04 00 00. MASONRY

04 00 03. GENERAL PROVISIONS

.1 SPLIT COURSING: Only full coursing will be permitted at the head of any type of opening.

.2 OVERHUNG MASONRY: Construction where the masonry units are suspended using mechanical devices, or where the units extend beyond lower courses and mechanical support devices are required, are not to be used. Buildings being renovated/restored, which have such overhung structures, shall be examined for safety and a report of condition provided.

.3 USE OF INK MARKING PENS ON SURFACES of any kind of material is prohibited. Experience has shown that such marks bled through paint and other finishes.

.4 ACID FOR MASONRY CLEANING: The cleaning solution must be included in applicable sections of the Specifications. The type of solution shall be approved by the University Architect.

.5 BRICK SURFACE TREATMENT: Treating of brick surface with stain or other surface treatment or simulation to obtain a color blend is prohibited.

.6 WINDOWSILLS AND COPINGS: Rollock brick at windowsills, projected header-brick, copings and other brick shapes with exposed skyward facing mortar joints are prohibited. Windowsills of limestone or precast stone are preferred.

.7 STRUCTURAL REQUIREMENTS: Where shelf angles are used provide continuous support for masonry veneer at building corners.

.8 PENETRATING WATER REPELLENTS: Use of penetrating water repellents over exterior masonry as a primary means of preventing or reducing water infiltration to the interior is prohibited.

.9 Paint shall not be used on the face of exterior brick or stone.

.10 PARAPETS: Where masonry parapets utilizing masonry backup systems extend more than 24-inches above the roof line, leave the roof side of the parapet uncovered with the exception of copings and roof base flashings. Provide appropriate through-wall flashings on both faces of parapet.

.11 ADHERED MASONRY: Thin adhered masonry facing over stucco, cement board, or other backing material is prohibited in exterior applications.

.12 GLASS BLOCK: Use of glass blocks as exterior fenestration is prohibited.

.13 Cavity drainage material is not permitted.

.14 Locate anchors and fasteners at mortar joints. Avoid installations into the masonry.

.15 Mortar repair shall match existing mortar mix type, color, texture, and tooling.

.16 Sealants shall not be used to repair mortar joints.

.17 REQUIRED INSPECTIONS DURING CONSTRUCTION:
See Section 01 45 10.1.

04 01 20. MASONRY RESTORATION AND CLEANING

.1 EXPERIENCE CLAUSE: A 10-year experience record of the subcontractor is required. Include the following paragraph in the specifications.

CERTIFICATION OF EXPERIENCE: Work shall be performed by experienced and skilled mechanics. The General Contractor shall furnish evidence that the subcontractor for restoration work has been engaged in the business of masonry restoration for a period of at least 10 consecutive years prior to the date of these specifications. Evidence or certification of experience shall be in letter form which, in addition to statement of experience, shall contain a list of at least five projects of comparable size and complexity which have been satisfactorily completed, a statement that proper equipment is available for use, and a statement that the work will be under the direct supervision of skilled mechanics only.

.2 MASONRY CLEANING DURING RESTORATION/REHABILITATION:

.2.1 Define the objectives of any cleaning operations involving exposed masonry in the appropriate sections of the Specifications. Objectives should include preserving the durability and integrity of the masonry and mortar and should also define an appropriate level of cleaning.

Commentary: Refer to *Preservation Brief 1: Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings* by the National Park Service when evaluating masonry cleaning options, and The Ohio State University's Historic Building Survey and Preservation Management Program.

.2.2 Cleaning operations should be designed using the least aggressive means available.

.2.3 Abrasive blasting, high-pressure water blasting, and strong acid or basic

solutions are prohibited unless otherwise approved by the University Architect.

.3 MOCK-UP SAMPLES: For existing buildings provide mock-up samples of each type of masonry repair and cleaning operation. Preferred sample size is a 4-foot by 4-foot wall area. Approved mock-up may be incorporated into the Work. For new buildings and additions in the construction documents, provide details of the mock-up and show its location on the site plan. Also, describe if the mock-up is to be for constructability, or aesthetics, or materials or all the above or if the contractor can just provide samples of materials. Scope of all Mock-ups to be reviewed by the University Architect.

04 05 13. MORTAR

.1 MORTAR FOR LAYING MASONRY:

.1.1 Mortar may be ready mixed ~~of~~ or site mixed except for repointing mortar.

.1.2 Specify mortar by types listed in ASTM C 270, Specify Type N mortar for masonry veneer.

.1.3 Do not specify mortar, which may corrode steel reinforcement or structure.

.1.4 Air entrained lime (Type SA) is prohibited.

.1.5 Masonry cement is prohibited.

.1.6 Polymer-modified mortars are prohibited.

