



## A D D E N D U M

**Project No.: 2301106**

Project: WCSC Milford Elementary

**Addendum No: 4**

Date: 07-23-2024

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### **TO: ALL BIDDERS OF RECORD**

ADDENDUM NO. 4, to Drawings and Specifications dated 06-21-2024, for the new Milford Elementary School for the Wawasee Community School Corporation; as prepared by ELEVATUS Architecture, 111 E. Wayne Street, Suite 555, Fort Wayne, IN 46802

This ADDENDUM shall hereby be and become a part of the Contract Documents the same as if originally bound thereto.

The following clarifications, amendments, additions, revisions, changes, and modifications change the original Contract Documents only in the amount and to the extent hereinafter specified and set forth in this ADDENDUM.

Each Bidder shall acknowledge receipt of this ADDENDUM on the Bid Form.

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### **PROJECT MANUAL:**

#### **ITEM NO. 1.00 - PROJECT MANUAL, 00 01 10 Table of Contents**

A. Refer to revised Section 00 01 10 attached to this Addendum No. 4.

#### **ITEM NO. 1.01 - PROJECT MANUAL, 04 22 00 Unit Masonry**

A. Refer to revised Section 04 22 00 attached to this Addendum No. 4.

#### **ITEM NO. 1.02 - PROJECT MANUAL, 04 42 00 Exterior Stone Cladding**

B. Refer to revised Section 04 42 00 attached to this Addendum No. 4.

Submitted By:

Samuel R. Schaust, AIA



cc:  File: G:\002023\2301106 WCSC Milford Elementary School\0800 Bidding\0810 Addenda\Addendum #4\Supporting Documents\2024-07-23\_WCSC Milford Elementary\_Addendum #4\_Write-up.docx  
 Owner:  
 Contractor:  
 Consultant:  
 Consultant:



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DIVISION 07: THERMAL AND MOISTURE PROTECTION

07 14 13	Pedestrian-Grade Waterproofing	
07 21 00	Building Insulation.....	rev Add 03 – 7/23/24
07 22 00	Roof and Deck Insulation.....	rev Add 02 – 7/16/24
07 26 10	Underslab Vapor Retarder	
07 27 29	Air Barrier Coatings.....	rev Add 03 – 7/23/24
07 42 10	Cladding Support System	
07 42 13	Preformed Wall Panels	
07 42 93	Soffit Panels	
07 46 43	Composite Building Panels	
07 54 00	Fully Adhered PVC Sheet Roofing.....	rev Add 02 – 7/16/24 rev Add 03 – 7/23/24
07 62 00	Flashing and Sheet Metal	
07 92 00	Joint Sealants.....	rev Add 02 – 7/16/24

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08 11 00	Steel Doors and Frames	
08 14 16	Wood Doors	
08 31 13	Access Doors and Frames	
08 33 13	Coiling Counter Doors	
08 41 13	Aluminum Framed Entrances and Storefront.....	rev Add 02 – 7/16/24
08 51 13	Aluminum Windows.....	rev Add 02 – 7/16/24
08 71 00	Door Hardware	
08 71 13	Automatic Door Operators	
08 80 00	Glazing.....	rev Add 02 – 7/16/24
08 91 19	Fixed Louvers	

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09 29 00	Gypsum Board.....	rev Add 02 – 7/16/24
09 30 13	Tiling.....	rev Add 02 – 7/16/24
09 50 00	Integrated Ceiling Assemblies	
09 51 13	Acoustical Panel Ceilings	
09 64 66	Wood Athletic Flooring.....	rev Add 02 – 7/16/24
09 65 19	Resilient Flooring	
09 67 23	Resinous Flooring.....	rev Add 02 – 7/16/24
09 72 00	Wall Coverings.....	added to TOC and rev by Add 02 – 7/16/24
09 68 13	Tile Carpeting	
09 80 00	Acoustical Wall Treatment	
09 91 00	Painting	

DIVISION 10: SPECIALTIES

10 11 00	Visual Display Units	
10 12 00	Display Cases	
10 14 00	Identifying Devices.....	added to TOC by Add 02 – 7/16/24
10 21 13.19	Solid Plastic Toilet Compartments	
10 21 23	Cubicle Curtains and Tracks	
10 26 0043	Wall and Door Protection	
10 28 13	Toilet Accessories	
10 41 16	Emergency Key Cabinets	

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10 44 00	Fire Extinguishers, Cabinets, and Accessories	
<del>10 51 00</del>	<del>Lockers</del>	.....deleted by Add 03 – 7/23/24
<del>10 51 13.13</del>	<del>Athletic Lockers</del>	.....deleted by Add 03 – 7/23/24
10 75 00	Ground-Set Flagpoles	

DIVISIONS 11: EQUIPMENT

11 40 00	Food Service Equipment
11 66 23	Gymnasium Equipment
11 68 44	Scoreboards

DIVISIONS 12 – FURNISHINGS

12 24 13	Roller Window Shades	
12 32 16	Manufactured Plastic Laminate-Clad Casework	.....rev Add 02 – 7/16/24
12 66 00	Telescoping Stands	

DIVISIONS 13 – 20: (NOT USED)

DIVISION 21 – FIRE SUPPRESSION

21 01 00	Fire Suppression Common Requirements
21 05 17	Sleeves And Sleeve Seals For Fire-suppression Piping
21 05 18	Escutcheons For Fire-suppression Piping
21 05 23	General-duty Valves For Water-based Fire-suppression Piping
21 05 53	Identification For Fire-suppression Piping And Equipment
21 13 13	Wet-pipe Sprinkler Systems

DIVISION 22: PLUMBING

22 01 00	Plumbing Common Requirements
22 05 13	Common Motor Requirements For Plumbing Equipment
22 05 16	Expansion Fittings And Loops For Plumbing Piping
22 05 17	Sleeves And Sleeve Seals For Plumbing Piping
22 05 18	Escutcheons For Plumbing Piping
22 05 19	Meters And Gauges For Plumbing Piping
22 05 23.12	Ball Valves For Plumbing Piping
22 05 23.13	Butterfly Valves For Plumbing Piping
22 05 23.14	Check Valves For Plumbing Piping
22 05 29	Hangers And Supports For Plumbing Piping And Equipment
22 05 48.13	Vibration Controls For Plumbing Piping And Equipment
22 05 53	Identification For Plumbing Piping And Equipment
22 05 93	Testing, Adjusting, And Balancing For Plumbing
22 07 19	Plumbing Piping Insulation
22 11 16	Domestic Water Piping
22 11 19	Domestic Water Piping Specialties
22 11 23.13	Domestic-Water Packaged Booster Pumps
22 11 23.21	Inline, Domestic-water Pumps
22 12 23.11	Facility Indoor Potable-water Storage Tanks
22 13 16	Sanitary Waste And Vent Piping
22 13 19	Sanitary Waste Piping Specialties

