 - 2) For insulating glass.
 - 3) For laminated-glass lites.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 1/4 inch thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units with lites 1/4 inch thick and a nominal 1/2-inch- (12.7-mm-) wide interspace.
 4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).

- b. Solar Heat Gain Coefficient: NFRC 200.
- c. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
 - 1. Samples:
 - 2. Each type and thickness of glass: three (3) samples, 12 inches square.
 - 3. Gaskets and Tapes: Three (3) samples, 6 inches long; each type and shape; molded corners for each type of gasket.
- B. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- C. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- D. Qualification Data: For installers.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glass: Obtain glass through one source from a single manufacturer for each glass type.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- D. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- E. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- F. Safety Glazing Products including wired glass: Comply with testing requirements in CPSC 16 CFR 1201, Category II and ANSI Z97.1.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. (0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. (0.84 sq. m) or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: GANA Laminated Division's "Laminated Glass Design Guide" and GANA's "Glazing Manual."
 2. AAMA Publications: AAMA GD5G-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Sloped Glazing Guidelines."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
1. Insulating Glass Certification Council.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Primary Glass Manufacturers:
 - a. AFG Industries, Inc.
 - b. Guardian Industries, Inc.
 - c. Pilkington Building Products North America
 - d. PPG Industries, Inc.
 - e. Viracon
 - f. Visteon Corp.

2.2 GLASS PRODUCTS

- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.

- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
 2. Heat Strengthened: Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 3. Tempered: Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
- C. Tinted Glass:
1. Product: Subject to compliance with requirements, provide Solarban 60 SOLARGRAY as manufactured by PPG Industries, Inc. or equal by one of the above listed primary glass manufacturers
 2. Color: Gray
 3. Comply with the following properties for one-inch insulating glass with Low-E Coating:
 - a. Visible Light Transmittance: 35%
 - b. Summer U-Value: 0.27
 - c. Winter U-Value: 0.29
 - d. Solar Heat Gain Coefficient: 0.25
 - e. Shading Coefficient: 0.29
- D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article.
1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 4. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - a. Polyisobutylene and polysulfide or silicone.
 - 1) Silicone seal is required for all four sided or two sided structural glazing.
 5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material:

- 1) Aluminum with mill or clear anodic finish for non-structurally glazed applications
 - 2) Aluminum with black, color anodic finish for structurally glazed applications.
- b. Desiccant: Molecular sieve, silica gel, or blend of both.
 - c. Corner Construction: Manufacturer's standard corner construction.
- E. Low Emissivity-Coated Insulating Glass Units (Low-E): Manufacturer's standard unit with one pane coated with pyrolytic or sputtered, neutral colored, Low-E coating, on third surface of tinted insulating unit or second surface of clear insulating unit. See glass schedule for types and thicknesses.
1. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, and complying with other requirements specified.
 2. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.

2.3 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 Glazing Tape: Tremco #440; Shore A hardness of 10 at installation and not exceeding 20 upon aging.

2.4 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, black, and of profile and hardness required to maintain watertight seal:
1. Silicone, ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
1. Silicone.

2.5 GLAZING SEALANTS

- A. Sealant for Glazing: Meet requirements for materials and workmanship specified under Division 7 Section "Joint Sealants."
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Neoprene or EPDM 70 to 90 Shore A Hardness as recommended by manufacturer; certified non-staining and compatible with sealant. Use EPDM for units set with silicone glazing sealant.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Grind smooth and polish exposed glass edges and corners.

C. Glazing Contractor, Glass Fabricator and Glass Manufacturer shall determine which areas require heat strengthening. The glazing contractor shall include in his bid and shall install heat strengthened glass where it is required by manufacturer and/or fabricator.

2.8 GLASS SCHEDULE

A. Schedule of Glass Types:

GL-1 Tempered Monolithic Glass:
Tint: Clear
Thickness: 1/4"

GL-11 Tempered Insulating Glass consisting of:
Exterior Lite: 1/4"
Tint: Gray
Airspace: 1/2"

GL-12 Laminated Metal Panel
 Thickness: 1/4"
 Color: Match adjacent framing
 Interior Lite: 1/4"
 Tint: Clear
 Low-E Coating: #3 Surface.

GL-13 Insulated Metal Panel
 Thickness: 1"
 Color: Match adjacent framing

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
 - 1. Install glass in accordance with recommendations outlined in "Glazing Manual" and "Glazing Sealing Systems Manual" prepared by Flat Glass Marketing Association.
- B. Interior glazing shall be dryset with black glazing tape.
- C. Exterior glazing at entrance doors, sidelights, transoms, window wall frames, and similar members shall be installed with dryset gasket glazing.
- D. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- E. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

- F. Apply primers to joint surfaces where required for adhesion of sealants.
- G. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- H. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- I. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- J. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- K. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.5 GASKET GLAZING

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

SECTION 08 9000 - LOUVERS AND VENTS**PART 1 - GENERAL****1.1 RELATED DOCUMENTS:**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Extent of louvers and vents is indicated on drawings, including indications of sizes and locations.
- B. Types of louvers and vents include the following:
 - 1. Extruded aluminum louvers
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 7 Section "Joint Sealants" for sealants.
 - 2. Division 15 for air-handling louvers connected to ductwork.

