

Stone Specification

Cover Sheet

Notice 08-04

Project Name: Folsom Stadium – Removable Fencing & Monuments

Project No. PR 003428

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SECTION 04860 - STONE MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Stone masonry veneer on concrete retaining walls.
2. Stone masonry veneer anchored to concrete back-up.
3. Stone masonry veneer anchored to cold-formed metal framing and sheathing.
4. Anchors and joint reinforcement.
5. Weep holes.
6. Through-wall flashing.

B. Related Sections:

1. Division 1 Section: "Alternates" for alternates related to Limestone Work.
2. Division 1 Section: "Sustainable Requirements" for additional sustainable green building requirements
3. Division 1 Section: "Construction Waste Management and Recycling." for additional waste and recycling requirements.
4. Division 1 Section - "Quality Control" for testing.
5. Division 3 Section - "Grout."
6. Division 4 Section - "Unit Masonry Assemblies."
7. Division 7 Section - "Sheet Metal Flashing and Trim."
8. Division 7 Section - "Joint Sealants."

1.2 SYSTEM DESCRIPTION

A. Material Acquisition:

1. Exterior walls on the main campus will generally be of native stone.
2. Stone may be procured from independent quarries.
3. Final trimming and splitting is done on the site.

1.3 SUBMITTALS

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

1. For stone varieties proposed for use on Project, include data on physical properties required by referenced ASTM standards.
2. Submit manufacturer's product data for each type of masonry accessory required.

B. Stone Samples for Verification: Sets for each color, grade, finish, and variety of stone required. Include 2 or more Samples in each set showing the full range of variations expected in these characteristics.

C. Qualification Data: For firms and persons specified in the "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.

D. LEED Submittals:

1. **Local/Regional Materials:** Provide a statement from the manufacturer stating that materials provided were manufactured within a 500 mile radius of the project. Include location of the manufacturing facility including name, address and distance between manufacturing facility and the project site. Provide manufacturer's documentation indicating location where the base materials were extracted, mined, harvested, etc. and distance between manufacturing facility and the project site (Applies to LEED MRc5.1 and MRc5.2: Regional Materials).
 - a. Include material costs (excluding cost of installation).
2. **Recycled Content:** Provide a statement from the manufacturer including the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial (Applies to LEED MRc4.1 and MRc4.2: Recycled Content).

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer for all stone masonry work may be pre-qualified prior to bidding on the project. Refer to bidding information for pre-qualification requirements.
2. Engage an Installer experienced in the type of stonework required having not less than 5 years successful experience on projects of similar size and scope.

B. Fabricator Qualifications: Engage a firm which has successfully fabricated stone similar to the quality specified for a period of not less than 5 years and which is equipped to provide the quantity shown without delaying the work.

C. Source Limitations for Stone: Obtain variety of stone from multiple quarries with resources to provide materials of consistent quality in appearance and physical properties without delaying the work. Stone broker may be required to find right colors from several quarries.

D. Source Limitations for Mortar and Grout Materials: Obtain mortar ingredients of uniform quality for each cementitious component from a single manufacturer and each aggregate from one source or producer.

E. Mockups:

1. Mockups shall be in accordance with Division 1 Section: "Submittals, Shop Drawings, Product Data, and Samples."
2. Mockups shall require the approval of the Architect and Owner prior to acceptance and the commencement of the Work (unless otherwise indicated in Division 1 Section: "Submittals, Shop Drawings, Product Data, and Samples.").

F. Standards:

1. Obtain each type of stone from one quarry with consistent color range and texture throughout the work.

2. Provide limestone which complies with the recommendations of the Indiana Limestone Institute (ILI).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in undamaged condition.
- B. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, or other causes.
- C. Store cementitious materials off the ground, under cover, and in a dry location.
- D. Store aggregates, covered and in a dry location, 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.

1.6 PROJECT CONDITIONS

- A. Protection of Stone Masonry Veneer: During erection, cover tops of walls, projections, and sills with waterproof sheeting at the end of each day's work. Cover partially completed stone masonry veneer when construction is not in progress.
- B. Stain Prevention: Immediately remove grout, mortar, and soil to prevent them from staining the face of stone masonry veneer.
 1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the 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.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed stone masonry veneer.
- C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace stone masonry veneer damaged by frost or freezing conditions. Comply with the following requirements:
 1. Cold-Weather Construction: When ambient temperature is within limits indicated, use the following procedures:
 - a. 40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C).
 - b. 32 to 25 deg F (0 to minus 4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry.
 - c. 25 to 20 deg F (minus 4 to minus 7 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry. Use heat on both sides of walls under construction.

- d. 20 deg F (minus 7 deg C) and below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar above freezing until used in masonry. Heat stone to 40 deg F (4 deg C). Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F (0 deg C) within enclosures.
2. Cold-Weather Protection: When mean daily temperature is within limits indicated, provide the following protection:
 - a. 40 to 25 deg F (4 to minus 4 deg C): Cover masonry with weather-resistant membrane for 48 hours after construction.
 - b. 25 to 20 deg F (minus 4 to minus 7 deg C): Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Use windbreaks when wind velocity exceeds 15 mi./h (25 km/h).
 - c. 20 deg F (minus 7 deg C) and below: Provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within enclosure for 48 hours after construction.
 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until stone masonry veneer has dried out, but not less than 7 days after completing cleaning.
- D. Hot-Weather Requirements: Protect stone masonry-veneer work when temperature and humidity conditions produce excessive evaporation of water from mortar. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.

PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

A. LEED Requirements:

1. Recycled Content: Provide indication that materials/products contain the maximum amount of recycled content permitted in order for material or product to retain its integrity.
2. Local/Regional Materials: Preference shall be given to products and materials which have been manufactured, harvested, extracted mined quarried, etc. within a 500 mile radius of the project site.

2.2 SANDSTONE (NATIVE STONE)

A. Lyons Sandstone; Tuscan Vernacular Sandstone conforming to ASTM C616, Class II, quartzitic sandstone (Basis-of-Design):

1. Cut stone 4-inches wide strips (tolerance of plus 1-1/2 inches to minus ¼-inch) to allow for 3/4-inch to 1 average face projection.
2. Length: Minimum of three times the height, maximum of 7 feet.

