

GUIDE SPECIFICATIONS AND NOTES TO SPECIFIER

The following Guide Specifications were written as the framework for a specifications section. The Guide Specifications appear in the CSI three-part format on the left hand pages with explanatory information on the adjacent right hand pages titled *NOTES TO SPECIFIER*.

Each Guide Specification addresses a particular type or use of masonry construction. They should serve as a guide only and they must be revised and customized for each particular project.

When using any specification the Specifier must consider applicable building codes, local practices and the particular features of the project. The Specifier may find it useful to combine some of these specifications into one specification for smaller projects.

**SECTION 04220
GUIDE SPECIFICATION
REINFORCED CONCRETE UNIT MASONRY**

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS:

Division 1 requirements, Drawing, General Conditions, Supplementary General Conditions, and Special Conditions apply to this section.

1.02 WORK INCLUDED:

- A. Furnish and install concrete masonry units, mortar, grout and reinforcing steel in the masonry. Provide equipment necessary for their installation.
- B. Install items furnished by others including:
 - 1. Bolts, anchors and shelf angles: Section 05____.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

- A. Site Utilities: Section 02____.
- B. Concrete: Section 03____.
- C. Masonry Accessories: Section 04 ____.
- D. Structural Steel: Section 05____.
- E. Rough Carpentry: Section 06 ____.
- F. Caulking, Sealants and Waterproofing: Section 07____.
- G. Flashing and Sheet Metal Work: Section 07____.

NOTES TO SPECIFIER

1.01 This includes all the work the masonry contractor is to accomplish.

1.02 and **1.03** “WORK INCLUDED” and “RELATED WORK” are listed here to define these facets, though they are sometimes not made part of the Division Specifications.

If these paragraphs are included, the Specifier must check that there are no portions overlapping or not covered elsewhere.

Many of these items are not part of the masonry section but may be required for the completed project such as bolts, dowels, and shoring and must be specified in the appropriate sections of the specification.

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H. Insulation: Section 07 ____.

1.04 QUALITY ASSURANCE:

A. Submittals:

1. Samples: Submit _____ full size concrete masonry units of each type, including special shapes required to show range of colors, textures, finishes and dimensions.
2. Certification: Furnish manufacturer's certification that masonry units provided meet or exceed the requirements of this specification.

B. Sample Panels:

1. Construct ____ ft x ____ ft sample panel. This panel may be part of the actual masonry system.
2. Show color range, texture range, bond, mortar color, joint tooling, critical design details and quality of workmanship. The panel should represent completed masonry work.
3. Masonry construction may not proceed until the Architect/Engineer approves sample panel mock-up. The accepted mock-up shall serve as the project standard.
4. Sample panel shall remain on the project site for comparison to the actual masonry work. If the sample panel is not included in the actual masonry work, it shall be demolished and removed from the job site after the masonry work for the project has been completed.

1.04.A Specify which units and quantity required for approval. ASTM C-90 suggests not less than 4 units.

1.04.B Sample panels are only necessary for exposed, architectural concrete masonry walls. If a sample is desired, specify the desired size (often 4 feet by 4 feet) and any other special requirements.

The panel may be included as part of the project wall if approved by the architect.

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C. Testing:

1. Cost for testing of units after delivery shall be borne by the purchaser, unless tests indicate that the units do not conform to the requirements of the specifications, in which case the cost shall be borne by the seller.
2. Concrete Masonry Units shall be tested in accordance with ASTM C 140 - _____, *Sampling and Testing Concrete Masonry Units*.
3. Grout shall be tested in accordance with ASTM C 1019-_____, *Standard Method of Sampling and Testing Grout*.
4. Masonry prisms shall be tested in accordance with ASTM C 1314-_____, *Standard Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry*.
5. Masonry testing shall be overseen by an individual certified through the American Concrete Institute. The laboratory performing masonry testing shall be accredited in accordance with ASTM C-1093

D. Inspection: Continuous or periodic special inspection of the masonry construction shall be provided.

E. Pre-Installation Meeting: The architect, general contractor, mason contractor and concrete masonry unit manufacturer shall attend a meeting prior to commencement of concrete masonry installation. Review procedures and coordination required between parties.

