

**MAINE DEPARTMENT OF TRANSPORTATION  
PROPRIETARY RETAINING WALL SYSTEM  
PRE-APPROVAL PROCESS**

**PURPOSE**

This document is to provide a systematic process which enables the Maine Department of Transportation (MaineDOT) to pre-approve proprietary retaining wall systems. The document is based on FHWA publications and guidelines, and the AASHTO LRFD Bridge Design Specifications, and provides information for the consistent selection, review and acceptance of proprietary retaining walls.

This pre-approval process is used to update and maintain an approved list of proprietary walls and special provisions for wall systems.

A checklist of the various items needed for technical consideration and the required submittal for acceptance of wall systems is given below.

**PRE-APPROVAL**

Not all wall systems are suitable for Department projects. Department pre-approval of different wall systems prior to preparation of contract documents eliminates the use of substandard systems and systems that have not been adequately evaluated. A pre-approved list also provides contractors a more concise description of the proposed wall system(s) and hence a more accurate bid. The criteria for appointment to the Department's Qualified Product List are as follows:

- 1.1 The supplier must have a Department approved manufacturing facility to fabricate the necessary wall components.
- 1.2 The wall system has a sound theoretical and practical basis for the Department to evaluate its claimed performance.
- 1.3 Past experience in building and performance of the proposed system.
- 1.4 Evaluation by FHWA's HITEC (Highway Innovative Technology Evaluation Center), if available.
- 1.5 Documentation and design calculations demonstrating the wall system's compliance with:
  - a) AASHTO LRFD Bridge Design Specifications 5<sup>th</sup> Edition, 2010 (herein referred to as LRFD),
  - b) FHWA-NHI-10-024, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume I, November 2009,
  - c) FHWA-NHI-10-025, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes – Volume II, November 2009,
  - d) FHWA-NHI-09-087, Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, November 2009,
  - e) MaineDOT Bridge Design Guide, 2003, with updates through 2010.
- 1.6 The supplier or wall manufacturer should submit a package that contains the following items:

- a) How and when the wall was developed, system theory, laboratory and field experiments which support the theory or wall design.
- b) Practical applications with descriptions, photos and a list of users including names, addresses and phone numbers.
- c) List of state departments of transportation that have pre-approved the proposed wall system including names, addresses and phone numbers.
- d) Heights, loading, surcharge, and backslope that the supplier is seeking approval for.
- e) Details of wall elements, analysis of structural elements, special designs for traffic barriers or guardrail posts, drainage details, minimum embedment for frost protection, abutments and corner and skew details.
- f) Design calculations demonstrating the stability of the wall against sliding, overturning, eccentricity, bearing resistance, reinforcement pullout, reinforcement rupture, and reinforcement/facing connection failure, for all those wall heights and loading conditions (vehicle impact on guardrail, traffic surcharge) for which the designer-supplier requests pre-approval by the Department, in accordance with the codes and documents listed in paragraph 1.5, above.

Design calculations that consist of computer program generated output shall be supplemented with at least one hand calculation and graphic demonstrating the design methodology used. Design calculations shall provide thorough documentation of the sources of equations used and material properties. The wall calculations shall be prepared and sealed by a Professional Engineer licensed in the State of Maine.

- g) Estimated design life, corrosion design, procedures for field and laboratory evaluation of corrosion, corrosivity, durability and long term performance including special requirements.
- h) Maximum tolerable differential settlements within the wall and between the wall facing elements.
- i) Sample material and construction quality control specifications showing material type, quality, certifications, field testing, acceptance and rejection criteria and installation procedures.
- j) Facing panel or block dimensions, tolerance, geometry and weight, details of how they fit together; shear strength and long term durability of alignment pins, shear lips; compressive strength, freeze thaw resistance and moisture absorption characteristics of facing blocks or panels.
- k) Laboratory test data for connection strength between soil reinforcement and facing elements and frictional resistance between soil reinforcement and backfill.
- l) For reinforcement for MSE walls - macrostructure, metals, coatings or polymers used; ultimate tensile strength; 10,000 hour creep test data at multiple load levels and temperatures; backfill requirements including shear strength, gradation and corrosivity: chemical, biological and microstructural degradation data that can be used to estimate long-term strength losses during the design life.

- m) A well-documented field construction manual describing in detail, with illustrations as needed, the step by step construction sequence.
- n) Typical unit costs per square foot of vertical face area, supported by data from actual projects given in b) above.
- o) Details of no-dig zones, warning markers or other protective measures.

The pre-approval submission will be reviewed by the Geotechnical Engineering staffs of the MaineDOT Highway Program, Bridge Program, and the Safety, Training and Research Office, with regard to the design, construction practicality and anticipated performance of the system. The MaineDOT Fabrication Unit also reviews the product specifications.

Based on the findings of the Department Review, wall systems will be granted a status of either “approved”, “not approved” or “trial use”. A wall system that adequately meets the criteria above, for those wall heights and loading conditions for which pre-approval was requested, will be labeled “approved” on the MaineDOT Qualified Products List. A wall system that does not adequately meet the criteria above, for those wall heights and loading conditions for which pre-approval was requested, will be granted a “not approved” status. Wall systems that do not adequately meet the criteria above may be granted a “trial status”. The maximum number and application of “trial status” walls that will be constructed, and the length of the trial use period, will be defined in a letter to the wall designer-supplier or provided on the MaineDOT Qualified Products List website.