3. Colors: The following colors shall require the approval of the University Facilities Planning Department and the Campus Architect:

Stone Color	Trade Names	Percent in Mix	Max. Height	Min. Height
Red	Lyons Red	40%	8 inch	1 inch
Red Natural	Lyons Red Natural	10%	8 inch	1 inch
Buff	Loveland Buff Masonville Buff	0%		
Buff Natural	Loveland Buff Masonville Buff	10%	4 inch	1 inch
Pink	Berthoud Pink Lykins Sunset	10%	8 inch	2 inch
Pink Natural	Berthoud Pink Lykins Sunset	10%	8 inch	2 inch
Variegated	Sunset Peach Bacon Strip Candy Stripe	10%	8 inch	1 inch
Variegated Natural	Sunset Peach Bacon Strip Candy Strip	10%	8 inch	1 inch

4. Staining: Black staining is not acceptable.
5. Stonework: The stonework patterning, joinery and pointing is intended to mimic the existing Wolf Law Building (located between Baseline Road and Kittredge Loop Road, adjacent to Kittredge Field and across the street on Kittredge Loop Road from Smith Hall and the Fleming Law Building). Final selection will based on approved mock-up(s).
- B. Shiners: Sandstone conforming to ASTM C616, Class II, quartzitic, Lyons red quartzitic sandstone:
1. Color range as selected by Architect and approved by the Owner.
 2. Honed or split face finish as approved by the Owner.
 3. Minimum thickness: 2.75 inch +/- 0.25 inch, unless otherwise noted on Drawings. Thickness shall be appropriate to size.

2.3 LIMESTONE

A. Manufacturers/Suppliers:

1. Colorado Stone Co., Longmont, Colorado.
2. Harding and Cogswell Corp., Bedford, Indiana.
3. 3D Stone Co., Bloomington, Indiana.

B. Materials:

1. Indiana Oolitic Limestone complying with ASTM C568, Category II (medium density).
 - a. Minimum compressive strength: 4000 psi per ASTM C170.
 - b. Maximum Absorption: 7.5% per ASTM C97.
 - c. Cathedral Rizzo Stone, Sugarcube light texture mixed buff and gray (40% maximum) by Harding and Cogswell Corp.
3. Provide samples to Architect for selection and approval.
4. Accessories:
 - a. Provide all miscellaneous iron, angles, anchors, fastenings, bolts, shims, setting pads, etc. required to support and attach the stone to the structural system and substrate.
 - b. All miscellaneous iron, angles, channels, etc. shall be hot-dipped galvanized.
 - c. All toe bars and anchors entering the stone shall be stainless steel Type 302 or 304
4. Weep holes shall be placed in joints where moisture may accumulate such as base of flashings, etc.

2.4 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color, white, or a blend to produce mortar color indicated.

1. Low-Alkali Cement: Portland cement shall contain not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S below grade, Type N above grade.

C. Aggregate: ASTM C 144 and as indicated below:

1. For joints narrower than 1/4 inch (6 mm), use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
2. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
3. White-Mortar Aggregates: Natural, white sand or ground, white stone.

D. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.

E. Water: Potable.

2.5 STONE MASONRY-VENEER ANCHORS

A. Manufacturers:

1. Dur-O-Wal, Inc.
2. AA Wire Products Co.
3. Heckmann Building Products, Inc.
4. Hohmann and Barnard, Inc.
5. Masonry Enforcing Corporation of America.
6. approved substitute in accordance with Section 01600.

B. Horizontal Reinforcement:

1. General for Concrete Masonry Units (CMU): Welded wire units of ASTM A82 cold-drawn steel wire, No. 9 gage, deformed continuous side rods and No. 9 gage plain cross rods. Width shall be approximately 2 inches less than width of wall or partition. Provide pre-fabricated corners, tees, and straight lengths not less than 10'-0" long. Furnish with galvanized finish, ASTM A641, Class 1 for interior walls and A153, Class B-2 for exterior walls.
2. Stone Veneer on Concrete Masonry Units (CMU) Back-Up: Same as above for CMU except adjustable veneer anchors on vertical rod shall be used. System must be capable of holding insulation (as required) tight against inside wythe.
 - a. Provide Tie-HVR by Hohmann and Barnard, Inc. or approved substitute listed manufacturer.

C. Stone Veneer Anchors on Metal Stud Back-Up: Adjustable triangular wire ties through sheathing to metal studs. Provide hot-dipped galvanized finish.

D. Stone Veneer Anchors on Concrete Back-Up: Dovetail anchor slots, 20 gage, with adjustable triangular wire ties. Provide hot-dipped galvanized finish.

E. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 series stainless-steel shank, complying with ASTM C 954, except manufactured with hex washer head and neoprene washer; No. 10 (4.8-mm) diameter by length required to penetrate steel stud flange by not less than 3 exposed threads.

2.6 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Hard or virgin polyvinyl chloride with plasticizers and other modifiers formed into flexible sheets not less than 20-mils thick.

1. Color: Black.

B. Sheet Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:

1. Stainless Steel Flashing: AISI Type 302 or 304, 2D finish, fully annealed or dead-soft temper, 0.12 inch thick.
 2. Fabricate through-wall metal flashing embedded in masonry as follows:
 - a. With ribs formed in sawtooth pattern at 3-inch (75-mm) intervals along length of flashing to provide a 3-way integral mortar bond and weep-hole drainage.
 3. Fabricate metal expansion-joint strips from sheet metal indicated above, formed to shape indicated.
 3. Application: Use where flashing is fully or partly concealed in masonry wall.
- B. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."
- C. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Type 2, Class A, Grade 1; compressible up to 35 percent; of width and thickness indicated; formulated from the following material:
1. Neoprene or urethane.
- B. Weep Holes:
1. Provide one of the following:
 - a. Dur-O-Wal, Inc; No, D/A 1006 polypropylene cell vent in color as selected by Architect.
 - b. ¼ inch round medium density polyethylene plastic tube weep holes.
 - c. Linch round Class 160 PVC (at landscape walls only).

2.8 MASONRY CLEANERS

- A. Masonry Cleaner Solution: Proprietary blend of detergent-acidic cleaner for masonry surfaces.
- B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Sure Klean® 600 Detergent; ProSoCo, Inc.

2.9 STONE FABRICATION

- A. General: Fabricate stone in sizes and shapes required to comply with requirements indicated, including details on Drawings.
- B. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs. Clean sawn backs of stone to remove rust stains and iron particles.

- C. Dress joints (bed and vertical) straight and at right angle to face, unless otherwise indicated.
- D. Shape stone for type of masonry (pattern) indicated.
- E. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.
- F. Carefully inspect stone units at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.

2.10 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. Mixing: 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. Mortar for Stone Masonry Veneer: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
 - 1. Limit cementitious materials in mortar to portland cement and lime.
 - 2. Set stone with Type S mortar below grade, Type N above grade.

PART 3 -- EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT AND RECYCLING

- A. All project construction waste and recycled materials shall be managed in accordance with Division 1 Section 01690 – "Construction Waste Management and Recycling." The Contractor shall submit documentation satisfying the requirements of that section.