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22 13 19.13	Sanitary Drains
22 13 23	Sanitary Waste Interceptors
22 14 14	Storm Drainage Piping
22 14 23	Storm Drainage Piping Specialties
22 31 00	Domestic Water Softeners
22 34 00	Fuel-fired, Domestic-water Heaters
22 42 13.13	Commercial Water Closets
22 42 13.16	Commercial Urinals
22 42 16.13	Commercial Lavatories
22 42 16.16	Commercial Sinks
22 42 23	Commercial Showers
22 42 33	Wash Fountains
22 47 16	Pressure Water Coolers

**DIVISION 23: HEATING, VENTILATING, AIR CONDITIONING**

23 01 00	Mechanical Common Requirements
23 05 13	Common Motor Requirements for HVAC Equipment
23 05 16	Expansion Fittings And Loops For HVAC Piping
23 05 17	Sleeves And Sleeve Seals For HVAC Piping
23 05 18	Escutcheons For HVAC Piping
23 05 19	Meters And Gauges For Hvac Piping
23 05 23.12	Ball Valves For Hvac Piping
23 05 23.13	Butterfly Valves For Hvac Piping
23 05 23.14	Check Valves For Hvac Piping
23 05 29	Hangers And Supports For Hvac Piping And Equipment
23 05 48.13	Vibration Controls For Hvac
23 05 53	Identification For Hvac Piping And Equipment
23 05 93	Testing, Adjusting, And Balancing For Hvac
23 07 13	Duct Insulation
23 07 16	Hvac Equipment Insulation
23 07 19	Hvac Piping Insulation
23 09 00	Instrumentation And Control For Hvac
23 09 01	Variable-frequency Motor Controllers
23 09 93	Sequence Of Operations For Hvac Controls
23 11 23	Facility Natural-gas Piping
23 21 13	Hydronic Piping
23 21 16	Hydronic Piping Specialties
23 21 23	Hydronic Pumps
23 23 00	Refrigerant Piping
23 25 13	Water Treatment For Closed-loop Hydronic Systems
23 31 13	Metal Ducts
23 33 00	Air Duct Accessories
23 33 46	Flexible Ducts
23 34 16	Centrifugal Hvac Fans
23 34 23	Hvac Power Ventilators
23 34 33.13	Commercial Air Curtains
23 36 00	Air Terminal Units
23 37 13.13	Air Diffusers
23 37 13.23	Registers And Grilles
23 37 23	Hvac Gravity Ventilators
23 52 16	Condensing Boilers
23 57 00	Heat Exchangers For Hvac

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23 64 23.13 Air-cooled, Scroll Water Chillers  
23 73 13.16 Indoor, Semi-custom Air-handling Units  
23 73 43.16 Outdoor, Semi-custom Air-handling Units  
23 81 26 Split-system Air-conditioners  
23 82 19 Fan Coil Units  
23 82 29 Radiators  
23 82 39.13 Cabinet Unit Heaters

DIVISION 24 - 25: (NOT USED)

DIVISION 26: ELECTRICAL

26 00 10 Supplemental Requirements For Electrical  
26 01 00 Electrical Common Requirements  
26 05 19 Low-voltage Electrical Power Conductors And Cables  
26 05 23 Control-voltage Electrical Power Cables  
26 05 26 Grounding And Bonding For Electrical Systems  
26 05 29 Hangers And Supports For Electrical Systems  
26 05 33.13 Conduits For Electrical Systems  
26 05 33.16 Boxes And Covers For Electrical Systems  
26 05 33.23 Surface Raceways For Electrical Systems  
26 05 36 Cable Trays for Electrical Systems  
26 05 44 Sleeves And Sleeve Seals For Electrical Raceways And Cabling  
26 05 48 **Vibration and Seismic Controls for Electrical System.....added to TOC Add 03 – 7/23/24**  
26 05 53 Identification For Electrical Systems  
26 05 73.13 Short-circuit Studies  
26 05 73.16 Coordination Studies  
26 05 73.19 Arc-flash Hazard Analysis  
26 09 23 Lighting Control Devices  
26 09 43.23 Relay-based Lighting Controls  
26 22 13 Low-voltage Distribution Transformers  
26 23 00 Low-voltage Switchgear  
26 24 16 Panelboards  
26 27 26 Wiring Devices  
26 28 13 Fuses  
26 28 16 Enclosed Switches And Circuit Breakers  
26 29 13.03 Manual And Magnetic Motor Controllers  
26 32 13.13 Diesel-engine-driven Generator Sets  
26 36 00 Transfer Switches  
26 43 13 Surge Protective Devices For Low-voltage Electrical Power Circuits  
26 51 19 Led Interior Lighting  
26 52 13 Emergency And Exit Lighting  
26 56 13 Lighting Poles And Standards  
26 56 19 **LED Exterior Lighting .....added to TOC Add 03 – 7/23/24**

DIVISION 27: COMMUNICATIONS

27 01 00 Communications Common Requirements  
27 05 26 **Grounding and Bonding for Communications Systems .....added to TOC Add 03 – 7/23/24**  
27 05 28 Pathways For Communications Systems  
27 05 29 **Hangers and Supports for Communications Systems .....added to TOC Add 03 – 7/23/24**

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<del>27 11 00</del>	<del>Communications Equipment Room Fittings</del> .....	<del>deleted from TOC Add 03 – 7/23/24</del>
27 05 53	Identification for Communications Systems .....	added to TOC Add 03 – 7/23/24
27 11 16	Communications Racks, Frames, and Enclosures .....	added to TOC Add 03 – 7/23/24
27 15 13	Communications Copper Horizontal Cabling	
<del>27 15 23</del>	<del>Communications Optical Fiber Horizontal Cabling</del> .....	<del>deleted from TOC Add 03 – 7/23/24</del>
27 51 16	Public Address Systems	
27 51 23.50	Educational Intercommunications And Program Systems	

DIVISION 28: ELECTRONIC SAFETY AND SECURITY

<del>283111</del>	<del>Addressable Fire Alarm Systems</del> .....	<del>deleted from TOC Add 03 – 7/23/24</del>
28 46 21.11	Addressable Fire-Alarm Systems.....	added to TOC Add 03 – 7/23/24

DIVISIONS 29 – 30: (NOT USED)

DIVISION 31: EARTHWORK

31 00 00	Control of Site Work	
31 10 00	Site Demolition	
31 20 00	Site Earthwork	
31 30 00	Soil Erosion and Sediment Control	

DIVISION 32: EXTERIOR IMPROVEMENTS

32 12 16	Bituminous Concrete Pavement	
32 13 13	Portland Cement Concrete Pavement	
32 31 00	Fences and Gates	
32 92 00	Lawns and Grasses	
32 93 00	Site Landscaping	

DIVISION 33: UTILITIES

33 05 00	Site Utility Piping	
33 11 16	Site Water Distribution	
33 31 14	Sanitary Sewer System	
33 41 00	Storm Drainage System	

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**SECTION 04 22 00 - UNIT MASONRY**

