

Section 620. — STONE MASONRY

Description

620.01 This work consists of constructing or rehabilitating stone masonry structures and the stone masonry portions of composite structures.

Masonry class is designated according to Subsection 705.03 and as follows:

(a) Dimensioned masonry. Stones are cut in two or more dimensions and laid in a broken-course pattern in mortar.

(b) Class A masonry. Stones are shaped, dressed to within 6 millimeters of true line, and laid in mortar.

(c) Class B masonry. Stones are shaped, dressed to within 19 millimeters of true line, and laid in mortar.

(d) Rubble masonry. Stones vary in size and shape, are roughly dressed, and laid in random courses in mortar.

Finish for exposed faces is designated according to Subsection 705.03(f).

Material

620.02 Conform to the following Section and Subsections:

Concrete	601
Grout	725.22(f)
Mortar	712.05(a)
Rock for masonry structures	705.03

Construction Requirements

620.03 General. Furnish stone that matches the native stone on the project. Submit stone samples representing the range of colors and sizes to be used on the project to the CO 14 days before beginning work.

Keep an adequate inventory of the stone on the site to provide an ample variety of stones for the masons. When additional stone is added, mix the new stone with the existing stone in a uniform pattern and color.

Excavate and backfill according to Section 209. Prepare the foundation bed normal to, or in steps normal to, the face of the masonry. Where foundation masonry is used, clean the bearing surface thoroughly and wet immediately before spreading the mortar bed.

620.04 Placing Stone. Place stone to provide a uniform pattern and color. Do not place stone masonry when the ambient temperature is below 0 °C. Maintain completed masonry at a temperature above 4 °C for 24 hours after construction. Clean all stones thoroughly and moisten immediately before placing. Clean and moisten the bed.

When removing and resetting stone masonry, use hand tools to clean the exposed faces of the stones of all mortar before resetting.

Spread the mortar. The thicknesses of beds and joints for face stones are as shown in Table 620-1. Ring stone joints on the faces and soffits are not less than 6 millimeters or more than 38 millimeters thick. However, make the bed of each course of uniform thickness throughout.

Construct joints in dimensioned masonry vertical. In all other masonry, joints may be at angles with the vertical from 0 to 45 degrees.

Level the cross beds for vertical walls. Beds for battered walls may vary from level to normal to the batter line of the face of the wall.

Lay the stones with the longest face horizontal and the exposed face parallel to the masonry face. Flush the joints with mortar.

Do not jar or displace the stones already set. If a stone is loosened after the mortar has taken initial set, remove it, clean off the mortar, and relay the stone with fresh mortar.

**Table 620-1
Masonry Bed and Joint Thicknesses**

Class	Beds (millimeters)	Joints (millimeters)
Rubble	13 - 64	13 - 64
Class B	13 - 50	13 - 50
Class A	13 - 50	13 - 38
Dimensioned	10 - 25	19 - 25

620.05 Pointing. Conform to the following:

(a) Pointing new joints. Crown the mortar in the joints on top surfaces slightly at the center of the masonry to provide drainage.

Where raked joints are required, squarely rake all mortar in exposed face joints and beds to the required depth. Where weather joints are required, slightly rake the joints. Do not leave the mortar flush with the stone faces.

Clean all face stone of mortar stains while the mortar is fresh. After the mortar sets, clean again using wire brushes and acid. Protect the masonry during hot or dry weather and keep it wet for at least 3 days after the work is completed.

(b) Repointing joints. Remove loose mortar from joints using a small mason's chisel, small pneumatically-power chisel, or other raking tool approved by the CO. Do not use power saws or grinders. Demonstrate proficiency if power equipment is used before removing mortar from the structure. Remove mortar to a depth of 2 ½ times the width of the joint. Remove any dirt or vegetation with a wire brush or other tools approved by CO. Clean joint of all loose fragments and dust with pressurized air or water.

Before filling the joint dampen adjacent stone. Do not place mortar to a depth greater than 2 ½ times the joint width. Place mortar in layers of approximately 6 millimeters for joints deeper than 2.5 millimeters. Add successive layers, once mortar has reached thumb-print hardness. Tool the final layer to match the approved joint appearance. Construct a 1 meter test section of joint along the structure to be approval by the CO before continuing with work. Approved test section maybe incorporated into the work.

Clean excess mortar and stain from stone masonry using a bristle brush after the mortar has dried but before the initial set. Do not use chemicals for cleaning unless approved by the CO. Protect joints during hot or dry weather by keeping damp for 3 days after work has been completed.

620.06 Constructing Walls. Construct an L-shaped sample section of wall not less than 1.5 meters high and 2.5 meters long, showing examples of face wall, top wall, method of turning corners, and method of forming joints. Do not construct masonry other than the foundation masonry before the sample is approved.

Set face stones in random bond to produce the effect shown on the plans and to correspond with the approved sample section. Do not extend beds in an unbroken line through more than 5 stones and joints through more than 2 stones. Bond each face stone with all contiguous face stones at least 150 millimeters longitudinally and 50 millimeters vertically. Do not construct so that the corners of four stones are adjacent to each other.

Do not bunch small stones or stones of the same size, color, or texture. In general, the stones decrease in size from the bottom to the top of work. Use large stones for the bottom courses and large, selected stones in the corners.

(a) Headers. Where required, distribute headers uniformly throughout the walls of structures to form at least 20 percent of the faces.

(b) Backing. Construct the backing out of large stones. Bond the individual stones composing the backing and heart with the stones in the face wall and with each other. Fill all openings and interstices in the backing completely with mortar or with spalls surrounded completely by mortar.