1.3 QUALITY ASSURANCE:

- A. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.
- B. Field measurements: Verify size, location and placement of louver units prior to fabrication, wherever possible.
- C. Shop Assembly: Coordinate field measurements and shop drawings with fabrication and shop assembly to minimize field adjustments, splicing, mechanical joints and field assembly of units. Pre-assemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.4 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Substitutions for products as specified MUST be submitted in accordance with Division 1 Substitute products not submitted in accordance with Division 1 Section "Product Requirements" will NOT be considered.
- B. Product Data: Submit manufacturer's specifications; certified test data, where applicable; and installation instructions for required products, including finishes.
- C. Samples: Submit pairs of samples of each type and color of aluminum finish, on 12" long sections of extrusions or formed shapes or 6" square sheets. Where color or texture variations are anticipated, include 2 or more units in each set of samples indicating extreme limits of variations.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- A. Manufacturer: Subject to compliance with requirements, provide products equal to Ruskin Manufacturing Co. No. ELF 211D drainable blade louver.
 - 1. The Airlite Co.
 - 2. American Warming and Ventilating Co.
 - 3. Construction Specialties, Inc.

2.2 MATERIALS:

- A. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer to provide required finish.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T52.
- C. Fastenings: Use same material as items fastened, unless otherwise indicated. Fasteners for exterior applications may be hot-dip galvanized, stainless steel or aluminum. Provide types, gages and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
- D. Anchors and Inserts: Use non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
- E. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

2.3 FABRICATION, GENERAL:

- A. Provide louvers and accessories of design, materials, sizes, depth, arrangement, and metal thicknesses indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; air leakage, where applicable (for adjustable units, if any); strength; durability; and uniform appearance.
- B. Fabricate frames including integral sills to suit adjacent construction with tolerances for installation, including application of sealants in joints between louvers and adjoining work.
- C. Include supports, anchorages, and accessories required for complete assembly.
- D. Join frame members to one another and to stationary louver blades by welding, except where indicated otherwise or where field bolted connections between frame members are made necessary by size of louvers. Maintain equal blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

2.4 STATIONARY EXTRUDED ALUMINUM WALL LOUVERS:

- A. Horizontal Blade Louvers: Size and depth indicated, with blades of profile, slope and spacing indicated, or if not indicated, to meet performance requirements.
 - 1. Frame Depth: 2"
 - 2. Extrusion Thickness: Not less than 0.060" for blades and frames.

3. Continuous Horizontal Blades: Conceal supporting framework from vision on outside face of louver by placing braces, mullions and brackets on inside face; with close fitting, field-made splice joints in blades designed to permit expansion and contraction without deforming blades or framework.
 - a. Exterior Corners: Shop miter and weld blades into prefabricated corner units to align with straight sections. Include concealed bracing.
 - b. Aluminum: Not less than 14 gage.
4. Provide glazing frame where indicated on drawings for louver to be glazed into storefront framing

2.5 LOUVER GRILLES

- A. General: Provide louvers with grilles at locations indicated.
 1. Grille Location for Fixed Louvers: Exterior face.
 2. Grille Type: Perforated metal panel
 - a. Material: ASTM B209, Alloy 6063, Temper T-6 Aluminum.
 - b. Thickness: 0.064"
 - c. Perforations: 1" square perforations placed in straight line pattern, 1.5" on center
 - d. Finish: Dark bronze anodized
- B. Secure grille to louver frames with stainless steel machine screws, spaced at each corner and at 12 inch o.c. between.

2.6 LOUVER SCREENS

- A. General: Provide louvers with screens at locations indicated.
 1. Screen Location for Fixed Louvers: Interior face, unless otherwise indicated.
 2. Screening Type: Bird screening, unless otherwise indicated.
- B. Secure screens to louver frames with stainless steel machine screws, spaced at each corner and at 12 inch o.c. between.
- C. Louver Screen Frames: Fabricate screen frames with mitered corners to louver sizes indicated and to comply with the following requirements:
 1. Metal: Same kind and form of metal as indicated for louver frames to which screens are attached.
 - a. Reinforce extruded aluminum screen frames at corners with clips.
 - b. Finish: Same finish as louver frames to which louver screens are attached.
 - c. Type: Non-rewireable U-shaped frames for permanently securing screen mesh.
- D. Louver Screening for Aluminum Louvers: Fit aluminum louver screen frames with screening covering louver openings and complying with the following requirements:
 1. Bird Screening: 1/2 inch square mesh formed with 0.063 inch diameter aluminum wire.

2.7 BLANK-OFF PANELS

- A. General: Fabricate blank-off panels from materials and to sizes indicated and to comply with the following requirements:
 - 1. Finish: Match finish applied to louver with respect to coating type, except for color which shall be as follows:
 - a. Black.
 - 2. Attach blank-off panels to back of louver frames with stainless steel sheet metal screws.
- B. Insulated Blank-Off Panels: Laminated metal-faced panels consisting of insulating core surfaced on back and front with metal sheets; complying with the following requirements:
 - 1. Thickness: 2 inch.
 - 2. Metal Facing Sheets: Aluminum sheet, 0.032 inch thick.
 - 3. Insulating Core: Extruded polystyrene insulation board insulation complying with ASTM C 578, Type VII (2.2 lb/cu. ft. density).
 - 4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded aluminum channel frames 0.081 inch thick, with corners mitered and with same finish as panels.
 - 5. Seal perimeter joints between panel faces and louver frames with polyvinyl chloride compression gaskets, 1/8 inch by 1 inch.