## **VENDOR and DEPARTMENT RESPONSIBILITY**

Seven (7) submittals are required. Proprietary wall vendors shall send submittals to:

Product Evaluation Coordinator  
Maine Department of Transportation  
Safety, Training and Research Office  
16 State House Station  
Augusta, Maine 04333-016

*Figure 1 – Proprietary Retaining Wall Review Flowchart*, presents the organizational unit and necessary actions and tasks by that unit to select, coordinate and review proprietary wall systems. Tasks are summarized below:

### Product Evaluation Coordinator:

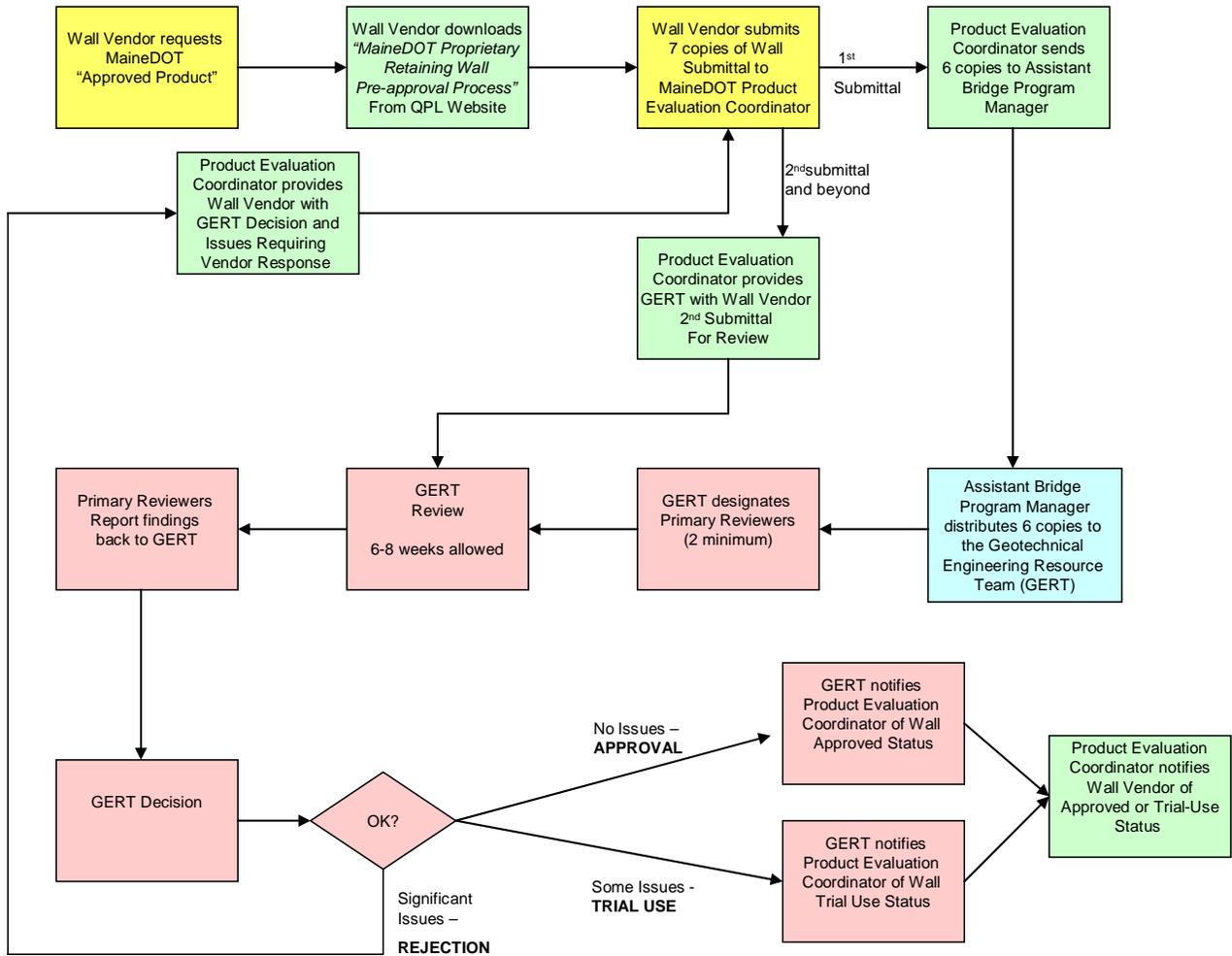
- Provides six copies to the Bridge Program, Assistant Program Manager (formerly Engineer of Design)
- Maintains MaineDOT Qualified Products List webpage
- Acts as the liaison between the Geotechnical Engineers Resource Team (GERT) and the Retaining Wall Vendor regarding acceptance status.

### Assistant Bridge Program Manager, MaineDOT Bridge Program:

- Distributes six copies of Vendor Submittals to the Geotechnical Engineers Resource Team (GERT)

Geotechnical Engineers Resource Team (GERT)

- Review of vendor wall submittals in accordance with this Pre-approval Process (6 to 8 weeks, per submittal, allotted for review).
- Reviews geotechnical design and construction aspects of wall supplier submission
- Expedites review of structural aspects of the wall system by a Bridge Program Structural Engineer
- Expedites review of mix design, materials and fabrication aspects of the wall supplier submittal by the Fabrications Unit
- Maintains retaining wall Standard Specifications and Special Provisions



**Figure 1.** Proprietary Retaining Wall Review Flowchart