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide labor, materials, and equipment necessary for complete installation of unit masonry as shown on the Drawings and specified herein.
  - 1. Refer to Section 07 21 00 for rigid cavity and perimeter insulations.
- B. Work installed under this Section, but materials or products furnished under the following Divisions or Sections:
  - 1. Masonry mortar furnished under the Work of Section 04 05 13.
  - 2. Masonry grout furnished under the Work of Section 04 05 16.
  - 3. Masonry accessories furnished under the Work of Section 04 05 23.
  - 4. Anchor bolts, steel plates, and steel lintels; refer to Division 5.
    - a. Installation of lintels in masonry walls shall be included under the Work of this Section.
  - 5. Wood bucks and nailing blocks in masonry construction; refer to Section 06 10 00.
- C. Cooperate with other trades requiring items of equipment or services to be installed within or in conjunction with Unit Masonry Work.
- D. Other Materials provided and installed by this Section:
  - 1. Masonry cleaners
  - 2. Concrete slab protection.
- E. Products installed, but not furnished, under this Section include the following:
  - 1. Steel lintels and shelf angles for unit masonry, furnished under Division 5 Section "Metal Fabrications."
  - 2. Manufactured reglets in masonry joints for metal flashing.
  - 3. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section "Steel Doors and Frames."

1.2 SUBMITTALS

- A. All unit masonry products specified in this Section shall be submitted as a single package as practicable.. Separate submittals for each system or product may not be acceptable.
- B. Do not submit MSDS or SDS sheets with the product data submittal. Architect is not responsible for review of this information. Submittals that include MSDS or SDS data sheets may be returned as rejected.
- C. Test report from independent laboratory showing result of efflorescent test conducted per ASTM C67 for each provided face brick type.



- D. Upon regular presentation within past 6 months of representative units by approved manufacturer, a test report from an independent laboratory showing resultant weight, compressive strength (based on net area), and water absorption properties, as well as adherences to standards where so specified, for:
1. Each proposed type of concrete masonry unit.
- E. A test report from an independent testing laboratory showing compressive strength of concrete masonry prisms constructed from the concrete masonry units and mortar to be used in the masonry work for:
1. Each proposed type and size of concrete masonry unit as required on the Reinforced Masonry Plans in the Drawings.
- F. Mock-up panels as erected on site grounds are only samples required.
- G. Approved manufacturer's published complete product data, with particular items to be provided clearly marked thereon, for:
1. Proposed masonry cavity wall insulation
  2. Integral color
  3. Preformed insulation inserts
- H. Submit minutes from preinstallation conference.
- I. Fire-rated CMU certification.
- J. Installer's examination report.
- K. Submit written masonry inspection reports as specified herein.
- L. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- M. Shop Drawings: Show fabrication and installation details for the following:
1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
  2. Fabricated Flashing Details: Detail corner units, end-dam units, and other special applications.
  3. Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
- N. Samples for Initial Selection: For the following:
1. Unit masonry Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
  2. Colored mortar Samples showing the full range of colors available.
- O. Samples for Verification: For the following:
1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
  2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
  3. Stone trim samples not less than 12 inches in length, showing the full range of colors and textures expected in the finished construction.
  4. Weep holes/vents in color to match mortar color.

5. Accessories embedded in the masonry.
- P. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.
- Q. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
1. Each type of masonry unit required.
  2. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
  3. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
  4. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
  5. Each material and grade indicated for reinforcing bars.
  6. Each type and size of joint reinforcement.
  7. Each type and size of anchor, tie, and metal accessory.
- R. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

### 1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the provisions of the following codes, specifications, and standards, except as otherwise shown or specified:
1. ACI 530/530.1 Building Code Requirements and Specifications for Masonry Structures and Related Commentaries.
  2. NCMA-TEK 18-1A Compressive Strength Evaluation of Concrete Masonry.
  3. NCMA-TEK 3-2A Grouting Concrete Masonry Walls.
  4. NCMA-TEK 18-2A Sampling and Testing Concrete Masonry Units.
  5. ASTM C140 Standard test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
  6. NCMA-TEK 70A Concrete Masonry Prism Strength.
  7. NCMA-TEK 132
  8. Comply with ALL NCMA-TEK Standards.
- B. Changes in the source or brand of masonry materials during construction will require resubmission and re-testing at the Contractor's expense.
- C. Job Mock-Up
1. Prior to installation of masonry work, erect sample wall panel mock-up using materials, bond, and joint tooling shown or specified for final work. Provide special features as directed for caulking and contiguous work. Build mock-up at the site, where directed, of full thickness and approximately 4¢¢ x 4¢¢ 8' x 8', unless otherwise shown, indicating the proposed range of color, texture, and workmanship to be expected in the completed work. Erect panels with finish face of panels facing south. Obtain Architect's acceptance of visual qualities of the mock-up before start of masonry work. Retain mock-up during construction as a standard for judging completed masonry work. Do not alter, move, or destroy mock-up until work is completed. Provide mock-up panel for the following:

- a. Typical exterior face brick wall.
- b. Typical interior partition of concrete masonry units.
- c. Typical exterior CMU wall indicating all of the different types of CMU and finishes as specified herein.
- d. Uniformity of joints

D. Concrete Masonry Inspection

1. Refer to Division 01 for additional requirements.
  - a. Masonry inspection is required for those masonry elements where it is imperative that construction produces elements which can attain high design strengths. These masonry elements include, but are not limited to, grout filled CMU walls, CMU bearing walls, and grout filled and vertically reinforced CMU walls, and other walls as may be indicated on the Drawings.
  - b. The Contractor will be responsible for the masonry inspections. Masonry inspections shall be by an independent laboratory as specified in Division 01. Submit reports as specified herein.
2. Submit written reports for each section of wall inspected to include:
  - a. Project identification name and number.
  - b. Name of Masonry Contractor.
  - c. Name of inspecting service.
  - d. Date of report.
  - e. Specific location of work inspected.
  - f. Horizontal joint reinforcing size, type, spacing, and lap.
  - g. Preparation of cores and cavities to be grouted. Inspect every core and cavity.
  - h. Vertical reinforcing centering clip size, type, spacing, and proper alignment.
  - i. Size spacing and lap of vertical reinforcing and installation in centering clips.
  - j. Installation and vibration of grout in cores and cavities.
  - k. Remarks as to general conditions pertinent to the strength and quality of the masonry work.
3. Inspection shall use NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry and NCMA-TEK 132 Inspector's Guide for Concrete Masonry Construction as guidelines.
4. The masonry inspection agency shall be selected prior to the pre-masonry conference and shall have the inspector who will inspect this project attend the conference.
5. **The contractor for the work of this Section shall be responsible for the masonry inspection to be performed by an independent testing laboratory.**
6. Frequency of masonry inspections shall be as defined herein.

E. Fire Performance Characteristic: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means acceptable to authorities having jurisdiction.

F. Definitions:

1. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.
2. CMU: Concrete masonry unit.

G. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

H. Pre-Installation Conference: Conduct an on-site pre-installation conference prior to beginning masonry work on the project. Masonry contractor and all parties shall attend. Refer to Division 01 for additional requirements. Notify Architect 14 days prior to pre-installation conference. Suggested agenda as follows:

1. All of the contractor's masonry submittals shall be previously submitted, completed and reviewed by the Architect prior to the Pre-Installation Conference.
2. Locations of load-bearing walls.
3. Locations of CMU control joints.
4. Contractor's concern for missing/incomplete details.
5. Verify use of up-to-date plans/specifications.
6. Contractor's responsibility for temporary wall bracing.
7. Installation procedures.
8. Coordination issues with other trades.
9. Protection of concrete floors during masonry installation.
10. Open issues/concerns.
11. Job-site storage and staging areas
12. Mortar dropping concerns on exposed concrete floors in the Dayrooms and Booking.
13. Concrete slab protection during construction.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.
- C. Store cementitious materials off the ground, under cover, and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

#### 1.5 TESTS OF CONCRETE MASONRY PRISMS

- A. For grout filled and reinforced or un-reinforced concrete masonry wall construction tests for the compressive strength of prisms as described in ASTM E 447, latest edition and NCMA-TEK 70A.
  1. Provide a minimum of one set of 3 masonry prisms for testing per each 5000 square feet of masonry wall construction.
- B. Submit written reports for each prism tested. Provide the project identification name and number, date of report, name of Contractor, name of Testing service, name of material suppliers, specific location where masonry represented by the prism is used, test results, and values specified in the referenced specification. Indicate whether tested prism is acceptable for intended use.
- C. If the compressive strength tests fail to meet the minimum requirements specified, the concrete masonry represented by such tests shall be considered deficient in strength.
- D. Deficient masonry construction shall be removed and replaced by the Contractor without additional cost to the Owner. In lieu of removal and replacement, additional cores may be grouted as required and directed by the Architect without additional cost to the Owner.

#### 1.6 PROJECT CONDITIONS

- A. Protect partially complete masonry against weather, when Work is not in progress, by covering top of walls with strong, waterproof, non-staining membrane. Extend membrane at least 2 foot down both sides of walls and anchor securely in place.

- B. Protect partially complete masonry walls against wind damage by bracing as required until support of walls is integral with the building structure.
- C. Protect masonry against freezing when the temperature of the surrounding air is 40 degrees F and falling. Heat materials and provide temporary protection of complete portions of masonry work. Comply with the requirements of the governing code and with the "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes on Brick.
- D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.
- E. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:
  - 1. Do not lay masonry units that are wet or frozen.
  - 2. Remove masonry damaged by freezing conditions.
- F. Hot-Weather Construction: Comply with referenced unit masonry standard.

#### 1.7 MASONRY INSPECTION

- A. The Contractor's testing agency is responsible for all masonry inspections and reports as specified herein.
- B. Provide masonry construction inspection of concrete masonry walls ~~on the drawings~~ **indicated as requiring inspection** to ensure that masonry construction is in conformance with the Contract Documents. Masonry inspection is required for those masonry elements which must be constructed to attain high design strengths, such as, but not limited to, vertically reinforced grouted CMU walls, grouted CMU wall, and load-bearing CMU walls. **Refer to 1.3, D, 1, a herein.**
- C. Qualification of Inspection Agency: Refer to Division 1 requirements.
- D. Inspection shall use NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry and NCMA-TEK 132 Inspector's Guide for Concrete Masonry Construction as guidelines.
- E. The individual or individuals who will perform the masonry inspection shall be present for the Pre-masonry Conference.
- F. The masonry inspector shall prepare a written report or reports for each day of inspection.
- G. The masonry inspector shall be present and observe all grouting operations in walls requiring inspection. The masonry inspector shall be present at the project site within sufficient time, in advance of grouting operations, to inspect the construction to ensure its conformance to the contract Documents and that grouting may proceed. Periodically, the masonry inspector shall be present during the placing of masonry units and reinforcement. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

## 1.8 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths ( $f_m$ ) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
1. For Concrete Unit Masonry:  $f_m = 2000$  psi.
  2. For Brick Unit Masonry:  $f_m = 3000$  psi.

## 1.9 CONCRETE SLAB PROTECTION

- A. Protect all new concrete floors scheduled to be sealed that are directly under and adjacent to CMU walls. Mortar droppings on concrete floors scheduled to be sealed will not be allowed. Discuss this requirement at the Preinstallation Meeting.
- B. Mortar stains on concrete floors shall be removed in their entirety prior to concrete floor sealer final installation and buffing installation. Refer to Section 03 35 00 for additional requirements.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

### 2.2 MASONRY UNITS

- A. Obtain masonry units from one manufacturer for uniform texture and color for each kind required, for each continuous area and visually related areas.
- B. Concrete Masonry Units (CMU) (NOTE: All CMU on this PROJECT to have minimum compressive strength of 2800 psi on net area per ASTM C90.)
1. CMU Manufacturer: Shall be member of the National Concrete Masonry Association.
  2. Size: Manufacturer's standard units with face dimensions of 15-5/8 by 7-5/8 inches (actual), and other sizes as may be indicated on the drawings and details.
  3. Special Shapes: Provide, where shown and where required, lintels, inside and outside corners, jambs, sash, control joints, headers, bond beams, bullnoses, and other special conditions.
    - a. Provide bullnose corners at all exposed external corners (except at heads), and sills.
  4. Hollow Load-Bearing (HL) CMU: Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of 2800 psi on the net section.
  5. Solid Loadbearing CMU (Solid CMU): Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of 2800 psi on the gross section.
  6. Normal Weight Units: ASTM C33 concrete aggregates for a dry net weight of not less than 125 pounds per cu. ft. Strength shall be as indicated above.
  7. Curing: Cure units in a non-moisture-controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C90, Type II.
  8. Exposed Face:

- a. Manufacturer's standard color and texture. Smooth face.
  9. Where CMU walls are indicated as fire-rated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means as acceptable to authorities having jurisdiction.
  10. Fire Rated CMU shall meet requirements of the UL 618 and may be lightweight block manufactured with 100% rotary kiln produced expanded shale, clay, or slate. Blending of screenings or any other deleterious substance which impairs the fire rating is prohibited. The producer of the CMU shall furnish a one page certification showing conformance with all requirements of UL 618.
  11. Provide masonry lintels at all openings greater than 1'-0" in width that occur in CMU walls unless indicated to be steel on the drawings.
  12. All vertical wall corners (exposed corners) and window and opening jambs shall be bullnose CMU. 1-inch radius corners.
- C. Face Brick
1. Quality Standard: ASTM C216, latest edition, Grade SW for exterior exposure, Type FBX.
  2. Size
    - a. Face brick shall be Standard Modular size.
    - b. Other special sizes as may be required or indicated for a total and complete installation in every respect.
  3. Manufacturer
    - a. **TYPE 1:** Belden Brick #8632
    - b. **TYPE 2:** Belden Brick "Sienna Blend Velour".
    - c. **TYPE 3:** Belden Brick "Desert Sun Velour".
  4. Provide special molded shapes and solids as required. No brick holes shall be visible in the final product.
  5. Compressive Strength: Shall exceed 3000 psi when tested with the loads applied normally to the bedding surface.
  6. Water Absorption: Average maximum water absorption by submersion in boiling water for 5 hours shall be less than 17 percent. Average saturation coefficient shall be less than 0.78.
  7. The Contractor for this Section of the Work shall include in the Base Bid the cost for solid brick required, the cost for cutting of brick required, the cost for cutting of brick required to obtain special shapes, the cost of special size brick required, and the cost of special molded shapes required.
  8. Bond Pattern: Flemish Bond

