

DESIGN GUIDELINES FOR SPREAD FOOTINGS ON ROCK

The design of spread footing on rock shall be in accordance with the AASHTO LRFD Bridge Design Specifications as summarized in the following procedure.

General

On rock, a linear pressure distribution is used for all limit states. This is because the rock will not be able to yield to form a more rectangular pressure distribution. The deformation of the rock will basically stay linear. The flexibility of the footing will affect this, but the linear distribution is the closest distribution to use.

Service Limit State

- In the design of the footing reinforcement, the service limit state must be checked for crack control.
- Settlement does not need to be checked for footings on competent rock.
- As per Article 10.6.2.2.3d, elastic settlement on rock may generally be assumed to be less than 1/2". If settlements of this magnitude are unacceptable and a settlement analysis is required, there are no eccentricity requirements.
- There are no sliding requirements.
- The resistance factor is 1.0.

Strength Limit State

- The eccentricity requirements should be in accordance with Article 10.6.3.2.5.
- The resistance factors should be provided by the Geotechnical Engineer based upon his method of estimating the capacity of the rock.
- Sliding should be checked in accordance with Article 10.6.3.3. For equation 10.6.3.3-2, the friction angle shall be in accordance with Table 3.11.5.3-1.

Extreme Limit State

- The eccentricity requirements should be in accordance with Article 10.6.3.2.5 which limits the length of the pressure distribution under the footing is at least 3/8 the footing length or width. This is to keep the footing from rocking too much.
- Sliding should be checked in accordance with Article 10.6.3.3. For equation 10.6.3.3-2, the friction angle shall be in accordance with Table 3.11.5.3-1.

Seismic Design of Abutments

Article 11.6.5 allows the location of resultant of the reaction forces to within the middle 3/8 to middle 0.8 of the footing base.

Commentary

Spread Footings on Rock Design Guidelines established based on LRFD specifications and correspondence from Monte Smith of Sargent Engineers.

Revisions:

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Added new article.