

Vertical Reinforcement Spacing

MSE walls are designed and constructed with continuous sheet or discrete soil reinforcement. Geogrid soil reinforcement is most commonly used with segmental wall systems and is placed continuously at each design level (100% horizontal coverage). The vertical spacing of the geogrid reinforcement levels is limited by the size of retaining wall units and facial stability calculations. The vertical spacing can also be limited by specific project design considerations such as calculated tension, connection strength, and pullout factors for static and seismic loadings.

Most published design specifications and common design practice requires that the vertical reinforcement spacing be limited to twice the depth of the unit, W_u , not to exceed 32". This limitation is based on a typical facing stability analysis during construction and extensive industry experience. For the standard 12" deep structural retaining wall unit, a 24" vertical spacing can be maintained and meet all requirements. All major design guidelines address these requirements as noted below:

NCMA Design Manual for Segmental Retaining Walls, 3rd Edition
Section 7.2.2: Geogrid Vertical Spacing Requirements

Vertical spacing of geogrid layers should also be limited to a maximum spacing, regardless of the results of the stability calculations. It is often cost efficient to maximize vertical spacing between geogrid layers as allowed by the stability factors of safety. Even when all internal and facial stability failure modes can be satisfied with greater spacing, However, a maximum vertical spacing between reinforcement layers of 24 in. (610 mm) is suggested to reduce construction stability issues. Some proprietary systems may be capable of supported larger spacing between reinforcement layers without construction issues, however, the reinforcement should not exceed 24" (813 mm). This maximum spacing limits construction issues and also ensures a reinforced soil mass behaves as composite material, as intended by this design methodology. Within these limits, the wall designer should choose an appropriate maximum reinforcement spacing for the proprietary system used.

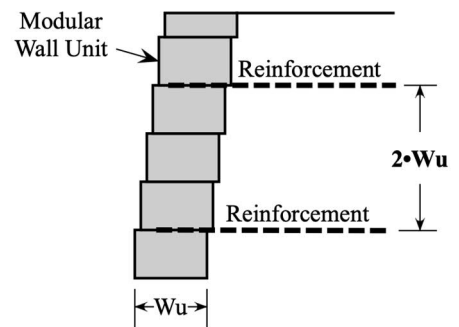
For modular blocks that are less than or equal to 10 in. (254 mm) in depth, it is recommended that the maximum vertical spacing of the reinforcement layers be no more than twice the depth of the unit. For example, the maximum vertical spacing for a 9 in. (229 mm) deep modular block unit would be 18 in. (457 mm). Regardless of the spacing of the reinforcement, compaction of the reinforced/retained soil zone must never exceed 8 in. (203 mm) in thickness.

AASHTO LRFD Bridge Design Specifications, 2016, Section 11.10.2.3.1

...For segmental concrete facing blocks, facing stability calculations shall include an evaluation of the maximum vertical spacing between reinforcement layers, the maximum allowable facing height above the uppermost reinforcement layer, inter-unit shear capacity, and resistance of the facing to bulging. The maximum spacing between reinforcement layers shall be limited to twice the width, W_u , illustrated in Figure 11.1.6.4.4.b-1, of the segmental concrete facing block or 2.7 ft, whichever is less.....

FHWA NHI-10-024, Section 4.4.7.d

For walls constructed with modular blocks, the maximum vertical spacing of reinforcement should be limited to two times the block depth (front face to back face) or 32 in. (810 mm), whichever is less, to insure construction and long-term stability...



Maximum Spacing Section

Examples:

For a 8" tall x 9" deep unit, the vertical spacing is limited to $2 \times 9" = 18"$ which would be two block courses or 16" vertical spacing.

For a 6" tall x 10" deep unit, the vertical spacing is limited to $2 \times 10" = 20"$ which would be three block courses or 18" vertical spacing.