

Mike Gresser
President/CEO
3 Checkered Flag Blvd
Shakopee, MN
55379

March 27, 2015
BC-15-020

Dear Mr. Gresser,

Re: Analysis of various slab options, Lakeville Warehouse

Further to our ongoing discussions Beton Consulting Engineers LLC has prepared this summary to compare the performance of different designs of slabs on ground. This analysis has been performed to compare alternatives for the loading condition described below. The best way to make a simple comparison is to compare computed safety factors. A safety factor less than 1 indicates a very high probability of cracking. For a slab on grade a safety factor above 1.3 balances the risk and cost well. The higher the safety factor the lower the probability of cracking.

Load : 2 16 kip posts 14 inches apart.

Modelled as a 32 kip post on a 14 inch by 4 inch plate.

All of the models assumed that the concrete had a strength of 4000 psi at 28 days and are not loaded until that time or later.

The five cases examined are as follows:

- I. 6 inch floor with wire mesh over a sand base. (original Floor)
- II. 5 inch PrīmXComposite over the 7 inch class V or recycled base contemplated in our meeting.
- III. 6 inch PrīmXComposite over a 6 inch class V or recycled base..
- IV. 8 inch traditional slab with 30 pounds of helix fibers with control joints every 20 feet
- V. 10 inch thick floor with No. 5 bars 16 in c/c ew in two layers.

Case I + V was modelled with a subgrade modulus of 100 psi/in. The remaining class, with Class 5 below the slab, were modelled with a subgrade modulus of 200 psi/in.

The four load cases were examined under the same conditions. Case I + V was modelled using the PCA method as described in ACI 360 "Design of Slabs on Ground". The remaining cases were analyzed using the yield line method.

The safety factors determined are as follows:

Case I	0.95
Case II	1.33
Case III	2.06
Case IV	1.09 (Near the Joint)
Case V	1.25

Based on the analysis the slabs in Case II or Case III are suitable. The 6 inch slab on sand will likely fail as the load approached the maximum.

We trust that this letter is self-explanatory. If there are any questions or concerns, please contact the undersigned at 612-363-7111.

Thank you.

Sincerely,



Kevin A. MacDonald, Ph.D., PE(MN), FACI
Principal Engineer
Beton Consulting Engineers, LLC