### 2.3 PREFORMED INSULATION INSERTS

- A. U-shaped, preformed insulation inserts shall be expanded polystyrene preformed and individually molded with a minimum density of 1 pcf, and shall conform to ASTM C578, latest edition, Type I. Install in CMU block at producers plant.
- B. Manufacturer: ÓÓKorfil U-Shaped Concrete Block Insulating Systems by Concrete Block Insulating Systems, West Brookfield, MA.
- C. Shape: U-shaped insert accomplishing compression fit with inside faces of both the front and rear face shells and the central web of the CMU allowing re-bar placement at center of CMU core, and handhold access at center web of the CMU.

2.4 MASONRY CLEANERS

- A. "NMD 80" buffered-detergent based solution for new masonry as manufactured by EaCo Chem, Inc., New Castle, PA; "EK 2010" by ProsoCo, Inc., or Architect approved equal.
- B. Clean concrete masonry (CMU) by means of cleaning method indicated in NCMA TEK 8-2A applicable to type of stain present on exposed surfaces.

2.5 SOURCE QUALITY CONTROL

- A. Concrete Masonry Unit Tests: For each type, class, and grade of concrete masonry unit indicated, units will be tested by qualified independent testing laboratory for strength, absorption, and moisture content per ASTM C 140, latest edition.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
- B. Thickness: Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.
- D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.
- E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.
- F. Frozen Materials and Work: Do not use frozen materials mixed or coated with ice or frost. For masonry, which is specified to be wetted, comply with the BIA recommendations. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.
- G. Matching Existing Masonry: Match coursing, bonding, color, and texture of new masonry with existing masonry.



### 3.3 CONSTRUCTION TOLERANCES

- A. Comply with construction tolerances of referenced unit masonry standard.
- B. CMU shall comply with NCMA-TEK standards.
- C. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10", or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story or 20' maximum, nor 1/2" in 40' or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10', 1/2" maximum.
- D. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.
- E. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.
- F. Variation in Cross-Sectional Dimensions: For columns and thicknesses of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".
- G. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8"

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay-up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
  - 1. For the first and second block courses above and below apertures, run reinforcing continuous or extend two feet back from aperture edge. Refer to notes on Structural drawings.
- C. Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work. Do not wedge partitions tight against structural ceiling or beams, but provide a caulk or insulation filled joint between top of masonry and the structural roof deck, structural steel framing or structural floor deck. Stop masonry a minimum of 1/2 inch from vertical, horizontal and sloped steel surfaces.
- D. Pattern Bond CMU: Lay concrete masonry units (CMU) in 1/2 running bond. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2 inches. Lay masonry with vertical joints plumb, one above the other.
- E. Pattern Bond Face Brick: Lay face brick in Flemish Bond..
- F. Weight Requirements for CMU Units:
  - 1. Normal Weight: All CMU.

- G. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.
- H. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
  2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
  3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
  4. Install adjustable hollow metal frame anchors, locating anchors on jambs in horizontal bed courses near the top and bottom of each frame and at intermediate points not over 24 inches apart.
  5. Fill jambs and heads of all hollow metal door and window frames installed in CMU or concrete walls solid with grout.
  6. Rake joints around exterior side of exterior hollow metal door frames for sealant under Division 07.
  7. Where hollow metal frames do not wrap around masonry jambs and heads, rub exposed corners of block to remove sharp, irregular edges.
- I. Intersecting Masonry Walls: Where interior non-load-bearing masonry partition or wall intersects interior load-bearing masonry wall at 90 degrees, stop horizontal joint reinforcing in interior partition 4 inches short of intersection. Horizontal joint reinforcing in interior load-bearing wall shall run continuous. In the same courses as horizontal reinforcing, install wire mesh extending 8 inches minimum into interior partition and projecting into the exterior wall to within 2 inches of exterior face of wall. Install wire mesh reinforcing in horizontal joints 16 inches o.c. vertically.
- J. Grout masonry walls where indicated on drawings.
- K. Installing New Masonry in Existing Masonry Wall Construction:
1. For alignment of faces of adjacent existing exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.
  2. Special requirements may be required for shoring and bracing of existing masonry wall construction and new masonry walls in existing masonry wall construction.
  3. It is the Masonry Contractor's full responsibility to design and erect the shoring and bracing system for masonry walls. If structural calculations are required to determine the shoring and bracing requirements for masonry walls, the Masonry Contractor is responsible for obtaining that information which must be reviewed by the Architect's Structural Engineer.
  4. All shoring and bracing shall comply with OSHA requirements.
  5. Shoring and bracing shall comply with the Standard Practice for Bracing Masonry Walls under Construction, latest edition, as published by the Masonry Contractors Association of America (MCAA) and Masonry Wall bracing Handbook, latest edition.
  6. Shoring and bracing is identified and defined as means and methods which is the full responsibility of the Contractor. Owner and Architect are held harmless.

### 3.5 MORTAR BEDDING AND JOINTING

- A. Mix mortar ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials which would impair the work. Each mortar batch is allowed only one re-tempering. Do not use mortar which has begun to set after the first re-tempering or if more than 2-1/2 hours has elapsed since initial mixing.

- B. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Butter ends of brick in hand and in the wall at closures. Do not slush head joints.
- C. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.
- D. Joints: Maintain joint widths shown, except for minor variations required, to maintain joint alignment. Lay walls with 3/8 inch joints. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials. For exposed masonry, provide joints as follows:
  - 1. Fill Exposed Joints: Concave tooled.
  - 2. Fill Concealed Joints: Struck flush.
- E. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jams to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

### 3.6 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

- A. Use continuous horizontal joint reinforcement installed in horizontal mortar joints for bond tie between wythes.
- B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.
  - 1. Provide continuity with horizontal joint reinforcement at corners using prefabricated "L" units, in addition to masonry bonding.
- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:
  - 1. Provide individual metal ties.
  - 2. Provide continuity with horizontal joint reinforcement using prefabricated "T" units.
  - 3. Install pressure-relieving joint filler in joint between top of partition and underside of structure above.
  - 4. Wedge nonbearing partitions against structure above with small pieces of tile, slate, or metal.

### 3.7 CAVITIES/AIR SPACES

- A. Keep cavities/air spaces clean of mortar droppings and other materials during construction. Strike joints facing cavities/air spaces flush.
- B. Tie exterior wythe to interior wythe with individual metal ties. Stagger alternate courses.
- C. Tie exterior wythe to interior wythe with continuous horizontal joint reinforcing embedded in mortar joints at not more than 16 o.c.
- D. Install vents in vertical head joints at the top of each continuous cavity/air space. Space vents and close off cavities/air spaces vertically and horizontally with blocking in manner indicated.

