

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT SUPPLEMENTAL REQUIREMENTSⁱ

Introduction

The Louisiana Department of Transportation (LaDOTD) maintains a list of approved supplier based retaining wall systems. The list is available on the LaDOTD website at http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Pavement_Geotechnical/MSE%20Walls/Forms/AllItems.aspx.

Wall vendor submittal requirements for requesting approval are stated in LaDOTD Approval Procedure for Supplier Based Retaining Wall Systems. This document is also available at website address noted above. The procedure is for Mechanically Stabilized Earth Wall (MSEW) systems and for other types of supplier based retaining wall systems. The approval process includes:

- Wall system supplier contacting the LaDOTD Retaining Wall Committee to arrange for receipt of a retaining wall system approval package.
- Submission of detailed package.
- Verbal presentation of the retaining wall system to the LaDOTD Retaining Wall Committee, with question and answer session on the detailed submittal package.

LaDOTD requires an IDEAⁱⁱ report as part of a supplier submittal package. Their submittal does require additional and some variation of the information listed on the IDEA protocols (available at <https://www.geoinstitute.org/special-projects/idea>). The required submittal items are organized under three categories – A, B, and C set of requirements. The IDEA report is required under Category B.

LaDOTD should contact the IDEA webmaster and update their report when their policies, etc. change. This supplemental requirements report is readily updateable, and a revision number and date should be noted.

Items to submit to LaDOTD to request approval of a wall system, in addition to an IDEA Evaluation Report, are listed on the following pages. Additional submittal requirements specific to MSE wall systems, including example design calculations and details, are listed. Note that LaDOTD will consider eliminating or requiring a partial submittal of the items under the C category portion of the submittal if the Technical Evaluation Report (Category B item) satisfactorily addresses the issues. Items that are addressed in an IDEA protocol that can be referenced to (i.e., supplement) in a LaDOTD specific submittal are noted within the following list. References to the current IDEA protocols are noted in brackets.

IDEA Protocols and Format

The LaDOTD list of Submittal Requirements under Categories A and B are reproduced on the following pages. Items that are addressed in an IDEA protocol that can be referenced to (i.e., supplement) in a LaDOTD specific submittal are noted within this list. References to the current IDEA protocols are noted in brackets. The protocol number (see Table 1) followed by protocol section are listed within the brackets.

Table 1. IDEA Wall System Evaluation Protocols

PROTOCOL NUMBER	TYPE	FACING	SOIL REINFORCEMENT
C1	MSE	Concrete modular block	Extensible
C2	MSE	Concrete modular block	Inextensible
C3	MSE	Precast concrete panel	Extensible
C4	MSE	Precast concrete panel	Inextensible
C5	MSE	Steel mat	Extensible
C6	MSE	Steel mat	Inextensible
C7	Gravity	Precast modular block	n/a

LaDOTD Submittal Requirements

The following items are to be submitted, in addition to an IDEA Evaluation Report for proprietary retaining wall systems. Provide the following additional information; following the order and with reference to the numbering system used.

- A. The supplier shall furnish the LaDOTD Retaining Wall Systems Committee, five (5) complete sets of full size standard construction drawings and notes. The supplier's standard wall details shall include the following:
 1. Construction of each type of structural component (i.e. panel, block, struts, etc.) to be used in wall construction
 2. Location and type of reinforcement anchorage system
 3. Connection of reinforcement to permanent and temporary facing
 4. Passage of wall components and/or reinforcement around piling, drainage, structures, etc.
 5. Construction, location, and the method of attaching appurtenances (barrier copings, barrier rails, traffic barriers, drainage structures, etc.) to the proposed retaining wall system in conformance with the details furnished in the Department's Geotechnical Engineering Design Guide No. 8, Mechanically Stabilized Earth Wall (MSEW) Design Guide.
 6. Other miscellaneous details

- C. Six (6) complete sets of submittal documents shall be furnished in a loose leaf binder, tabbed and arranged as follows:

Tab Letter	Topic/Description
A	Retaining Wall System History
B	Retaining Wall Design Methodology Design and Construction Limitations & Special Details
C	Computer Design Software and User's Manual
D	Design Case I - Level back slope w/Live Load
E	Design Case II - Level back slope w/Live Load and Foundation Obstruction at Abutment
F	Design Case III - 3H:1V Broken Back slope w/Live Load
G	Wall Component Structural Design
H	Laboratory/Field Testing Documentation
I	Construction Manual

Note that the Department will consider eliminating or requiring a partial submittal of this portion of the submittal if the Technical Evaluation Report satisfactorily addresses the issues presented in this item. Information that addresses specific items listed under these tabs can be cross referenced to the IDEA report. Alternatively, information from an IDEA report can be directly pulled into a detailed information submittal to LaDOTD.