3.2 EXAMINATION

- A. Examine surfaces to receive stone masonry veneer, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry veneer.
 - 1. Examine wall framing, sheathing, and asphalt-saturated felt covering to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.
 - 2. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Advise installers of other work about specific requirements for placement of reinforcement, anchors, ties, flashing, and similar items to be built into stone masonry veneer.
- B. Accurately mark stud centerlines on face of asphalt-saturated felt before beginning stone installation.
- C. Protect stone masonry veneer during erection as follows:
 - 1. Cover tops of walls 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 (600 mm) 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 the ground and over the wall surface.
 - 4. Protect sills, ledges, and projections from mortar droppings.
- D. Clean stone surfaces that have become dirty or stained by removing soil, stains, and foreign materials before setting. 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.

3.4 SETTING STONE MASONRY VENEER, GENERAL

- A. Execute stone masonry veneer by skilled masons experienced with the kind and form of stone and installation method indicated.

1. Employ skilled stone fitters at the Project site to do necessary field cutting as stone is set. Produce lines cut straight and true, with edges eased slightly to prevent snipping.
- B. Set stone to comply with requirements indicated on Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone masonry veneer in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- C. In accordance with University of Colorado, Boulder Standards, install stone masonry as follows:
1. Lay native face stone work from outside face of walls.
 2. Lay stones on natural flat beds in horizontal courses.
 3. Shape stone to fit each other approximately. Knock off weak portions to bring stones to even bearing.
 4. The general pattern for sandstone veneer is to be 2 against 1, a few 3 against 1, and some 2 against 2. No 3 against 3 will be permitted. No continuous horizontal joints to exceed 7' in length (unless specifically requested: coordinate/relief angles) nor vertical joints to exceed 12-inches in height. 20% of vertical joints may be angled.
 5. Clip 60% of sandstone units on both ends for an average projection of 3/4-inch to 1inch from face of wall. Cut stone at building corners to a straight vertical line from top to bottom of wall.
 6. Grout the full void between stone and backup with slush mortar as stone is laid.
 7. Joints: 1/2-inch to 3/4-inch wide. Provide both vertical and beveled head joints. Work all joints so that joints are in the same plane.
 8. Provide 4-inches minimum overlap in coursing.
 9. Completed stone work shall match accepted mock-up panel. Do not use stone units with chips, voids, stains or other defects which might be visible in the finished work.
 10. Maintain pattern consistency throughout building.

3.5 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (10 mm in 6 m), or 1/2 inch in 40 feet (12 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (12 mm in 12 m) or more.
- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (12 mm in 12 m) or more.
- C. Variation of Linear Building Line: For position shown in plan and related portion of walls, and partitions, do not exceed 1/2 inch in 20 feet (12 mm in 6 m) or 3/4 inch in 40 feet (19 mm in 12 m) or more.
- D. Measure variation from plumb, level, and position shown in plan as the variation of the average plane of the face of each stone from a plumb, level, or dimensioned plane.
- E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

3.6 INSTALLING ANCHORED STONE MASONRY VENEER

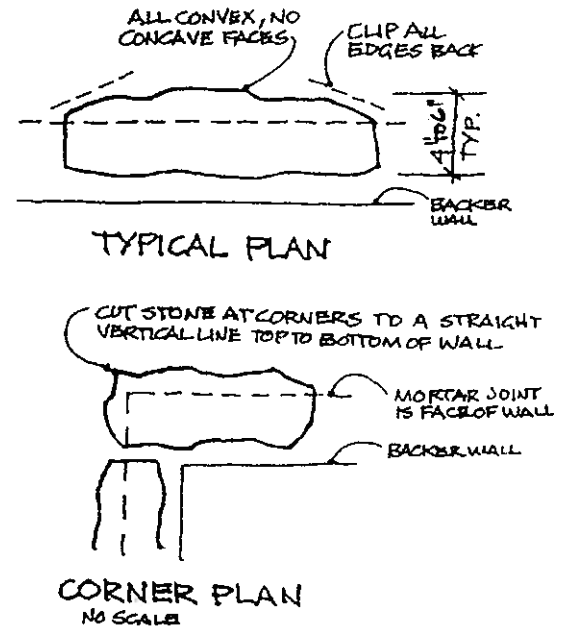
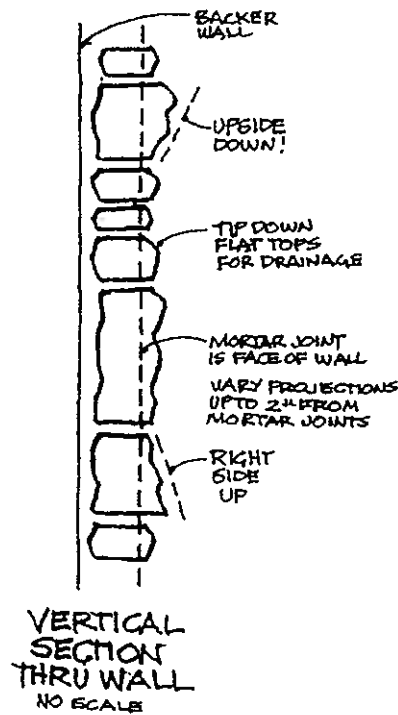
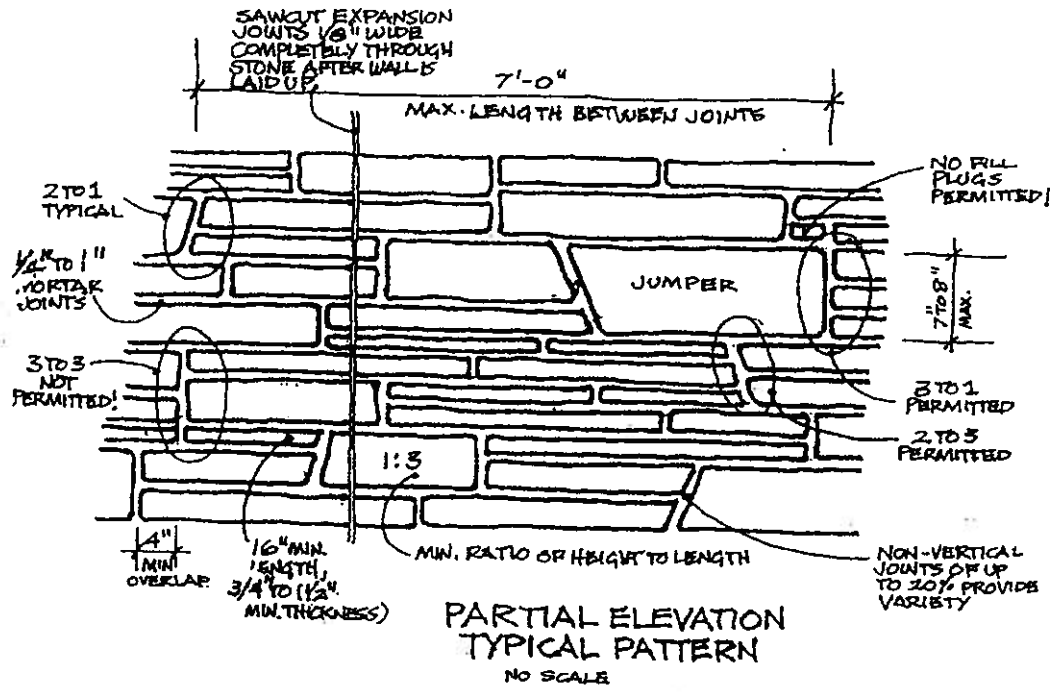
- A. Anchor masonry veneer to framing with adjustable masonry-veneer anchors to comply with the following requirements:
 - 1. Embed tie section in mortar joints to within 1-1/2 inches (38 mm) of face.
 - 2. Space anchors as indicated, but not more than 18 inches (457 mm) o.c. vertically and 24 inches (600 mm) o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals around perimeter not exceeding 12 inches (305 mm).
 - 3. Fill cavity space between back of stone masonry and weather-resistant paper or unit masonry with mortar as stone is set throughout the Work.

