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Index 400-011 Gravity Wall

Design Criteria

AASHTO LRFD Bridge Design Specifications; ***Structures Design Guidelines (SDG), FDOT Design Manual (FDM)***

Design Assumptions and Limitations

Index 400-011 has been developed as a self-contained standard having pre-designed wall sections; therefore, no additional reinforcing list is required in the Contract Plans.

Gravity walls are generally most efficient when the difference in height between the ground levels is less than 5 feet. If the difference in height between ground levels is greater than 5 feet, other wall types or project specific designs are required.

Gravity wall design is based on the following soil criteria which covers the majority of soil types found in Florida:

Classification = Cohesion less (Fine Sand)

Friction Angle = 30 Degrees

Moist Unit Weight of Backfill = 120 pcf

Presumptive Allowable Bearing Pressure:

= 2,500 psf for slopes equal to or flatter than 1:1½

= 3,300 psf for slopes steeper than 1: 1½.

Corrected SPT Blow Count for foundation = 10 blows/ft.

(average value within the range of depth from the base of wall to 1.5 x base width below wall).

Max. Seasonal High Water Table (SHWT) is one (1) foot below the horizontal ground surface at the toe of the wall, except as noted.

In cases where the Designer considers the soil at the specific site location to be of lesser strength, an analysis is required to verify that sliding, bearing, overturning and stability requirements are satisfied.

Figures 1, 2 and 3 show the minimum toe berm widths for overall stability with the assumed soil properties listed above. The minimum toe berm width may need to be increased to satisfy other ***FDM*** criteria, such as maintenance access.

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Figure 1 Minimum Toe Berm Width for Overall Stability - Scheme 1