2.8 METAL FINISHES:

- A. GENERAL: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory after products are assembled. Protect finishes on exposed surfaces with protective covering, prior to shipment. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process.
- B. Aluminum Finishes:
 - 1. Class I Color Anodized.
 - a. Comply with Aluminum Association AA-C21A44.
 - b. Apply finish following chemical etching and pretreatment.
 - c. Minimum Thickness: 0.7 mils (0.018 mm), 60 minute anodizing process.
 - e. Class I Color Anodized: Dark Bronze.

PART 3 - EXECUTION

3.1 PREPARATION:

- A. Coordinate setting drawings, diagrams, templates, instructions and directions for installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION:

- A. Locate and place louver units plumb, level and in proper alignment with adjacent work.
- B. Use concealed anchorages wherever possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Repair finishes damaged by cutting, welding, soldering and grinding operations required for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items which cannot be refinished in field to shop, make required alterations, and refinish entire unit, or provide new units, at Contractor's option.
- D. Protect galvanized and non-ferrous metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces which will be in contact with concrete, masonry or dissimilar metals.
- E. Refer to Division-7 sections for sealants in connection with installations of louvers.

END OF SECTION

SECTION 12 2413 - ROLLER SHADES

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 manual roller shades.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for wood blocking and grounds.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other Work, operational clearances, and relationship to adjoining work.
- C. Full size sample for verification purposes of each type of window shade showing all components, materials, and finishes to be exposed to view. Prepare samples from same materials to be used for fabricating units.
- D. Samples for Verification:
 - 1. Complete, full-size operating unit not less than 16 inches (400 mm) wide for each type of roller shade indicated.
 - 2. Shade Material: Not less than 3 inches (80 mm) square, with specified treatments applied. Mark face of material.
 - 3. Valance: Full-size unit, not less than 12 inches (300 mm) long.
- E. Window Treatment Schedule: Include roller shades in schedule using same room designations indicated on Drawings.
- F. Product Certificates: For each type of roller shade product, signed by product manufacturer.
- G. Product Test Reports: For each type of roller shade product.
- H. Qualification Data: For Installer.
- I. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining roller shades and finishes.

2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
 3. Operating hardware.
- J. Warranty: Furnish a twenty five year (25) guarantee against defects in material and workmanship from the date of substantial completion.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed installation of roller shades similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
1. Provide a list of three institutional-quality window shade projects successfully completed within the last five years. For each project include the following:
 - a. Project/building name and location.
 - b. Description of scope.
 - c. Representative's name and phone number.
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.
- C. Corded Window Covering Product Standard: Provide roller shades complying with WCMA A 100.1.
- D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory packages, marked with manufacturer and product name, and location of installation using same room designations indicated on Drawings and in a window treatment schedule.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide MechoShades as manufactured by MechoShade Systems, Inc or equal products by one of the following:
1. Draper Shade and Screen Co., Inc.
 2. Solarfective Products, Ltd.
- B. Refer to roller shade schedule in Part 3.

2.2 ROLLER SHADES

- A. Shade Band Material - Translucent
1. Translucent Shades shall be light filtering, flame retardant, fade and soil resistant and washable.
 - a. Construction: 100% thermoplastic olefin
 - b. Openness Factor: 3 percent.
 - c. Meets Government Spec. #CCC-C-521-E.
 - d. Type I product
 - e. Weight: Must be a minimum of 6.4 oz. per square yard.
 - f. Color: As selected by Architect from manufacturer's full range.
 - 1) Design Intent: Grey and white.
 2. Provide EcoVeil 1550 Series ShadeCloth as manufactured by MechoShade Systems or equal products by one of the following:
 - a. Draper Shade and Screen Co., Inc.
 - b. Solarfective Products, Ltd.
- B. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with removable spline fitting integral channel in tube Provide capacity for one roller shade band per roller, unless otherwise indicated on Drawings.
- C. Direction of Roll: Regular, from back of roller.
- D. Mounting Brackets: Galvanized or zinc-plated steel.
- E. Roller Shades, Non-Pocket-Style:
1. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; length as indicated on Drawings or in a window treatment schedule; removable design for access.
 2. Top/Back Cover: L shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.

- F. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide exposed-to-view, external-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.
- G. Shade Operation:
 - 1. Manual: Provide with spring roller continuous loop bead chain, clutch, and cord tensioner and bracket lift operator.
 - a. Position of Clutch Operator: Left or Right side of roller, as determined by hand of user facing shade from inside, unless otherwise indicated on Drawings or in a window treatment schedule.
 - b. Clutch: Capacity to lift size and weight of shade; sized to fit roller or provide adaptor.
 - c. Lift Assist Mechanism: Manufacturer's standard spring assist for balancing roller shade weight and lifting heavy roller shades.
 - d. Loop Length: Length required to make operation convenient from floor level.
 - e. Bead Chain: Nickel-plated metal or stainless steel.
 - f. Operating Function: Stop and hold shade at any position in ascending or descending travel.
- H. Valance: Style matching hem; as indicated by manufacturer's designation color or as indicated in a window treatment schedule.
- I. Mounting: As indicated on Drawings, mounting permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.

