Index D6011 Gravity Wall (Options B & C)

Design Criteria

AASHTO LRFD Bridge Design Specifications, 6th Edition; ***Structures Design Guidelines (SDG)***; ***Plans Preparation Manual (PPM)*** Volume 1, Chapter 30

Design Assumptions and Limitations

This index has been developed as a self-contained standard with predesigned wall sections for a maximum exposed height of 5 feet. No additional reinforcing list is required in the Contract Plans.

Option B consists of block walls of two types:
B1 - Unreinforced (Modular Block Wall)
B2 - Reinforced Soil (Segmental Block Wall)

Option C is the traditional C.I.P. gravity wall, but with GFRP reinforcing.

If the difference in height between ground levels is greater than 5 feet, other wall types or project specific designs are required. Designs for this Index are based on a plumb wall configuration, with a maximum 1:12 face batter for aesthetics.

Designs are based on the following foundation, embankment and backfill soil criteria which covers the majority of soil types found in Florida:

Classification = Cohesionless (Fine Sand)

Friction Angle = 30 Degrees

Moist Unit Weight of Backfill = 120 pcf

Edge Drain Concrete Unit Weight (Option B1 - MBW) = 115 pcf

Select Backfill (Option B2 - SBW):
Moist Unit Weight = 105 pcf
Friction Angle = 30 Degrees

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.

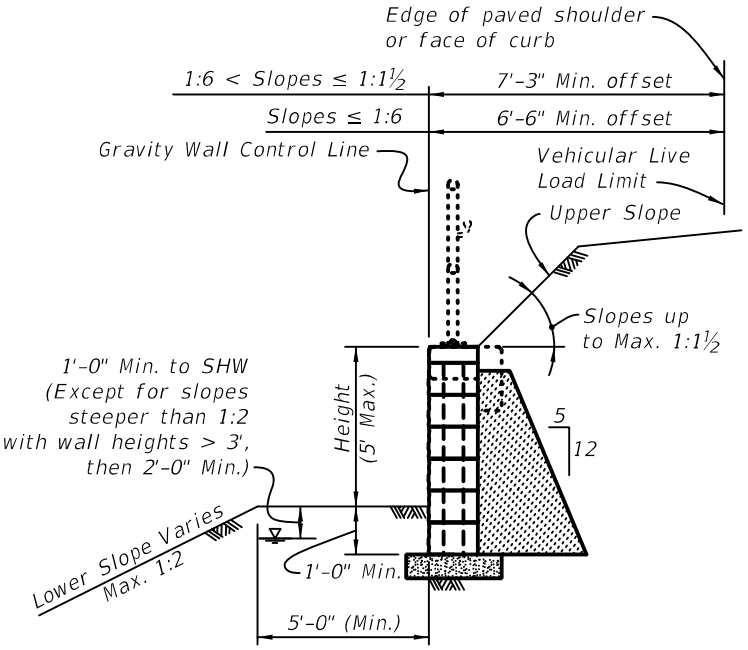
(average value within the range of depth from the base of wall to 1.5 x base width below wall).

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

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 (eccentricity) and stability requirements are satisfied.

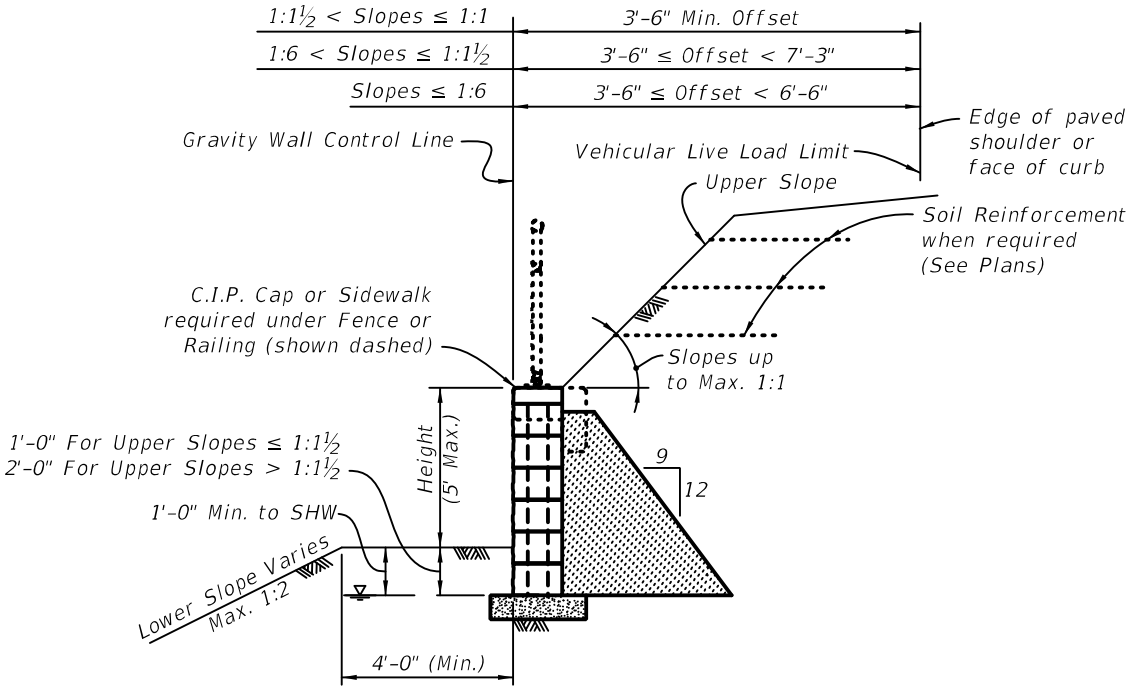
Figures 1, 2 and 3 show the minimum toe berm widths for overall stability with the assumed soil properties listed above. The minimum toe berm width may need to be increased to satisfy other ***PPM*** criteria, such as maintenance access.

