262 Retaining Walls

262.1 General

This chapter describes the procedure to be used in the development of retaining wall plans. This chapter should be used in conjunction with the ***Structures Design Guidelines (SDG)***, the ***Structures Detailing Manual (SDM)***, and the applicable ***Standard Plans Instructions (SPI)***.

See ***FDM 215*** for guidance on roadside barrier requirements and the ***SDG, Chapter 6*** for retaining wall mounted traffic railing requirements. See ***FDM 222*** for pedestrian and bicycle rail requirements. See the ***SDG*** for the policy on retaining wall surface finishes.

Only Mechanically Stabilized Earth (MSE) walls that are included in the Approved Products List (APL) are allowed for permanent, temporary, and 2-phase applications. Precast walls other than MSE walls should be considered as an alternate when sufficient room for soil reinforcement is not available.

Standard Plans, Index 400 Series, 455 Series, 548 Series, and ***Indexes 521-600*** through ***521-640*** contain general notes and common details for retaining walls. See the applicable ***SPI*** for information on the use of these standards.

Using the site-specific geotechnical information, the structures Engineer of Record (EOR), in cooperation with the Geotechnical Engineer, will determine the appropriate wall type and its requirements. See the ***SDG***, ***Chapter 3*** for the Permanent Retaining Wall Selection Process.

For retaining walls greater than 5 feet in height, provide a 10-ft maintenance area (1:10 or flatter) in front of the wall face with suitable access for maintenance vehicles. See ***SDG Chapter 3*** for information regarding partial height walls. See ***FDM 210.6*** for additional roadside slope information.

The following sections refer to the structures plans submittal procedure. For projects where there are no bridges, the roadway EOR must adjust the procedure as required for the roadway project.

262.2 Retaining Wall Plans Submittal Procedures

On projects with retaining wall types not listed on the ***Approved Product List*** (***APL***) (C-I-P wall systems, permanent concrete and steel sheet pile walls, soldier pile walls, non-proprietary precast wall systems, complex wall systems, or project specific designs), the complete wall design and details are included in the plans by the EOR.

On projects with proprietary retaining wall systems listed on the APL, the EOR provides the Wall Control Drawings and the appropriate wall systems Data Tables in the plans.

The EOR selects which FDOT Wall Type (see ***SDG, Chapter 3***) is appropriate for the project and places this information in the notes associated with the Data Tables. The contractor then selects the APL listed retaining wall system to build based on the allowable wall types shown in the notes associated with the Data Tables and on the ***Standard Plans***. Proprietary retaining walls require shop drawings in accordance with ***FDM 152***.

Proprietary retaining wall design plans are not required in the contract plans for normal wall projects (see ***FDM 262.2.2***). If the proprietary walls are two-phased, include generic details for attaching the permanent facing (second phase) to the primary reinforcement in the contract plans. If spatial limitations require project specific details, or the wall is subject to unusual geometric or topographic features, include project-specific details in the contract plans. If the proprietary wall is experimental, it is required to have fully detailed design plans in the contract plans (see ***FDM 262.2.3***).

Provide an analysis with the 60% Structures Plans submittal meeting the requirements of ***SDG, Chapter 77*** when an existing MSE wall with metallic soil reinforcement will be widened or modified on a construction project and the existing soil reinforcement provides resistance for the proposed configuration. For wall projects without bridges, provide the analysis with the Phase II Submittal.

Modification for Non-Conventional Projects:
Delete the above paragraph and replace with the following: Unless otherwise shown in the RFP, provide an analysis with the 90% Submittal meeting the requirements of ***SDG, Chapter 7*** when an existing MSE wall with metallic soil reinforcement will be widened or modified on a construction project and the existing soil reinforcement provides resistance for the proposed configuration.

Prior to construction on projects utilizing proprietary wall systems, the contractor will submit, for approval by the EOR, shop drawings that are based on an ***APL*** listed wall system that is shown in the plans. Site-specific details for the wall construction will be included in these shop drawings.