Therefore, items that are addressed in an IDEA protocol that can be referenced to in a LaDOTD specific submittal are noted within this list. References to the current IDEA protocols are noted in brackets. The protocol number (see Table 1) followed by protocol section are listed within the brackets.

1. Tab "A" shall contain a brief history of the retaining wall system including the following:
 - a. A Retaining Wall System Product Data sheet (see Attachment A) shall be required which briefly summarizes the retaining wall system.
 - b. Practical applications with descriptions and photographs.
 - c. Limitations and disadvantages of the retaining wall system.
 - d. A representative list of previously completed projects using the proposed retaining wall system. The list should include a variety of applications (i.e. traffic live load, bridge abutments, channel applications, etc.) Listed projects shall include the year built, location, design, method, maximum wall height, and the owner's address, telephone number, and contact person.
2. Tab "B" shall contain a description of the MSEW supplier's design methodology in accordance with the Department's Geotechnical Engineering Design Guide No. 8, Mechanically Stabilized Earth Wall (MSEW) Design Guide. Retaining wall systems not addressed by the Department's Geotechnical Engineering Design

Guide No. 8 shall require full documentation of the supplier's retaining wall design methodology.

The following design issues and construction details shall also be addressed under this item:

- a. Height design limitations
 - b. Component selection
 - c. Subgrade settlement design limitations
 - d. Temporary facing details
 - e. Wall drainage issues
 - f. Foundation and other obstructions
 - g. Special designs and details
 - h. Field performance (i.e. limiting differential settlement, field wall batter, etc.)
3. Tab "C" shall be used for suppliers that have developed computer assisted design programs for analysis of the internal stability of the retaining wall system. As a requirement for retaining wall system acceptance, the supplier shall furnish a registered version of the supplier's computer program to the LADOTD along with any applicable usage licenses. Any changes to the program's source code as required by the Department shall be made prior to acceptance of the retaining wall system. The software user's manual documenting input/output and any design limitations inherent in the software shall also be furnished. Hand design calculations provided in Tabs "D", "E", and "F" shall be used to verify the computer program output. When computer program designs are provided in Tabs "D", "E", and "F", all hard copies shall be legible and shall be summarized for proper interpretation.
 4. Tab "D" shall have a complete set of, legible, hand design calculations for MSEW Case I shown in Figure 1. In addition to the hand calculations, computer generated designs shall also be included when applicable. See Attachment B for MSEW design criteria.
 5. Tab "E" shall have a complete set of, legible, hand design calculations for MSEW Case II shown in Figure 2. The wall reinforcement required for internal stability of MSEW Case I shall be modified to satisfy internal stability requirements when an MSEW is to be constructed with a single row of deep foundations at a bridge abutment. Foundation elements at abutments shall not be used to retain soil or as a soil reinforcement when analyzing the stability of the retaining wall. In addition to the hand calculations, computer generated designs shall also be included when applicable. See Attachment B for MSEW design criteria.

6. Tab "F" shall have a complete set of, legible, hand design calculations for MSEW Case III shown in Figure 3. In addition to the hand calculations, computer generated designs shall also be included when applicable. See Attachment B for MSEW design criteria.
7. Tab "G" shall contain complete, legible, hand calculations verifying the structural adequacy of each structural wall component to be incorporated into the supplier's wall system. Facing design shall include verification of the adequacy of the proposed facing element reinforcement connection system.
8. Tab "H" shall contain the Certification Package documenting the system design parameters used with the example MSEW designs (Tabs "D", "E", and "F") in accordance with the Department's Geotechnical Engineering Design Guide No. 8, Mechanically Stabilized Earth Wall (MSEW) Design Guide. **[IDEA Report – C1, C3, and C5: 1.2.4, 1.2.6, 1.2.7]**

Retaining wall systems not addressed by the Geotechnical Engineering Design Guide No. 8 shall be submitted with certified copies of all laboratory and field testing performed to establish/verify design values used in Tabs "D", "E", and "F" above. To be acceptable, test results must bear the legible signature and seal of the responsible engineer, the name and address of the testing agency, and a description of the test method employed. Tests performed using a recognized procedure of an established testing agency (AASHTO, ASTM, etc.) may be identified by procedure number only.