### 3.8 HORIZONTAL JOINT REINFORCEMENT

- A. Provide continuous horizontal joint reinforcing as shown and specified. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls and 1/2 inch at other locations. Lap reinforcement a minimum of 6 inches at ends of units. Do not bridge control and expansion joints with reinforcing. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend units as directed by manufacturers for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- B. Space continuous horizontal reinforcing as specified in Section 04 05 23.
- C. Reinforce masonry openings greater than 1 foot wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8 inches apart, both immediately above the lintel and immediately below the sill. Extend reinforcing a minimum of 2 foot beyond jambs of the opening except at control joints.
- D. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- E. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.9 MOVEMENT (CONTROL AND EXPANSION) JOINTS

- A. Install control and expansion joints in unit masonry where indicated, or if not indicated, space at a maximum of 25'-0" o.c. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as follows:
  - 1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.
  - 2. Install preformed control joint gaskets designed to fit standard sash block.
  - 3. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.
- C. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with 3/8-inch expansion joint filler sheets (column isolation). Secure with light gauge wire. Refer to Section 04 05 23 for column isolation specifications.

### 3.10 INSTALLATION OF REINFORCED UNIT MASONRY

- A. Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.
- B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
  - 1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
- C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

- D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

### 3.11 FLASHING/WEEP HOLES

- A. Install embedded flashing and weep holes in exterior wythe face brick and exterior stone cladding masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Install flashings as follows at exterior Face Brick wythe and Exterior Stone Cladding:
  - 1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. Extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within 1/2 inches of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.
  - 2. At heads and sills and where flashing is interrupted, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
  - 3. Install flashing in masonry veneer walls as specified above but carry flashing up face of sheathing at least 8 inches and behind air infiltration barrier/building paper.
  - 4. Interlock end joints of ribbed sheet metal flashings by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer and seal and lap with adhesive as recommended by the flashing manufacturer.
  - 5. Install brick vents in the head joints of the second brick course above each flashing and the third course of brick below each flashing and spaced at a maximum of 4 $\phi$ -0 o.c. horizontally.
- C. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashings and as follows:
  - 1. For weep holes with product specified in Part 2 of this Section.
  - 2. Space weep holes 16 inches o.c.
  - 3. In un-insulated cavities/air spaces place pea gravel to a height equal to height of first course but not less than 2 inches immediately above flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.
  - 4. In insulated cavities/air spaces cover cavity/air space side of open weep holes with copper or plastic insect screening before placing loose-fill masonry insulation in cavity.
- D. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.
- E. Provide concealed flashing in the first in the first course above grade. Provide concealed flashing at other locations in masonry work as shown. Prepare masonry surfaces smooth and free from projections which might puncture flashing. Place through-wall flashing on bed of mortar and cover with mortar. Seal flashing penetrations with mastic before covering with mortar. Terminate flashing 1/4 inch beyond face of wall and bend down at 45 degree angle to create a drip edge, unless otherwise shown. Extend flashings beyond edges of lintels and sills at least 4 inches and turn up edge on sides to form pan to direct moisture to exterior. Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings, spaced 16 inches o.c.
  - 1. Interlock end joints of deformed metal flashings by over-lapping deformations not less than 1-1/2 inches and seal lap with elastic sealant, or in accordance with manufacturer's instructions.

### 3.12 VERTICAL REINFORCED CONCRETE MASONRY

- A. Where grout filled or steel reinforced concrete block masonry foundations or masonry walls are called for on the Drawings, they shall be reinforced and grouted in accordance with the Drawings and details. All cells to be grouted shall be clean and free of mortar protrusions and droppings in the cells.
- B. The low-lift grouting procedure shall be used as described in the Drawings and in NCMA-TEK 23A Grouting for Masonry Walls. Maximum height of grouting shall be 4 feet.
- C. 1500 psi 2000 psi 3000 psi grout shall be installed in the block cavities so as to completely fill each cavity with homogenous grout, extending from the lowest course to the top of the reinforced portion of the foundation or wall. Concrete or mortar shall not be used as grout for CMU.
- D. After the grout is placed, it shall be consolidated with a small vibrator. The top of the grout filling shall be stopped 1-1/2 inches below the top of the concrete block, except for the top course in the wall where the grout shall be struck flush with the top. If highly absorptive masonry units are used, the grout shall be re-vibrated after it has begun to stiffen.
- E. Aggregate used in the grout shall be small enough not to interfere with placement and plasticity. Water-cement ratio shall be maintained so compressive strength at 28 days shall not be less than 2000 lbs. per sq. in.
- F. Caging devices and centering clips shall be spaced vertically such that every section of vertical reinforcing steel bar is restrained by 2 clips or devices, one near its top and one near its bottom.

### 3.13 LINTELS

- A. Install steel lintels where indicated and/or as required for masonry openings.
- B. For CMU walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout, or as may be indicated on the Structural Drawings.
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

### 3.14 INSTALLATION OF REINFORCED UNIT MASONRY

- A. Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.
- B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
  - 1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
- C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
- D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

### 3.15 ANCHORING MASONRY WORK

- A. Provide anchoring devices of the type shown and as specified.

- B. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:
1. Provide an open space not less than 1/2 inch width between masonry and structural member, unless other types of anchoring devices are shown. Keep open space free of mortar or other rigid materials.
  2. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless other types of anchoring devices are shown.
  3. Space anchors as shown, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally.
  4. The ends of wall ties shall be embedded in mortar joints. Wall tie ends shall engage outer face shells of hollow units by at least 1/2 inch. Wire wall ties shall be embedded at least 1-1/2 inch into the mortar bed of solid masonry units or solid grouted hollow units.
  5. Unless otherwise required, wythes not bonded by headers shall be bonded with wall ties as follows:
    - a. Size - Minimum number of ties required
    - b. #9 gauge - One wall tie wire per 2.67 sq.ft.
    - c. 3/16 inch diameter - One wall tie wire per 4.50 sq.ft.
  6. Unless accepted by the Architect/Engineer, reinforcement shall not be bent after being embedded in grout or mortar.
  7. Unless otherwise required adjustable ties shall meet the following requirements:
    - a. Use one tie for each 1.77 sq.ft. of wall area.
    - b. Neither horizontal nor vertical spacing shall exceed 16 inches.
    - c. Maximum misalignment of bed joints from one wythe to the other shall be 1-1/4 inch.
    - d. Maximum clearance between connecting parts of the ties shall be 1/16 inch.