2. Install weep holes in all landscape walls in accordance with the Drawings.

3.8 ADJUSTING AND CLEANING

- A. Remove and replace stone masonry veneer of the following description:
 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if the methods and results are approved by Architect.
 2. Defective joints.
 3. Stone masonry veneer and joints not matching approved samples and mockups.
 4. Stone masonry veneer not complying with other requirements indicated.
- B. Replace in a manner that results in stone masonry veneer's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone masonry veneer as work progresses. Remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry veneer as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and nonmasonry 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 before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 5. Clean stone in accordance with manufacturer's product data instructions.
- E. Protection: Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure stone masonry veneer is without damage and deterioration at the time of Substantial Completion.

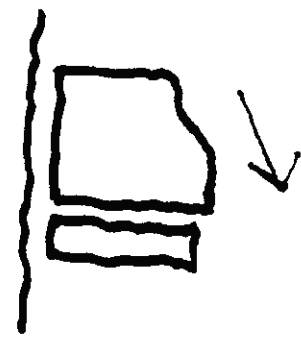
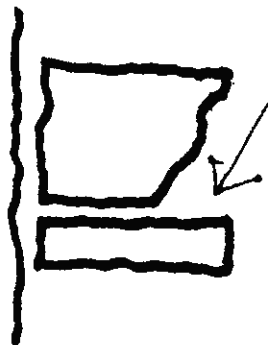
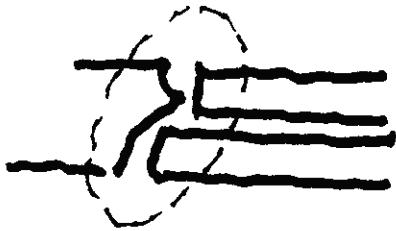
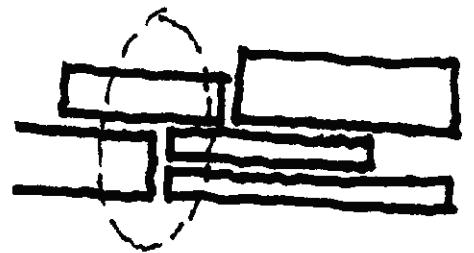
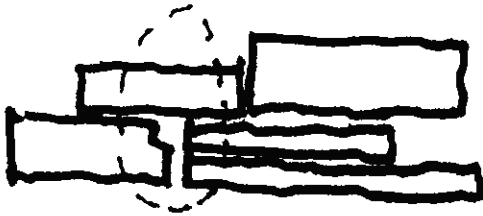
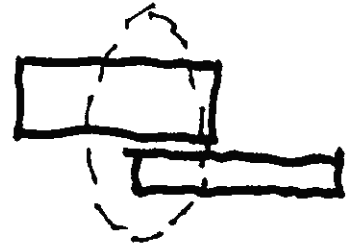
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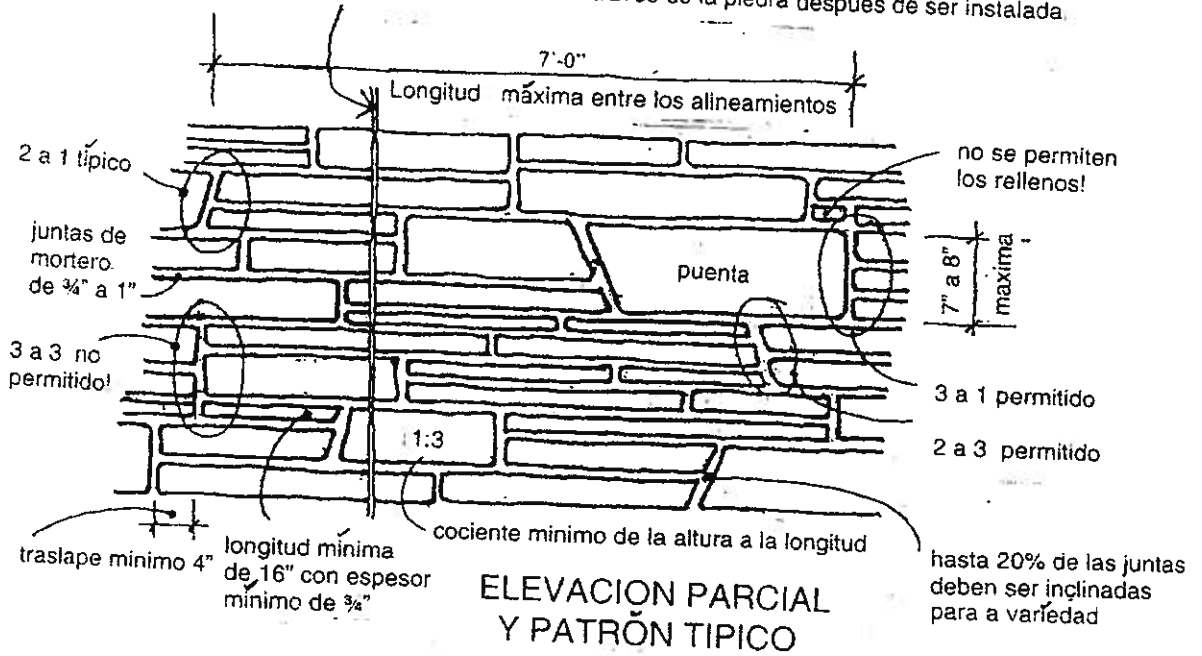
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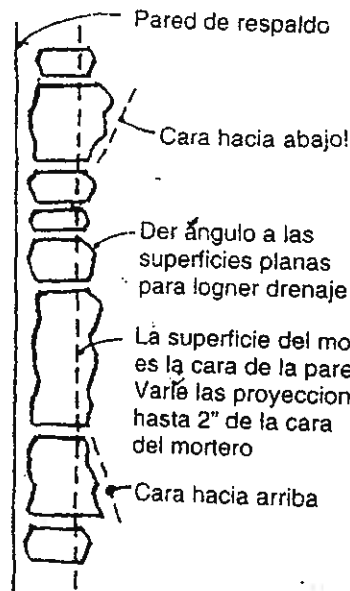
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Las juntas de expansión cortadas con sierra de 1/8" de espesor se cortan completamente a través de la piedra después de ser instalada.

