

VAMC COATESVILLE, PA
INSTALL BACKFLOW PREVENTER SOUTH PUMP BLDG 25
PROJECT NUMBER: 542-15-121

SECTION 04 20 00

MASONRY

02/11

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

ACI 530/530.1	(2011; Errata 2011; Errata 2013) Building Code Requirements and Specification for Masonry Structures and Related Commentaries
ACI SP-66	(2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM C1019	(2013) Standard Test Method for Sampling and Testing Grout
ASTM C1072	(2013) Standard Test Method for Measurement of Masonry Flexural Bond Strength
ASTM C1142	(1995; R 2013) Standard Specification for Extended Life Mortar for Unit Masonry
ASTM C129	(2011) Standard Specification for Nonloadbearing Concrete Masonry Units
ASTM C140/C140M	(2013a) Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
ASTM C144	(2011) Standard Specification for Aggregate for Masonry Mortar
ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C207	(2006; R 2011) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C216	(2013) Facing Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C27	(1998; R 2008) Fireclay and High-Alumina Refractory Brick

VAMC COATESVILLE, PA
INSTALL BACKFLOW PREVENTER SOUTH PUMP BLDG 25
PROJECT NUMBER: 542-15-121

ASTM C270	(2012a) Standard Specification for Mortar for Unit Masonry
ASTM C476	(2010) Standard Specification for Grout for Masonry
ASTM C494/C494M	(2013) Standard Specification for Chemical Admixtures for Concrete
ASTM C55	(2011) Concrete Brick
ASTM C593	(2006; R 2011) Fly Ash and Other Pozzolans for Use with Lime for Soil Stabilization
ASTM C62	(2013a) Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C641	(2009) Staining Materials in Lightweight Concrete Aggregates
ASTM C67	(2013a) Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
ASTM C73	(2010) Calcium Silicate Brick (Sand-Lime Brick)
ASTM C780	(2012a) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
ASTM C90	(2014) Loadbearing Concrete Masonry Units
ASTM C91/C91M	(2012) Standard Specification for Masonry Cement
ASTM C94/C94M	(2014) Standard Specification for Ready-Mixed Concrete
ASTM C989/C989M	(2013) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM E119	(2012a) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E514/E514M	(2011) Standard Test Method for Water Penetration and Leakage Through Masonry

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2012) International Building Code
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U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-04	(2013) Seismic Design for Buildings
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1.2 SYSTEM DESCRIPTION

1.2.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 (mile) radius from the project site, if available from a minimum of three sources. Submit documentation indicating distance between manufacturing facility and the project site, and distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in the project.

1.2.2 Environmental Data

Submit manufacturer's descriptive data. Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

1.2.3 Design Requirements

1.2.3.1 Unit Strength Method

Compute compressive strength of masonry system "Unit Strength Method", ACI 530/530.1. Submit calculations and certifications of unit and mortar strength.

1.2.4 Additional Requirements

- a. Maintain at least one spare vibrator on site at all times.
- b. Provide bracing and scaffolding necessary for masonry work. Design bracing to resist wind pressure as required by local code.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following:

SD-04 Samples

Concrete Brick; G

SD-05 Design Data

Pre-mixed Mortar; G

SD-06 Test Reports

Field Testing of Mortar; G

Field Testing of Grout; G

1.4 QUALITY ASSURANCE

1.4.1 Appearance

Manufacture bricks at one time and from the same batch. Blend all brick to produce a uniform appearance when installed. An observable "banding" or "layering" of colors or textures caused by improperly mixed brick is unacceptable.

1.5 DELIVERY, STORAGE, AND HANDLING

Materials shall be delivered, stored, handled, and protected to avoid chipping, breakage, and contact with soil or contaminating material. Store and prepare materials in already disturbed areas to minimize project site disturbance and size of project site.

1.5.1 Masonry Units

Cover and protect moisture-controlled concrete masonry units and cementitious materials from precipitation. Conform to all handling and storage requirements of ASTM C90. Mark prefabricated lintels on top sides to show either the lintel schedule number or the number and size of top and bottom bars.

1.5.2 Cementitious Materials, Sand and Aggregates

Cementitious and other packaged materials shall be delivered in unopened containers, plainly marked and labeled with manufacturers' names and brands. Cementitious material shall be stored in dry, weathertight enclosures or be completely covered. Cement shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness. Store sand and aggregates in a manner to prevent contamination or segregation.