9. Tab "I" shall contain a well documented field construction manual describing in detail, and with illustrations where necessary, the step-by-step construction sequence. **[IDEA Report – C1 through C7: 3.1.2]**

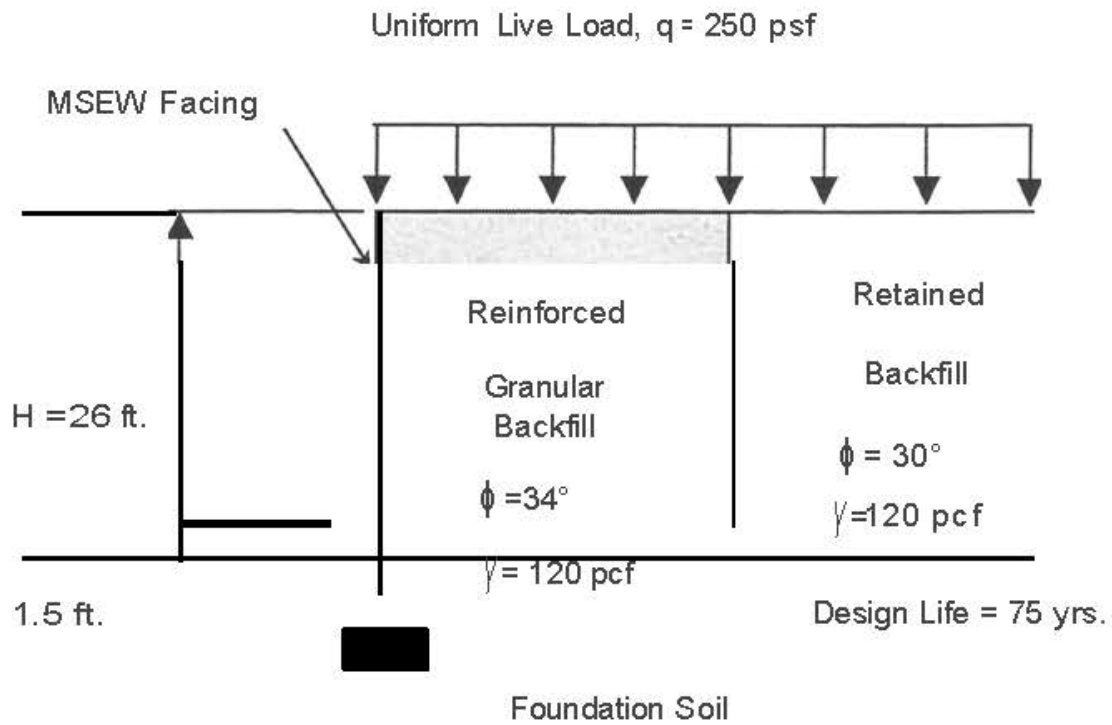


Figure 1. Level Backslope with Uniform Live Load (Case I)

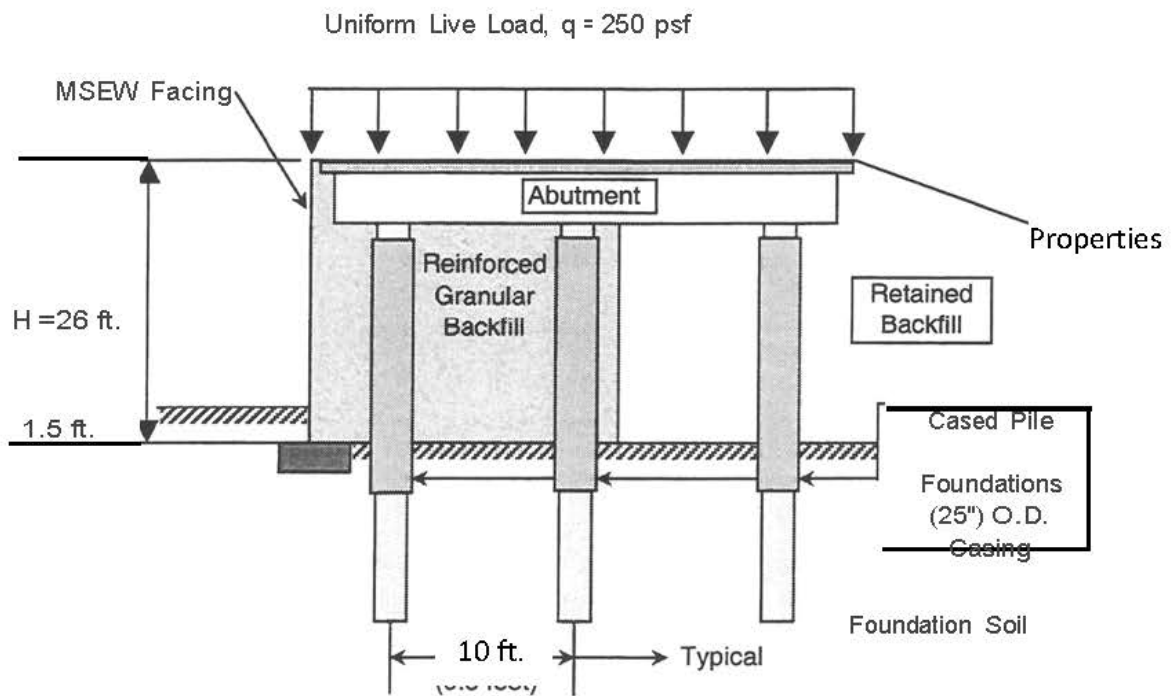


Figure 2. Level Backslope with Uniform Live Load & Cased Pile Obstructions (Case II)