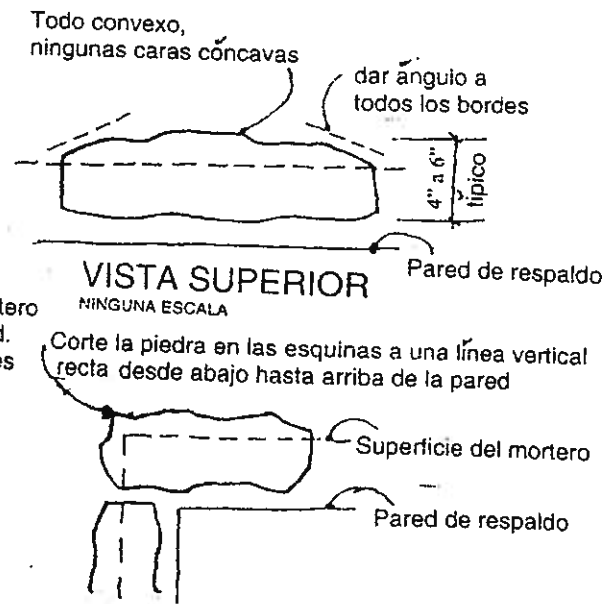


NINGUNA-ESCALA



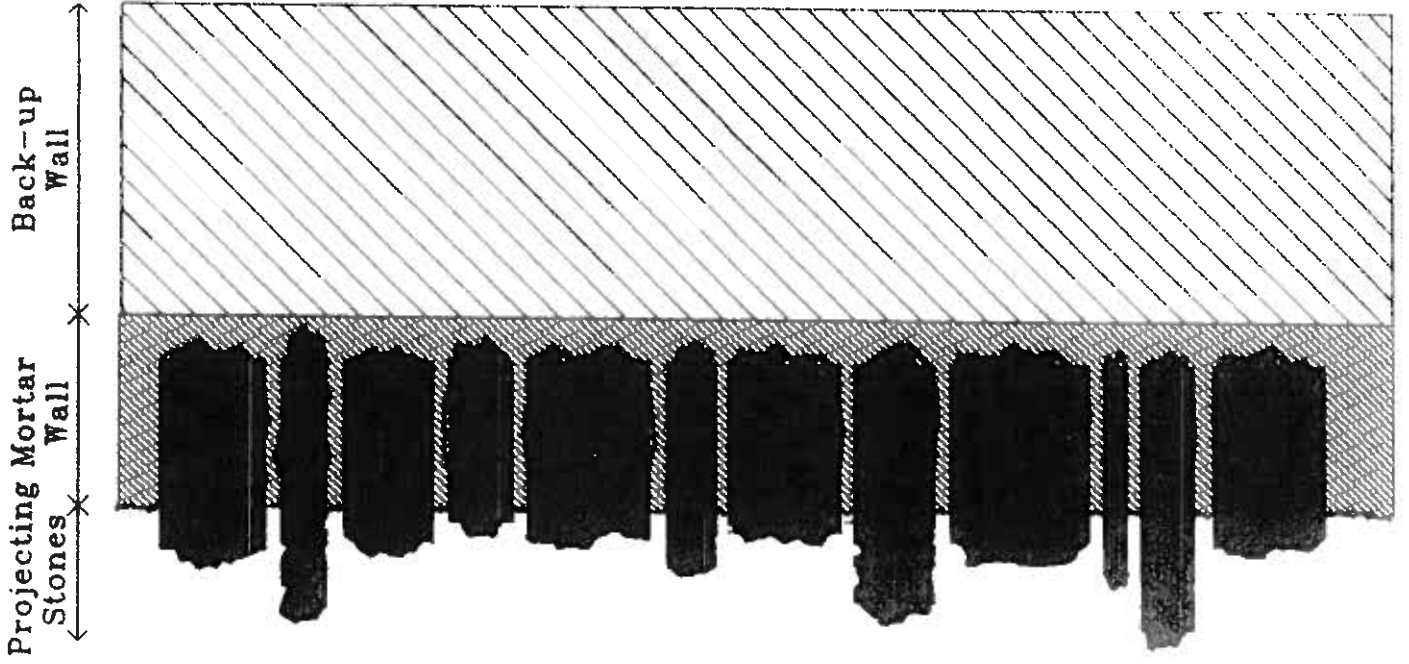
VISTA LATERAL-CORTE A TRAVES DE LA PARED