1.04.C When testing is necessary specify all tests that are to be conducted along with who shall pay for such tests.

1.04.C.5. Prism testing is not always specified unless selected or required per the f'm compliance method.

1.04.D Specify the minimum quality assurance inspection levels in accordance with Table 3.1 in TMS 402, *Building Code Requirements for Masonry Structures*.

1.04.E This meeting is important for architectural concrete masonry walls coated with a clear water repellent.

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1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Store masonry units above ground to prevent contamination by mud, dust or other materials likely to cause staining or other defects.
- B. Cover and protect masonry units from inclement weather to maintain quality control and physical requirements.

1.06 EXTREME WEATHER CONDITIONS:

- A. Cold Weather Conditions (ambient air temperature below 40° F):
 1. Frozen masonry units shall not be used. Temperature of units when laid may not be less than 20° F.
 2. Aggregates and mixing water shall be heated to produce mortar temperatures between 40° F and 120° F.
 3. Maintain mortar temperature on mortar boards above 32° F.
 4. Heat grout aggregates and mixing water to produce grout temperatures between 70° F and 120° F. Maintain grout temperature above 70° F at the time of placement.
 5. Remove any ice or snow which has inadvertently formed on the masonry bed by carefully applying heat to the surface until it is dry to the touch. Remove any frozen or damaged masonry.
 6. When the air temperature is expected to fall below 25° F, provide salamanders or other heat sources on both sides of walls under construction.

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1.05.B It is important to cover the concrete masonry units if there is inclement weather, either rain or snow, to prevent them from becoming excessively wet.

1.06 These conditions can be deleted or selectively referred to for the applicable conditions. Referencing TMS 602, *Specification for Masonry Structures*, Articles 1.8c and 1.8D is another option.

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7. When the air temperature is expected to fall below 20° F, provide enclosures and heat sources to maintain the air temperature above 32° F.
8. Protect completed masonry and masonry not being worked on:
 - a. When the minimum daily air temperature is between 40° F and 25° F, cover masonry with weather-resistive membrane for at least 24 hours.
 - b. When the minimum daily air temperature is between 25° F and 20° F, cover masonry completely with weather resistive insulating blankets for at least 24 hours.
 - c. When the mean daily air temperature is between 25° F and 20° F, cover masonry completely with insulating blankets or other equal protection for at least 24 hours.
 - d. When the minimum daily air temperature is below 20° F, the masonry temperature shall be maintained above 32° F for at least 24 hours by enclosure and supplementary heat, electric heating blankets, infrared heat lamps or other acceptable methods. Extend time period to 48 hours for grouted masonry unless Type III portland cement is used in the grout.

B. Hot Weather Conditions:

1. When ambient air temperature is above 100° F or 90° F with wind greater than 8 mph, provide and maintain mortar and grout temperature below 120° F.
 - a. Maintain mortar consistency by retempering with cool water.
 - b. Use mortar within 2 hours of initial mixing.

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- c. Fog spray newly constructed masonry until damp, at least three times a day until the masonry is three days old.
2. When ambient air temperature is above 115° F or 105° F with a wind greater than 8 mph, additionally shade materials and mixing equipment from direct sunlight.
 - a. Use cool mixing water for mortar and grout.

PART 2 – PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Hollow and solid load-bearing concrete masonry units.
 1. ASTM C 90-___, *Specification for Load-Bearing Concrete Masonry Units*.
 2. Nominal face dimensions: _____ in. x _____ in.
 3. Linear shrinkage shall not exceed 0.065 percent.
 4. Minimum unit density shall be _____ lb./cu. ft.

Units shall be manufactured with aggregates conforming to ASTM C-33 and C-331.
 5. (Optional provision, see specifier notes.) Units shall contain the integral water repellent admixture Dry-Block® II or equal. Units shall be manufactured by a block producer qualified by the admixture supplier. Minimum concrete oven-dry density shall be 110 lb./cu. ft.
 6. Units shall be manufactured by a member of the Northwest Concrete Masonry Association.