1.6 PROJECT/SITE CONDITIONS

Conform to ACI 530/530.1 for hot and cold weather masonry erection.

1.6.1 Hot Weather Installation

Take the following precautions if masonry is erected when the ambient air temperature is more than 37 degrees C (99 degrees F) in the shade and the relative humidity is less than 50 percent or the ambient air temperature exceeds 32 degrees C (90 degrees F) and the wind velocity is more than 13 km/h (8 mph). All masonry materials shall be shaded from direct sunlight; mortar beds shall be spread no more than 1.2 m (4 feet) ahead of masonry; masonry units shall be set within one minute of spreading mortar; and after erection, masonry shall be protected from direct exposure to wind and sun for 48 hours.

1.6.2 Cold Weather Installation

Before erecting masonry when ambient temperature or mean daily air temperature falls below 4 degrees C (40 degrees F) or temperature of masonry

VAMC COATESVILLE, PA
INSTALL BACKFLOW PREVENTER SOUTH PUMP BLDG 25
PROJECT NUMBER: 542-15-121

units is below 4 degrees C (40 degrees F), submit a written statement of proposed cold weather construction procedures for approval.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

The source of materials which will affect the appearance of the finished work shall not be changed after the work has started except with Contracting Officer's approval. Submit sample of colored mortar with applicable masonry unit and color samples of three stretcher units and one unit for each type of special shape. Units shall show the full range of color and texture. Submit test reports from an approved independent laboratory. Test reports on a previously tested material shall be certified as the same as that proposed for use in this project. Submit certificates of compliance stating that the materials meet the specified requirements.

2.2 CLAY OR SHALE BRICK

2.2.1 Solid Clay or Shale Brick

Solid clay or shale brick shall conform to ASTM C62. Brick size shall be modular and the nominal size of the brick used shall be match existing brick in the surrounding wall to be patched. Minimum compressive strength of the brick shall be 2000 psi.

2.2.3 Sand-Lime Brick

ASTM C73, Grade SW, approximately 92 mm thick, 57 mm high, 200 mm long (nominal) (3 5/8 inches thick, 2 1/4 inches high, and 8 inches long (nominal) or nominal modular), with smooth surfaces and natural color.

2.4 SALVAGED BRICK

Use salvaged bricks in place of new bricks or masonry units as indicated. When using salvaged brick, select exterior face bricks from salvaged exterior face bricks. Bricks shall meet standards of new bricks otherwise used in application, and shall be cleaned of all mortar prior to use. Place exterior face towards the exterior.

2.4 MASONRY MORTAR

See specification section 04 05 13 MASONRY MORTARING.

2.5 WATER-REPELLANT ADMIXTURE

Polymeric type formulated to reduce porosity and water penetration and water absorption of the mortar and masonry units.

2.6 GROUT AND READY-MIXED GROUT

See specification section 04 05 16 MASONRY GROUTING.

VAMC COATESVILLE, PA
INSTALL BACKFLOW PREVENTER SOUTH PUMP BLDG 25
PROJECT NUMBER: 542-15-121

PART 3 EXECUTION

3.1 PREPARATION

Prior to start of work, masonry inspector shall verify the applicable conditions as set forth in ACI 530/530.1, inspection. The Contracting Officer will serve as inspector or will select a masonry inspector.

3.1.1 Protection

Ice or snow formed on the masonry bed shall be thawed by the application of heat. Heat shall be applied carefully until the top surface of the masonry is dry to the touch. Sections of masonry deemed frozen and damaged shall be removed before continuing construction of those sections.

3.1.1.1 Air Temperature 4 to 0 Degrees C (40 to 32 Degrees F)

Heat sand or mixing water to produce mortar temperatures between 4 and 49 degrees C (40 and 120 degrees F)

3.1.1.2 Air Temperature 0 to minus 4 Degrees C (32 to 25 Degrees F)

Heat sand and mixing water to produce mortar temperatures between 4 and 49 degrees C (40 and 120 degrees F). Maintain temperature of mortar on boards above freezing.

3.1.1.3 Air Temperature Minus 4 to Minus 7 Degrees C (25 to 20 Degrees F)

Heat sand and mixing water to provide mortar temperatures between 4 and 49 degrees C (40 and 120 degrees F). Maintain temperature of mortar on boards above freezing. Use sources of heat on both sides of walls under construction. Employ windbreaks when wind is in excess of 24 km/hour (15 mph).