NINGUNA ESCALA




VISTA SUPERIOR DE LA ESQUINA

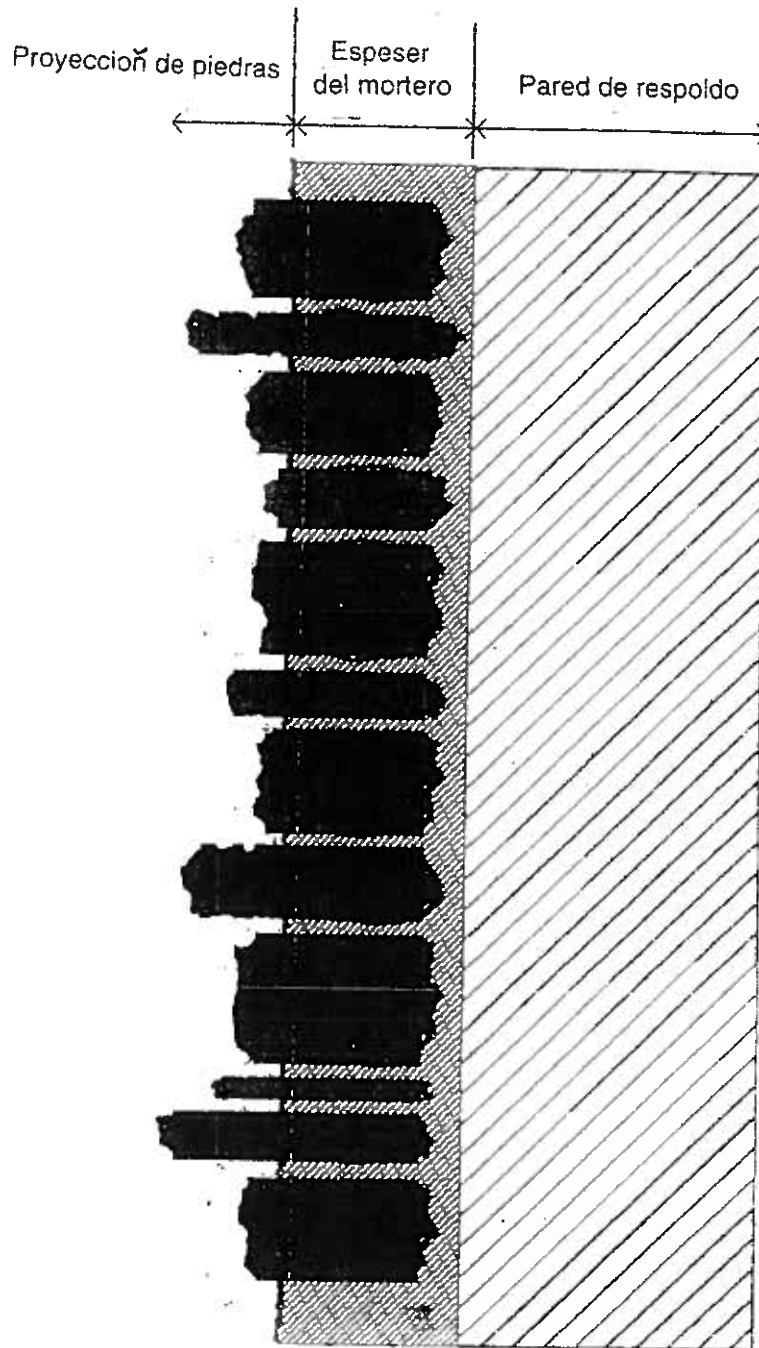
NINGUNA ESCALA



Side View Cut Through Wall

(no scale)

UCB Campus Architect 7/30/01 
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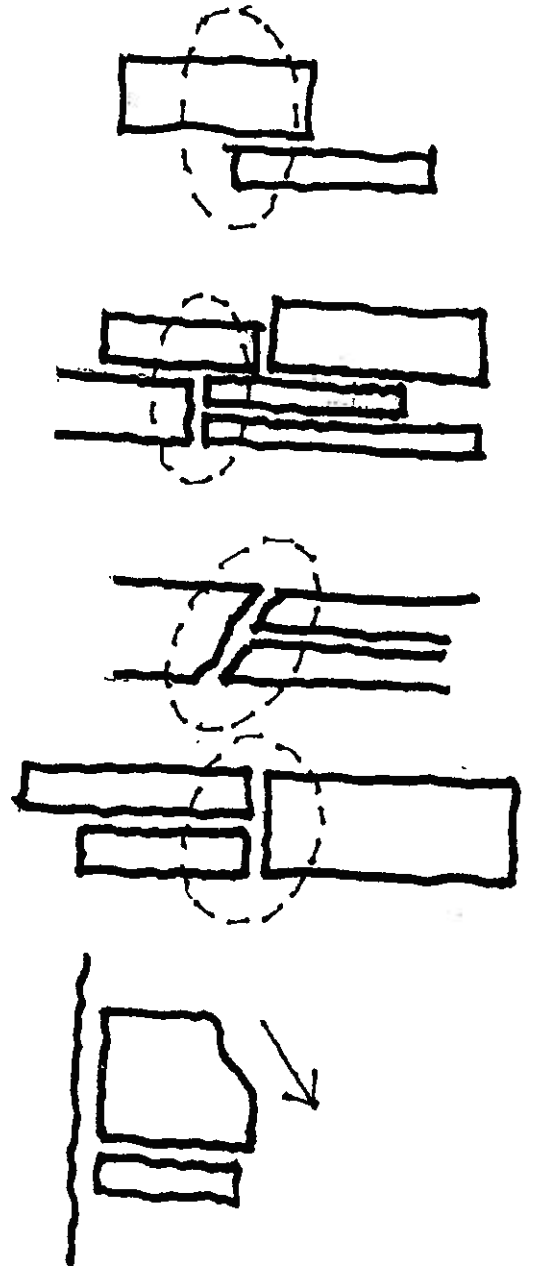
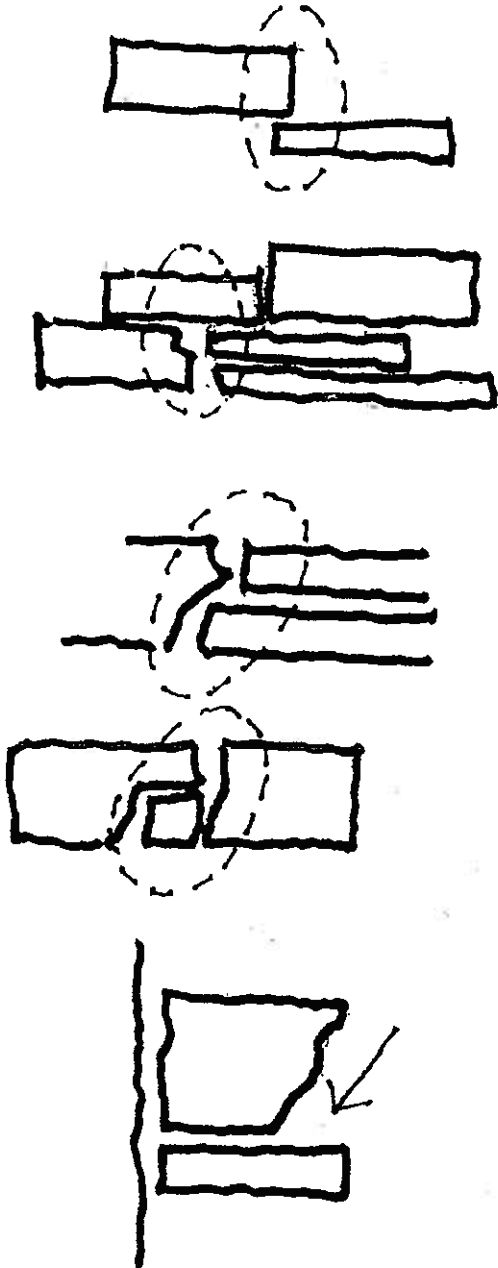


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SECTION 03600 - GROUT

PART 1 - GENERAL

1.01 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.

1.02 SCOPE

- A. Extent of grout work includes pumping applications of cementitious, non-shrink, non-metallic grout under steel column base plates, steel joists and beam bearing plates and elsewhere as indicated.
- B. Related Specification Sections include:
 - 1. Division 1 Section: "Sustainable Requirements" for additional sustainable green building requirements.
 - 2. Division 1 Section: "Construction Waste Management and Recycling" for construction waste management and recycling requirements.
 - 3. Concrete Work, 03310.
 - 4. Structural Steel, 05120.
 - 5. Metal Fabrications, 05500.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature including preparation and application instructions and recommendations, storage and handling requirements.
- B. LEED Submittals:
 - 1. Local/Regional Materials: Provide a statement from the manufacturer stating that materials provided were manufactured within a 500 mile radius of the project. Include location of the manufacturing facility including name, address and distance between manufacturing facility and the project site. Provide manufacturer's documentation indicating location where the base materials were extracted, mined, harvested, etc. and distance between manufacturing facility and the project site (Applies to LEED MRc5.1 and MRc5.2: Regional Materials).
 - a. Include material costs (excluding cost of installation).
 - 2. Recycled Content: Provide a statement from the manufacturer including the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial (Applies to LEED MRc4.1 and MRc4.2: Recycled Content).

