May 8, 2023

Mr. Spencer Stephens
1141 East 2800 North
North Ogden, Utah 84414

Mr. Stephens:

Re: Geotechnical Consultation
Access Road
123-Acre Old Snowbasin Road Property
South of the Intersection of Old Snowbasin Road and Basinview Road
Huntsville, Weber County, Utah
CMT Project No.: 13739

## INTRODUCTION

A geologic study[1] was recently prepared for the subject property by CMT Engineering Laboratories, now CMT Technical Services (CMT). Since the time of our study, planning for the development has continued and at this time additional information related to the pavement sections for the private roadways within the development are now required.

As requested, we have evaluated a new private roadway section utilizing asphaltic concrete paving and aggregate base course to provide the road bed structure for accessing the proposed single-family residences. As an alternative, the roadway may be constructed using aggregate base course as the final surface. Additionally, the proposed private roadway must support emergency vehicle access to the residences.

## PAVEMENT SECTION RECOMENDATIONS

Based on our observations of the site and evaluation of the referenced geologic report, it was determined that that the surficial clay soils would control design. It is our opinion that based on correlations with soil type, a projected California Bearing Ratio (CBR) of 3 is appropriate for design of the pavement section.

Traffic is expected to be very minor and primarily of light automobiles and pickup trucks with occasional single-unit delivery trucks and possibly a 75,000-pound emergency vehicle.

[1] "Report, Professional Geologist Site Reconnaissance and Review, 123-Acre Old Snowbasin Road Property, South of the intersection of Old Snowbasin Road and Basinview Road, Huntsville, Weber County, Utah" CMT Job No. 13739, December 9, 2019.

Estimated Average Daily Traffic (ADT) is 10 vehicles per day with the following breakdown:

15 Personal vehicles per day (UDOT Class1)
1 Single unit truck per day (UDOT Class 4)

Given the projected traffic as discussed above, the following pavement sections are recommended:

| MATERIAL | PAVEMENT SECTION THICKNESS (inches) | | | |
|---|---|---|---|---|
| Asphalt | **3** | **3** | **---** | **---** |
| Untreated Base Course | **6** | **4** | **14** | **4** |
| Subbase | **0** | **4** | **---** | **15** |
| Total Thickness | **9** | **11** | **14** | **19** |

Untreated base course (UTBC) should conform to county specifications, or to 1-inch-minus UDOT specifications for A–1-a/NP, and have a minimum CBR value of 70%. Subbase shall consist of a granular soil with a minimum CBR of 30%. Untreated base course and subbase materials should be compacted as recommended below. Asphalt material generally should conform to APWA requirements, having a ½-inch maximum aggregate size, containing no more than 15% of recycled asphalt (RAP) and a PG58-28 binder.

## SITE PREPARATION AND GRADING

### General

It is anticipated that initial site preparation will consist of the removal of any surface vegetation, topsoil, and any other deleterious materials from beneath an area extending out at least 2 feet beyond pavements. Trees and their associated root bulbs will require deeper removal depths.

If encountered, non-engineered fill may remain within pavement areas if: free of debris and deleterious materials, no more than 3 feet thick, subsequent site grading fills are not more than 3 feet thick, and if properly prepared.

Proper preparation of existing fills below pavements will consist of the scarification of the upper 12 inches followed by moisture preparation and re-compaction to the requirements of structural fill. Where existing surface fill soils are less than 12 inches in total thickness then preparation shall consist of the total thickness of surface fill present.

Subsequent to stripping and prior to the placement of structural site grading fills, exterior flatwork, and pavements, the exposed subgrade must be proofrolled by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice. If excessively soft or otherwise unsuitable soils are encountered beneath footings, they must be completely removed. In pavement and exterior flatwork areas, unsuitable natural soils should be removed to a maximum depth of 2 feet and replaced with compacted granular structural fill. Fills must be handled as described above.

Site grading and drainage must be designed to facilitate proper drainage away from the pavement sections and water shall not be allowed to pond within or adjacent to the pavement areas.

The site should be examined by a CMT geotechnical engineer to assess that suitable natural soils have been exposed and any deleterious materials, loose and/or disturbed soils have been removed, prior to placing site grading fills and pavements.

**Temporary Excavations**

For cohesionless (sandy/gravelly) soils, temporary construction excavations not exceeding 4 feet in depth should be no steeper than one-half horizontal to one vertical (0.5H:1V). For excavations up to 8 feet and above groundwater, side slopes should be no steeper than one horizontal to one vertical (1H:1V). Excavations encountering saturated cohesionless soils will be very difficult to maintain and will require very flat side slopes and/or shoring, bracing and dewatering and these soils will tend to flow into the excavation. Where excavations extend below groundwater within cohesionless soils, the need for shoring must be anticipated.

