



December 6, 2012

Summit, LLC
c/o Mr. Ryan Begelman
1335 North 5900 East
Eden, Utah 84310

IGES Project No. 01628-003

Subject: Report Addendum
Water Tank Foundation and Backfill
Powder Mountain Resort
Weber County, Utah

Reference: IGES, Inc., 2012, Design Geotechnical Investigation, Powder Mountain Resort, Weber County, Utah, Project No. 01628-003, dated November 9, 2012

Mr. Begelman:

As requested, IGES is providing the following addendum to our referenced geotechnical report to address recommendation for the planned water tank. This addendum is in response to an informal request by Mr. Ryan Bradley (Summit, LLC) and Mr. Jeff Beckman (Bowen Collins Associates, BCA) to re-evaluate our recommendations presented in our referenced report with respect to the planned water tank.

Proposed Water Tank

Our understanding of the water tank is based on the preliminary cross-section titled "*Reservoir Section*" (S-2), undated, provided to IGES by BCA. The drawing indicates that the water tank will be a reinforced concrete structure; the perimeter of the tank will be founded on a thickened slab, and the roof structure will be supported on columns founded on conventional isolated footings. The column footings will be placed directly on the tank slab-on-grade (no foundation burial). The tank will have a height of about 20 feet (finish floor to top of concrete cover). The drawing indicates that the tank will be completely buried, with a maximum of 2 feet of cover – however, the tank may have as little as 10 feet of burial. The exact diameter of the tank has not been decided yet, but the diameter is expected to be on the order of 70 feet. The drawing suggests that the water will be about 15 feet deep.

Foundation Recommendations

Mat foundations (structural slabs, thickened slabs, e.g. the perimeter tank foundation) may be designed using an allowable bearing capacity of **2,500 psf** and a Modulus of Subgrade Reaction of **240 psi/inch**. The *net allowable* bearing value presented above is for dead load plus live load conditions. It should be noted that the Modulus of Subgrade Reaction is not a function of soil properties alone but is also influenced by other factors, including the width of the loaded area, the shape of the loaded area, and the specific location under the slab. As such, the structural engineer should exercise care and engineering judgment when using the above stated value for design.

Conventional spread or continuous wall footings constructed entirely on a minimum of 1 foot of structural fill or entirely on competent granular native soils may be proportioned utilizing a maximum net allowable bearing pressure of **4,200 pounds per square foot (psf)** for dead load plus live load conditions.

Sizing of Footings: The *maximum* recommended conventional spread footing width is 5 feet for continuous wall footings and 8 feet for isolated spread footings. Footings larger than the maximum allowable dimensions may induce static settlement in excess of ½ inch. Therefore, proposed conventional footings that are larger than the maximum recommended dimensions presented herein should be evaluated on a case-by-case basis by IGES.

The recommended bearing values presented above may be increased by 1/3 for transient loading such as for wind or seismic.

The preceding recommendations are intended to limit total static settlement to ½ inch or less.

Lateral Earth Pressure Recommendations

Ultimate lateral earth pressures from backfill acting against the buried tank may be computed assuming a friction angle of 36 degrees. This value assumes the tank backfill will consist of excavated coarse, granular soils, with a fines content equal to or less than 25 percent (after over-size material has been removed). Substantial processing of excavated site soils should be anticipated prior to use as tank backfill (removal of over-size material). Prior to backfill, IGES should evaluate backfill soils to assess compatibility with these recommendations. Backfill assessment may include observation and/or laboratory testing (grain size distribution, remolded direct shear).

Construction Considerations

The referenced tank section indicates that the tank slab/foundations will be founded on an 8-inch gravel layer and 2-inch sand layer (~ 1-ft. over-excavation), presumably to accommodate construction of an under-drainage system. IGES takes no exception to this design. However, due to the presence of abundant cobbles and boulders, a 1-ft. over-excavation may be impractical from a constructability standpoint. The Contractor should be made aware that an over-excavation up to 2 feet may be required to accommodate the necessary removal of abundant over-size material.

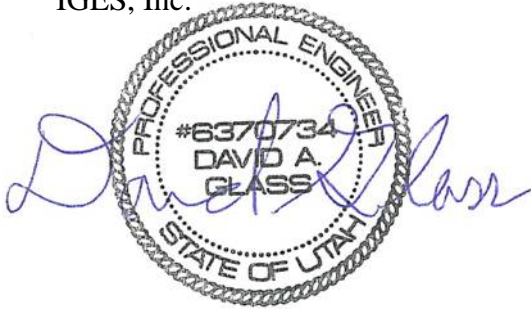
Since assessment of tank backfill may involve laboratory testing, sufficient lead-time must be given to IGES so as not to unnecessarily delay construction. A two-week advanced notice is recommended to minimize delays due to laboratory back-log.

Closure

The recommendations presented herein supersede the recommendations for tank foundation and backfill presented in our referenced geotechnical report (IGES, 2012). All other recommendations presented in our referenced report remain valid and should be implemented into the design and construction of the project.

We appreciate the opportunity to provide you with our services. If you have any questions please contact the undersigned at your convenience (801) 748-4044.

Respectfully Submitted,
IGES, Inc.



David A. Glass, P.E.
Senior Geotechnical Engineer