

# Case Study on Construction of Railway Tunnel

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**Abstract-** Indian Railway has proposed a new railway line from Ramganj-Mandi to Bhopal. Under this project, CH 82580 to CH 83140 an underground passage (Tunnel 2) of length of 560 meter has awarded to Dhorajia Projects & Construction JV (DPC) by West Central Railway, Kota Division – Engineering Department Construction Unit (WCR).

**Index terms-** gantry, tests, survey, slope tunnel, shortcrete, geo technical reports

## I. INTRODUCTION

Dhorajia Projects & Construction JV (DPC) to perform a geotechnical investigation and structural design of the proposed tunnels construction at the project site. The purpose of this geotechnical investigation is to obtain information on the subsoil conditions by drilling boreholes and performing in-situ and laboratory tests on selected soil or rock samples. These information's obtained is used to provide geotechnical parameters recommendations for tunnel design at the project site. It is understood that, Client This report is presented herewith summarizes the results of the core drilling and core processing activities completed at three nos. of boreholes with moderate depth in vertical direction, analyses based on thorough study of the geotechnical investigation results. A complete geotechnical assessment was undertaken to indicate the nature and behavior of soil/rock under the application applicable load conditions on proposed tunnel near Pachola, Aklera, Dist. Jhalawar, Rajasthan.

## II. METHODOLOGY

Construction methodology and quality control manual will be issued in below.

### 1. Survey Work & Profile Marking

2. Drilling, Loading and Blasting
3. Mucking
4. Loose Scaling
5. Shortcrete
6. Rock Support / Rock Bolt Fixing
7. Rib Erection
8. Concrete Backfilling
9. Tunnel Lining

## III. SURVEY WORK AND PROFILE MARKING

This is a main and primary aspect of tunneling:

Survey profile generally done by surveyor as per geologist's direction.

This aspect related with payline as per design and types of rock as per site geologist.



Figure 1: Survey profile

## IV. GEOGRAPHY OF THE AREA



Figure 2 : Tunnel-1 Center line and location of boreholes

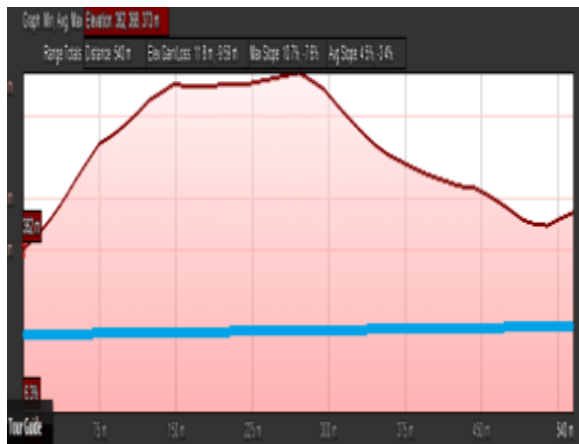


Figure 3 L-Profile of Tunnel Area

#### Zones of drilling Fluid Loss

During coring activities, the volume of drilling fluids in circulation tanks at ground surface were manually monitored during each core run using a graduated measuring staff with 1-inch increments to help identify significant permeable bedrock zones where the volume in the tanks dropped.

Laboratory testing consisted of moisture contents, Atterberg Limits, grain size analysis, water-soluble Sulphate, resistivity tests, Bulk Density and moisture content, Index properties, Shear tests (Triaxial shear test), Consolidation tests, Uniaxial Compressive Test and Point load Index on selected samples. The results of the laboratory tests are shown on the boreholes logs and discussed within the text of this report.

Table 3: Laboratory Test Standards for Soil Sample

Tests	Reference Standard	Type Samples
Sample	IS 2720 Pt I	DS / UDS

Preparation		
Moisture Content	IS 2720 Pt II	DS / UDS
Dry Unit Weight.	LAMBE	UDS
Specific Gravity	IS 2720 Pt III	DS
Liquid Limit	IS 2720	DS
Plastic Limit	IS 2720 Pt V	DS
Grain Size Analysis	IS 2720 Pt IV	DS
Soil Classification	IS 1498	DS / UDS
Consolidation	IS 2720 Pt XV	UDS
U.Comp. Strength	IS 2720 Pt X	UDS
Triaxial Comp. Test	IS 2720 Pt X	UDS

Table 4 shows the list of laboratory test and standard, conducted on selected rock cores, as required.

Table 4 Laboratory Test Standards for Rock Sample

Tests	Reference Standard	Type Samples
Sample Preparation	IS 4464	Rock Core
Moisture Content	IS 2720 Pt II	Rock Core
Dry Unit Weight	LAMBE	Rock Core
Specific Gravity	IS 2720 Pt III	Rock Core
Uniaxial Compressive Strength	IS 9143	Rock Core
Point load index test	IS 10785 1983	Rock Core

#### V. CONCLUSION

Ground water table is not encountered up to 36.0m depth during investigation. However, ground water level in existing well near BH1 shows water level up to 4.2 m below well collar (346.50 m elevation).

1. Permeability results show poor drainage property in case of rock.
2. Rock mass characteristics were inconsistent between boreholes.
3. Rock strength within tunnel area was estimated as medium to strong rock with uniaxial compressive strength range from 25 Mpa to 80 Mpa. In some area it was up to 10 Mpa.
4. Overall Core recovery within tunnel area ranged from 41.8% to 56.4%.
5. Loss of core at 14.2 m in borehole BH1, 15.6 m in Borehole BH2 and 9.2 m in Borehole BH3 were observed below existing ground level.
6. Core recovery was very poor due to weak conglomeratic layer, fractured and folied lime stone.

7. Some mechanical discontinuity observed due to bitted sample.
8. Interpreted geological cross sections based on three boreholes

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