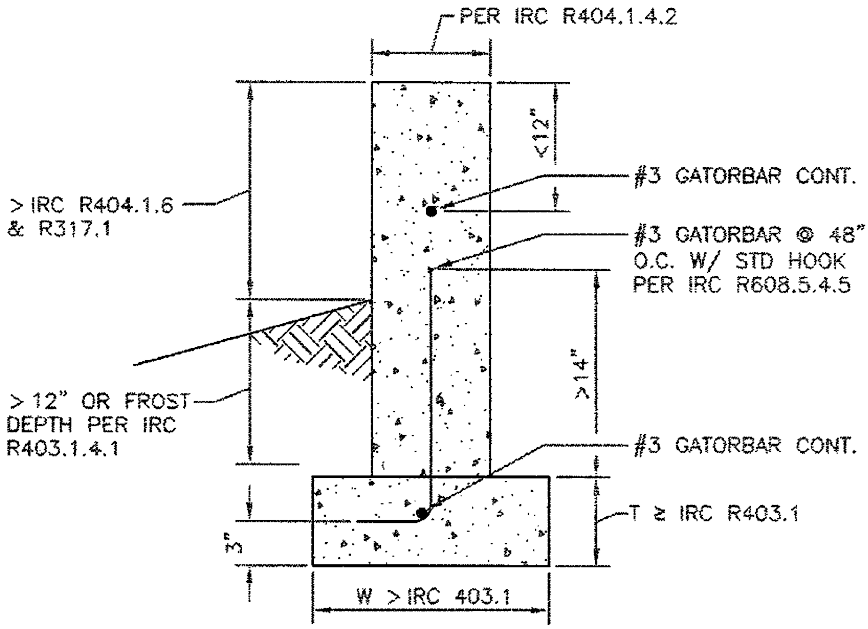
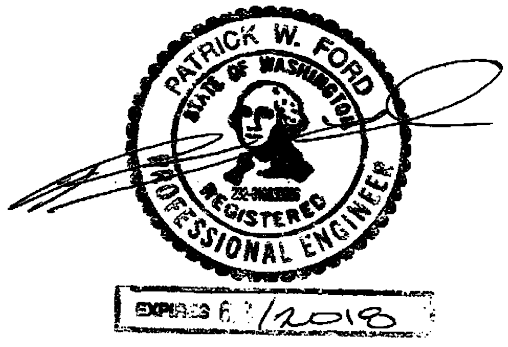


1. CONCRETE PER IRC R402.2
2. SEISMIC DESIGN CATEGORIES A, B, C, D_0, D_1 & D_2
3. APPLIES TO ONE AND TWO FAMILY RESIDENTIAL DWELLINGS OF THREE STORIES OR LESS, SUPPORTING LIGHT FRAMED CONSTRUCTION.

CONCRETE STEM WALL & FOOTING



MATSEN FORD DESIGN
Associates, INC.

January 04, 2018

Mr. Ken Keranen, COO
Neuvokas Corp.
3206 Number 6 Rd,
Ahmeek, MI 49901

RE: Use of GatorBar® in Residential Foundations

Dear Mr. Keranen:

Per your request, I have reviewed the use of GatorBar reinforcing in residential footings as shown in the attached details.

In my professional opinion as a registered Professional Engineer in the State of Washington, the #3 GatorBar® may replace #4 steel bars, and may be used as indicated in footings, thickened edge slab foundations, and stem walls in one- or two-family residential construction. This would be applicable to buildings of three stories or less of light framed construction in Seismic Design Categories A to D_2, since it meets or exceeds the intent of the International Building Code (IBC) and the International Residential Code (IRC).

The reasoning is fairly straightforward: in this particular instance, the footings and foundations in question would be considered plain concrete per ACI 318, which defines plain concrete as follows: "Plain Concrete – 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 wall and thickened edge slab footings per the IBC or IRC is less than the minimum for reinforced concrete. Therefore, by definition these are plain concrete footings with longitudinal bars included. Stem walls are considered as part of the footing/foundation under the IRC and their requirements are included under the Footings Section. In Seismic Design Categories D_0, D_1, or D_2 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 allowed by ACI 318 for reinforced concrete construction) with hooks extending into the footing and at least 14 inches into the stem wall. This amount of reinforcement is also insufficient to qualify this as a reinforced concrete wall. It is a plain concrete wall, with a minimum prescribed amount of reinforcement. For the longitudinal bars, substitution of #3 GatorBar® for #4 steel would be acceptable, since they provide greater tensile strength. The vertical bars, since they are only required where the stem wall is placed after the footing, provide some tensile reinforcement to prevent overturning of the wall and some small amount of shear at the construction joint. For this purpose #3 GatorBar® with a tensile strength of 14.6 kips is greater than Grade 40, #4 steel with a tensile yield of 7.85 kips and would be acceptable in my opinion. Direct substitution would meet the apparent design intent of the IRC requirement.

N8 W22350 JOHNSON DRIVE, B9
WAUKESHA, WI 53186
(262)-522-9500 matsenford.com

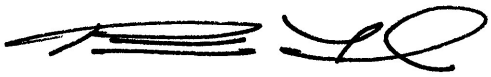
RE: Use of GatorBar® in Residential Foundations (continued)

Regarding spread footings used in seismic design code areas D_0 to D_2; supporting foundation walls with light frame construction above, for up to three story residential buildings, must have dimensions as specified in the IBC 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 is incorporated by reference into the IBC. The IBC applies to any building type, so it encompasses the limited IRC 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 analyzed the GatorBars for compatibility based on strength and elongation for the purposes of maintaining the concrete integrity under shrinkage and temperature stresses. We find that the #3 GatorBars as shown are more than adequate for this purpose.

The foregoing is my professional opinion based on the given properties of the GatorBar as well as the applicable codes and my interpretation of their intent. Please feel free to contact me should you have any questions about this opinion.

Sincerely,



Patrick W. Ford, P.E.
Matsen Ford Design Associates, Inc.

N8 W22350 JOHNSON DRIVE, B9
WAUKESHA, WI 53186
(262)-522-9500 matsenford.com