The success of these methods for producing wall plans is highly dependent on complete, accurate and informative control plans. The importance of the Geotechnical Engineer's role in this scheme cannot be emphasized enough and is detailed in ***Geotechnical Design Manual, Chapters 3, 8, and 9***.

The Geotechnical Engineer's wall type recommendation must be presented in a report together with the results of field and laboratory testing and the reasoning for the recommendation. For proprietary walls, also include the following: external stability analyses, minimum soil reinforcement length versus wall height for external stability, recommended soil reinforcement type limitations if any (e.g., synthetic versus steel),

maximum bearing pressure for each wall height, and soil reinforcement length for each different wall height (2-ft increments).

The normal failure modes to be investigated are shown in ***SDG, Chapter 3***.

Procedures for developing retaining wall plans follow.

262.2.1 Non-Proprietary Retaining Walls

(1) Bridge Development Report (BDR) / 30% Plans:

The BDR must discuss and justify the use/non-use of non-proprietary retaining walls. If the use of these retaining walls is applicable to the site and economically justified, it may be the only design required or it may be an alternate to a proprietary design. Include Wall Control Drawings (as specified in ***SDM, Chapter 19***), cross sections, details and general notes in the 30% Plans submittal. Denote the location of drainage inlets, utilities, sign structures, lights, and barrier joints in the plans. See ***SDM, Chapter 19*** for more information.

(2) 30% Plans:

The 30% Plans must be submitted for approval and development of the plans continued towards the 90% Plans submittal.

(3) 90% Plans:

The 90% Plans submittal must be further developed to include, in addition to the information required for the 30% Plans, the information listed in ***SDM, Chapter 19***.

Modification for Non-Conventional Projects:
Delete ***FDM 262.2.1*** and replace with the following: **262.2.1 Non-Proprietary Retaining Walls** See ***SDG***, ***Chapter 3*** for wall selection requirements. Include Wall Control Drawings (as specified in ***SDM, Chapter 19***), cross sections, complete wall details and general notes in the Component Plans submittal. Denote the location of drainage inlets, utilities, sign structures, lights and barrier joints in the plans. See ***SDM, Chapter 19*** for more information.

262.2.2 Proprietary Wall Systems Where Full Design Details Are Not Required In Contract Plans

Preapproved vendor drawings for proprietary wall systems are listed on the ***APL*** and are categorized in accordance with the applicable FDOT Wall Type(s). Utilize these drawings with the applicable standard(s) and Data Tables. Do not include the vendor drawings in the plans.

Use the following procedure in preparing plans for wall projects.

(1) BDR/30% Plans:

Discuss and justify the use of proprietary retaining walls and FDOT Wall Types (see ***SDG, Chapter 3***) in the BDR. Provide documentation of all site-specific geotechnical information and wall system considerations in the Retaining Wall Justification portion of the BDR. Include the Retaining Wall System Data Tables and Preliminary Wall Control Drawings with the information shown in ***SDM, Chapter 19*** for the Plan and Elevation Sheets.

(2) 60% Plans/Phase II Roadway Submittal:

For bridge projects requiring project-specific details for proprietary wall systems, include the project-specific details in the 60% Plans submittal. For wall projects without bridges, project-specific details must be included in the Phase II submittal.

(3) 90% Plans/Phase III Roadway Submittal:

Include the completed Wall Control Drawings, project-specific details and Data Tables in the 90% Plans submittal.

Modification for Non-Conventional Projects:

Delete ***FDM 262.2.2*** and replace with the following:

262.2.2 Proprietary Wall Systems Where Full Design Details Are Not Required In Contract Plans

Preapproved vendor drawings for proprietary wall systems are listed on the ***APL*** and are categorized in accordance with the applicable FDOT Wall Type(s). Utilize these drawings with the applicable standard(s) and Data Tables. Do not include the vendor drawings in the plans.

Using site-specific geotechnical information, the EOR, in cooperation with the geotechnical engineer, will determine all wall system requirements. See ***SDG, Chapter 3*** to determine the appropriate FDOT Wall Type. Include Wall Control Drawings, project-specific details, and Data Tables in the Component Plans submittal, as specified in

SDM, Chapter 19. Denote the location of drainage inlets, utilities, sign structures, lights and barrier joints in the plans. See ***SDM, Chapter 19*** for more information.

