

November 13, 2018

File # 180745

Matt Kero
Vice President of Engineering
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Re: Use of GatorBar in Residential Foundations

Dear Mr. Kero,

At your request, I have reviewed the use of GatorBar® reinforcing in footings and slabs-on-grade for residential construction.

In my opinion, as a registered Structural Engineer in the State of California, the #3 GatorBar® may replace #4 steel bars, and may be used in standard "Inverted-Tee" footings, slab-on-grades with integral continuous exterior footings and slabs-on-grade for driveways and other light uses. This would be applicable to buildings of three stories or less of light-framed construction in Seismic Design Categories A through D₂, since it meets or exceeds the intent of the California Building Code (CBC) and the California Residential Code (CRC).

Footings and foundations complying with residential construction provisions of the CBC and CRC would be considered plain concrete per ACI 318, which defines plain concrete as: "Structural concrete with no reinforcement or with less reinforcement than the minimum amount specified for reinforced concrete". The typical specified amount of reinforcement for stem walls and slab edge footings in the CBC or CRC is less than the minimum required for reinforced concrete. These are, therefore, plain concrete footings with longitudinal bars included. Stem walls are part of the foundation under the CRC and their requirements are included under the "Footings" section. In Seismic Design Categories D₀, D₁ or D₂ a longitudinal #4 bar is required within the top 12 inches of the stem wall and another longitudinal #4 bar at 3 to 4 inches above the bottom of the footing. Additionally, when the stem wall is poured separately from the footing, vertical #4 bars are required at not more than 48 inches on center (much greater than the minimum spacing required by ACI 318 for reinforced concrete construction) extending into the footing and into the stem wall. This amount of reinforcement is insufficient to qualify the stem as a reinforced concrete wall. It is a plain concrete wall, with a minimum prescribed amount of reinforcement.

For longitudinal bars in foundations, the substitution of #3 GatorBar® for #4 rebar is acceptable, since the #3 GatorBar has greater tensile strength. The vertical bars, required where the stem wall is placed after the footing, provide some tensile reinforcement to prevent overturning of the wall and a small amount of shear capacity at the construction joint. For this purpose, #3 GatorBar®, with a tensile strength of 14.6 kips, is greater than a Grade 40, #4 rebar with a tensile yield capacity of 8 kips and would be acceptable, for prescriptive footing reinforcement. Direct substitution would meet the CRC requirement.

Spread footings used in seismic design category areas D₀ to D₂; supporting foundation walls with light-frame construction above, for up to three story residential buildings, must have dimensions, as specified in the CBC, or greater and meet ACI 318. ACI 318 states that foundations of structural plain concrete are not allowed in Seismic Design Categories D, E, or F, except for "detached one-and two-family dwellings three stories or less, with stud bearing walls." Plain concrete is allowed by ACI 318 for footings for the excepted category of buildings, which are incorporated by reference into the CBC. The CBC applies to any building type, so it encompasses the limited CRC buildings, which only applies to one- and two-family residential dwellings, three stories and less. However, in many places, it is customary to provide longitudinal bars and at least one #4 bar is placed in the top and bottom of the footing. Therefore, in these instances, the use of #3 GatorBar® would also be acceptable.

We also evaluated the GatorBars for use to resist shrinkage and temperature effects. We found that the #3 GatorBars are more than adequate for this purpose. The GatorBars offered the additional benefit of not being subject to corrosion. They have been used successfully in a number of applications where corrosion is an issue.

Sincerely,

MKM & ASSOCIATES
A California Corporation



John M. Cook

JMC/TDP

Enclosure(s)

cc:

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