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



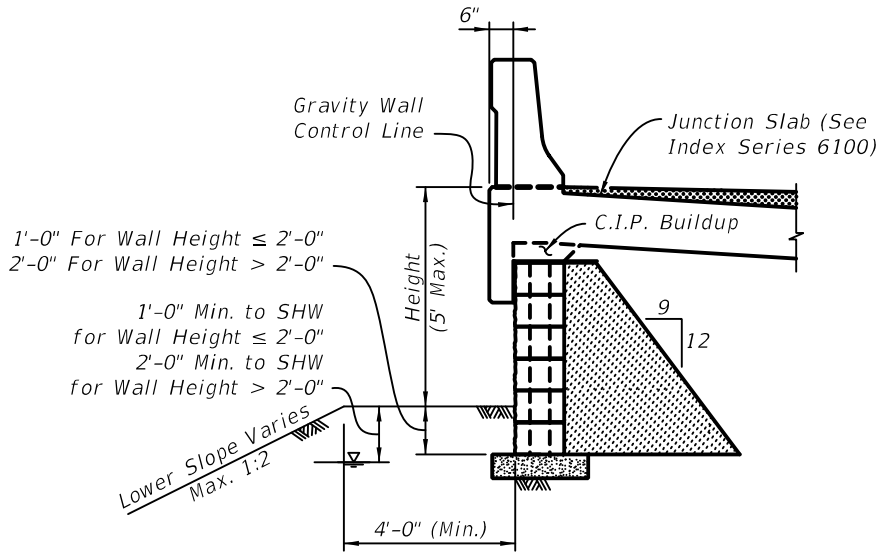
(No Traffic Loading Effects Option B1 shown, Options B2 & C similar)

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



(With Traffic Loading or Slopes > 1:1½ Option B1 shown, Options B2 & C similar)

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



(With Traffic Railing Option B1 shown, Options B2 & C similar)

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.) for 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.

For Option B1 or Option B2, block manufacturers prefer walls be constructed with a small reclining batter on the face of the retained soils using a preset offset between layers of blocks. Setback distance is dependent on block dimensions and height of the wall. Designers should strive to accommodate a setback distance resulting from a 1:12 (horizontal : vertical) batter. If this setback distance cannot be accommodated due to project constraints, then indicate on the plans the maximum permissible setback distance from the horizontal control line (front face at top of wall).

Plan Content Requirements

Insert the entire ***Developmental Design Standards*** Index, received from the Central Office monitor, into the appropriate component plan set in accordance with ***PPM***, Volume 2, Section 3.8.

In the Structures or Roadway Plans:

Prepare Wall Control Drawings and related drawings as specified in ***SDM*** Chapter 19 and ***PPM*** Vol. 1, Chapter 30, and include them in the plans.

Include "Developmental Design Standard Index D6011b and/or D6011c Gravity Wall" and clearly indicate which Wall Scheme (Scheme 1, Scheme 2 or Scheme 3) is required.

When 1:12 batter cannot be accommodated, clearly indicate the maximum horizontal offset from the wall control line(s).

Where Structures component of plan set is used, place these drawings in the Structures Plans, otherwise, include these drawings in the Roadway Plans. Provide Top and Bottom of wall elevations at a minimum of 25 foot intervals. Intermediate elevations of walls may not be necessary for short walls or walls on constant grade.

Payment

Item number	Item description	Unit Measure
400-0-1	Concrete Class NS, Gravity Wall	CY

Commentary: Pay item for the Option B predesigned block walls (modular and segmental) is based on the cubic yards of concrete required for an equivalent C-I-P Gravity Wall (see Index 6011).

See Instructions for Design Standards Index 6100 Series for Traffic Railing/Junction Slab Pay Items as required.