1.04 DELIVERY, STORAGE AND HANDLING

- A. Materials must be delivered in original, unopened containers with the manufacturer's labels including product name and batch numbers.

- B. Protect material from freezing. Store above ground in a cool, dry place.

1.05 JOB CONDITIONS

- A. Environmental Conditions: Do not apply material when temperature is below 45°F or when temperature is expected to fall below 45°F within 48 hours.
- B. Protection: Precautions should be taken to avoid damage to any surface near the work zone.

PART 2 – PRODUCTS

2.01 MATERIALS, GENERAL

- A. LEED Requirements:
 - 1. Recycled Content: Provide indication that materials/products contain the maximum amount of recycled content permitted in order for material or product to retain its integrity.
 - 2. Local/Regional Materials: Preference shall be given to products and materials which have been manufactured, harvested, extracted mined quarried, etc. within a 500 mile radius of the project site.

2.02 NON-SHRINK, NON-METALLIC GROUT OR DRYPACK

- A. Acceptable Manufacturer and Products:
 - 1. Grout shall conform to ASTM C1107-02 Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).
 - 2. Performance Characteristics per ASTM C-109 Compressive Strength testing at fluid water ratio (ASTM C-939):
 - a. 1 Day – 2700 psi minimum
 - b. 3 Day – 5500 psi minimum
 - c. 7 Day – 7000 psi minimum
 - d. 28 Day – 8000 psi minimum
 - 3. Acceptable Manufacturers:
 - a. Master Builders "Masterflow 928"
 - b. L&M Chemicals "Crystex"
 - c. Euclid Chemical Company "NS Grout"
 - d. U.S. Mix Products Co. "MP Grout"
 - e. Or approved equal

PART 3 – EXECUTION

3.01 CONSTRUCTION WASTE MANAGEMENT AND RECYCLING

- A. All project construction waste and recycled materials shall be managed in accordance with Division 1 Section 01690 – "Construction Waste Management and Recycling." The Contractor shall submit documentation satisfying the requirements of that section.

3.02 INSTALLATION

- A. Remove all grease, oil, dirt, laitance, and unsound concrete. Saturate area to receive grout with water. Remove any puddles of water before placing grout. Maintain a temperature between 45°F and 90°F prior to application and during initial 24 hours.
- B. Completely fill with grout under beam and column bearings, erection blockouts, connection blockouts or pockets, and elsewhere as required. Mix, install, and cure grout according to manufacturer's recommendations.

END OF SECTION 03600

SECTION 04810 - UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Concrete unit masonry units (CMU's).
 - 2. Reinforced unit masonry.
 - 3. Fire-rated unit masonry.
 - 4. Cavity Insulation.

1.02 Related Sections:

- A. Refer to Division 1 Section – "Submittals, Shop Drawings, Product Data, and Samples" for additional requirements.
- B. Division 1 Section: "Sustainable Requirements" for additional sustainable green building requirements."
- C. Division 1 Section: "Construction Waste Management and Recycling." for additional waste and recycling requirements.
- D. Division 3 Section – "Grout."
- E. Division 4 Section - "Dimension Stone Cladding."
- F. Division 4 Section - "Stone Masonry Veneer."
- G. Division 7 Section – Water Repellants."
- H. Division 7 Section – "Joint Sealants."

1.03 SYSTEM DESCRIPTION

- A. Exterior Concrete Masonry Units: All exterior concrete masonry units shall be treated as specified in Division 7 Section – "Water Repellants."

1.04 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following installed compressive strengths (f_m) at 28 days.
 - 1. For Concrete Unit Masonry: As follows, based on minimum average net-area compressive strength per ASTM C 90 as indicated on Drawings.
 - a. $f_m = 1500$ psi (13.1 MPa).

1.05 SUBMITTALS

- A. Product data for each different masonry unit, accessory, and other manufactured product specified.
- B. Shop drawings for stone trim in the form of cutting and setting drawings showing sizes, profiles, and locations of each stone trim unit required.
- C. Samples for verification of the following:

1. Weep holes/vents in color to match mortar color.
 2. Accessories embedded in the masonry.
- D. Material test reports from a qualified independent testing agency, employed and paid by Contractor or manufacturer, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
1. Mortar complying with property requirements of ASTM C 270.
 2. Grout mixes. Include description of type and proportions of grout ingredients.
 3. Masonry units.
- E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience.
- F. LEED Submittals:
1. Local/Regional Materials: Provide a statement from the manufacturer stating that materials provided were manufactured within a 500 mile radius of the project. Include location of the manufacturing facility including name, address and distance between manufacturing facility and the project site. Provide manufacturer's documentation indicating location where the base materials were extracted, mined, harvested, etc. and distance between manufacturing facility and the project site (Applies to LEED MRc5.1 and MRc5.2: Regional Materials).
 - a. Include material costs (excluding cost of installation).
 2. Recycled Content: Provide a statement from the manufacturer including the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial (Applies to LEED MRc4.1 and MRc4.2: Recycled Content).

1.06 QUALITY ASSURANCE

- A. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- B. Preconstruction Testing: Employ and pay a qualified independent testing agency to perform the following preconstruction testing to establish compliance of proposed materials and construction with specified requirements:
1. Concrete Masonry Unit Test: For each different concrete masonry unit indicated, test units for strength, absorption, and moisture content per ASTM C 140.
 2. Submit compression tests of composite masonry unit system. Testing method and requirements should conform to building code requirements.
 3. Prism Test: For each type of wall construction indicated, test masonry prisms per ASTM E 447, Method B. Testing method and requirements should conform to building code requirements.
 4. Test mortar properties per test methods of ASTM C 270.
 5. Evaluate mortar composition and properties per ASTM C 780.
 6. Test grout compressive strength per ASTM C 1019.
- C. Certificates: If requested by the Architect, furnish manufacturer's certification and test results indicating that concrete masonry units meet specified ASTM requirements.