3.1.1.4 Air Temperature Minus 7 Degrees C (20 Degrees F) and Below

Heat sand and mixing water to provide mortar temperatures between 4 and 49 degrees C (40 and 120 degrees F). Provide enclosure and auxiliary heat to maintain air temperature above 0 degrees C (32 degrees F). Temperature of units when laid must not be less than minus 7 degrees C (20 degrees F).

3.1.2 Completed Masonry and Masonry Not Being Worked On

3.1.2.1 Mean Daily Air Temperature 4 to 0 Degrees C (40 to 32 Degrees F)

Protect masonry from rain or snow for 24 hours by covering with weather-resistive membrane.

3.1.2.2 Mean Daily Air Temperature 0 to Minus 4 Degrees C (32 to 25 Degrees F)

Completely cover masonry with weather-resistant membrane for 24 hours.

VAMC COATESVILLE, PA
INSTALL BACKFLOW PREVENTER SOUTH PUMP BLDG 25
PROJECT NUMBER: 542-15-121

3.1.2.3 Mean Daily Air Temperature Minus 4 to Minus 7 Degrees C (25 to 20 Degrees F)

Completely cover masonry with insulating blankets or equally protected for 24 hours.

3.1.2.4 Mean Daily Temperature Minus 7 Degrees C (20 Degrees F) and Below

Maintain masonry temperature above 0 degrees C (32 degrees F) for 24 hours by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps, or other approved methods.

3.1.3 Stains

Protect exposed surfaces from mortar and other stains. When mortar joints are tooled, remove mortar from exposed surfaces with fiber brushes and wooden paddles. Protect base of walls from splash stains by covering adjacent ground with sand, sawdust, or polyethylene.

3.1.4 Loads

Do not apply uniform loads for at least 12 hours or concentrated loads for at least 72 hours after masonry is constructed. Provide temporary bracing as required.

3.1.5 Surfaces

Clean surfaces on which masonry is to be placed of laitance, dust, dirt, oil, organic matter, or other foreign materials and slightly roughen to provide a surface texture with a depth of at least 3 mm (1/8 inch). Sandblast, if necessary, to remove laitance from pores and to expose the aggregate.

3.2 LAYING MASONRY UNITS

- a. Coordinate masonry work with the work of other trades to accommodate built-in items and to avoid cutting and patching. Masonry units shall be laid in running bond pattern to match existing. Facing courses shall be level with back-up courses, unless the use of adjustable ties has been approved in which case the tolerances shall be plus or minus 13 mm (1/2 inch). Each unit shall be adjusted to its final position while mortar is still soft and plastic.
- b. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned, and relaid with fresh mortar. Air spaces, cavities, chases, expansion joints, and spaces to be grouted shall be kept free from mortar and other debris. Units used in exposed masonry surfaces shall be selected from those having the least amount of chipped edges or other imperfections detracting from the appearance of the finished work. Vertical joints shall be kept plumb.
- c. Units being laid and surfaces to receive units shall be free of water film and frost. Solid units shall be laid in a nonfurrowed full bed of mortar. Mortar for veneer wythes shall be beveled and sloped toward the center of the wythe from the cavity side. Units shall be shoved

into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control, expansion, and isolation joints, shall be completely filled with mortar. Mortar will be permitted to protrude up to 13 mm (1/2 inch) into the space or cells to be grouted. Means shall be provided to prevent mortar from dropping into the space below.

- d. In double wythe construction, the inner wythe may be brought up not more than 400 mm (16 inches) ahead of the outer wythe. Collar joints shall be filled with mortar or grout during the laying of the facing wythe, and filling shall not lag the laying of the facing wythe by more than 200 mm (8 inches).

3.2.1 Forms and Shores

Provide bracing and scaffolding as required. Design bracing to resist wind pressure as required by local codes. Forms and shores shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Supporting forms and shores shall not be removed in less than 10 days.

3.2.2 Clay or Shale Brick Units

Lay brick facing with the better face exposed. Lay brick in running bond with each course bonded at corners, unless otherwise indicated. Lay molded brick with the frog side down. Brick that is cored, recessed, or has other deformations may be used in sills, treads, soldier courses, except where deformations will be exposed to view.