262.2.3 Proprietary Wall Systems Where Full Design Details Are Required In Contract Plans

The following procedure for plans preparation should be followed if the walls are required to be fully detailed in the contract plans.

(1) BDR/30% Plans:

The BDR must discuss and justify the use of proprietary retaining walls. Include Wall Control Drawings in the 30% Plans. It will not be necessary for these plans to contain pay items; however, they must include, but not be limited to, the information listed in ***SDM, Chapter 19***.

(2) Control Plans/Invitation Package:

The control plans must be reviewed by the Department and, upon approval, sent to all the appropriate wall companies. Provide a set of control plans, roadway plans and foundation report to the wall companies no later than by the 60% Plans submittal. A copy of the transmittals to the wall companies must be sent to the DSDO or SDO as appropriate. The proprietary companies must acknowledge receipt of the invitation package. If they choose to participate, they must provide design plans for the retaining walls and submit the plans for review as prescribed in the invitation letter.

(3) 90% Plans:

Upon receipt of the proprietary design plans, the designer must review the design and incorporate the wall plans into the contract plans set. The plans from the wall companies, control plans and wall company standard drawings must constitute the 90% Plans. Coordination between the roadway EOR and the structures EOR will be required to identify earthwork quantities (see ***FDM 216.4.6.1*** for more information).

Modification for Non-Conventional Projects:
Delete ***FDM 262.2.3*** and replace with the following: **262.2.3 Proprietary Wall Systems Where Full Design Details Are Required In Contract Plans** Using site-specific geotechnical information, the EOR, in cooperation with the geotechnical engineer, will determine wall system requirements. See ***SDG, Chapter 3*** to determine the appropriate FDOT Wall Type. The Design-Build EOR must coordinate with one of the vendors with approved wall drawings on the ***APL*** to prepare fully detailed project-specific proprietary drawings for inclusion into the Component Plans. Include Wall Control Drawings and Data Tables (in accordance with ***SDM, Chapter 19***) in the Component Plans submittal. Denote the location of drainage inlets, utilities, sign structures, lights and barrier joints in the plans. See ***SDM, Chapter 19*** for more information.

262.2.4 Temporary Walls

Typically, temporary walls are either proprietary MSE walls or steel sheet pile walls. Concrete sheet piles, soldier pile walls and precast or cast-in-place concrete walls may also be used as temporary walls.

On bridge projects, discuss the use of and the selected type of temporary walls in the BDR. On roadway projects without bridges, provide limits of required temporary wall in the 60% roadway plans.

Modification for Non-Conventional Projects:
Delete the first sentence in the second paragraph above.

262.2.4.1 Critical Temporary Walls

A critical temporary wall is a temporary wall that is necessary to maintain the safety of the traveling public or the structural integrity of nearby structures or utilities during construction. Traffic lanes located either above or below a grade separation and within the limits shown in ***SDG, Chapter 3*** will require the design of a critical temporary wall.

Critical temporary proprietary MSE walls must comply with ***Standard Plans, Index 548-030*** (and the applicable ***SPI***) and require generic design details in the contract plans. The

plans format must be in accordance with ***FDM 262.2.2*** and ***FDM 262.2.3***. Include control drawings and the completed Temporary Retaining Wall System Data Tables. Submit the final design details in the shop drawings.

If critical temporary steel sheet pile walls are used, ***Standard Plans, Index 455-500*** (and applicable ***SPI***) may be utilized for the design of cantilevered sheet pile walls meeting the criteria provided in the ***SPI***. For sheet pile walls not meeting the criteria in the ***SPI***, provide project specific designs. Include control drawings and complete the associated Data Table and include it in the plans. See the ***SDG & SDM*** for more information including critical temporary wall definitions.

If other types of critical temporary walls are used, prepare the necessary details and include them with the control drawings in the plans.