2.3 ROLLER SHADE FABRICATION

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.
- B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
 - 1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch (6 mm) from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 - 2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.
- E. Installation Fasteners: Not fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

- F. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- G. Colors of Metal and Plastic Components Exposed to View: As selected by Architect from manufacturer's full range.

2.4 WARRANTY

- A. Furnish a twenty five year (25) guarantee against defects in material and workmanship from the date of substantial completion.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.
- B. Connections: Connect motorized operators to building electrical system.

3.3 ADJUSTING

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

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

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

3.6 ROLLER SHADE SCHEDULE

- A. Type A Shade Band Material: Translucent
Operation: Manual
Installation: Non-pocket style

END OF SECTION

SECTION 28 3100 - FIRE ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
- B. Related Sections include the following:
 - 1. Division 26 Section "Electrical General Requirements."

1.2 SECTION INCLUDES

- A. Fire alarm and smoke detection systems. Removal and reinstallation of existing National Time & Signal pull stations, in full compliance with all applicable codes and guidelines. The features and system capacities contained in this specification shall be furnished as part of this project.
- B. The system as described shall be installed, tested, and delivered to the Owner in first class condition. The system shall include all the required hardware and software to accomplish the requirements of this specification and the contract documents, whether or not specifically itemized herein.
- C. All equipment furnished shall be new and include the latest state of the art products from a single manufacturer, engaged in the manufacturing and sale of fire detection devices for over ten years. The equipment manufacturer shall have an installed base of existing systems as a reference.

1.3 REFERENCES

- A. NFPA 72 - National Fire Alarm Code.
- B. NFPA 101 - Life Safety Code.
- C. U.L. 1971 - Standard for Safety Signaling Devices for the Hearing Impaired.

1.4 REGULATORY REQUIREMENTS

- A. System: UL (FPED) and FM listed.
- B. Conform to requirements of NFPA 101.
- C. A.D.A. Federal guidelines.
- D. Conform to State of Michigan Fire Code.
- E. Conform to International Building Code.

1.5 SUMMARY

- A. This Section includes **the removal and reinstallation of fire alarm pull stations at Hamilton and Wass Elementary Schools. Work required due to window replacement, pull stations are mounted on window mullions. Extend circuiting as required.**
- B. Related Sections include the following:

1. Division 8 Section "Door Hardware" for door closers and holders with associated smoke detectors, electric door locks, and release devices that interface with the fire alarm system.

1.6 SYSTEM DESCRIPTION

- A. Noncoded, addressable system; multiplexed signal transmission dedicated to fire alarm service only.
 1. Interface with existing fire alarm system where indicated.
- B. Fire alarm system shall consist of the following:
 1. All new fire alarm control panel, devices, and wiring.
 2. System smoke detection above all control panels and notification appliance power supply panels.
 3. System smoke detection as required at air handling units, smoke rated transfer openings, and smoke damper locations.
 4. System smoke detection in areas identified on plans.
 5. All flow and tamper switches to monitor fire sprinkler and standpipe systems and report appropriate alarm and supervisory signals.
 6. Manual fire alarm boxes at each building exit (prior to entering exit stairwells at each floor).
 7. Audible and visual notification appliances in all public and common areas of the building.

1.7 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 72.
- B. Comply with NFPA 70.
- C. A complete functional system meeting the requirements of this specification, including alarm initiating devices and notification appliances at locations and ratings to meet the requirements of the Authorities Having Jurisdiction and all applicable codes shall be provided.
- D. Coordinate and avoid conflicts with casework, markerboards, feature walls, and other areas where fire alarm devices would interfere with furnishings, finishes, etc.
- E. Fire alarm system vendor shall provide sound pressure level calculations demonstrating compliance with NFPA 72 and establish quantities and tap settings of audible devices.
- F. No additional charges for work or equipment required for a code compliant system approved by the Authority Having Jurisdiction will be allowed.
- G. Obtain and refer to mechanical drawings for smoke damper locations, smoke rated transfer openings, and air handling equipment CFM's. Provide smoke detection as required by applicable codes.
- H. Premises protection includes Education Type building use group.

1. Refer to drawings for complete code analysis including construction type, use groups, special occupancy types, rated walls, smoke barriers and partitions, etc.

- I. System functional performance shall be as indicated on the fire alarm matrix on the drawings.

1.8 SYSTEM DESCRIPTION

- A. General: Complete, zoned, noncoded, addressable, microprocessor-based fire detection and alarm system with manual and automatic alarm initiation, addressable analog initiating devices, and automatic alert.
- B. The fire alarm system shall allow for loading and editing special instructions and operating sequences as required. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel (FACP).
- C. Resident software shall allow for full configuration of initiating circuits so that additional hardware shall not be necessary to accommodate future changes.
- D. Resident software shall allow for configuration of notification appliance and control circuits so that additional hardware shall not be necessary to accommodate changes.
- E. The system shall have the capability of recalling alarms and trouble conditions in chronological order for the purpose of recreating an event history.
- F. Signal Transmission: Notification appliance circuits shall be NFPA Style Y, Class B. Signaling line circuits shall be NFPA Style 4, Class B.
- G. Data Communication Transmission Between Control Units: Style 7, Class A.