.2 REPOINTING MORTAR: Unless rigorous testing proves an alternate mix design to be more appropriate, repointing mortar shall be an appropriate manufactured premixed Type N mortar to ensure quality control and color consistency. All mortar shall conform to ASTM C 270 *Standard Specification for Mortar for Unit Masonry*, Type N and ASTM C1713-17 *Standard Specification for Mortars for the repair of Historic Masonry.*

Commentary: *Manufactured premixed mortars are defined as those supplied by U.S. Heritage Group, Cathedral Stone, Saint-Astier, Edison Coatings, Inc., Conproco Repoint, Henry Frerk Sons.*

.2.1 Masonry cement is prohibited.

.2.2 Site mixes are prohibited for repointing mortar.

.2.3 Natural colored mortar shall be used unless otherwise directed for new building or matching historic mortar color.

.2.4 Pointing mortar for clay facing tile masonry shall be made with white silica sand and white Portland cement. See 04 21 00

.2.5 See 04 21 13.3 when mortar matching is required.

.2.6 Non-staining mortar shall be used for stonework. See 04 40 20.1.3.

.2.7 Historic mass masonry walls use an appropriate manufactures premixed hydrated lime based historic Type N or O pointing mortar. See 04 05 13.2 Commentary.

.2.8 Mortar mixes shall not be at any time stronger in compressive strength than the masonry they are being used for.

.2.9 Sealant or caulk type materials shall not be used in mortar joints unless specifically called for as an expansion joint or in other specific circumstance.

.2.10 Repointing mortars shall match existing mortars and aggregates as closely as possible through the process of mortar analysis.

.2.11 Tool joints to precisely match all existing historic joint profiles.

.2.12 Keep joints damp for 72--hours as a minimum after repointing using hydrated lime mortar.

.2.13 MORTAR JOINT THICKNESS: Exposed mortar joints shall be 3/8-ich nominal unless otherwise authorized by University Architect.

.2.14 MORTAR JOINT PROFILE: Exposed mortar joints shall be tooled to be concave or "V" shaped. Flush, raked, and struck joints are prohibited at exposed mortar joints.

.2.15 HEAD AND BED JOINTS: Specify that all head and bed joints are to be completely filled with mortar. Slushing head joints with mortar after masonry placement is prohibited. Furrowed bed joints are prohibited.

04 05 19. MASONRY ANCHORAGE AND REINFORCING

.1 WALL TIES

.1.1 All masonry wall ties shall be hot-dipped galvanized to comply with ASTM A 123 *Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products* or ASTM A 153 *Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware,* Class B2 or AISI Type 304 or 316 stainless steel.

.1.2 Attaching wall ties to metal stud wall back-up use stainless steel bolts and

nuts and stainless-steel washers. Sheet metal screws and similar attachments are not acceptable.

.1.3 Epoxy-coated wall ties are prohibited.

.1.4 Corrugated wall ties are prohibited.

.1.5 For cavity veneer walls with masonry backup specify eye and pintel horizontal joint reinforcing to match dimensions of each wall section. Bending or skewing eye wires to fit the wall dimensions in the field shall be prohibited.

.1.6 Verify the need for seismic clips and anchoring for masonry veneer.

.2 JOINT *REINFORCEMENT*: _

.2.1 All masonry reinforcing shall be hot-dipped galvanized to comply with ASTM A 123 or A 153, Class B2 or AISI Type 304 or 316 stainless steel.

.2.2 Wire mesh type is prohibited.

.2.3 Ladder type horizontal joint reinforcement is preferred.

.2.4 Trussed type horizontal joint reinforcement spanning clay face brick veneer and CMU back-up is prohibited.

.2.5 Horizontal joint reinforcing with crimps in the cross wires that serve as a drip is prohibited.

.2.6 Also see 04 21 00.1

.3 VENEER ANCHORS: Provide engineered calculations for masonry anchors where the distance from the exterior face of the stud to the interior face of the masonry exceeds 4-1/2 inches. Calculations shall indicate compliance with TMS 402 *Building Code Requirements for Masonry Structures (*Formerly also designated as ACI 530 and ASCE 5)_ and be stamped by a registered Ohio professional engineer.

04 05 23. MASONRY ACCESSORIES

.1 CONTROL AND EXPANSION JOINTS:

.1.1 Analyze the expansion and contraction of masonry veneers, back-up masonry, and structural framing resulting from temperature changes, moisture changes, creep,and structural deflections. Reference BIA Technical Notes 18A *Accommodating Expansion of Brickwork* when designing expansion joints. Place control and expansion joints accordingly.

.1.1.1 Consider placing expansion and control joints at corners, offsets, setbacks, intersections, changes in wall height, changes in backing systems, and changes in exposure.

.1.1.2 Vertical expansion joints for exposed brickwork must be placed no greater than 25-feet on center in walls without openings and 20-feet on center in walls with openings.