3.2.2.1 Wetting of Units

Wetting of clay, shale brick, or hollow brick units having an initial rate of absorption of more than 0.155 gm per minute per square cm (1 gram per minute per square inch) of bed surface shall be in conformance with ASTM C67. The method of wetting shall ensure that each unit is nearly saturated but surface dry when laid. Test clay or shale brick daily on the job, prior to laying, as follows: Using a wax pencil, draw a circle the size of a quarter on five randomly selected bricks. Apply 20 drops of water with a medicine dropper to the surface within the circle on each brick. If the average time that the water is completely absorbed in the five bricks is less than 1-1/2 minutes, wet bricks represented by the five bricks tested.

3.2.2.2 Brick-Faced Walls

For brick-faced walls bond brick in the pattern to match existing brick pattern in surrounding wall. Provide additional bonding ties spaced not more than one meter (3 feet) apart around the perimeter of and within 300 mm (12 inches) of all openings.

3.2.2.2.1 Collar Joints

Fill collar joints solid with mortar as each course of brick is laid. Do not disturb units in place.

3.2.2.2.2 Brick Sills

Lay brick on edge, slope, and project not less than 13 mm (1/2 inch) beyond the face of the wall to form a wash and drip. Fill all joints solidly with mortar and tool.

3.2.2.4 Cavity Walls

Provide a continuous cavity as indicated. Securely tie the two wythes together with horizontal joint reinforcement. Bevel mortar beds away from cavity to prevent projection into cavity when bricks are shoved in place. Keep cavities clear and clean of mortar droppings.

3.2.2.5 Reinforced Brick Walls

Provide two wythes of brick separated by a continuous space filled with grout to match existing. Bevel mortar beds away from grout space to prevent projection into grout space when bricks are shoved in place. Deeply furrowed bed joints will not be permitted. Lay exterior wythe of brick to the height of each grout pour in advance of interior wythe. Clean grout space and set reinforcing before laying interior wythe. Provide metal ties to prevent spreading of the wythes and to maintain vertical alignment of walls. Position reinforcing as indicated. Wire vertical reinforcing securely in position as the brickwork progresses. Use puddling rod or vibrator to consolidate the grout. The minimum clear distance between parallel bars shall be the nominal diameter of the bars; the minimum clear distance between masonry and reinforcing shall be 6 mm (1/4 inch). Unless indicated or specified otherwise, form splices by lapping bars not less than 40 bar diameters and wire tying them together. Stagger splices in adjacent horizontal bars.

3.2.3 Tolerances

Lay masonry plumb, true to line, with courses level. Keep bond pattern plumb throughout. Square corners unless noted otherwise. Except for walls constructed of prefaced concrete masonry units, lay masonry within the following tolerances (plus or minus unless otherwise noted):

TABLE II TOLERANCES	
Variation from the plumb in the lines and surfaces of columns, walls and arises	
In adjacent masonry units	3 mm 1/8 inch
In 3 m 10 feet	6 mm 1/4 inch
In 6 m 20 feet	10 mm 3/8 inch
In 12 m 40 feet or more	13 mm 1/2 inch
Variations from the plumb for external corners, expansion joints, and other conspicuous lines	
In 6 m 20 feet	6 mm 1/4 inch

In 12 m 40 feet or more	13 mm 1/2 inch
Variations from the level for exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines	
In 6 m 20 feet	6 mm 1/4 inch
In 12 m 40 feet or more	13 mm 1/2 inch
Variation from level for bed joints and top surfaces of bearing walls	
In 3 m 10 feet	6 mm 1/4 inch
In 12 m 40 feet or more	13 mm 1/2 inch
Variations from horizontal lines	
In 3 m 10 feet	6 mm 1/4 inch
In 6 m 20 feet	10 mm 3/8 inch
In 12 m 40 feet or more	13 mm 1/2 inch
Variations in cross sectional dimensions of columns and in thickness of walls	
Minus	6 mm 1/4 inch
Plus	13 mm 1/2 inch

3.2.4 Cutting and Fitting

Full units of the proper size shall be used wherever possible, in lieu of cut units. Cutting and fitting, including that required to accommodate the work of others, shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Openings in the masonry shall be made carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms parallel with the masonry bed joints. Reinforced masonry lintels shall be provided above openings over 300 mm (12 inches) wide for pipes, ducts, cable trays, and other wall penetrations, unless steel sleeves are used.