1.9 SYSTEM FUNCTIONS

- A. Signal Initiation: The manual or automatic operation of an alarm-Initiating or supervisory-operating device shall cause the FACP to transmit an appropriate signal including:
 1. General alarm.
 2. System trouble.
 3. Valve tamper supervisory.
 4. Door release.
 5. Fan shutdown.
 6. Release electrically held door locks.
 7. A general alarm shall be initiated by:
 8. Water-flow alarm switch operation.
 9. Smoke detection. Alarm verification is required for all smoke detector zones.
 10. Manual station operation.
 11. Heat detector operation.

- B. General Alarm: A system general alarm shall:
1. Indicate the general alarm condition at the FACP.
 2. Identify the device that is the source of the alarm at the FACP.
 3. Display the alarm on an 80 character LCD display. The system alarm LED shall flash on the control panel until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone shall flash the system alarm LED on the control unit. The display shall show the new alarm information.
 4. Sound a pulsing alarm tone within the FACP until the event has been acknowledged.
 5. Operate audible and visible alarm notification signals throughout the building.
 6. Sound a continuous fire alarm signal until silenced by the alarm silence switch at the FACP.
 7. Flash all visible alarm notification appliances continuously until the System Reset Switch is operated. Any subsequent zone alarm shall reactivate the alarm notification appliances.
 8. Close fire and smoke doors normally held open by magnetic door holders.
 9. Stop supply and return fans serving zone where alarm is initiated.
 10. Close smoke dampers on system serving zone where alarm is initiated.
 11. Transmit the alarm to the proprietary supervising station.
- C. A supervisory alarm shall be initiated by:
1. Sprinkler valve tamper switch operation.
- D. Loss of primary power at the FACP shall sound a trouble signal at the FACP and shall indicate at the FACP when the system is operating on an alternate power supply.
- E. Circuit Supervision: Circuit faults shall be indicated by means of both a zone and a trouble signal at the FACP.
- F. Annunciation: Manual and automatic operation of alarm and supervisory initiating devices shall be annunciated on the FACP, indicating the location and type of device.
- G. FACP Alphanumeric Display: Shall display plain-language description of alarms, trouble signals, supervisory signals, monitoring actions, system and component status, and system commands.
- H. Independent System Monitoring: Supervise each independent smoke detector, fire suppression system and duct detector, for both normal operation and trouble.
- I. Alarm Silencing: If the "Alarm Silence" button is pressed, all audio alarm signals shall cease operation.
- J. System Reset: The "System Reset" button shall be used to return the system to its normal state after an alarm condition has been remedied.
- K. Activation of an auxiliary bypass switch shall override the selected automatic functions.

- L. Auxiliary manual controls shall be supervised so that an "off normal" position of any switch shall cause an "off normal" system trouble. The "off normal" status shall be clearly identified in plain-language on the FACP.
- M. Recording of Events: Record all alarm, supervisory, and trouble events in non-volatile memory.
- N. Smoke Sensor Sensitivity Adjustment:
 - 1. Authorized operation of controls at the FACP shall cause the selection of specific addressable smoke sensors for adjustment, display of their current status and sensitivity settings, and control of changes in those settings.
 - 2. Remote Controllability: Individually monitor sensors at the FACP for calibration, sensitivity, and alarm condition, and individually adjust for sensitivity from the FACP. The alarm decision for each sensor shall be determined by the control unit. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
- O. The actuation of the "enable one person test" program at the FACP shall activate the "One Person Testing" mode of the system which shall cause the following to occur:
 - 1. The city circuit connection shall be bypassed.
 - 2. Control relay functions shall be bypassed.
 - 3. The FACP shall show a trouble condition.
 - 4. The alarm activation of any initiation device shall cause the audible notification appliances to code a number of pulses to match the zone number.
 - 5. The FACP shall automatically reset after signaling is complete.
 - 6. Any momentary opening of an initiating or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.
 - 7. The system shall have the capacity of 8 programmable, passcode protected, one person testing groups, such that only a portion of the system need be disabled during testing.
- P. Power Requirements
 - 1. The FACP shall receive 120 VAC power via a dedicated 20A branch circuit breaker provided with a red lock-on device.
 - 2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
 - 3. All circuits requiring system operating power shall be 24 VDC and shall be individually fused at the control panel.
 - 4. The incoming power to the system shall be supervised so that any power failure must be audibly and visibly indicated at the control panel. A green "power on" LED shall be displayed continuously while incoming power is present.

5. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visibly indicated at the FACP and the command center.

- Q. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.