(c) Coping. Construct copings as shown on the plans. Where copings are not called for, finish the top of the wall with stones wide enough to cover the top of the wall from 0.5 to 1.5 meters in length, and of random heights, with a minimum height of 150 millimeters. Lay stones in a manner that the top course is an integral part of the wall. Pitch the tops of the top courses of stone to line in both vertical and horizontal planes.

(d) Parapet walls. Use selected stones, squared and pitched to line and with heads dressed in the ends of parapet walls and in all exposed angles and corners. Interlock headers with as many headers as possible extending entirely through the wall. Interlock both the headers and stretchers in the 2 faces of the wall. The headers and stretchers shall comprise practically the whole volume of the wall. Completely fill all interstices and spalls with mortar.

(e) Weep holes. Provide weep holes for all walls and abutments. Place weep holes at the lowest points where free outlets can be obtained and space them no more than 3 meters center to center.

620.07 Facing for Concrete.

(a) Stone placed before concrete. Make the back of the masonry uneven to improve the bond to the concrete backing.

Use no. 10M reinforcing steel bent into an elongated letter S to anchor the stone. Embed each anchor in a mortar bed to within 50 millimeters from the face of the stones. Project the other end ± 250 millimeters into the concrete backing. Space the anchors 0.5 meter apart both horizontally and vertically.

After the mortar has attained sufficient strength, clean the back masonry surface of all dirt, loose material, and mortar drippings. Wash surfaces just before placing the concrete using a high-pressure water jet.

When placing the concrete, carry a neat cement grout of the consistency of cream on top of the concrete and against the masonry at all times. Coat all interstices in the back of the masonry with grout.

(b) Concrete placed before stone. Allow a facing thickness as shown on the plans. Set galvanized metal slots with anchors in the concrete face. Set the anchors vertically at a horizontal spacing not exceeding 600 millimeters. Place a temporary filling of felt or other material in the slots to prevent filling with concrete.

Where setting the stone facing, fit the metal anchors tightly in the slots at an average vertical spacing of 600 millimeters. Bend at least 25 percent of the anchors at a short right angle to engage a recess cut in the stone. Extend the anchors to within 75 millimeters of the exposed face of the stone work.

Where the shape of the concrete face is unsuitable for the use of metal slots, use 3.8-millimeter galvanized iron wire ties at a rate of 7 ties for each square meter of exposed surface. Install ties after the concrete has cured using a gun.

Keep the concrete face continuously wet for 2 hours preceding the placing of the stone and fill spaces between the stones and concrete with mortar.

620.08 Constructing Arches. Prepare and submit drawings for falsework according to Section 562. Stratify arch ring stones parallel to the radial joint and stratify other stones parallel to the beds.

Lay out a full-size template of the arch ring near the quarry site showing face dimensions of each ring stone and thickness of joints. Receive approval before the shaping of any ring stone is started and place no ring stone in the structure until all ring stones have been shaped and dressed.

Construct arch centering according to the approved drawings. Provide suitable wedges for adjusting the elevation of the forms.

Set arch ring stones to the exact position and hold in place with hardwood wedges until the joints are packed with mortar. When required, support centering with approved jacks to correct settlement after masonry placement begins. Lower the centering gradually and symmetrically to avoid overstresses in the arch. Make the arch self-supporting before the railing or coping is placed.

For filled spandrel arches, strike the centers before constructing the spandrel walls to avoid jamming of the expansion joints. Place the backfill so the ring is uniformly and symmetrically loaded.

620.09 Guardwall. Use rubble masonry. Concrete corewalls for guardwall may be cast-in-place or precast units according to Section 601. Concrete will have a minimum 28-day compressive strength of 25 megapascals.

Construct an 8-meter sample section of guardwall. Do not construct additional guardwall before the sample is approved.

Construct the guardwall true and uniform along its length with no stone projecting more than 38 millimeters. Make mortar beds and joints according to Table 620-1. Rake the joints and beds to a depth of 50 millimeters on the front and top sides and to 38 millimeters on the back.

Use a one-piece capstone for the full width of the guardwall for at least 25 percent of the total length. Use a two-piece capstone with the joint within 100 millimeters of the guardwall center for the remaining length.

Place all stones, including the capstones, randomly to avoid a pattern. Lay stones to reflect the width of the expansion joints. Do not leave a gap or a mortar edge at the expansion joint. Use various size stones to coin or key the corners of the guardwall.

620.10 Acceptance. See Table 620-2 for sampling and testing requirements.

Material for mortar will be evaluated under Subsections 106.02 and 106.03. Mortar will be evaluated under Subsections 106.02 and 106.04.

Rock for masonry structures will be evaluated under Subsections 106.02 and 106.04.

Construction or rehabilitation stone masonry structures will be evaluated under Subsections 106.02 and 106.04.

Excavation and backfill will be evaluated under Section 209.

Concrete will be evaluated under Section 601.

Measurement

620.11 Measure the Section 620 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Measure stone masonry by the cubic meter in the structure.

Do not measure sample wall sections not incorporated in the work.

Measure stone masonry guardwall including terminal sections.

Measure remove and reset stone masonry by the cubic meter in the structure after resetting.

Measure repoint stone masonry along the centerline of joint.

Payment

620.12 The accepted quantities will be paid at the contract price per unit of measurement for the Section 620 pay items listed in the bid schedule. Payment will be full compensation for all work prescribed in this Section. See Subsection 109.05.