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2.01 Specify the size of units along with any special requirements regarding the configuration, texture, color and strength of the units.

When applicable, request submittal of a sample consisting of not less than four units, representing the range of texture and color. (Section 1.04.A.1)

2.01.A.1. Specify most recent version **year** of ASTM C-90.

2.01.A.2 Specify the nominal sizes of the units. Unit thickness and type shall be shown on the construction plans.

2.01.A.4 Concrete masonry unit weight affects numerous properties including water absorption, shrinkage potential, sound transmission, thermal and fire resistance. Specifying block by concrete density rather than weight classification is recommended to meet performance requirements.

A minimum concrete density of **95 lb./cu. ft.** is recommended for opaque coated or weather protected walls.

A minimum concrete density of **105 lb./cu. ft.** is recommended for clear sealed, weather exposed walls; and all 4 inch wide concrete masonry veneer units.

These density recommendations apply when using pumice aggregate per ASTM C-331. Pumice is the common lightweight aggregate used in the Northwest.

2.01.A.5 Include this provision when walls are clear sealed on the exterior and exposed to wet weather climates. This applies to Western Washington and Western Oregon locations.

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7. (Optional provision, see specifier notes.) Net area compressive strength of the units: _____psi.
8. Testing of units shall be overseen by a qualified laboratory technician of an accredited testing agency.

2.02 MORTAR:

Mortar shall conform to section 04101.

2.03 GROUT:

Grout shall conform to Section 04102.

NOTES TO SPECIFIER

When specifying units with an integral water repellent, the admixture must also be used in the mortar.

Request submittal of a copy of a current producer qualification certificate issued by the admixture supplier. Additionally, require site testing of the water repellency of a concrete masonry unit sample panel.

2.01.A.7 Unless otherwise specified, concrete masonry units conforming to ASTM C 90 will have a minimum net compressive strength of 2,000 psi. If stronger units are required, specify strength here. Structural notes should call out the masonry compressive strength required, if so, omit this section.

2.01.A.8 Testing should be overseen by an individual certified through the American Concrete Institute. The laboratory performing masonry testing should be accredited in accordance with ASTM C-1093.

2.02 See Guide Specification for Mortar.

2.03 See Guide Specification for Grout.

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2.04 REINFORCING STEEL:

- A. Steel reinforcing shall conform to ASTM ____ - ____, Grade ____.
- B. All vertical steel shall be furnished in specified lengths plus laps.
- C. Reinforcing bar hooks shall be fabricated in accordance with TMS 602 Section 2.7A.
- D. Wire joint reinforcement shall conform to *Joint Reinforcement for Masonry* or ASTM A 951.
- E. Joint Reinforcing wire shall be fabricated as shown on the drawings. Fabrication shall be by electric welding.
- F. Reinforcement shall be clean and free from loose rust, scale, dirt and any other coatings that may reduce bond.
- G. Metal Ties and Anchors:
Metal ties and anchors shall meet the requirements of TMS 602 Section 2.4D.
- H. Coatings. Reinforcement shall be clean at the time of installation, as hereinafter specified, and shall be uncoated. Galvanizing shall be in accordance with ASTM Standard A 153, Class B-2 for exterior walls.

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- 2.04** Specify the ASTM specification that the reinforcing steel must meet (ASTM A 615 or A 706) along with the reinforcing grade.

Typically ASTM A 615, Grade 60 reinforcing steel is used.

Horizontal steel in reinforced grouted masonry may be placed in the grout as the work progresses, and this is considered as adequate positioning for this steel, unless the designer has specified and considered in his design that the horizontal steel is the principal steel and hence must be held accurately in position.

- 2.04.D.** One must be careful that this type wire is used instead of a soft annealed wire. ASTM A 82 wire develops high strength and has dependable structural qualities which are required in structural work. The stiffness of this wire is a factor to aid in keeping it straight for proper placement in joints.

Joint reinforcing wire shall be straight and true when placed in the joints.

