Geologic Conditions at Proposed Highway Tunnel Site East of Idaho Springs, Colorado

Introduction

This report has been prepared to illustrate and describe geologic conditions between stations 170 and 185 on Colorado Highway Department F.A.P. No. I-70-3(1)250 in Clear Creek County, east of Idaho Springs, where it is proposed to construct twin tunnels approximately 700-800 feet in length. Geologic conditions (rock types, attitude of bedding, overburden, and veins) on the present ground surface are shown on the accompanying plan and profile sheet. Projection of geologic conditions underground are described in the following report and illustrated on the geologic cross section.

General Geology

Bedrock at the tunnel site consists of gray to pink metamorphic quartz monzonite gneiss of Precambrian age. Within the monzonite gneiss are lensed and layers of amphibolite and lime silicate gneiss.

The metamorphic rocks exhibit a layering or foliation which simulates the bedding of sedimentary rocks. In this report this foliation is referred to as bedding. The attitude of the bedding planes is extremely variable due to folding and warping, and ranges from horizontal to nearly vertical. The dip is northward and the strike of the beds is generally east-west.

Talus (overburden) blankets the surface over the western portals of the proposed tunnels, but is thin to absent at the eastern portal. The talus ranges from 5 to 15 feet in thickness.

Geologic structure

The dip and strike of the bedding of the rocks along the centerline of the alignment varies considerably, as shown by the dip and strike symbols on the plan view and in the geologic cross section, but in general average about 45 degrees to the north. Surface observations indicate that similar variations of dip and strike will probably be encountered underground along the grade line of the proposed tunnels.

Prominent joint systems trending N. 70 E., dipping 90°, N. 20 W., dipping 88° NE, and N. 65 W., dipping 85° NE, were observed near the proposed eastern tunnel portals. Spacing between joints varies from 1 to 3 feet. The joints were tight and were not carrying water. It is believed that these joints are probably characteristic of those to be found along the proposed grade line.

No large faults were observed in the area mapped. Small amounts of displacement may have occurred in the past along some of the bedding planes, joints and veins, but there is no evidence of movement at the present time.

A vein approximately 15-25 feet thick is present about 300 feet south of the centerline. The vein trends generally east-west, dipping 70-80° northward. Projection of the vein underground indicates its position to be about 250 feet south of the centerline at grade line. A smaller mineralized vein 1-3 feet thick crops out near the western end of the left lane tunnel and between stations 170 and 174. Projected down to grade line this vein may be encountered in the left lane tunnel from the portal to station 174.

Masses of pegmatite (coarse-grained granitic rock) are interspersed at random throughout the bedded gneissic rocks along the tunnel alignment. Pegmatite is normally a firm rock and offers little difficulty in excavation.

Overburden

Talus (overburden) covers an area between stations 171 and 174. The talus varies in thickness from 5 to 15 feet and is composed of a heterogenous mixture of soil and rocks up to 3 feet in length. The contact between the overburden and bedrock may carry small amounts of water during wet weather, and may possibly be subject to slipping if cuts are excavated in the lower sections. Provision for protection against talus fall may be needed at the west portal unless talus is completely stripped off.

Water problems

Rocks in the area are believed to contain little water and tunnel excavations should be relatively dry. With the exception of the vein near the western edge of the left tunnel which may carry minor amounts of water and the possibility of water in the overburden, water problems in the tunnels should be negligible during excavation.