.1.1.3 Expansion joints in exposed brickwork must also be placed within 10-feet of corners but not less than 2-feet from corners.

.1.1.4 Extend vertical expansion and control joints through parapets. Placement and sizing of vertical expansion and control joints at parapets requires special consideration and generally should not exceed 15-feet on center.

.1.1.5 Horizontal expansion joints or "soft joints" are required below shelf angles. Horizontal expansion joints must be a minimum of ½-inch wide and filled with a highly compressible material. The actual size of horizontal expansion joints must account for expansion of the masonry, deflection of the shelf angle, and deflection of the structural framing to prevent transferring significant loads into the masonry.

.1.1.6 Expansion joints must be a minimum of ½-inch wide.

.1.1.7 Evaluate the width of sealant joints and the movement capability of specified sealants when designing expansion and control joints. Sealants for expansion and control joints must conform to ASTM C 920 *Standard Specification for Elastomeric Joint Sealants,* Class 50.

.1.2 Expansion joints must be free of mortar or other debris and be filled with a highly compressible joint filler. Joint fillers for expansion joints must conform to ASTM D 1056 *Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber,* Class 2A1.

.1.3 Joint reinforcing shall not extend through expansion or control joints.

.1.4 Avoid the use of lipped or inverted lipped brick at horizontal expansion joints in exterior brick veneers.

.2 FLASHING:

.2.1 Aluminum, galvanized steel, PVC, and corrugated metal through-wall flashings or drips are prohibited.

.2.2 Consider galvanic reactions between dissimilar metals when selecting

flashing materials and fasteners.

.2.3 Through-wall flashings are required at wall bases, windowsills, openings, shelf angles, tops of walls, parapets, and other disruptions in the wall assembly. Locations of all flashings must be shown on the Construction Documents with details provided at corners, terminations, and movement joints.

.2.4 Extend through-wall flashings a minimum of 8-inches laterally beyond openings.

.2.5 Through-wall flashings must extend a minimum of ¼-inch beyond the outboard face of the masonry veneer and turn down ¾-inch at a 45-degree angle to form a drip. UV sensitive flashing materials must be lapped and fully bonded onto a stainless steel drip edge (1-inch minimum).

.2.6 Fully bed the underside of metal drip edges in sealant or mastic set on the masonry substrate, shelf angle, or lintel.

.2.7 Through-wall flashings must extend up the vertical, interior face of the drainage cavity a minimum of 8-inches and be anchored with a termination bar against sheathing, a reglet into concrete, or embedded in a mortar joint of the masonry back-up a minimum of 2-inches.

.2.8 Locate flashings so they are in direct contact with lintels and shelf angles. Do not indicate flashing one course above lintels and angles.

.2.9 Through-wall flashings at the base of the wall must be placed so the drip edge is a minimum of 8-inches above finish grade and 4-inches below the top of the adjacent interior floor elevation. Any cavity below the flashing at the base of the wall should be grouted solid.

.2.10 End dams for through-wall flashings must be designed and shown on the Construction Documents. End dams must turn up into the head joints of masonry a minimum of 1-inch.

.2.11 Wall anchors and joint reinforcing shall not coincide with flashing placement in a bed joint.

.2.12 Flashing segments must be lapped a minimum of 6-inches and laps must be fully bonded or sealed.

.2.13 Extend metal copings down the face of the walls a minimum of two courses, with the bottom edges anchored using concealed cleats designed to resist wind loads.

.2.14 Integrate all through-wall flashings with adjacent waterproofing systems (e.g., roof counter-flashings, foundation waterproofing, projecting window

head copings, etc.).

.2.15 For additions abutting existing masonry cavity wall systems, retrofit flashing systems for the existing building as needed (e.g., at existing wall-to-new roof interface).

.3 MASONRY CAVITY DRAINAGE:

.3.1 Masonry wall cavities must contain a clear, open-air space a minimum of 2 inches wide but no more than 4 ½-inches wide without additional structural evaluation,

.3.2 Air cavities must extend into parapets.

.4 WEEP HOLES:

.4.1 Weep holes in brick head joints shall be fitted with louvered stainless steel or aluminum or corrugated plastic vents of size to fit head joints in brickwork shall be used. Weep tubes, weep holes, treated sash cord, or rope are prohibited. Open head joints must be at least 2-inch high and placed with maximum spacing of 24-inches on center.

.4.2 Mortar Net or other comparable mortar collection products are prohibited. It is recommended to use a mortar board to catch mortar droppings and lift them out of the cavity.

.5 AIR BARRIER/VAPOR RETARDER:

.5.1 Provide an air barrier or vapor retarder as appropriate based on the design of the wall system and the local climate.