3.2.5 Jointing

Joints shall be tooled when the mortar is thumbprint hard. Horizontal joints shall be tooled last. Joints shall be brushed to remove all loose and excess mortar. Mortar joints shall be finished as follows:

3.2.5.1 Flush Joints

Joints in concealed masonry surfaces and joints at electrical outlet boxes in wet areas shall be flush cut. Flush cut joints shall be made by cutting off the mortar flush with the face of the wall. Joints in unparged masonry walls below grade shall be pointed tight. Flush joints for architectural units, such as fluted units, shall completely fill both the head and bed joints.

3.2.5.2 Tooled Joints

Joints in exposed exterior and interior masonry surfaces shall be tooled to match existing. Joints shall be tooled with a jointer slightly larger than the joint width so that complete contact is made along the edges of the unit. Tooling shall be performed so that the mortar is compressed and the joint surface is sealed. Jointer of sufficient length shall be used to obtain a straight and true mortar joint.

3.2.6 Joint Widths

Joint widths shall be as follows:

3.2.6.1 Brick

Brick joint widths shall be the difference between the actual and nominal dimensions of the brick in either height or length. Brick expansion joint widths shall be as shown.

3.2.7 Embedded Items

Fill spaces around built-in items with mortar. Point openings around flush-mount electrical outlet boxes in wet locations with mortar. Embed anchors, ties, wall plugs, accessories, flashing, pipe sleeves and other items required to be built-in as the masonry work progresses. Fully embed anchors, ties and joint reinforcement in the mortar. Fill cells receiving anchor bolts and cells of the first course below bearing plates with grout.

3.2.8 Unfinished Work

Step back unfinished work for joining with new work. Toothing may be resorted to only when specifically approved. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

3.3 ANCHORED VENEER CONSTRUCTION

Completely separate the inner and outer wythes by a continuous airspace as indicated. Lay up both the inner and the outer wythes together except when adjustable joint reinforcement assemblies are approved for use. When both wythes are not brought up together, through-wall flashings shall be protected from damage until they are fully enclosed in the wall. The airspace between the wythes shall be kept clear and free of mortar droppings by temporary wood strips laid on the wall ties and carefully lifted out before placing the next row of ties. A coarse gravel or drainage material shall be placed behind the weep holes in the cavity to a minimum depth of 100 mm (4 inches) of coarse aggregate or 250 mm (10 inches) of drainage material to keep mortar droppings from plugging the weep holes.

3.4 MORTAR MIX

Mix mortar in a mechanically operated mortar mixer for at least 3 minutes, but not more than 5 minutes. Measure ingredients for mortar by volume. Ingredients not in containers, such as sand, shall be accurately measured by the use of measuring boxes. Mix water with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Retemper mortar that has stiffened because of loss of water through evaporation by adding water to restore the proper consistency and workability. Discard mortar that has reached its initial set or that has not been used within 2.5 hours after mixing.

3.5 PLACING GROUT

Fill cells containing reinforcing bars with grout. Hollow masonry units in walls or partitions supporting plumbing, heating, or other mechanical fixtures, voids at door and window jambs, and other indicated spaces shall be filled solid with grout. Cells under lintel bearings on each side of openings shall be filled solid with grout for full height of openings. Walls below grade, lintels, and bond beams shall be filled solid with grout. Units other than open end units may require grouting each course to preclude voids in the units. Grout not in place within 1-1/2 hours after water is first added to the batch shall be discarded. Sufficient time shall be allowed between grout lifts to preclude displacement or cracking of face shells of masonry units. If blowouts, flowouts, misalignment, or cracking of face shells should occur during construction, the wall shall be torn down and rebuilt.

3.5.1 Vertical Grout Barriers for Fully Grouted Walls

Provide grout barriers not more than 10 m (30 feet) apart, or as required, to limit the horizontal flow of grout for each pour.

3.5.2 Horizontal Grout Barriers

Embed grout barriers in mortar below cells of hollow units receiving grout.

3.5.3 Grouting Equipment

3.5.3.1 Grout Pumps

Pumping through aluminum tubes will not be permitted. Operate pumps to produce a continuous stream of grout without air pockets, segregation, or contamination. Upon completion of each day's pumping, remove waste materials and debris from the equipment, and dispose of outside the masonry.

3.5.3.2 Vibrators

Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. Maintain at least one spare vibrator at the site at all times. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation.

