



SECTION 720

MECHANICALLY STABILIZED EARTH WALL SYSTEMS

720.1 Description. This work shall consist of furnishing and constructing mechanically stabilized earth wall systems in accordance with these specifications, as shown on the plans or as directed by the engineer.

720.2 Material. All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Section
Concrete	501
Select Granular Backfill for Structural Systems	1010
Geotextile	1011
Miscellaneous Drainage Material	1013
Reinforcing Steel for Concrete	1036
Resin Anchor Systems	1039
Mechanically Stabilized Earth Wall System Components	1052

720.2.1 Whenever a wall system is located adjacent to and within ten feet of the limits of a permanent roadway, the steel reinforcement used in the concrete elements of the wall system shall be epoxy coated. This requirement will not apply to soil reinforcement and corresponding attachments used for connecting the reinforcement to the wall system units.

720.2.2 Reinforcement for wall system units shall be either Grade 60 deformed bars or an equivalent steel welded wire reinforcement. Reinforcement for coping or top cap units shall be Grade 60 deformed bars.

720.2.3 Joint material for large block wall systems shall be used in accordance with the wall manufacturer's recommendations.

720.2.4 The unit fill that is used for small block wall systems shall consist of a granular backfill in accordance with Gradation D or E of [Sec 1005](#).

720.2.5 Class B or B-1 air entrained concrete shall be used for the coping or top cap units used for the wall system. Class B or B-1 concrete shall be used for cast-in-place concrete leveling pads used for the wall system.

720.3 Design Requirements.

720.3.1 Only the mechanically stabilized earth wall systems shown in the bridge prequalified products listing will be allowed for use by the contractor. The bridge prequalified products list may be obtained through Bridge or MoDOT's web site. Any deviations from the prequalified wall system details previously submitted to Bridge shall be specifically outlined in the cover letter submitted with the design plans, details and computations.

720.3.2 Small block wall systems will be permitted for uses where the wall height does not exceed ten feet. This limit may be exceeded up to a maximum height of 12 feet to accommodate peaks in the wall or to accommodate lengths of the wall that do not exceed more

than ten percent of the total wall length. The height of the wall will be determined by measuring from the top of the concrete leveling pad to the top of the cap on the wall.

720.3.3 The contractor shall submit six complete sets of the manufacturer's design plans, details and computations for each individual wall structure to the engineer. All submitted information shall be clear and complete, and thoroughly checked before the information is submitted. All submitted information shall be legible and of sufficient contrast to be suitable for archiving in accordance with MoDOT's current practice for archiving. Submitted information determined to be unsuitable for archiving purposes will be returned for corrective action.

720.3.4 The contractor will be solely responsible for the content of the design plans, details and computations that are submitted, and for the performance of the wall system. The contractor shall be solely responsible for ensuring that the information submitted by the manufacturer is in accordance with all contract plans and specifications and with the wall system used. Completed design plans shall contain all material, fabrication and construction requirements for erecting the wall system complete in place. The completed design plans shall show the longitudinal and lateral layout of the drainage systems used for the wall system. The contractor shall be responsible for the internal and external stability of the structure including compound stability. Overall global stability will be the responsibility of the engineer.

720.3.5 All design plans, details and computations submitted for distribution shall be signed, sealed and stamped in accordance with the laws relating to architects and professional engineers (Chapter 327, RSMo).

720.3.6 Mechanically stabilized earth wall systems shall be designed in accordance with the AASHTO specifications shown on the plans and in accordance with additional publications or specifications referenced within the AASHTO specifications. The seismic performance category, angle of internal friction for the selected granular backfill for structural systems and other design requirements shown on the plans shall be incorporated into the design of the wall system.

720.4 Construction Requirements.

720.4.1 Small Block Wall Systems.

720.4.1.1 The contractor shall use a unit fill to fill the voids of the blocks for the wall system. This unit fill shall extend a minimum distance of 12 inches beyond the extreme back face of the wall system. Each course of the wall system shall have the unit fill in place before the next course of the wall system is placed.

720.4.1.2 Precast top cap units shall be used on small block wall systems. The top cap units shall be permanently attached as shown on the plans, utilizing either a resin anchor system or an equivalent detail.

720.4.1.3 Any equivalent details used shall be part of the prequalified mechanically stabilized earth wall system details on file for the manufacturer of the wall system.

720.4.2 Large Block Wall Systems.

720.4.2.1 A Class 1 geotextile filter cloth shall be placed between the wall and the select granular backfill for structural systems at all joints between the individual wall system units.

720.4.2.2 Precast or cast-in-place coping shall be placed on large block wall systems in accordance with the design plans. Capstone may be used in lieu of coping whenever coping is specified on the design plans. When coping or capstone is used, the maximum distance between construction joints shall be 20 feet. The joints for coping or capstone should align with the vertical joints in the MSE wall face.

720.4.3 Drainage Requirements. A drainage system shall be provided at the base of the wall system near the facing elements and at the interface of the select granular backfill for structural systems and the retained backfill. The drainage system shall consist of a perforated pipe wrapped in a Class 2 geotextile to prevent clogging of the perforations. The pipe shall be placed in such a manner that water drains freely from the pipe. When the wall length is such that the slope of the pipe becomes excessive in the engineer's judgment, lateral drain pipes shall be installed underneath the concrete leveling pad.