.6 MISCELLANEOUS: Also see 04 40 20.1.4

.7 PLUG ANCHORAGE by use of wood or plastic is prohibited.

04 20 00. UNIT MASONRY

04 21 00. STRUCTURAL CLAY FACING TILE:

Masonry must conform to ASTM C 126 *Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick and Solid Masonry Units* and ASTM C 212 *Standard Specification for Structural Clay Facing Tile,* Grade S.

.1 REINFORCEMENT: Structural clay facing tile partitions shall be reinforced every second course with approved joint reinforcement.

04 21 13. BRICK MASONRY:

Color and blend of face brick shall generally be specified to match brickwork in a specific adjacent building. Consult the University Architect regarding this requirement. Brick masonry for exterior use must conform to ASTM C 216 *Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)* or ASTM C 652 *Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)*, Grade SW.

.1 EFFLORESCENCE TEST FOR FACE BRICK: Submit to the University Architect manufacturer's certification that bricks show no efflorescence when tested in accordance with ASTM Method C67.

.2 SAMPLE PANEL: Include the following paragraph in the specifications:

SAMPLE PANEL: Before starting work, build one sample panel for inspection and approval. Build panel on a firm foundation, in location indicated by the A/E. Panel shall be F-shaped, with long side a minimum of 5 feet 4 inches long by 3 feet 4 inches high, with one corner return at least 2 feet long and with one intersecting 6 inch thick concrete block wall 2 feet long. Construct long side and return of 8 inch concrete block and face brick. Panel shall show color range and texture of masonry units, bond, mortar joints, and workmanship. Completed masonry work in the building shall be equal to that shown in the approved panel. Do not remove panel until masonry work is completed or until removal is authorized. Scope of all Mock-ups to be reviewed by the University Architect.

.3 MATCHING MORTAR: If adjacent mortar is to be matched, samples of the original mortar are to be taken from the joints and analyzed for aggregate content, binder material, overall coloration, and other applicable characteristics. A 3-foot sample area of masonry joint is to be installed to demonstrate the color, texture, and tooling for approval by the A/E and the University Architect.

.4 COURSING: Brick shall be laid with modular coursing, three courses to 8 inches, unless otherwise required to match existing coursing.

.5 DESIGN: Designs, which include brick roof construction, shall not be used.

.6 NON-STANDARD BRICK is prohibited.

.7 INITIAL RATE OF ABSORPTION: Bricks with an initial rate of absorption (IRA) greater than 30g/min-30in² (30g/min - 194cm²) are prohibited.

04 22 00. CONCRETE UNIT MASONRY:

Concrete block shall be used wherever feasible for interior wall finish. ASTM tests shall be indicated on all materials used below per the Ohio Building Code

requirements.

.1 CINDER BLOCK: The use of cinder block is prohibited.

.2 CONCRETE BLOCK, TYPES AND USES:

.2.1 LOAD-BEARING - normal weight, standard size.

.2.2 NON-LOAD-BEARING - lightweight, made with expanded shale aggregate and of standard size.

.2.3 EXPOSED EXTERIOR - washed crushed limestone coarse aggregate and washed limestone sand, only, shall be used.

04 40 00. STONE

04 40 20. CUT STONE:

.1 LIMESTONE: Buff Indiana Oolitic limestone shall be used, except where other types might be required to match existing stone.

.1.1 BACKS AND BONDING FACES shall be damp proofed with a water barrier as recommended by the Indiana Limestone Institute of America, Inc.

.1.2 LIMESTONE SHALL BE NO CLOSER THAN 4-INCHES TO GRADE, when adjacent to lawns and planting areas.

.1.3 SEALANT: Use a two-component, non-staining urethane elastomeric joint sealant for pointing stonework. Specify products that do not require priming of joint surfaces.

.1.4 ANCHORS, DOWELS, AND OTHER ACCESSORIES used in setting stone shall be stainless steel.

.1.5 HANDLING, PROTECTION, AND INSTALLATION shall comply with the recommendations of the Indiana Limestone Institute.

.1.6 Limestone to brick joints shall be pointed with a hydrated lime based historic Type N mortar, use of sealant is prohibited.

.1.7 Limestone stairs shall be pointed with a hydrated lime based historic Type N mortar, use of sealant is prohibited for tread and riser joints.

.2 MARBLE: Marble shall be domestic. The edges of marble window stools shall be eased.

.3 GRANITE: Granite shall be domestic. Granite may be specified for exterior stair treads when heavy traffic is anticipated.

.4 Provide field-construct mock-ups for each finish, color, and texture variation of stone, marble, and granite.

04 42 00 Exterior Stone Cladding

.1 PROHIBITED: Soft stone (limestone and sandstone) cladding from grade up to 36" above grade along paved walkways and drives due to snow salt melting deteriorating wall surfaces.

END OF DIVISION 04 - MASONRY