Bureau of Materials
Materials Approval Procedures

MAP Number: **116-15**

Effective Date: April 1, 2015

Approved By: *Eileen Sheehy*

PROCEDURE FOR APPROVAL OF MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALL SYSTEMS

PURPOSE:
To establish a procedure to approve MSE Retaining Wall Systems for addition to the NJDOT Bureau of Material's Qualified Products List (QPL).

REFERENCES:
New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction
Section 513 – Retaining Walls
Section 904.02.02 – Precast Concrete Retaining Walls
AASHTO LRFD Bridge Design Specifications
NJDOT Bridges and Structures Design Manual.

PROCEDURE:

A. Manufacturer's Request for Approval.

The manufacturer shall request in writing the approval of the MSE Retaining Wall System. To be qualified as a MSE Retaining Wall System, the wall system shall meet the definition that is specified in Subsection 11.10.1 of the *AASHTO LRFD Bridge Design Specifications*. The following information shall be included in the request for approval:

1. The name, address and contact information for the manufacturer.
2. The name or designation of the MSE Retaining Wall System that is to be evaluated.
3. Information as required in the attached checklist.

Mail the request for approval to the following:

Mailing Address (USPS):
Manager, Bureau of Materials (Thiokol Bldg. 4)
New Jersey Department of Transportation
P.O. Box 600
Trenton, NJ 08625-0600

Street Address (UPS, Fed Ex, etc.):
Manager, Bureau of Materials (Thiokol Bldg. 4)
New Jersey Department of Transportation
930 Lower Ferry Road
West Trenton, NJ 08628

B. Bureau of Structural Engineering Review.

The Bureau of Structural Engineering will review the manufacturer's submittal for completeness according to the checklist. If the submittal is incomplete, it will be rejected. The Bureau of Structural Engineering will review the design criteria to verify that it meets AASHTO LRFD Bridge Design Specifications and NJDOT design parameters. The Bureau of Structural Engineering will make the final determination on the approval of the wall system for addition to the QPL.

PROJECT ACCEPTANCE REQUIREMENTS:
Qualification of a MSE Retaining Wall System and its addition to the QPL does not constitute a blanket approval of the wall system. On a project to project basis, the final design of the wall system shall be submitted for approval according to the Working Drawing procedures of the *NJDOT Standard Specifications.*

DISQUALIFICATION:
The ME may remove a wall system from the QPL for non-conformance with design and construction specification requirements or for a documented history of poor field performance. The manufacturer shall notify the ME, in writing, of any change in product formulation. Failure to notify the ME of changes in product formulation will result in disqualification.

REQUALIFICATION:
The ME will reevaluate a product which has been disqualified and removed from the QPL only after submission of a formal request along with acceptable evidence that the problems causing the disqualification have been resolved.

The ME may require the manufacturer to requalify the product for any of the following reasons:

1. To ensure that obsolete wall systems are not kept on the list, the ME may request written confirmation from the manufacturer that the wall system is still available and has not changed formulation. Failure to respond to the Bureau's written request will result in the product being removed from the list.
2. If the formulation of the wall system has changed, the ME may require that the new formulation be requalified.
3. If the NJDOT Standard Specifications, AASHTO LRFD Bridge Design Specifications, or NJDOT Bridges and Structures Design Manual change, or if any referenced ASTM or AASHTO specifications change, the ME may require requalification to ensure that the product meets new criteria.

Submittal Check List

MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALL SYSTEM

INSTRUCTIONS

To expedite the evaluation of the MSE Retaining Wall system, applicants must furnish information as indicated in the Checklist. The Checklist items should be referenced to assure that the submittal package includes all of the listed information. The submittal package should be organized according to the numbered items in the Checklist. The completed Checklist should be included with the submitted package.

Part One:

Identify material specification designations that govern the materials that are used in furnishing the wall system components. Provide product literature that describes the wall system, its components and adequately addresses the checklist items. Identify precast concrete facilities that have experience with fabricating the concrete components of the wall system.

1.1 Concrete Facing Unit

Yes	No	N/A	
___	___	___	standard dimensions and tolerances
___	___	___	joint sizes
___	___	___	concrete strength (f”c = 5000 psi minimum)
___	___	___	wet cast concrete % air (range)
___	___	___	moisture absorption (percent by weight)
___	___	___	scaling resistance
___	___	___	freeze thaw durability
___	___	___	facing unit to facing unit shear resistance
___	___	___	bearing pads (joints)
___	___	___	spacers (pins, etc.)
___	___	___	joint filter requirements: geotextile or graded granular
___	___	___	aesthetic choices (texture, relief, color, graffiti treatment)
___	___	___	other facing materials

1.2 Earth reinforcement

1.2.1 Inextensible (Metallic)

Yes	No	N/A	
___	___	___	type identified (welded wire, steel bars, etc.)
___	___	___	ultimate and yield strength of steel
___	___	___	minimum galvanization thickness
___	___	___	corrosion resistance test data

