

Roadway embankment fill was encountered beginning at the existing ground surface at all of the bridge borings drilled for this project. The fill extends to a depth of ± 5.5 feet (Elevation ± 3172 feet) at End Bent-1, and to depths of ± 8.6 feet to ± 8.0 feet (Elevation ± 3169 feet) at End Bent-2. The roadway embankment fill encountered generally consists of very loose to very dense gravel and silty, coarse to fine sand (A-1-a, A-1-b, and A-2-4). An approximately 1 foot diameter boulder was encountered within the fill at Boring EB1-A beginning at a depth of 2.5 feet (Elevation 3175.1 feet). Standard Penetration Resistance values of 1 to 54 blows per foot (bpf) were measured within the roadway embankment fill. It should be noted that the blow counts at 2 feet at Boring EB1-A and at 7 feet at Boring EB2-A were influenced by gravel.

Colluvial soil was encountered underlying the roadway embankment fill at End Bent-1. Colluvial soils were not encountered at End Bent-2. The colluvium extends to depths of 13.0 feet and 11.5 feet (Elevations 3164.6 feet and 3166.5 feet), and consists of medium dense to very dense, gravel and silty, fine to coarse sand (A-1-a and A-1-b). Standard Penetration Resistance values of 13 to 71 blows per foot (bpf) were measured within the colluvial material.

Residual soils were encountered underlying the colluvium at Boring EB1-A, and underlying a weathered rock layer at Boring EB1-B. Residual soil was not encountered at End Bent-2. The residual soil, where encountered, extends from 13.0 feet to 17.5 feet (Elevations 3164.6 to 3160.1 feet) at Boring EB1-A, and from 15.8 feet to 22.0 feet (Elevations 3162.2 feet to 3156.0 feet) at Boring EB1-B. The layer of weathered rock separating the colluvial and residual soils at EB1-B extends between the depths of 11.5 feet and 15.8 feet (Elevations 3166.5 feet and 3162.2 feet). The residual soils generally consist of dense to very dense, micaceous, saprolitic, clayey, silty, coarse to fine sand (A-2-4). Standard Penetration Resistance values within the residuum were 40 and 82 bpf.

Weathered rock was encountered directly underlying the roadway embankment fill at Boring EB2-B, underlying the colluvium and residual soil at Boring EB1-B, and as zones within the crystalline rock at all four borings. The weathered rock generally consists of severely weathered, very soft to soft, biotite-hornblende gneiss and biotite gneiss with very close to close fracture spacing. The weathered rock was encountered between the following depths and elevations: 18.6 feet to 20.6 feet (Elevations 3159.0 feet to 3157.0 feet) and 22.1 feet to 23.6 feet (Elevations 3155.5 feet to 3154.0 feet) at Boring EB1-A; 11.5 feet to 15.8 feet (Elevations 3166.5 feet to 3162.2 feet), 22.0 feet to 28.2 feet (Elevations 3156.0 feet to 3149.8 feet), and 29.8 feet to 32.2 feet (Elevations 3148.2 feet to 3145.8 feet) at Boring EB1-B; 9.6 feet to 15.1 feet (Elevations 3167.9 feet to 3162.4 feet) at Boring EB2-A; and 8.0 feet to 9.1 feet (Elevations 3168.7 feet to 3167.6 feet), and 15.1 feet to 21.3 feet (Elevations 3161.6 feet to 3155.4 feet) at Boring EB2-B.

Crystalline rock was encountered at all of the bridge borings. The crystalline rock directly underlies the roadway embankment fill at Boring EB2-A, directly underlies the residual soil at Boring EB1-A, and underlies weathered rock at Borings EB1-B and EB2-B. The crystalline rock generally consists of biotite-mica gneiss, biotite-hornblende gneiss, and biotite gneiss. The crystalline rock was encountered at the following depths and elevations: 17.5 feet (Elevation 3160.1 feet) at EB1-A, 28.2 feet (Elevation 3149.8 feet) at EB1-B, 8.6 feet (Elevation 3168.9 feet) at EB2-A, and 9.1 feet (Elevation 3167.6 feet) at EB2-B. As noted in the previous paragraph, zones of weathered rock were encountered within the crystalline rock at all four borings. All of the bridge borings drilled for this project were terminated in crystalline rock.

Between ± 20 and ± 32 feet of weathered rock/crystalline rock was cored at each of borings. In general, the cored weathered rock is severely weathered, very soft to soft biotite-hornblende gneiss and biotite gneiss with very close to close fracture spacing. Strata recovery (REC) values within the weathered rock ranged from 0 to 63 percent. In general, the cored crystalline rock is moderately severely to very slightly weathered, medium hard to very hard biotite-mica gneiss, biotite-hornblende gneiss, and biotite gneiss with very close to moderately close fracture spacing. Strata (REC) values within the crystalline rock ranged from 33 to 100 percent and strata Rock Quality Designation (RQD) values ranged from 0 to 100 percent. The quality of the crystalline rock varied greatly independent of depth with alternating zones of very good quality and very poor quality common.

3.5 GROUNDWATER

Groundwater was present in all four borings drilled for this project. The groundwater elevation ranged from ± 3171 feet to ± 3174 feet. The water surface elevation of Henson Creek measured during the survey portion of our exploration on December 31, 2003 was ± 3172 feet. Fluctuation of groundwater and creek water surface levels can occur with seasonal and climatic variations. According to the Bridge Survey and Hydraulic Report, the normal creek water surface elevation is approximately 3171.5 feet, the 25-year flood water surface elevation is approximately 3178.5 feet, the 50-year flood water surface elevation is approximately 3180.2 feet, the 100-year flood elevation is approximately 3181.1 feet, and the 500-year flood elevation is approximately 3182.1 feet.

4.0 NOTES TO THE DESIGNER

Boulders, cobbles, and large gravel are evident in abundance within the channel bed at the subject site. A boulder was encountered at Boring EB1-A between Elevations 3175.1 and 3174.1 feet, and gravel was