- 2.04.H** When galvanizing is required, delete "and shall be uncoated" from the first sentence. When there is no requirement for galvanizing, delete the entire second sentence.

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PART 3 – EXECUTION

3.01 PREPARATION

A. Materials:

1. Masonry materials at the job site shall be stored off the ground to ensure they are kept clean and protected from the elements.
2. All masonry units shall be sound, free of cracks or other defects that would interfere with the proper placing of the unit or impair the strength of construction. Minor cracks incidental to the usual method of manufacture or minor chipping resulting from customary method of handling and shipping and delivery shall not be deemed grounds for rejection.
3. Reinforcing bars shall be free of kinks or bends except for bends detailed on the drawings. Remove any loose rust, ice, oils and other deleterious coatings from the reinforcing steel.

B. Layout and Foundation:

1. If site conditions or layout is in any way improper, masonry work should not begin until cleared by governing authority.
2. Foundation shall be level and at correct grade so that the initial bed joint shall not be less than $\frac{1}{4}$ inch nor more than $1\frac{1}{4}$ inch.
3. Surface of foundation shall be clean and free of laitance and other deleterious materials.
4. When a foundation dowel does not align with a vertical cell, it may be bent to a slope of not more than 1 inch horizontally to 6 inches vertically. Remove dowels which do not align properly and replace with new bars of equal capacity.

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3.01.A Masonry materials must be stored properly to ensure they will remain clean and structurally sound.

3.01.B.2 The foundation must be brought into proper alignment either by chipping or by placing additional concrete or possibly by cutting the masonry units to fit.

3.01.B.4 Dowels may be replaced with new dowels dry packed or epoxied into place.

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3.02 INSTALLATION OF MASONRY UNITS:

A. General

1. All masonry units shall be laid true, level, plumb and in uniform coursing in accordance with the drawings. All corners and angles shall be square unless otherwise indicated on the drawings.
2. Unless otherwise specified or shown on the drawings, units shall be laid in running bond.
3. Use masonry saws to cut and fit masonry units.
4. Concrete masonry units shall not be wetted unless otherwise approved.
5. Adjust masonry units into final position while mortar is soft and plastic. If units are displaced after mortar has stiffened, remove the mortar, clean the joints and units and relay the units with fresh mortar.

B. Protection of Work:

1. Protect masonry surfaces from mortar and grout droppings.
2. Cover the top of partially completed walls when work is not in progress unless dry weather is expected. Extend covers minimum of 2 feet down both sides of the wall and securely hold the cover in place. Provide additional protection of the masonry work as required in this specification for extreme weather conditions.

3.02.A.1 Specifier may include tolerance requirements for masonry work and positioning of reinforcing steel.

3.02.A.2 Masonry is typically laid in running bond. If a special pattern is required, specify it here.

3.02.B.2 Protection of masonry work is particularly important if it is subjected to inclement weather, either rain or snow.

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C. Mortar Joints:

1. The initial mortar joint at the foundation shall not be less than $\frac{1}{4}$ inch nor more than $1\frac{1}{4}$ inch in thickness. Provide full mortar coverage on the bed joint at the foundation except that mortar shall not project into cells to be grouted.
2. Nominal mortar joint thickness shall be $\frac{3}{8} \pm \frac{1}{8}$ inch.
3. Mortar joints shall be straight, clean and uniform in thickness.
4. Head and bed joints of hollow units shall be filled with mortar for the thickness of the face shell. Solid units shall have full head and bed joints.
5. Provide tooled concave mortar joints for all exposed below grade masonry. Walls which are to be plastered shall have flush cut or sacked mortar joints.
6. Unless otherwise specified or noted on the drawings, all mortar joints shall be tooled with a concave surface. Tooling shall be done when the mortar is partially set but still sufficiently plastic to bond. All tooling shall be done with a tool that compacts the mortar.
7. If it is necessary to remove a unit after it has been set in place, the unit shall be removed from the wall, cleaned and set in fresh mortar.
8. Control joints shall be placed and constructed as shown on the drawing. Keep these joints clean from mortar droppings and other debris.