1.2.2 Extensible (Geosynthetics)

Yes	No	N/a	
___	___	___	polymer type and grade
___	___	___	HDPE: resin type, class, grade & category
___	___	___	minimum intrinsic viscosity correlated to number of average molecular weight and maximum carboxyl end groups
___	___	___	weight per unit area
___	___	___	minimum average roll value for ultimate strength
___	___	___	creep reduction factor for 75 and 100 year design life, including effect of temperatures
___	___	___	durability reduction factor (chemical, hydrolysis, oxidation)
___`	___	___	additional durability reduction factor for high biologically active environments
___	___	___	installation damage reduction factor for range of backfill (select backfill, course aggregate)
___	___	___	UV resistance

1.3 Facing Connection(s)

Yes	No	N/A	
___	___	___	mode (structural, frictional or combined)
___	___	___	connection strength as a % of reinforcement strength at various confining pressures for each reinforcement product and connection type submitted
___	___	___	composition of devices, dimensions, tolerances
___	___	___	full scale connection test method/results

1.4 Range of Backfill

Yes	No	N/A	
___	___	___	soil classification, graduation, unit weight, friction angle for reinforcement method
___	___	___	soil classification, graduation, unit weight, friction angle for facing type

1.5 Leveling Pad

Yes	No	N/A	
___	___	___	cast-in-place
___	___	___	precast
___	___	___	granular

1.6 Drainage Elements

Yes	No	N/A	
___	___	___	weep holes
___	___	___	base
___	___	___	backfill
___	___	___	surface

1.7 Coping

Yes	No	N/A	
___	___	___	precast
___	___	___	precast attachment method/details
___	___	___	cast-in-place

1.8 Traffic Barrier

Yes	No	N/A	
___	___	___	precast
___	___	___	cast-in-place

1.9 Connections to Appurtenances

Yes	No	N/A	
___	___	___	precast

Part Two: Design

Clearly identify that the design conforms to the AASHTO LRFD Bridge Design Specifications. Identify design assumptions and procedures with specific references (e.g., design code sections) for each of the listed items.
(Note: When designing the moment (anchor) slab for a concrete barrier installation, the design of the barrier section may be based on a 10 kip transverse force that is distributed over a 5 feet section of barrier. For stability analysis, a 20 feet length of moment slab to counteract sliding and overturning shall be used.)

2.1 AASHTO LRFD Provisions

Yes	No	N/A	
___	___	___	sliding
___	___	___	overturning (including traffic impact)
___	___	___	bearing resistance
___	___	___	overall stability
___	___	___	seismic
___	___	___	movement at service limit state
___	___	___	passive resistance and sliding
___	___	___	safety against structural failure
___	___	___	drainage

2.2 Performance Criteria

Yes	No	N/A	
__	___	___	erection tolerances
__	___	___	horizontal/vertical deflection limits

2.4 Drawings

Provide representative drawings (may be on 8 ½ x 11 paper size) showing all standard details along with any alternate details, including the following:

Yes	No	N/A	
___	___	___	details for wall elements
___	___	___	connection details

___ ___ ___ appurtenance connection details

__ ___ ___ obstruction detail (utilities, parapet/sidewalk connection, light standard and box)

___ ___ ___ corrosion/durability protection details

___ ___ ___ construction details

2.5 Specifications

Provide sample specifications for:

Yes No N/A

___ ___ ___ wall system component materials

2.6 Example Calculations

Provide sample calculations for the design items listed in Part 2.1 above.

Yes No N/A

___ ___ ___

2.7 Computer Support

If a computer program is used for design or distributed to customers, provide representative computer printouts of design calculations for the above typical applications demonstrating the reasonableness of computer results.

Yes No N/A

___ ___ ___

Part Three: Construction

Provide the following information related to the construction of the system:

3.1 Fabrication of Facing Units

Yes No N/A

___ ___ ___ curing methods

___ ___ ___ concrete surface finish requirements

3.2 Field Construction Manual

Provide a documented field construction manual describing in detail and with illustrations as necessary the step-by-step construction sequence, including requirements for:

Yes	No	N/A	
___	___	___	foundation preparation
___	___	___	special tools required
___	___	___	leveling pad
___	___	___	facing erection
___	___	___	facing batter for alignment
___	___	___	steps to maintain horizontal and vertical alignment
___	___	___	retained and backfill placement/compaction
___	___	___	erosion mitigation
___	___	___	all equipment requirements

3.3 Contractor or Subcontractor Prequalification Requirements

List any contractor or subcontractor pre-qualifications.

Yes	No	N/A
___	___	___

Part Four: Performance

Provide the following information related to the performance of the system:

4.1 Project Performance History

Provide a well-documented history of performance (with photos, where available), including:

Yes	No	N/A	
___	___	___	oldest
___	___	___	highest
___	___	___	projects experiencing maximum measured settlement (total and differential) measurements of lateral movement/tilt
___	___	___	demonstrated aesthetics
___	___	___	maintenance history