In cohesive (clayey) soils, temporary construction excavations not exceeding 4 feet in depth may be constructed with near-vertical side slopes. Temporary excavations up to 8 feet deep, above or below groundwater, may be constructed with side slopes no steeper than one-half horizontal to one vertical (0.5H:1V). Excavations deeper than 8 feet are not anticipated at the site.

All excavations must be inspected periodically by qualified personnel. If any signs of instability or excessive sloughing are noted, immediate remedial action must be initiated. All excavations should be made following OSHA safety guidelines.

**Fill Material**

Structural fill is defined as all fill which will ultimately be subjected to structural loadings, such as imposed by footings, floor slabs, pavements, etc. Structural fill will be required as backfill over foundations and utilities, as site grading fill, and as replacement fill below footings. All structural fill must be free of sod, rubbish, topsoil, frozen soil, and other deleterious materials.

Following are our recommendations for the various fill types we anticipate will be used at this site:

| Fill Material Type | Description/Recommended Specification |
|---|---|
| Structural Fill | Placed below flatwork and pavement. Imported structural fill should consist of well-graded sand/gravel mixture, with maximum particle size of 4 inches, a minimum 70% passing 3/4-inch sieve, a maximum 20% passing the No. 200 sieve, and a maximum Plasticity Index of 10. |
| Site Grading Fill | Placed over larger areas to raise the site grade. Sandy to gravelly soil, with a maximum particle size of 6 inches, a minimum 70% passing 3/4-inch sieve, and a maximum 40% passing No. 200 sieve. |
| Non-Structural Fill | Placed below non-structural areas, such as landscaping. On-site soils or imported soils, with a maximum particle size of 8 inches, including silt/clay soils not containing excessive amounts of degradable/organic material. |
| Stabilization Fill | Placed to stabilize soft areas prior to placing structural fill and/or site grading fill. Coarse angular gravels and cobbles 1 inch to 8 inches in size. May also use 1.5- to 2.0-inch gravel placed on stabilization fabric, such as Mirafi RS280i, or equivalent (see below). |

All fill material should be approved by a CMT geotechnical engineer prior to placement.

**Fill Placement and Compaction**

The various types of compaction equipment available have their limitations as to the maximum lift thickness that can be compacted. For example, hand operated equipment is limited to lifts of about 4 inches and most "trench compactors" have a maximum, consistent compaction depth of about 6 inches. Large rollers, depending on soil and moisture conditions, can achieve compaction at 8 to 12 inches. The full thickness of each lift should be compacted to at least the following percentages of the maximum dry density as determined by ASTM D-1557 (or AASHTO[2] T-180) in accordance with the following recommendations:

[2] American Association of State Highway and Transportation Officials

| Location | Total Fill Thickness (feet) | Minimum Percentage of Maximum Dry Density |
|---|---|---|
| Beneath flatwork and pavement (applies to structural fill and site grading fill) | 0 to 5<br>5 to 8 | 95<br>98 |
| Site grading fill outside area defined above | 0 to 5<br>5 to 8 | 92<br>95 |
| Utility trenches within structural areas | -- | 96 |
| Roadbase and subbase | - | 96 |
| Non-structural fill | 0 to 5<br>5 to 8 | 90<br>92 |

Structural fills greater than 8 feet thick are not anticipated at the site. For best compaction results, we recommend that the moisture content for structural fill/backfill be within 2% of optimum. Field density tests should be performed on each lift as necessary to verify that proper compaction is being achieved.

**Utility Trenches**

For the bedding zone around the utility, we recommend utilizing sand bedding fill material that meets current APWA[3] requirements.

All utility trench backfill material below structurally loaded facilities (flatwork, floor slabs, roads, etc.) shall be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill shall be proofrolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proofrolling shall be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proofrolling, they shall be removed to a maximum depth of 2 feet below design finish grade and replaced with structural fill.

Most utility companies and City-County governments are now requiring that Type A-1a or A-1b (AASHTO Designation – basically granular soils with limited fines) soils be used as backfill over utilities. These organizations are also requiring that in public roadways the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D-1557) method of compaction. We recommend that as the major utilities continue onto the site that these compaction specifications are followed.

[3] American Public Works Association

In private utility areas, existing fill soils and natural soils may be re-utilized as trench backfill over the bedding layer provided that they are properly moisture prepared and compacted to the minimum requirements stated above under Fill Placement and Compaction.

## CLOSURE

The conclusions and recommendations presented in this report are based on the information provided, the soil conditions observed, and our experience with similar conditions. If conditions are different during construction than presented herein, please advise us so that any appropriate modifications can be made. Our observations, analyses, conclusions and recommendations were conducted within the limits prescribed by our client, with the usual thoroughness and competence of the engineering profession in the area. No other warranty or representation, either expressed or implied, is intended in our proposals, contracts or reports.

We appreciate the opportunity to work with you on this project. If we can be of further assistance or if you have any questions regarding this project, please do not hesitate to contact us at (801) 590-0394.

Sincerely,
**CMT Technical Services**


Andrew M. Harris, P.E.
Geotechnical Division Manager