3.5.4 Grout Placement

Lay masonry to the top of a pour before placing grout. Do not place grout in two-wythe solid unit masonry cavity until mortar joints have set for at least 3 days during hot weather and 5 days during cold damp weather. Grout shall not be placed in hollow unit masonry until mortar joints have set for at least 24 hours. Grout shall be placed using a hand bucket, concrete hopper, or grout pump to completely fill the grout spaces without segregation of the aggregates. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. The height of grout pours and type of grout used shall be limited by the dimensions of grout spaces as indicated in Table III. Low-lift grout methods may be used on pours up to and including 1.5 m (5 feet) in height. High-lift grout methods shall be used on pours exceeding 1.5 m (5 feet) in height.

3.5.4.1 Low-Lift Method

Grout shall be placed at a rate that will not cause displacement of the masonry due to hydrostatic pressure of the grout. Mortar protruding more than 13 mm (1/2 inch) into the grout space shall be removed before beginning the grouting operation. Grout pours 300 mm (12 inches) or less in height shall be consolidated by mechanical vibration or by puddling. Grout pours over 300 mm (12 inches) in height shall be consolidated by mechanical vibration and reconsolidated by mechanical vibration after initial water loss and settlement has occurred. Vibrators shall not be inserted into lower pours that are in a semi-solidified state. Low-lift grout shall be used subject to the limitations of Table III.

3.5.4.2 High-Lift Method

Mortar droppings shall be cleaned from the bottom of the grout space and from reinforcing steel. Mortar protruding more than 6 mm (1/4 inch) into the grout space shall be removed by dislodging the projections with a rod or stick as the work progresses. Reinforcing, bolts, and embedded connections shall be rigidly held in position before grouting is started. CMU units shall not be pre-wetted. Grout, from the mixer to the point of deposit in the grout space shall be placed as rapidly as practical by pumping and placing methods which will prevent segregation of the mix and cause a minimum of grout splatter on reinforcing and masonry surfaces not being immediately encased in the grout lift. The individual lifts of grout shall be limited to 1.2 m (4 feet) in height. The first lift of grout shall be placed to a uniform height within the pour section and vibrated thoroughly to fill all voids. This first vibration shall follow immediately behind the pouring of the grout using an approved mechanical vibrator. After a waiting period sufficient to permit the grout to become plastic, but before it has taken any set, the succeeding lift shall be poured and vibrated 300 to 450 mm (12 to 18 inches) into the preceding lift. If the placing of the succeeding lift is going to be delayed beyond the period of workability of the preceding, each lift shall be reconsolidated by reworking with a second vibrator as soon as the grout has taken its settlement shrinkage. The waiting, pouring, and reconsolidation steps shall be repeated until the top of the pour is reached. The top lift shall be reconsolidated after the required waiting period. The high-lift grouting of any section of wall between vertical grout barriers shall be completed to the top of a pour in one working day unless a new series of cleanout holes is established and the

resulting horizontal construction joint cleaned. High-lift grout shall be used subject to the limitations in Table III.

TABLE III POUR HEIGHT AND TYPE OF GROUT FOR VARIOUS GROUT SPACE DIMENSIONS				
			Minimum Dimensions of the Total Clear Areas Within Grout Spaces and Cells in mm inches (1,2)	
Maximum Grout Pour Height m feet (4)	Grout Type	Grouting Procedure	Multiwythe Masonry (3)	Hollow-unit Masonry
0.31	Fine	Low Lift	203/4	40 x 50 1-1/2 x 2
1.55	Fine	Low Lift	502	50 x 75 2 x 3
2.48	Fine	High Lift	502	50 x 75 2 x 3
3.612	Fine	High Lift	652-1/2	65 x 75 2-1/2 x 3
7.324	Fine	High Lift	753	75 x 75 3 x 3
0.31	Coarse	Low Lift	401-1/2	40 x 75 1-1/2 x 3
1.55	Coarse	Low Lift	502	65 x 75 2-1/2 x 3
2.48	Coarse	High Lift	502	75 x 75 3 x 3
3.612	Coarse	High Lift	652-1/2	75 x 75 3 x 3
7.324	Coarse	High Lift	753	75 x 100 3 x 4

Notes:

- (1) The actual grout space or cell dimension shall be larger than the sum of the following items:
 - (a) The required minimum dimensions of total clear areas given in the table above;
 - (b) The width of any mortar projections within the space;
 - (c) The horizontal projections of the diameters of the horizontal reinforcing bars within a cross section of the grout space or cell.
- (2) The minimum dimensions of the total clear areas shall be made up of one or more open areas, with at least one area being 20 mm (3/4 inch) or greater in width.
- (3) For grouting spaces between masonry wythes.