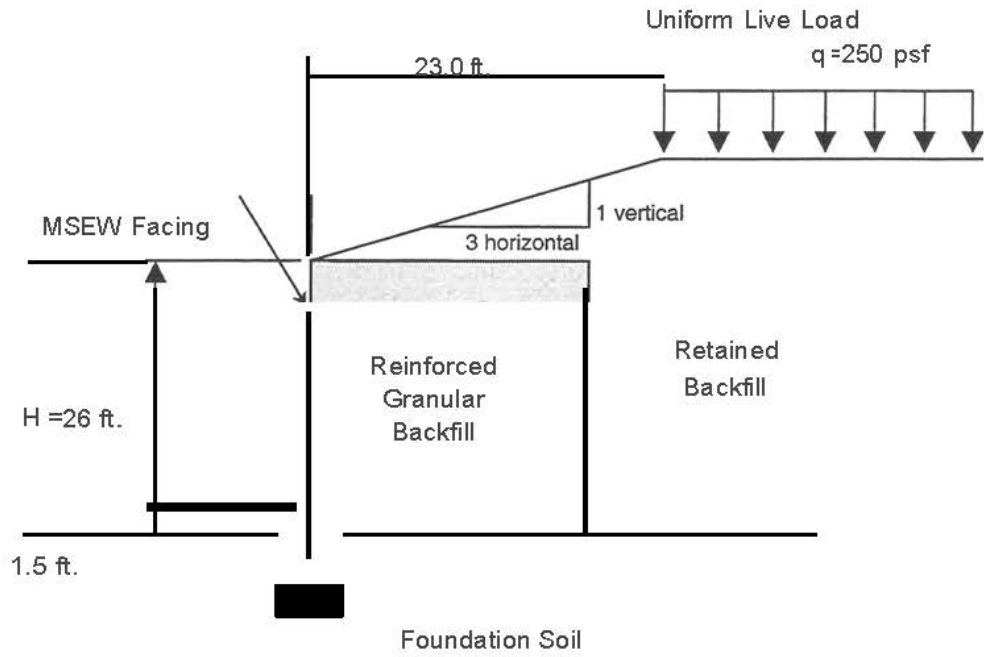


Figure 3. Broken Backslope (Case III)

Attachment A. Proprietary MSE Wall Summary Product Data

ATTACHMENT A

PROPRIETARY MSE WALL SUMMARY PRODUCT DATA

TRADE NAME: _____
Is the Trade Name Registered? Yes No Not Yet
Is the Trade Name Patented? Yes No Not Yet
Date patented: _____ Date expired: _____ Date applied for: _____

COMPANY: _____
 Proprietor Supplier Manufacturer Engineering Firm

Representative: _____
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____ Fax: _____

Brief description of product or components of system: _____

Recommended Uses: _____

Advantages: _____

Disadvantages: _____

Cost:	Typical installed cost (range)	\$ _____
	Typical materials only cost (range)	\$ _____
	Typical equipment only cost (range)	\$ _____
	Typical labor only cost (range)	\$ _____

FOR LADOTD USE ONLY			
(To be completed by LADOTD MSE Retaining Structures Committee)			
Product:	_____	Status:	_____
Initials:	_____	Date:	_____

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Attachment B. MSEW Design Criteria, Design Cases I, II, and III

Design Life:

75 years (permanent MSEW structure)

Estimated Settlement:

Maximum differential settlement = 1:200 (MSEW Identification)

Maximum settlement at (STA 0+00) = 3 inches

Reinforced Backfill Material:

Granular backfill

Internal friction angle = 34°

Wet unit weight = 120 pcf

Retained Backfill:

Internal friction angle = 30°

Wet unit weight = 120 pcf

Foundation Soils:

Cohesive material

Undrained shear strength – cohesion = 2000 psf

Drained shear strength – Internal friction angle = 30°

Ultimate bearing capacity = 10000 psf

External Stability:

Global Stability Safety Factor, $FS_{\text{overall}} = 1.3$

Sliding Stability Safety Factor, $FS_{\text{sliding}} = 1.5$

Overtopping Safety Factor, $FS_{\text{overtum}} = 2.0$

Eccentricity $\leq L/5$

Bearing Capacity Safety Factor, $FS_{\text{bearing}} = 2.5$

Internal Stability:

Pullout Safety Factor, $FS_{\text{po}} = 1.5$

Minimum Required Base Width, B_{Req} :

$B_{\text{Req}} = 19$ feet

ⁱ Report Ver 1, June 2021.

ⁱⁱ Current (May 2018) Approval Procedure for Supplier Based Retaining Wall Systems requires a HITEC evaluation report; that has now been replaced by IDEA evaluations and report.