±956 feet) at Bent-1, and to depths of ±35 feet to ±52 feet (Elevations ±971 feet to ±944 feet) at End Bent-2. Residual soil was also encountered as zones within the weathered rock/crystalline rock at Boring DOT EB1-A(DET) between depths of ±43 feet and ±55 feet (Elevations ±943 feet and ±932 feet), at Boring TB1-A between depths of ±29 feet and ±34 feet (Elevations ±956 feet and ±952 feet) and ±39 feet and ±66 feet (Elevations ±947 feet and ±919 feet), at Boring TB1-B between depths of ±36 feet and ±38 feet (Elevations ±949 feet and ±947 feet), and at Boring TEB2-A between depths of ±43 feet and ±46 feet (Elevations ±947 feet and ±944 feet). The residual soils generally consist of medium dense to very dense, variably micaceous, silty, coarse to fine sand (A-2-4); and stiff to hard, variably micaceous, coarse to fine sandy silt (A-4 and A-5). The residual soils appear to be saprolitic in nature. Standard Penetration Resistance values within the residuum ranged from 9 and 88 bpf. Boring DOT EB1-A(DET) and the bridge rod soundings at Bent-2 were terminated within residual soil.

Weathered rock was encountered underlying the residual soils at all of the borings drilled for this project. The weathered rock generally consists of biotite gneiss and isolated calc-silicate rock. The weathered rock was encountered between the following depths and elevations: 24.0 feet to 27.5 feet (Elevations 964.8 feet to 961.3 feet) and 31.5 feet to the boring termination depth of 38.8 feet (Elevations 957.3 feet to 950.0 feet) at Boring TEB1-A; 26.5 feet to 34.7 feet (Elevations 960.0 feet to 951.8 feet) feet and 38.3 feet to 43.3 feet (Elevations 948.2 feet to 943.2 feet) at Boring DOT EB1-A(DET); 19.0 feet to the boring termination depth of 34.1 feet (Elevations 968.3 feet to 953.2 feet) at Boring TEB1-C; 18.0 feet to the boring termination depth of 53.7 feet (Elevations 979.6 feet to 943.9 feet) at Boring DOT EB1-B; 27.3 feet to 29.0 feet (Elevations 957.6 feet to 956.4 feet) and 66.5 feet to the boring termination depth of 76.6 feet (Elevations 918.9 feet to 908.8 feet) at Boring TB1-A; 29.0 feet to 35.5 feet (Elevations 956.0 feet to 949.5 feet), 38.1 feet to 42.6 feet (Elevations 946.9 feet to 942.4 feet), and 45.3 feet to the boring termination depth of 56.8 feet (Elevations 939.7 feet to 928.2 feet) at Boring TB1-B; 35.0 feet to 43.0 feet (Elevations 955.0 feet to 947.0 feet) and 46.0 feet to the boring termination depth of 54.4 feet (Elevations 944.0 feet to 935.6 feet) at Boring TEB2-A; 26.7 feet to the boring termination depth of 59.6 feet (Elevations 970.8 feet to 937.9 feet) at Boring TEB2-A; and 52.5 feet to the boring termination depth of 57.1 feet (Elevations 944.0 feet to 939.8 feet) at Boring DOT EB2-B. As noted in the previous paragraph, residual soil was encountered as zones within the weathered rock at Borings DOT EB1-A(DET), Boring TB1-A, Boring TB1-B, and Boring TEB2-A. As will be discussed in the following paragraph, zones of crystalline rock were encountered within the weathered rock/residual soil at Borings TEB1-A, DOT EB1-A(DET), TB1-A, and TB1-B. Borings TEB1-A, TEB1-C, DOT EB1-B, TB1-A, TB1-B, TEB2-A, DOT EB2-A, and DOT EB2-B were terminated within weathered rock.

Crystalline rock was encountered as a zone within the weathered rock/residual soil at Borings TEB1-A, DOT EB1-A(DET), TB1-A, and TB1-B. Crystalline rock was not encountered in the other borings drilled for this project. The crystalline rock generally consists of calc-silicate rock. The crystalline rock was encountered between the following depths and elevations: 27.5 feet to 31.5 feet (Elevations 961.3 feet to 957.3 feet) at TEB1-A, 34.7 feet to 38.3 feet (Elevations 951.8 feet to 948.2 feet) at DOT EB1-A(DET), 33.8 feet to 38.8 feet (Elevations 951.6 feet to 946.6 feet) at TB1-A, and 42.6 feet to 45.3 feet (Elevations 942.4 feet to 939.7 feet) at TB1-B.

Between ±16 and ±20 feet of weathered rock/crystalline rock was cored at Borings DOT EB1A(DET), TB1-A, and TB1-B. Rock coring was not performed at the remaining borings. In general, the cored weathered rock is severely weathered, very soft to soft with isolated moderately hard pieces, biotite gneiss. Strata recovery (REC) values within the weathered rock ranged from 0 to 48 percent. In general, the cored crystalline rock is slightly to very slightly weathered, moderately hard to hard calc-silicate rock with close to moderately close fracture spacing. Strata (REC) values within the crystalline rock ranged from 61 to 100 percent and strata Rock Quality Designation (RQD) values ranged from 61 to 70 percent.

3.5 GROUNDWATER

Groundwater was encountered in all of the borings drilled for this project. The groundwater elevation ranged from ±988 feet to ±976 feet. The water surface elevation of Mulberry Creek measured during the survey portion of our investigation on December 17, 2004 was ±981 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 980.0 feet, the 10-year floodwater surface elevation is approximately 988.3 feet, the 50-year floodwater surface elevation is approximately 990.6 feet, the 100-year flood elevation is approximately 991.4 feet, and the 500-year flood elevation is approximately 997.9 feet.

4.0 NOTES TO THE DESIGNER

Gravel was encountered in varying amounts within the alluvium at the site, and a hard gravel and cobble layer (old streambed material) was encountered at the base of the alluvium at Borings TEB1-A and TB1-B. Boulders with estimated widths of 2 to 3 feet and thicknesses of up to 2 feet were encountered at Borings TB1-A and TEB2-A at the base of the alluvium. It is assumed that boulders are also present at the base of the alluvium in other areas across the site. Riprap is present along the existing embankment slopes. The crystalline rock encountered at Borings TEB1A, DOT EB1-A(DET), TB1-A, and TB1-B ranges in thickness from ±3 feet to ±5 feet. This crystalline rock is underlain by residual soil and/or weathered rock.