### 3.16 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
  4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
  5. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 8-2A applicable to type of stain present on exposed surfaces.
  6. Clean all exposed concrete masonry of efflorescence in strict accordance with NCMA TEK 8-3A.
- C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION

**SECTION 04 42 00 - EXTERIOR STONE CLADDING**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stone set with individual anchors and/or horizontal reinforcing
2. Cementitious dampproofing

B. Related Requirements:

1. Section 04 22 00 Unit Masonry for installing horizontal reinforcing in unit masonry for anchoring stone cladding.
2. Section 04 05 23 Masonry Accessories
3. Section 07 92 00 Joint Sealants

1.2 DEFINITIONS

A. Definitions contained in ASTM C119 apply to this Section.

B. IBC: International Building Code.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Shop Drawings: Show fabrication and installation details for stone cladding assembly, including dimensions and profiles of stone units.

1. Show locations and details of joints both within stone cladding assembly and between stone cladding assembly and other construction.
2. Include details of mortar joints, sealant joints and mortar joints pointed with sealant.
3. Show locations and details of anchors and backup structure.
4. Show direction of veining, grain, or other directional pattern.

C. Stone Samples for Verification: Sets for each variety, color, and finish of stone required; not less than 12 inches square.

1. Sets consist of at least three (3) Samples, exhibiting extremes of the full range of color and other visual characteristics expected and will establish the standard by which stone will be judged.

D. Colored Pointing Mortar Samples for Verification: For each color required. Make Samples using same sand and mortar ingredients to be used on Project.

E. Sealant Samples for Verification: For each type and color of joint sealant required.



## 1.5 INFORMATIONAL SUBMITTALS

- A. Material Test Reports:
  - 1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous five years.
  - 2. For metal components, by a qualified testing agency, indicating chemical and physical properties of metal.
  - 3. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer complying with requirements in Section 07 92 00 "Joint Sealants" and indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.
- B. Source quality-control reports.
- C. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.
- D. Submit delegated design calculations for stone anchors and/or reinforcement anchorage to masonry prepared by a Professional Engineer in the State in which the project is located.

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate stone cladding assemblies similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: A firm or individual experienced in installing stone cladding assemblies similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.
- C. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Build mockups of typical exterior wall area not less than 72 inches long by 48 inches high. Mock-up may become part of the finished Work.
    - a. Include typical components, attachments to building structure, and methods of installation.
    - b. Include sealant-filled joint complying with requirements in Section 07 92 00 "Joint Sealants."
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Field Testing of Sealants: Before installing joint sealants, field test their adhesion to joint substrates according to Section 07 92 00 "Joint Sealants."

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
  - 1. Move stone, if required, using dollies with cushioned wood supports.
  - 2. Store stone on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

## 1.9 FIELD CONDITIONS

- A. Protect stone cladding during erection by doing the following:
  - 1. Cover tops of stone cladding installation with nonstaining, waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches down both sides and hold securely in place.
  - 2. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials without damaging stone.
  - 3. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
  - 4. Protect sills, ledges, and projections from mortar and sealant droppings.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace stone cladding damaged by frost or freezing conditions. Comply with cold-weather construction and protection requirements for masonry contained in TMS 602/ACI 530.1/ASCE 6.
- C. Hot-Weather Requirements: Comply with hot-weather construction and protection requirements for masonry contained in TMS 602/ACI 530.1/ASCE 6.

## 1.10 COORDINATION

- A. Coordinate installation of inserts that are to be embedded in concrete or masonry, flashing reglets, and similar items to be used by stone cladding Installer for anchoring, supporting, and flashing of stone cladding assembly. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for installation.
- B. Time delivery and installation of stone cladding to avoid extended on-site storage and to coordinate with work adjacent to stone cladding.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General: Design reinforcing according to ASTM C1242.
- B. Structural Performance: Stone cladding assembly shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Wind Loads: As indicated on Drawings.

- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Safety Factors for Stone: Design stone cladding assembly to withstand loads indicated without exceeding stone's allowable working stress determined by dividing stone's average ultimate strength, as established by testing, by the following safety factors:
  - 1. Safety Factor for Dolomitic Limestone: 6.
  - 2. Safety Factor for Concentrated Stresses: 10.
- E. Delegated Design: Professional Engineer shall design stone anchors to withstand loads indicated without exceeding allowable working stresses established by the following:
  - 1. For Postinstalled Fasteners in Masonry (if required): One-sixth of tested capacity when installed in masonry units indicated.
  - 2. Stone anchors shall be as specified in Section 04 05 23 Masonry Accessories.
- F. Corrosion and Staining Control: Prevent galvanic and other forms of corrosion as well as staining by isolating metals and other materials from direct contact with incompatible materials. Materials do not stain exposed surfaces of stone and joint materials.

## 2.2 LIMESTONE EXTERIOR STONE CLADDING

- A. Material:
  - 1. "Adair Limestone" by Arriscraft Stone Products, Fort Valley, PA
  - 2. "Birmingham Buff - Vein Cut" by Halquist Stone, Sussex, WI
  - 3. "Bottom Ledge Cottonwood" by U.S. Stone Industries, Manhattan, KS
- B. Color: demonstrated by each stone quarry and stone as specified.
- C. Material Standard: Comply with ASTM C568.
  - 1. Classification: III, High-Density.
- ~~D.~~ ~~Description: Dolomitic limestone~~
- ~~E.~~D. Cut: Vein.
  - 1. Orientation of Veining: Horizontal.
- ~~F.~~E. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
- ~~G.~~F. Finish: Smooth finish.
- ~~H.~~G. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
- ~~I.~~H. Thickness: Not less than 4 inches nominal unless otherwise indicated.
- ~~J.~~I. Size: (nominal) 4" thick by 12" high by 24" long.
- ~~K.~~J. Dolomitic Limestone: to ASTM C568, Category III – High-Density; special shapes as may indicated; having the following typical average properties when tested to the identified standard:
  - 1. Compressive Strength: 22,900 psi, to ASTM C170.

2. Absorption: 0.75 percent, to ASTM C97.
3. Density: 167 lb/ft<sup>3</sup>, to ASTM C97.
4. Modulus of Rupture: 2,250 psi, to ASTM C99.
5. Flexural Strength: 1,600 psi, to ASTM C880.
6. Abrasion Resistance: 18.0, to ASTM C241.

## 2.3 ANCHORS AND FASTENERS

- A. Fabricate anchors[ from stainless steel, ASTM A240/A240M or ASTM A666, Type 304; temper as required to support loads imposed without exceeding allowable design stresses. Fabricate dowels and pins for anchors from stainless steel, ASTM A276, Type 304.
- B. Fabricate shelf angles for ~~limestone~~ **exterior stone cladding** from hot-dip galvanized steel, ASTM A36/A36M for materials and ASTM A123/A123M for galvanizing. Refer to Structural.
- C. Fabricate anchors, including shelf angles, from extruded aluminum, ASTM B221, alloy and temper as required to support loads imposed without exceeding allowable design stresses, but not less than strength and durability properties of Alloy 6063-T6.

## 2.4 MORTAR MATERIALS

- A. Refer to Section 04 05 13 Mortar.

## 2.5 STONE ACCESSORIES

- A. Setting Shims: Strips of , nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
- B. Setting Buttons: Resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of pointing materials.
- C. Refer to Section 04 05 23 for additional accessories.

