

FOUNDATION MATERIALS

SUMMARY

All of the borings were drilled from the road elevation. The endbents found fill to be 10 feet thick, plus or minus 2 feet. The Alluvium thickness was variable, but the top of residual was fairly flat. Elevation of refusal, weathered rock, and crystalline rock are variable and show the effects of differential weathering and variable resistance to drilling.

A chart of some of the subsurface conditions appears below.

| Bent | Boring | Collar Elevation | Fill Thick | Water Elevation | Alluv Thcknss | Elevation top of Residual | Res. Soil Thknss | Res. Soil Type | Depth to Wthrd. Rock | Elev. Of Wthred Rock | thk of wthrd rock | Depth to Refusal | Elev. of Refusal | Depth of Top of Xline Rock | elev of top Xline rock |
|------|--------|------------------|------------|-----------------|---------------|---------------------------|------------------|----------------|----------------------|----------------------|-------------------|------------------|------------------|----------------------------|------------------------|
| EB1 | A | 394.99 | 12 | 388.19 | 14.2 | 368.79 | 3 | A-1-B | 29.2 | 365.79 | 5.3 | 39.5 | 355.49 | 34.5 | 360.49 |
| EB1 | B | 395.19 | 9.3 | 386.09 | 12.2 | 373.69 | 2.6 | A-1-B | 24.1 | 371.09 | 5 | 33.8 | 361.39 | 29.1 | 366.09 |
| B1 | B | 384.96 | none | 385.31 | 14.25 | 370.71 | 1.1 | A-2-4 | 15.35 | 369.61 | 4 | 19.35 | 365.61 | 19.35 | 365.61 |
| B2 | A | 384.68 | none | 387.48 | 12.7 | 371.98 | 2.5 | A-1-B | 15.2 | 369.48 | 0 | 15.2 | 369.48 | 15.2 | 369.48 |
| B3 | A | 378.98 | none | 381.98 | 5.4 | 373.58 | 4.6 | A-1-B | 10 | 368.98 | 14.7 | 24.7 | 354.28 | 24.7 | 354.28 |
| B3 | B | 380.42 | none | 385.02 | 8.5 | 371.92 | 6.8 | A-1-B | 15.3 | 365.12 | 0 | 15.3 | 365.12 | 15.3 | 365.12 |
| B4 | B | 378.93 | none | 387.33 | 7.1 | 371.83 | 2.5 | A-1-B | 9.6 | 369.33 | 23.9 | 38.5 | 340.43 | 33.5 | 345.43 |
| EB2 | A | 394.81 | 8 | 386.61 | 18.8 | 368.01 | 7.6 | A-2-4 | 34.4 | 360.41 | 10.2 | 44.6 | 350.21 | 44.6 | 350.21 |
| EB2 | B | 394.48 | 10.3 | 387.48 | 11 | 373.18 | 2.8 | A-2-4 | 24.1 | 370.38 | 5.3 | 29.4 | 365.08 | 29.4 | 365.08 |

SOIL SECTION:

Roadway Fill:

All of the fill section intervals were soft to very soft sandy silty clay, and where sampled returned a classification of A-6, with a PI of 15.

Alluvial Soil:

Alluvial soil was found in all of the bridge borings, around 12' thick outside of the channel, and about 7' thick in the channel.

Coarse Sand, A-1-B: This coarse sandy soil was found at the base of the alluvium at bent 3 in the center of the active channel.

Silty Sand, A-2-4: This very loose sandy soil was found at the base of the alluvium at bent 4 and the adjacent endbent 2.

Sandy Silt, A-4: This soft to very soft alluvial silt appears in Endbent 1A&B, Bent1-B, Bent2-A, and Endbent 1A&B. Every bent except those in the channel.

Sandy Silty Clay, A-6: Soft to very soft clayey soil appears in Endbent 1-B, and Bent 2-A, possibly a clay lens.

Residual Soil:

Residual soil was less than 10' thick, and noticeably harder than the alluvial soil. In most places it occurs as a transition to weathered rock.

Gravelly Sand, A-1-B An interval usually less than 5' thick of in-place gravelly rock was found as a transition zone at the top of weathered rock.

Silty Sand, A-2-4 The endbent 2 borings were sampled at the top of residual at blow counts approaching weathered rock, and found to be A-2-4.

Weathered Rock

On some borings, the transition from residual soil to crystalline rock is marked with a rind of weathered rock. In some borings, the weathered rock is followed by an interval of residual soil, then weathered rock, and then rock. The total weathered rock thickness is the most variable "unit".

Rock:

The core recovered in the drilling program may be divided into two categories: 1, a light tan feldspar-quartz- biotite gneiss and 2, dark gray biotite- quartz- feldspar gneiss. Some of the lighter colored core was positively identified as metamorphosed sediment with visible remnant pebbles.

Metamorphic effects in this material include the growth of secondary feldspar porphyroblasts. This secondary mineral formation has made it difficult to identify much of the core, but it is my feeling that it is all metamorphosed sediment, with darker material originating as a more muddy facies.

Rock Samples: RQD values were so low that there seemed to be little purpose in sending rock samples to the lab.

HYDROLOGY:

When the borings remained open, the water level was measured at the time of boring, and at 24 hours. Endbents 1 and 2 are on fill over alluvium, with the remainder of the borings being in alluvium over residual. The water level was clearly controlled by stream levels. Most of the alluvium samples are A-4 soil requiring a PI of less than 10. The blow counts in the alluvium section are so low that some underflow groundwater recharge is suspected, resulting in quick sand characteristics.

SCOUR:

The scour portrayed on the plans does not seem to agree with the calculations. The elevations portrayed graphically seemed more conservative, so those were used. No scour was predicted for Bent 1. Bent 2 and Bent 4 were predicted to have local scour only, and Bent 3, in the active channel was predicted to have 12' of scour. Please notice the discrepancy between the top of alluvium that was measured during drilling and what is presented graphically. (see table below).

Adjusted Scour Summary Table

| Bent | Boring | Hydro Alluv Top | Drilling Alluv Top | PredQ500 Scour | PredQ500 Scour Elev | WR elev. | Crystal Rk elev | Adj Scr | Adj Scr. Elev. |
|------|--------|-----------------|--------------------|----------------|---------------------|----------|-----------------|---------|----------------|
| B1 | B | 387 | 384.96 | 0' | 387 | 369.61' | 365.61 | 4' | 382.0 |
| B2 | A | 387.25 | 384.68 | 6.5' | 380 | 369.48' | 369.48 | 4.68' | 380.0 |
| B3 | A | 376.7 | 378.98 | 12' | 367 | 368.98' | 354.28 | 13.88' | 365.1 |
| B3 | B | 376.7 | 380.42 | 12' | 367 | 365.12' | 365.12 | 15.32' | 365.1 |
| B4 | B | 387.75 | 378.93 | 14' | 374 | 369.33' | 345.43 | 9.63 | 369.3 |

Our investigation was conducted during a high-water event. All of the interior bents were under water. Ground elevation at bents 1,2, and 4 was lower than that portrayed on the Hydrologic report. The active channel appears to be moving toward Endbent 2, so that Bent 4 is now in the active channel.