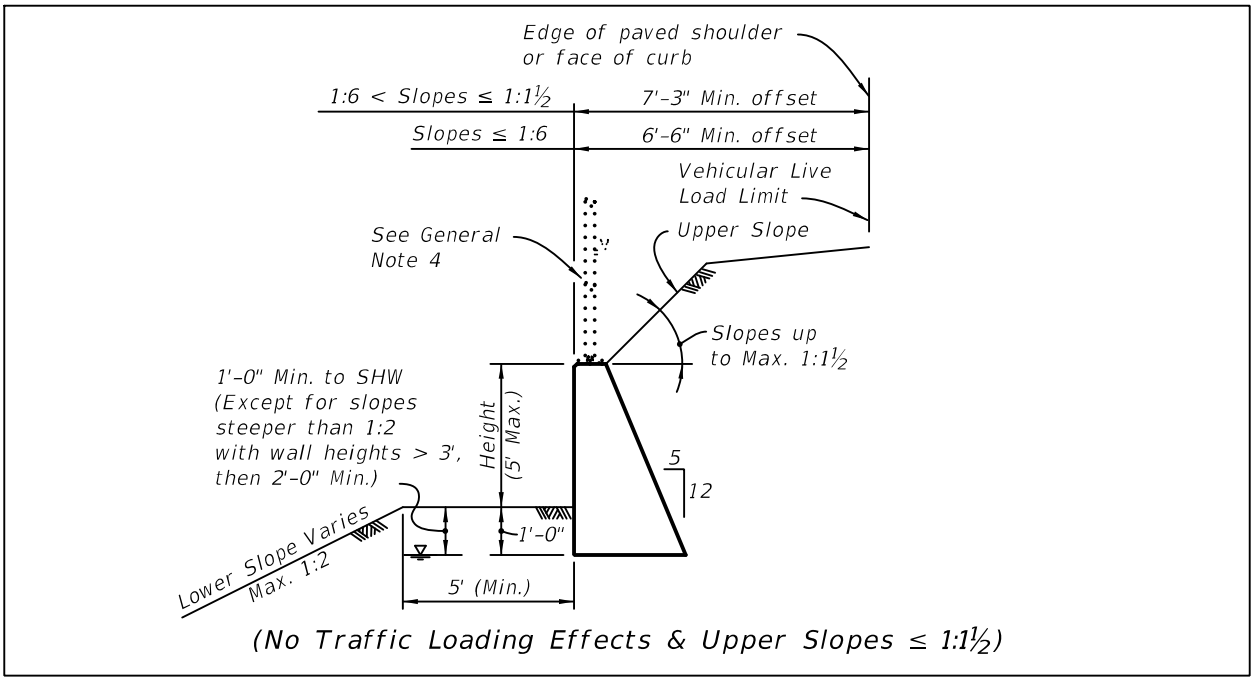

Figure 2 Minimum Toe Berm Width for Overall Stability - Scheme 2

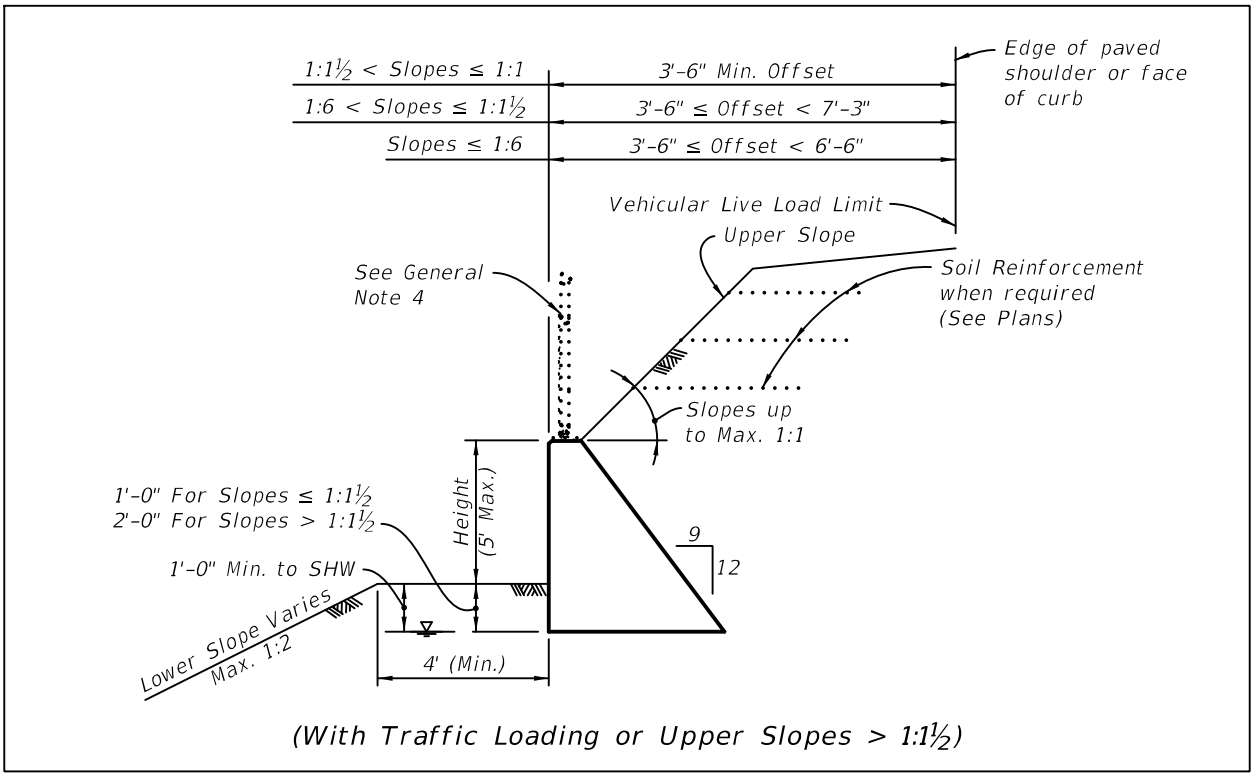

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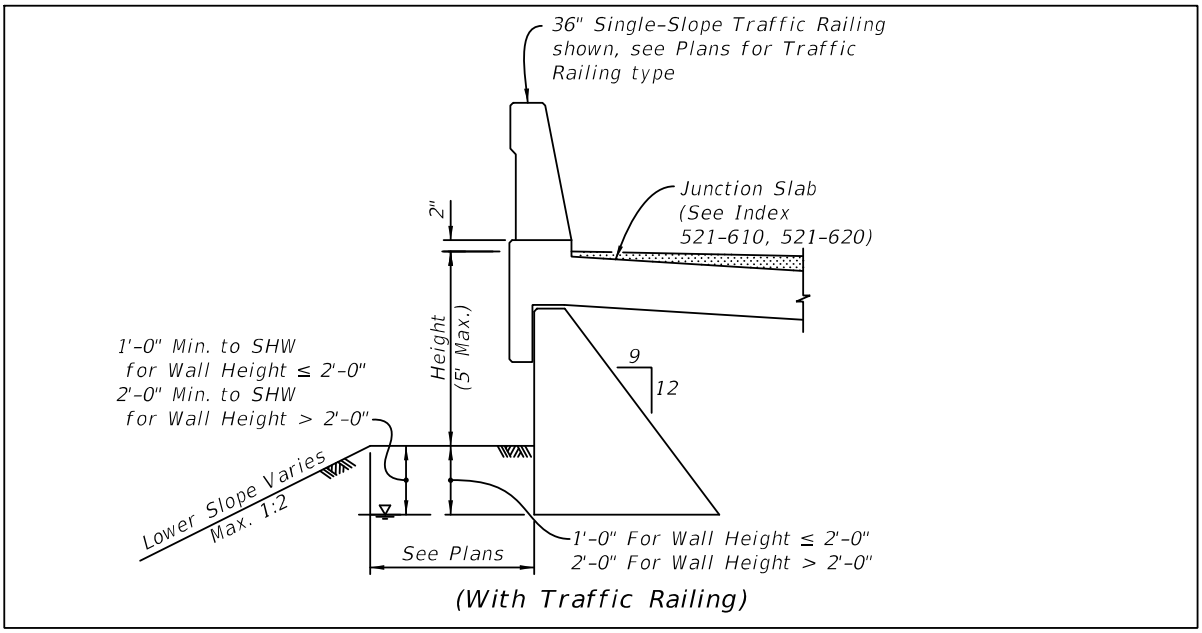
Figure 3 Minimum Toe Berm Width for Overall Stability - Scheme 3



Overall stability of the wall shall be analyzed when:

1. The lower or upper slope exceeds 1:2 (vert. : horiz.);
2. The upper slope exceeds a vertical height of 4'-0" when the lower slope is steeper than 1:6;
3. The seasonal high water (SHW) is less than 2 feet below the ground surface at the toe of the wall; or
4. The SHW is above the toe of the slope for lower slopes steeper than 1:6.

Stability of the upper slope shall be analyzed for slopes steeper than 1:2 (vert. : horiz.) with a minimum Factor of Safety = 1.3.

For Scheme 1 or Scheme 2, when a roadside barrier is required above the wall (guardrail, barrier wall, etc.) the deflection space required for the barrier must be considered. Locate the barrier so that there is no conflict between guardrail posts or barrier footing and the gravity wall or soil reinforcement. This may result in an offset greater than the minimum offset for the live load limit.

Plan Content Requirements

In the Structures or Roadway Plans:

Prepare Wall Control Drawings and related drawings as specified in ***SDM*** Chapter 19 and ***FDM*** 262, and include them in the plans.

Add any aesthetic requirements (e.g. coordinating appearance of exposed surface with adjacent walls) to the General Notes.

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Reference "Index 400-011 Gravity Wall" and Wall Scheme (Scheme 1, Scheme 2 or Scheme 3) in accordance with that shown on the Standard.

Where Structures component of plan set is used, place these drawings in the Structures Plans, otherwise, include these drawings in the Roadway Plans. Elevation of wall may not be necessary for short walls or walls on constant grade.

Payment

Item number	Item Description	Unit Measure
400-0-11	Concrete Class NS, Gravity Wall	CY

Commentary: See Standard Plans Instructions Index 521-600 Series for Concrete Barrier /Junction Slab Pay Items as required.

Commentary for Reviewers: Class NS Concrete - This class of concrete was determined to be appropriate for Index 400-011 based on consultation with the Structures Design, Roadway Design, State Materials and Construction Offices in 2005 during the LRFD redesign. This class of concrete is an economical choice and structurally appropriate for a non-flexural (gravity) earth retention system.