## 2.6 MORTAR MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
  1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
  2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.
- B. Pointing Mortar: Comply with ASTM C270, Proportion Specification, . Provide pointing mortar mixed to match Architect's sample and complying with the following:
  1. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
  2. Point limestone with mortar.

2.7 CEMENTITIOUS DAMPPROOFING

- A. Cementitious Dampproofing to coat concealed sides of all ~~limestone exterior stone cladding~~:
1. "MasterSeal 581" by Master Builders Solutions Construction Systems US, LLC, Shakopee, MN
  2. "Tamoseal" by Euclid Chemical Company, Cleveland, OH

2.8 FABRICATION

- A. General: Fabricate as shown and as detailed on final shop drawings and in compliance with recommendations of applicable stone association. Provide holes and sinkages cut or drilled for anchors, fasteners, supports, and lifting devices as shown and as necessary to secure stonework in place. Cut and back-check as required for proper fit and clearance. Shape beds to fit supports.
- B. Cut accurately to shape and dimensions shown on final shop drawings maintaining fabrication tolerances.
1. Dress joints (bed and vertical) straight and at 90 degree angle to face, unless otherwise indicated.
  2. Joint Width: Cut to provide joint widths as indicated or, if not indicated, cut to allow for uniform 1/4 inch wide joints.
- C. Thickness: Provide stone of thickness indicated. Saw-cut back surfaces which will be concealed in finished work.
- D. Fabricate molded work to profiles indicated, with arrises sharp and true and matched at joints between units.
1. Shape panels having larger dimensions at top or bottom may be fabricated from multiple pieces, subject to Architect's approval of joints details and joining methods.
  2. Where stonework is indicated in curved walls, face of finished pieces shall conform to radius of wall.
  3. Width of panels shall be minimum of 4 feet, except where corners or end pieces require smaller sizes.

2.9 MORTAR

- A. Mortar shall conform to ASTM C270, latest edition, Type N, using gray white Portland Cement of as selected by the Architect. Mortar color additive shall be mineral oxide pigment in color as selected by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive stone cladding and conditions under which stone cladding will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone cladding.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone cladding.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF STONE CLADDING, GENERAL

- A. Before setting stone, clean surfaces that are dirty or stained by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.
- B. Coat ~~limestone~~ exterior stone cladding with dampproofing to extent indicated below:
1. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches above finish-grade elevations.
  2. Apply dampproofing to five (5) sides of each piece.
  3. Allow dampproofing to cure before setting dampproofed stone. Do not damage or remove dampproofing while handling and setting stone.
- C. Execute stone cladding installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting as stone is set.
1. Use power saws with diamond blades to cut stone. Produce lines cut straight and true, with edges eased slightly to prevent snipping.
- D. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone cladding in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with uniform joints of widths indicated, and with edges and faces aligned according to established relationships and indicated tolerances.
- E. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
1. Sealing expansion and other joints is specified in Section 07 92 00 "Joint Sealants."
  2. Keep expansion joints free of mortar and other rigid materials.
- F. Install concealed flashing at continuous shelf angles, lintels, ledges, and similar obstructions to downward flow of water, to divert water to building exterior. Extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
- G. Keep cavities open where unfilled space is indicated between back of stone units and backup wall; do not fill cavities with mortar or grout.
1. Place weep vents in joints where moisture may accumulate, including at base of cavity walls and above shelf angles and flashing. Locate weep vents at intervals not exceeding 24 inches.
- H. Cementitious Dampproofing: Back-paint the following areas of the stone wall units with non-staining, cement-base masonry dampproofing compound following manufacturer's coverage and thickness recommendations. Wherever possible, apply compound to back of stone units and joints after setting. Areas requiring cementitious coating are as follows:
1. One foot up the back face of units set 24" near of and at grade, set on masonry or concrete, and at levels where weep holes occur. Install on all 4 edges and backs (5 sides) of limestone in these areas. Apply to all four (4) sides of weep spaces.
  2. Spray application is required.
  3. Apply in two (2) coats as recommended by the manufacturer.
  4. Joints; Butter vertical joints for full width before setting, and set units in full bed of mortar, unless otherwise indicated.
  - 4.5. ~~Apply cementitious dampproofing to the first course of exterior stone cladding.~~
- A. Exterior joints shall be concave tooled.

### 3.3 INSTALLATION OF MECHANICALLY ANCHORED STONE CLADDING

- A. Attach anchors securely to stone and to backup surfaces. Comply with recommendations in ASTM C1242.

### 3.4 INSTALLATION OF STONE CLADDING WITH MORTAR

- A. Set stone cladding with mortar and mechanical anchors unless otherwise indicated.
- B. Set stone in full bed of mortar with head joints filled unless otherwise indicated.
  - 1. Use setting buttons of adequate size, in sufficient quantity, and of thickness required to maintain uniform joint width and to prevent mortar from extruding. Hold buttons back from face of stone a distance at least equal to width of joint, but not less than depth of pointing materials.
  - 2. Do not set heavy units or projecting courses until mortar in courses below has hardened enough to resist being squeezed out of joint.
  - 3. Support and brace projecting stones until wall above is in place and mortar has set.
  - 4. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
- C. Rake out joints for pointing with mortar to depths of not less than 1/2 inch. Rake joints to uniform depths with square bottoms and clean sides.
- D. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply first layer of pointing mortar in layers not more than 3/8 inch until a uniform depth is formed.
- E. Point stone joints by placing pointing mortar in layers not more than 3/8 inch. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
- F. Tool joints with a round jointer having a diameter 1/8 inch larger than width of joint, when pointing mortar is thumbprint hard.
- G. Rake out mortar from sealant-pointed joints to depths required for sealant and sealant backing, but not less than 1/2 inch. Rake joints to uniform depths with square bottoms and clean sides.

### 3.5 INSTALLATION OF JOINT-SEALANTS

- A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Section 07 92 00 "Joint Sealants."

### 3.6 INSTALLATION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch in 40 feet or more. For external corners, corners and jambs within 20 feet of an entrance, expansion joints, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch in 40 feet or more.
- B. Variation from Level: For lintels, sills, water tables, parapets, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
- C. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed 1/4 inch in 20 feet or 1/2 inch in 40 feet or more.

- D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 1/4 inch.
- E. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/8 inch or a quarter of nominal joint width, whichever is less. For joints within 60 inches of each other, do not vary more than 1/8 inch or a quarter of nominal joint width, whichever is less from one to the other.
- F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/16-inch difference between planes of adjacent units.

### 3.7 ADJUSTING AND CLEANING

- A. Remove and replace broken, chipped, stained, or otherwise damaged stone, defective joints, and stone cladding that does not match approved samples[ **and mockups**]. Damaged stone may be repaired if Architect approves methods and results.
- B. Replace damaged or defective work in a manner that results in stone cladding's matching approved samples[ **and mockups**], complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone cladding as work progresses. Remove mortar fins and smears before tooling joints. Remove excess sealant and smears as sealant is installed.
- D. Final Cleaning: Clean stone cladding no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone.

END OF SECTION



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