1.10 SUBMITTALS

- A. Bidders will be required to submit shop drawings and product data during the construction phase of each project. Provide the following submittals for review:
1. Complete description data indicating UL listing for all network components. Include dimensioned plans and elevations showing minimum clearances and installed features and devices.
 2. Complete sequence of operation of all functions of the network that is project specific.
 3. A list of every address of every device connected to a panel that is provided for purposes of alarm initiating, status monitoring, supervised notification appliance circuits, and auxiliary control.
 4. A listing of the manufacturer's representatives responsible for installation coordination and service.
 5. Location of all controls, alarm actuating devices and notification appliance devices as shown on drawings.
 6. Wiring diagrams from manufacturer differentiating between factory-and field- installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Indicate components for both field and factory wiring. Provide complete diagrams for all components and interfaces including equipment supplied by others.
 7. Operation and maintenance data for inclusion in Operating and Maintenance Manual specified in Division 1. Include data for each type product, including all features and operating sequences, both automatic and manual. Include recommendations for spare parts to be stocked at the site. Provide the names, addresses, and telephone numbers of service organizations that carry stock of repair parts for the system to be furnished.
 8. The manufacturer shall provide calculations for battery size as applicable. Battery size shall be a minimum 125% of the calculated requirement.
 9. Provide calculations for control modules indicating circuit loading with 20% spare capacity.
- B. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of annotated Contract Drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, submit them for review. Make resubmissions if required to make clarifications or revisions to obtain approval. **Note: National Time & Signal (and the electrical contractor) shall include in their pricing submittals to the Bureau of Fire Services and all services, if required.**

1.11 PROJECT RECORD DOCUMENTS

- A. Submit as built drawings locating devices and conductor runs.

- B. Record of field tests of system.
- C. Submit manufacturer's certificate that system meets or exceeds specified requirements.

1.12 OPERATION, MAINTENANCE DATA, AND CALCULATIONS

- A. Provide to the Owner's representative operating instructions, maintenance, and repair procedures.
- B. After installation, include manufacturer representative's letter stating that system is operational.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Delivery, storage and handling of products will take place under the contract terms of each project in the construction phase of each project.

1.14 EXTRA MATERIALS

- A. Provide spare parts to the Owner's representative as noted below:
 - 1. Two keys of each type (for each project).
 - 2. Two smoke detectors (for each project).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **National Time & Signal. Expand the existing fire alarm system at Hamilton and Wass Elementary Schools as required to remove and reinstall fire alarm pull stations.**

2.2 FIRE ALARM CONTROL PANEL (FACP).

- A. General: Comply with UL 864, "Control Units for Fire-Protective Signaling Systems."
- B. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures. Accommodate all components and allow ample gutter space for interconnection of units as well as field wiring. Identify each enclosure by an engraved, red-laminated, phenolic resin nameplate. Lettering on the enclosure nameplate shall not be less than 1-inch high.
- C. Systems: Alarm and supervisory systems are separate and independent in the FACP. The alarm-initiating zone boards in the FACP consist of plug-in modules. Construction requiring removal of field wiring for module replacement is not acceptable.
- D. Control Modules: Types and capacities required to perform all functions of the fire alarm systems plus 20% for future expansion. Local visible, and audible signals notify of alarm, supervisory, and trouble conditions
- E. Zones: Provide for all alarm and supervisory zones indicated.
- F. Resetting: Provide the necessary controls to prevent the resetting of any alarm, supervisory, or trouble signal while the alarm or trouble condition still exists.

- G. Alphanumeric Display and System Controls: Arrange to provide the basic interface between human operator at FACP and addressable system components, including annunciation, supervision, and control. A display with a minimum of 80 characters displays alarm, supervisory, and component status messages and indicates control commands to be entered into the system for control of smoke detector sensitivity and other parameters. Arrange keypad for use in entering and executing control commands.
- H. System power supplies including necessary transformers, regulators, filters and surge protection required for system operation.
- I. System processor, with internal operating system to process incoming alarm signals and issue output commands required as a result of the alarm signals and issue output. Total system response time shall not exceed 2.5 seconds on a system configured to the 3000 point capacity. All system processors shall be supervised by individual watchdog circuitry furnishing automatic restart after loss of activity. Systems with single watchdog circuits for all processors will not be accepted unless furnished with a standby CPU.
- J. A limited energy output circuit for operation of direct current (DC) audible or visual devices, leased line or city tie, shall be provided by a controllable signal module.
- K. Where control of operations requiring switching functions is indicated, there shall be provided a software controlled relay module.
 - 1. Motherboards shall be furnished as the system bus furnishing systems communications to the various plug in modules necessary for system operations.
- L. Remote Station Signal Transmitter: Electrically supervised, capable of transmitting contact I.D. and point annunciation signals over a communication means (Internet) to remote central station receiver (National Time & Signal). The electrical contractor/National Time & Signal shall coordinate all requirements (cat 6 cabling/connections and UPS for 24 hour back-up, plus other requirements for a complete system).
Note: National Time & Signal shall be sub-contracted by the electrical contractor. Include all costs in bid.

2.3 REMOTE FIRE ALARM ANNUNCIATOR PANEL

- A. Provide remote annunciation and control using an 80 character, back-lit, alphanumeric, LCD readout. Alarm indication shall be identical to that at the main FACP including tone alert. Provide a minimum of four programmable control switches, alarm silence and system reset.
- B. Provide brushed aluminum trim plate.

2.4 EMERGENCY POWER SUPPLY

- A. General: Components include battery, charger, and an automatic transfer switch.
- B. Battery: Sealed lead-acid or nickel cadmium type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm indicating devices in alarm of supervisory mode for a period of 15 minutes.
- C. Magnetic door holders are not served by emergency battery power. Magnetic door holders are released after 15 seconds when normal power fails.