3.02.C.5 and C.6 Concave tooled joints provide the best weather resistance and strength and are therefore used widely. Specify if another joint type is desired. (A V-joint accents the horizontal coursing and provides good weather resistance. Consider in lieu of a raked joint.)

3.02.C.8 Proper location and detailing of control joints should be given on the drawings to ensure allowance for movement or shrinkage due to moisture and temperature changes.

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3.03 BUILT-IN WORK:

- A. Install bolts, anchors, nailing blocks, inserts, frames, vents, flashings, conduits and other built-in items as masonry work progresses.
- B. Solid grout all spaces around built-in items unless otherwise noted on the drawings.

3.04 INSTALLATION OF REINFORCING STEEL:

- A. Reinforcing shall be placed as detailed on the drawings and in accordance with TMS 602 Section 3.4B. Horizontal bars may rest on the cross web of hollow units.
- B. Tolerances for the placement of reinforcing steel in walls and flexural members shall be as follows:
 - 1. $\pm \frac{1}{2}$ inch for d equal to 8 inches or less.
 - 2. ± 1 inch for d equal to 24 inches or less but greater than 8 inches.
 - 3. $\pm 1 \frac{1}{4}$ inches for d greater than 24 inches.
 - 4. ± 2 inches for longitudinal location of reinforcement.
- C. Clearance between reinforcing steel and the surface of the masonry shall not be less than $\frac{1}{4}$ inch for fine grout and $\frac{1}{2}$ inch for coarse grout.
- D. Horizontal joint reinforcement shall be fully embedded in mortar with a minimum $\frac{5}{8}$ inch between the joint reinforcement and the exposed surface. Mortar joints with wire reinforcement shall be at least as thick as twice the diameter of the wire.

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- 3.04.B** These tolerances are in accordance with the requirements of the TMS 602 Section 3.4B.11.

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- E. Reinforcing bars and wire joint reinforcing shall be lapped as shown on the drawings.

3.05 GROUTING:

Masonry work shall be grouted as noted on the drawings and Section 04102.

3.06 POINTING AND CLEANING:

- A. Point and tool any holes in mortar joints to produce a uniform, tight joint.
- B. Cement, mortar and grout stains shall be removed from all surfaces.
- C. Architectural concrete masonry shall be left clean at the completion of the project.
- D. At the conclusion of masonry work, the mason contractor shall remove scaffolding and equipment used in the work along with all debris, refuse and surplus masonry materials from the premises.

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3.05 See Guide Specification for Grout

3.06.A Proper pointing of bee holes and line pin holes reduces the possibility of water penetration.

3.06.B Care should be taken to keep the work clean during construction and this will reduce the clean up work at the end of the masonry construction.

3.06.C Architectural Concrete Masonry is defined as masonry work to be exposed to view and coated with a clear water repellent.

The Specifier should specify the preferred method of cleaning the block surface (such as high pressure water cleaning or light abrasive blast cleaning, etc.). Note that specific instructions on the application of these methods is required to avoid etching or discoloring the concrete masonry units. Contact your concrete block supplier or mason contractor for specific cleaning information.

Do not use muriatic acid to clean architectural concrete masonry. It is advisable to test clean a small inconspicuous location before proceeding with cleaning the entire wall.

When using a cleaning solution:

- Apply the solution using low pressure (50 psi max).
- Pressure water rinse using 800-1000 psi.

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3.07 WATERPROOFING:

Upon completion of the cleaning operations, and their approval by the architect, apply _____ water repellent coating manufactured by _____ in strict accordance with Section 07 _____ and the Manufacturer's installation instructions.

END OF SECTION

NOTES TO SPECIFIER

When sweep sandblasting:

- Use a maximum pressure of 100 psi.
- Use #60 grit for smooth texture concrete block.
- Use #20 and #60 grit mix for split face block.

3.07

Coating may be specified here or in a separate section. Coating choices include opaque materials such as latex paint or elastomeric coatings; or clear coatings such as siloxane water repellent.

Specify an applicator with a minimum five years successful experience and approved by coating manufacturer.