

Bear Valley Design, Ltd.

Engineers - Consultants



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Mr. Jake Kruse
Kruse Construction, LLC
995 Captain Jack Drive
Steamboat Springs
Colorado, 80487

Subject: Soil investigation for four multi-unit live/work buildings proposed for 1940 Bridge Lane, in Steamboat Springs, Colorado.

Gentlemen,

Per your request, we performed a soil investigation on the subject lot late in September of this year. This letter presents the results of that investigation, along with recommendations for design parameters for the foundation of the proposed building. The recommendations contained herein assume that the proposed construction will be as described below.

The subject lot is located near the north bank of the Yampa river and to the east of Shield Drive. The lot is nearly flat and is covered with a variety of uncontrolled fill. The lot slopes very gently toward the river.

The proposed buildings are intended to be of wood frame construction, with slab on grade ground floors and two wood framed upper (residential) floors, and 'flat' gently sloped roofs sloped to drain to the back side of the buildings.

Two test pits were advanced on the lot in locations intended to get a reasonable evaluation of the soil conditions across the rather large extent of the subject lot. We are familiar with subsoil conditions in the area via having designed several foundations and observed the open excavations for a commercial buildings as well as for a water main extension in the vicinity. The pits revealed between 24 and 36 inches of

a dense gravelly and granular uncontrolled fill, which overlay native, slightly moist, soft, dark brown, long buried riparian topsoil, which, in turn, overlay a very dense, moist, sandy alluvial gravel. The depth to the top of the gravel varied from 7 to 9 feet in the two pits. No free water was observed at the top of the gravel, but this could reasonably be expected to change during the run-off season.

Our opinion is that the ground level, slab on grade floors of the four proposed buildings should be set at an elevation approximately one foot above the grade of the existing fill so as to enable construction of a driveway which slopes gently downward from the proposed buildings toward the street, and also provides for positive drainage away from the driveways and the buildings, downward toward a swale on the north side of the buildings and toward the river on the south side of the site.

The underlying alluvial gravel will provide stable, non-expansive end bearing for drilled piers at a maximum net bearing pressure of 5.0 KsF. No minimum dead load will be necessary on said piers. The piers, in turn, should be designed to support grade beams which will support the superstructure of the buildings.

Because of the pervious and granular nature of the subsoils on this site, as well as the seasonally high water table, no footer drain is necessary or would be appropriate. The exterior of the grade beams must be backfilled to within approximately seven inches below the top of said beams, using either native or imported granular material, compacted to 93% of its Standard Proctor density with a minimum slope of 2% (0.5% where impervious pavement is used) away from the buildings for a minimum of 10 feet. From this point, continuous drainage with no ponding must be provided either to swales or to the river which lies along the south side of the property.

The existing granular fill on the site is sufficiently thick and dense to provide a stable subgrade for the underslab fill beneath the proposed slab on grade lowest floors of the buildings. Underslab fill as required must be a minimum of nine inches thick, should be placed directly over the existing fill, be granular and be compacted to a minimum of 97% of its Standard Proctor density in maximum 8 inch thick lifts.

In order to provide for proper curing of the slabs on grade, as well as for code required insulation for the buildings, a minimum of a sheet of 6 mil thick visquene plus foam insulation of the required R value must be placed over the above described underslab fill prior to

placing the slab on grade concrete. vapor barrier. We have found that spraying closed cell foam of the appropriate thickness directly on top of the underslab fill serves these functions very well.

The existing fill materials beneath the proposed slabs on grade is sufficiently stable with changes in moisture content, and dense enough so that it will not be necessary to provide for movement of the slab when framing interior partitions on the ground floor of the building,

Because radon gas is nearly eight times as dense as ambient air and because there are no proposed below grade spaces in these buildings, and because the ground level floors of the buildings will be sloped to drain freely to the outside, no provision for positive venting of any possible accumulation of radon gas should be necessary.

Thank you for the opportunity to have been of professional service to you in this matter.

Sincerely,
Bear Valley Design, Ltd.



Gregory H. Hermann
Colorado P.E. #17422