



## 11.23 DESIGN CRITERIA FOR SOIL NAIL WALL FACING

### 11.23.1 GENERAL

This policy addresses the design criteria for soil nail wall facing. The *AASHTO LRFD Bridge Design Specifications* 8<sup>th</sup> does not include design provisions for soil nail earth retaining systems. All soil nail wall facing must be designed in conformance with all the requirements specified in *Geotechnical Engineering Circular No. 7* (FHWA GEC 007) published by FHWA in 2015.

### 11.23.2 DESIGN CRITERIA

Each facing must be proportioned to satisfy the requirements at the strength limit state and the extreme event limit state (earthquake). Initial facing must be designed for punching shear and flexural force effects. Final facing must be designed for punching shear, flexural, and concrete anchor tensile force effects. For each limit state, the facing must satisfy the following equation:

$$\sum_i \gamma_i Q_i \leq \phi R_n \tag{11.23.2.1}$$

where

$\gamma_i$  = load factor; equal to 1.35 for all loads in the strength limit state, and 1.0 for all loads in the extreme event (earthquake) limit state

$\phi$  = resistance factor as specified in Table 11.23.2.1

$Q_i$  = force effect

$R_n$  = nominal resistance of a structural component selected for a given limit state

**Table 11.23.2.1 Resistance Factors,  $\phi$  (from FHWA GEC 007, 2015)**

Facing Stage	Initial Facing	Final Facing	
Failure Mode	Strength Limit State	Strength Limit State	Extreme Event Limit State (Earthquake)
Punching Shear	0.9	0.9	0.9
Flexural	0.9	0.9	0.9
Concrete Anchor Tensile	--	0.7	0.65



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The initial and final facing must also satisfy the other requirements in the FHWA GEC 007.

### 11.23.3 Reference

Lazarte, C.A., Robinson, H., Gomez, J.E., Baxter, A., Cadden, A., Berg, R. (2015). "Soil Nail Walls – Reference Manual", Geotechnical Engineering Circular No. 7, Report No. FHWA-NHI-14-007, Federal Highway Administration, Washington, DC.