2.5 SMOKE DETECTORS, INTELLIGENT ADDRESSABLE

- A. Furnish and install where indicated on the drawings intelligent analog smoke detectors with features and characteristics as follows:
 - 1. Photoelectric detectors shall be listed for use as open area protective coverage, in duct installation and shall be insensitive to air velocity changes.
 - a. The control panel shall provide a sensitivity readout for all detectors without removal from the pluggable base. Detectors not listed for sensitivity testing and logging from the control panel are not acceptable.
 - b. Detectors shall be operational with relay bases (as applicable), audible bases, and remote indicating LED's, programmable by the control panel and controlled by the detector electronics.
- B. Provide smoke detectors above fire alarm control panel, remote annunciator panels, and remote notification appliance power supply panels.
- C. Provide smoke detectors with auxiliary set of contacts where required.

2.6 THERMAL DETECTOR, INTELLIGENT ADDRESSABLE

- A. The intelligent thermal detectors shall be of the rate compensated fixed temperature type and shall be listed by Underwriters Laboratories, Inc. The intelligent thermal detectors shall be individually annunciated on the control panel. The intelligent thermal detectors shall contain an integral alarm lamp.

2.7 DUCT SMOKE DETECTORS

- A. The air duct detector shall be listed by Underwriters Laboratories, Inc. The air duct detector shall operate on a cross-sectional air sampling principle to overcome stratification and the skin effect. The air duct detector shall consist of a standard (intelligent/analog) photoelectric detector mounted in an air duct sampling assembly and sampling tube that protrudes across the duct of the ventilating system. The air duct detector shall retain the features of the intelligent/analog photoelectric detector, and be installed in the ventilating duct as indicated in the manufacturer's instructions. Provide with addressable control module. Relay based duct detectors not acceptable.
- B. The duct mounted detector shall have an auxiliary set of contacts in order for the temperature controls contractor to tie in the starter of the fans. Contacts shall be rated 1A, 120V.

2.8 DUCT SMOKE DETECTOR REMOTE ALARM INDICATORS

- A. Provide remote alarm indicator station for duct smoke detectors located above ceilings or in other locations above 10 feet and/or not readily accessible.
- B. Provide LED alarm indicator designed for mounting in a single gang coverplate.

2.9 MANUAL STATIONS, INTELLIGENT

- A. Provide single action intelligent manual stations where shown on the drawings, to be flush or surface mounted as required.
 - 1. The manual stations shall be addressable and identifiable by the fire alarm control panel.
 - a. Address assignments shall be set mechanically or electronically and reside within the station in non-volatile memory.
 - b. Reset keys shall match previous projects.

2.10 ADDRESSABLE INTERFACE MODULE

- A. Provide for integration of compatible two wire and shorting style contact devices into the analog signaling circuit. Intelligent analog signaling circuit interface module shall have the following capabilities:
1. Communication interaction with the analog signaling circuit having the capability of reporting alarm or trouble conditions from the devices monitored.
 2. Compatibility with ionization, photoelectric, and linear beam style smoke detectors, heat detectors, and all listed contact type devices.
 3. The module shall be addressable and identifiable by the control panel.
 - a. Address assignments shall be set mechanically or electronically and reside within the module in non-volatile memory.
 4. Water Flow Switches: The water flow switches shall be provided by the mechanical contractor and wired by the electrical contractor. The switches shall be connected to the fire alarm system through the use of addressable interface modules.
 5. Tamper Switches: The tamper switches shall be provided by the mechanical contractor and wired by the electrical contractor. The switches shall be connected to the fire alarm system through the use of addressable interface modules.
 6. Provide addressable interface modules to uniquely identify each flow and tamper switch.

2.11 ADDRESSABLE CONTROL MODULE

- A. Provide for integration of auxiliary control functions into the analog signaling circuit. Intelligent analog signaling circuit control module shall have the following capabilities:
1. Communication interaction with the analog signaling circuit having the capability of initiating a control function to an auxiliary device based on a specified event.
 2. Provide NO/NC contact pairs rated at 2 amps 120 VAC or 24 VDC.

2.12 NOTIFICATION APPLIANCES

- A. Description: Equipped for mounting as indicated and with screw terminals for system connections.
1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.
 2. Finishes:
 - a. Wall mounted appliances: Provide red finish with white lettering.
 - b. Ceiling Mounted Appliances: Provide white finish.
- B. Voice/Tone Speakers:
1. UL 1480 listed.
 2. High-Range Units: Rated 2 to 15 W.
 3. Low-Range Units: Rated 1 to 2 W.

4. Matching Transformers: Tap range matched to the acoustical environment of the speaker location.
- C. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.
1. Rated Light Output: 15, 30, 60, 75, 110, 135, 185 candela as required to meet NFPA 72 requirements.
 2. Strobe Leads: Factory connected to screw terminals.

2.13 AUXILIARY DEVICES

- A. Door Release: Magnetic door holder with integral diodes to reduce buzzing, 24 VDC coil voltage.