- D. **Single-Source Responsibility for Masonry Units:** Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.
- E. **Single-Source Responsibility for Mortar Materials:** Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- F. **Installer Qualifications:** Masonry Installer must have not less than 5 years experience in masonry and successfully completed not less than 10 projects of size and complexity similar to this one.
- G. **Fire-Resistance Ratings:** Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- H. **Mockup Sample Masonry Panels:**
 - 1. After material samples are approved, erect a mock-up wall panel for each type of masonry construction indicated for the project. Types may be combined in composite panels.
 - 2. Size: Minimum 6'-0" long by 4'-0" high; typical thickness.
 - 3. Locations: As directed by the Architect and Owner.
 - 4. Mock-up shall consist of the following:
 - a. Color, range, texture of masonry units.
 - b. Bond, color, mortar joints, tooling, control joints and special patterns.
 - c. Anchors, joint reinforcement and wall ties.
 - d. Vapor barrier, moisture barrier, flashing, sheathing, studs, weep holes and insulation.
 - e. Surrounding materials such as stone trim, precast concrete, etc.
 - f. Special component features for contiguous work such as sealant joints, corner pieces or other special shapes.
 - g. Cleaning and water repellent coating.
 - 5. Notify Architect and Owner one week in advance of the dates and times when mockups will be constructed.
 - 6. Protect accepted mockups from the elements, and construction operations, with weather-resistant membrane.
 - 7. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Acceptance of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect and Owner in writing.

- b. Acceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect and Owner in writing.
 - c. Start of masonry work will not be permitted until sample masonry panels are approved by the Architect and Owner.
 - d. Approved mock-up sample masonry panels, after cleaning, shall be used as standards of workmanship as applied to masonry work for the entire project.
 - e. Mock-ups shall not be removed until masonry work is accepted.
 - f. When directed, demolish and remove mockups from Project site.
- I. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms, 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 install until they are in an air-dried condition.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.08 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.

- D. **Cold-Weather Requirements:** Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit masonry damaged by frost or freezing conditions. Comply with the following requirements:
1. **Cold-Weather Construction:** When the ambient temperature is within the limits indicated, use the following procedures:
 - a. 40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C).
 - b. 32 to 25 deg F (0 to -4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry.
 - c. 25 to 20 deg F (-4 to -7 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F (4 deg C) if grouting. Use heat on both sides of walls under construction.
 - d. 20 deg F (-7 deg C) and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F (4 deg C). Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F (0 deg C) within the enclosures.
 2. **Cold-Weather Protection:** When the mean daily temperature is within the limits indicated, provide the following protection:
 - a. 40 to 25 deg F (4 to -4 deg C): Cover masonry with a weather-resistant membrane for 48 hours after construction.
 - b. 25 to 20 deg F (-4 to -7 deg C): Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h (25 km/h).
 - c. 20 deg F (-7 deg C) and Below: Provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for 48 hours after construction.
 3. **Cold-Weather Cleaning:** Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.
- E. **Hot-Weather Requirements:** Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and above.

PART 2 – PRODUCTS

2.01 MATERIALS, GENERAL

A. LEED Requirements:

1. Recycled Content: Provide indication that materials/products contain the maximum amount of recycled content permitted in order for material or product to retain its integrity.
2. Local/Regional Materials: Preference shall be given to products and materials which have been manufactured, harvested, extracted mined quarried, etc. within a 500 mile radius of the project site.

2.01 CONCRETE MASONRY UNITS

A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required.

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners.

B. Lightweight Concrete Masonry Units (Less than 105 lbs. per cu. Ft. oven-dry weight of concrete): ASTM C 90 and as follows:

1. Aggregate: Conform to ASTM C331 (lightweight).
2. Hollow Load-Bearing Units: ASTM C 90.
3. Solid Load-Bearing Units: ASTM C145.
4. Classification: Grade N, Type 1.
 - a. Curing: In moisture controlled atmosphere at normal pressure and temperature, or in an autoclave, to comply with requirements for Type 1 units.
5. nominal Size: 8 inch by 16 inch, thickness as indicated on the Drawings.

2.02 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
- D. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm), use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.
- E. Aggregate for Grout: ASTM C 404.

60 (GRADE 420) DEFORMED
STM A706/A706M, GRADE 60

(2)	(3)	(4)	OTHER REQUIREMENTS (4)
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E SIZE INDICATED, USE
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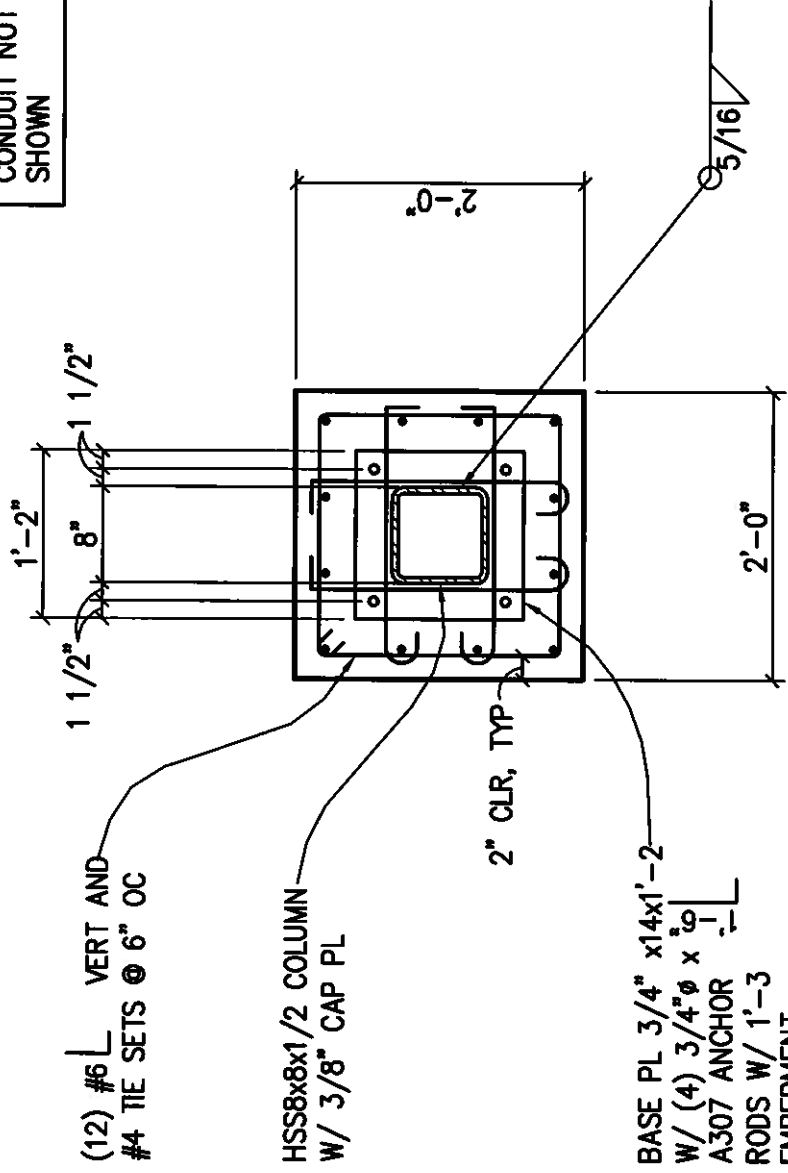
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CONCRETE PILASTER

3/4"=1'-0"