(4) Where only cells of hollow masonry units containing reinforcement are grouted, the maximum height of the pour shall not exceed the distance between horizontal bond beams.

3.6 PARGING

The outside face of below-grade exterior concrete-masonry unit walls enclosing usable rooms and spaces, except crawl spaces, shall be parged with type S mortar. Parging shall not be less than 13 mm (1/2 inch) thick troweled to a smooth dense surface so as to provide a continuous unbroken shield from top of footings to a line 150 mm (6 inches) below adjacent finish grade, unless otherwise indicated. Parging shall be coved at junction of wall and footing. Parging shall be damp-cured for 48 hours or more before backfilling. Parging shall be protected from freezing temperatures until hardened.

3.7 POINTING AND CLEANING

After mortar joints have attained their initial set, but prior to hardening, completely remove mortar and grout daubs or splashings from masonry-unit surfaces that will be exposed or painted. Before completion of the work, defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Immediately after grout work is completed, scum and stains which have percolated through the masonry work shall be removed using a high pressure stream of water and a stiff bristled brush. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

3.7.1 Dry-Brushing

- a. Exposed
- b. Exposed concrete brick surfaces
- c. shall be dry-brushed at the end of each day's work and after any required pointing, using stiff-fiber bristled brushes.

3.7.2 Clay or Shale Brick Surfaces

Clean exposed clay or shale brick masonry surfaces as necessary to obtain surfaces free of stain, dirt, mortar and grout daubs, efflorescence, and discoloration or scum from cleaning operations. After cleaning, examine the sample panel of similar material for discoloration or stain as a result of cleaning. If the sample panel is discolored or stained, change the method of cleaning to ensure that the masonry surfaces in the structure will not be adversely affected. The exposed masonry surfaces shall be water-soaked and then cleaned with a solution proportioned 30 mL (1/2 cup) trisodium phosphate and 30 mL (1/2 cup) laundry detergent to 1 L (one gallon) of water or cleaned with a proprietary masonry cleaning agent specifically recommended for the color and texture by the clay products manufacturer.

The solution shall be applied with stiff fiber brushes, followed immediately by thorough rinsing with clean water. Proprietary cleaning agents shall be used in conformance with the cleaning product manufacturer's printed recommendations. Efflorescence shall be removed in conformance with the brick manufacturer's recommendations.

3.8 PROTECTION

Protect facing materials against staining. Cover top of walls with nonstaining waterproof covering or membrane when work is not in progress. Covering of the top of the unfinished walls shall continue until the wall is waterproofed with a complete roof or parapet system. Covering shall extend a minimum of 600 mm (2 feet) down on each side of the wall and shall be held securely in place. Before starting or resuming, top surface of masonry in place shall be cleaned of loose mortar and foreign material.

3.9 WASTE MANAGEMENT

Manage waste according to the Waste Management Plan and as follows. Minimize water used to wash mixing equipment. Use trigger operated spray nozzles for water hoses.

3.9.1 Separate and Recycle Waste

Place materials defined as hazardous or toxic waste in designated containers. Fold up metal banding, flatten, and place in designated area for recycling. Collect wood packing shims and pallets and place in designated area. Use leftover mixed mortar as cavity fill at grade where lower strength mortar meets the requirements for bulk fill. Separate masonry waste and place in designated area for use as structural fill. Separate selected masonry waste and excess for landscape uses, either whole or crushed as ground cover.

3.10 TEST REPORTS

3.10.1 Field Testing of Mortar

Take at least three specimens of mortar each day. Spread a layer of mortar 13 to 16 mm (1/2 to 5/8 inch) thick on the masonry units and allowed to stand for one minute. Prepare and test the specimens for compressive strength in accordance with ASTM C780. Submit test results.

3.10.2 Field Testing of Grout

Field sampling and testing of grout shall be in accordance with the applicable provisions of ASTM C1019. A minimum of three specimens of grout per day shall be sampled and tested. Each specimen shall have a minimum ultimate compressive strength of 13.8 MPa (2000 psi) at 28 days. Submit test results.

-- End of Section --

VAMC COATESVILLE, PA
INSTALL BACKFLOW PREVENTER SOUTH PUMP BLDG 25
PROJECT NUMBER: 542-15-121

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