2.14 WIRE AND CABLE

- A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.
- B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.
1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.
- C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
1. Low-Voltage Circuits: No. 16 AWG, minimum.
 2. Line-Voltage Circuits: No. 12 AWG, minimum

PART 3 - EXECUTION

3.1 WARRANTY

- A. All equipment and systems shall be warranted by the contractor for a period of two years following acceptance. The warranty shall include parts, labor, prompt field service, pick-up and delivery.
- B. Provide two years testing and maintenance, which shall consist of:
1. Regularly and systematically examining all detectors, manual stations, panels, relays, pressure switches and accessories pertaining to the system.
 2. Regularly and systematically examine, adjust and clear all the electrical and mechanical components of water flow switches.
 3. Tests and written reports which certify that all initiating devices have been tested and which indicate the result of the inspection test as required by the authority having jurisdiction.

3.2 TESTS AND REPORTS

- A. The contractor shall perform all electrical and mechanical tests required by the equipment manufacturer's certification form. In addition, they shall measure and adjust each of the ionization detectors to the maximum stable sensitivity setting. This must be performed with the detector at its operational location and under normal operational environmental conditions in the area. Bench settings are not acceptable. All test and report costs shall be in the unit price established for each device. A checkout report shall be prepared by the installation technicians and submitted in triplicate, one copy of which will be registered with the equipment manufacturer. The report shall include, but not be limited to:
1. A complete list of equipment installed and wired.
 2. Indication that all equipment is properly installed and functions and conforms with these specifications.
 3. Test of individual zones as applicable.
 4. Serial numbers, locations by zone and model number for each installed detector.
 5. Voltage (sensitivity) settings for each ionization and photoelectric detector as measured in place with the HVAC system operating.
 6. Response time on thermostats and flame detectors (if used).
 7. Technician's name, certificate number and date.
- B. After completion of all the tests and adjustments listed above, the contractor shall submit the following information to the Architect:
1. "As-built" conduit layout diagrams including wire color code and/or tag number.
 2. Complete "as-built" wiring diagrams.
 3. Detailed catalog data on all installed system components.
 4. Copy of the test report.
- C. Final tests and inspection shall be held in the presence of engineer. The contractor shall supply personnel and required auxiliary equipment for this test without additional cost.
- D. The completed smoke detection system shall be tested to insure that it is operating properly. Acceptance of the system shall also require a demonstration of the stability of the system. This shall be adequately demonstrated if the system operates for a ninety (90) day test period.
- E. Before final acceptance of work, the contractor shall deliver five copies of a composite "Operating and Shop Maintenance Manual." Each manual shall contain, but not be limited to: a statement of guarantee including date of termination and name and phone number of the person to be called in the event of equipment failure.
- F. Individual factory issued manuals shall contain all technical information on each piece of equipment installed. In the event such manuals are not obtainable from the factory, it shall be the responsibility of the contractor to compile and include them. Advertising brochures or operational instructions shall not be used in lieu of the required technical manuals.

3.3 INSTALLATION

- A. Control and other panels shall be mounted with sufficient clearance for observation and testing.
- B. All fire alarm junction boxes must be clearly marked for easy identification as indicated in 16195. All wiring shall be in conduit unless noted otherwise on the contract documents or in the specifications. Flexible connectors shall be used for all devices mounted in suspended lay-in ceiling panels. All conduit, mounting boxes, junction boxes and panels shall be securely hung and fastened with appropriate fittings to insure positive grounding throughout the entire system.
- C. Fire alarm pull stations and horns installed in finished areas shall be mounted semi-flush and may be surface mounted in non-finished areas. Smoke detectors and thermal detectors shall be mounted on a recess mounted junction box in finished areas and to surface mounted junction boxes in non-finished areas.
- D. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be permitted in fire alarm conduits. Wiring splices are to be avoided to the extent possible, and if needed they must be made only in junction boxes and shall be crimp connected. Transposing or changing color coding of wires shall not be permitted. Wire nut-type connections are not acceptable. All conductors in conduit containing more than one wire shall be labeled on each end with "E-Z markers" or equivalent. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded. All controls, function switches, etc., shall be clearly labeled on all equipment panels. All wiring shall be checked and tested to insure that there are no grounds, opens or shorts.
- E. Install manual station flush mounted with operating handle 48 inches maximum above floor. Install audible and visual signal devices no more than 96 inches above highest floor level within the space or 6 inches below the ceiling, whichever is lower.
- F. Mount outlet box for electric door holder to withstand 80 pounds pulling force.
- G. Make conduit and wiring connections to door release devices, sprinkler flow switches, sprinkler valve tamper switches, panels, duct smoke detectors, and other auxiliary supervised devices.
- H. Automatic Detector Installation: NFPA 72.
- I. All gymnasiums and locker rooms fire alarm devices shall be provided with protective wire guards.
- J. Fire alarm system cable shall be plenum rated, with red outer coloring. All cable drops to devices shall be in conduit (concealed in walls). Cabling installed in open ceiling spaces shall be type FPLP, low smoke, fire resistant, with red coloring. Cabling shall be per manufacturer's recommendation, and shall be able to power the strobes and horn/strobes together, or independently.
- K. Install fire alarm cable in ceiling spaces to avoid damage. Use bridle rings and other similar means of support (lay-in ceiling areas).
- L. Cabling to the Fire Alarm Control Panel and drops to devices shall be in recessed conduit.
- M. Fire alarm cabling in exposed ceiling spaces and above drywall ceiling areas shall be in conduit. Conduit used for fire alarm system shall have couplings and junction boxes painted red.

END OF SECTION