



July 5, 2023

Thunderstruck Adventures  
Clay Hockel  
93525 HWY 71  
Windom, MN 56101

Job Number: 22-12817

Subject: Additional Foundation  
Recommendations, Proposed Thunderstruck  
Adventures Building, County Road 80, Routt  
County, Colorado.

Clay,

As requested, NWCC, Inc. (NWCC) has prepared this report providing additional foundation recommendations for the proposed storage building to be constructed within a parcel of land located on the east side of County Road 80 in Routt County, Colorado. NWCC previously completed a Subsoil and Foundation Investigation for this project in a report prepared under this job number and dated November 16, 2022.

**Additional Foundation Recommendations:** If the owner is made aware of the risks of constructing on expansive soils and they can accept additional differential foundation movement due to the presence of swelling soils, then the proposed structures can be constructed on a foundation system consisting of spread footings or individual pads with grade beams founded on the natural clays.

The design and construction details presented below should be observed if a shallow foundation system is opted for. The precautions and recommendations itemized below will not prevent the movement of the foundations if the underlying soils become wetted and swell; however, they should reduce the amount of differential foundation movement. Differential movements on the order of 2 to 4 inches could still occur if the clays undergo moisture changes and the client must be willing to accept this degree of differential movement.

- 1) Footings placed on the natural clays should be designed using an allowable soil bearing pressure of 3,500 psf. The footings should also be designed for a minimum dead load pressure of at least 1,500 psf.
- 2) Footings or pad sizes should be computed using the above soil pressures and placed on the natural undisturbed clays. Any topsoil and organic materials, as well as any loose or soft natural soils encountered within the foundation excavations should be removed and the excavations extended to competent natural clays prior to concrete placement. The footings may have to be narrow or

- interrupted to achieve and maintain the minimum dead load pressure. The foundation design should be closely checked to assure that it distributes the loads per the allowable pressures given.
- 3) Foundation walls should be designed and reinforced to span an unsupported distance of 10 feet or the length between pads, whichever is greater.
  - 4) Footings or pads should be placed well enough below final backfill grades to protect them from frost heave. Forty-eight (48) inches is typical for this location considering normal snow cover and other winter factors.
  - 5) Care should be taken when excavating the foundations to avoid disturbing the supporting materials. Hand excavation or careful backhoe/trackhoe soil removal may be required in excavating the last few inches.
  - 6) Based on experience, we estimate the total settlement for footings and pads designed and constructed as discussed in this section will be approximately 1 inch. Additional bearing capacity values along with the associated settlements are presented in Figure #1.
  - 7) The client must retain NWCC to observe the foundation excavations when they are near completion to identify the bearing soils and confirm the recommendations in this report.

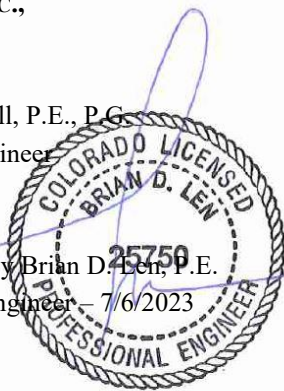
If the owner is not willing to accept the risk of differential foundation movement associated with the swelling clays, the proposed building should be constructed with a deep foundation system consisting of drilled piers or helical screw piles, as recommended in the original report.

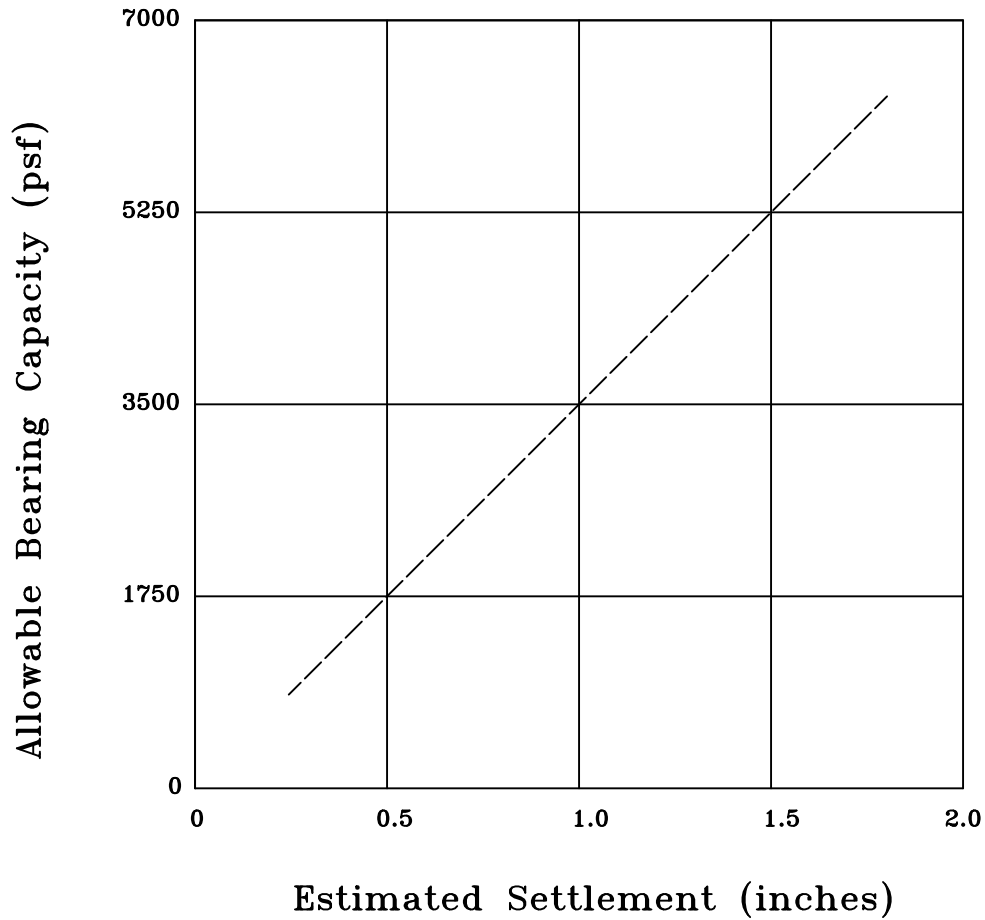
If you have any questions regarding this report, our observations or recommendations, or if we may be of further service please contact this office.

Sincerely,  
**NWCC, INC.,**


Erika K. Hill, P.E., P.G.  
Project Engineer

Reviewed by Brian D. Len, P.E.  
Principal Engineer – 7/6/2023





Note: These values are based on footing widths of 1 to 4 feet. If the footing width is to be greater than 4 feet in width, then we should be notified to re-evaluate these recommendations.

<b>Title:</b> BEARING CAPACITY CHART	<b>Date:</b> 6/30/23	 (970) 679-7888 • Fax (970) 679-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
<b>Job Name:</b> Thunderstruck Adventures Storage Building	<b>Job No.</b> 22-12817	
<b>Location:</b> County Road 80, Routt County, Colorado	<b>Figure</b> # 1	