720.4.4 Foundation Preparation. The foundation for the wall system shall be graded level for a width equal to or exceeding the length of the reinforcing strips, or as shown on the plans. Prior to wall construction, the foundation, if not on rock, shall be compacted as directed by the engineer. Any foundation soils found to be unsuitable shall be removed and replaced, as directed by the engineer.

720.4.5 Leveling Pad. An unreinforced cast-in-place concrete leveling pad shall be provided at the foundation level for each base unit of the wall system. The leveling pad shall be built to the elevations shown on the plans and shall not be raised in elevation to allow for the use of a particular wall system. The leveling pad shall be built a minimum width of 12 inches and a minimum depth of 6 inches. The concrete on the leveling pad shall be cured a minimum of 12 hours before any of the wall system panels are placed.

720.4.6 Batter Requirements. Wall systems shall be built with some inward batter, as determined by the wall system manufacturer, to accommodate the horizontal movement created by the placement and compaction of selected granular backfill for structural systems. Facing elements out of alignment shall not be pulled or pushed into proper place, as that may cause damage to the facing element or soil reinforcement strips. If misalignment occurs, the select granular backfill for structural systems and the soil reinforcement strips shall be removed and the facing elements reset to the proper alignment.

720.4.7 Select Granular Backfill for Structural Systems Placement.

720.4.7.1 Select granular backfill for structural systems shall be placed concurrently with the placement of the retained backfill. The placement of the select granular backfill for structural systems shall closely follow the erection of each course of the wall system and shall be placed in such a manner to avoid any damage or disturbance to the wall material or any misalignment of the facing elements of the wall system. Any wall system material that becomes damaged or disturbed during the installation of the wall system shall be removed, replaced or corrected at the contractor's expense, as directed by the engineer. Whenever placement of the select granular backfill for structural systems results in the wall facing system being misaligned or distorted outside the limits of this specification, the contractor shall correct the misalignment or distortion as directed by the engineer.

720.4.7.2 The select granular backfill for structural systems shall be compacted in accordance with Sec 203, with the following exceptions:

(a) The minimum density shall be no less than 95 percent of maximum density, determined in accordance with AASHTO T 99.

(b) When the material used contains more than 30 percent retained on the 3/4-inch sieve, a method of compaction consisting of at least four passes by a heavy roller shall be used.

(c) The moisture content of the material prior to and during compaction shall be uniformly distributed throughout each layer. The placement moisture content shall be no lower than three percentage points less than the optimum moisture content and shall be no more than the optimum moisture content.

(d) Compaction within 3 feet of the back face of the wall system shall be achieved by at least three passes of a lightweight mechanical tamper, roller or vibratory system.

(e) The contractor shall ensure that runoff within the wall system construction site is directed away from the wall facing during construction, and that runoff from adjacent areas of the general construction site is directed such that runoff does not enter the wall system construction site.

(f) Class 1 geotextile material shall be placed between the select granular backfill for structural systems, and the retained backfill and over the top of the select granular backfill for structural systems to prevent piping of in-situ soil into the wall system.

(g) Tamping-type (sheep's foot) rollers shall not be used for compaction of the select granular backfill for structural systems.

720.4.7.3 The select granular backfill for structural systems shall be initially placed parallel to the wall system, and at the rear and middle of the soil reinforcement strips, and then moved toward the facing elements of the wall system. Construction equipment shall at no time come in direct contact with the soil reinforcement strips. Each course or layer shall be compacted up to or slightly above the location of the next connection for the reinforcement strips prior to placing the next layer of reinforcement strips as designated in the erection sequence provided by the manufacturer of the wall system.

720.4.8 Construction Tolerances.

720.4.8.1 Wall systems shall be built in accordance with the dimensions and elevations specified on the plans and in accordance with the requirements of the system manufacturer. Alignments shall be maintained within the following dimensional tolerances:

Item	Tolerance
Final Horizontal Joint Gaps Between Adjacent Facing Panels (Large Block Walls)	± 1/8 in.
Final Vertical Joint Gaps Between Adjacent Facing Panels (Large Block Walls)	± 1/4 in.
Final Joint Gaps Between Adjacent Modular Block Units (Small Block Walls)	± 1/4 in.
Vertical and Horizontal Alignment of Facing Elements (All Wall Systems)	± 1/16 in. per ft
Soil Reinforcement Strip Elevations (All Wall Systems)	± 1 in.

720.4.8.2 Vertical alignments shall be measured along a theoretical vertical line established from the top of the wall system to the base of the wall system. For small block walls that have

a built-in setback, the alignment shall be measured along the theoretical vertical line and the straight line that describes the horizontal setback.

720.4.9 Technical Assistance. The contractor shall be responsible for having a technical advisor from the wall system manufacturer available for assistance during the installation of the wall system.

720.5 Method of Measurement.

720.5.1 Measurement of mechanically stabilized earth wall systems will be made to the nearest square foot. The quantity to be paid will be measured from the wall outline as shown on the plans. No adjustments in the measured quantity will be permitted for additional wall area required to meet the minimum wall elevations shown on the plans for any particular wall system.

720.5.2 Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

720.5.3 No measurement will be made for required excavation for placement of the leveling pad for the wall system. All other excavation required for the construction of the wall system will be included in roadway items.

720.6 Basis of Payment. The accepted quantity of mechanically stabilized earth wall systems, complete in place, will be paid for at the contract unit price for each of the pay items included in the contract.