

**TUNNEL SUPPORT SYSTEM FOR SAFE EXCAVATION OF TUNNEL,  
NEELUM JHELUM HYDRO POWER PROJECT**



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requirement for the degree of BS in Geology

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## **ABSTRACT**

The objective of this thesis is to evaluate excavation process used in Neelum Jhelum Hydro Power Project and also the support used in the project with more emphasis on the initial support along with a brief introduction of grouting. The project is in Majhoi and it is located to the southeast of Hazara Kashmir Syntaxis. The tunnel starts from Nauseri Dam which is towards the northeast of Majhoi while the tail race tunnel ends in Chattar Kalas power plant towards the south of Majhoi. Twin tunnel entrance is located in Majhoi which is below Muzzafarabad Fault and Jhelum River Fault Zone. Total length of the tunnel is 48 km and the overall project is of 964 MW and it carries Neelum River from below the Jhelum River. The objective described above was attained through field study of the area by assessing the Q value of few faces exposed in the area. After assessment the rock quality was found out to be highly heterogeneous, so the Q value assessed are between Q1 to Q5. At first Drill and Blast technique was used for tunnel excavation but due to its slow progress and the upcoming deadline of the project the technique has been switched to Tunnel Boring Machine (TBM) at the expense of being costly. The initial supports being used included rock bolts, wire mesh, spiling, lattice girders, pipe canopies, shotcrete and reinforced shotcrete ribs. As the project area is located in the vicinity of two rivers so the area has high water content because of which some initial supports are customized for the project only. These supports included grouted rock bolts, lattice girders, project specific reinforced shotcrete, tunnel plug and concrete gallery.

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<b>CONTENTS</b>		<b>Page</b>
<b>ABSTRACT</b>		i
<b>ACKNOWLEDGMENTS</b>		ii
<b>CONTENTS</b>		iii
<b>FIG.URES</b>		vii
<b>TABLES</b>		x

## **CHAPTER 1**

### **INTRODUCTION**

1.1	General Introduction	1
1.1.1	Excavation in rocks & soils	1
1.1.2	Dams	2
1.2	Tunnels	3
1.2.1	Requirement & Advantage	4
1.2.2	Parts of Tunnel	4
1.2.3	Tunnelling Methods	5
1.2.4	Tunnelling Techniques	6
1.3	Introduction to study area	6
1.3.1	Location	7
1.3.2	Power House	8
1.3.3	Transformer Hall	8
1.3.4	Busbar Tunnels	8
1.3.5	Draft Tubes	8
1.3.6	WAPDA Colony	8
1.3.7	Consultants	8
1.4	Objectives	8
1.5	Data	9
1.6	Methodology	9

## **CHAPTER 2**

### **STRATIGRAPHY AND TECTONICS**

2.1	Regional Geology	11
2.1.1	Fault Zone at Jhelum Crossing	12
2.2	Lithology	13
2.2.1	Murree Formation	14

2.3	Exposed Rock Units in Project Area	15
2.3.1	Sandstone Unit 1	15
2.3.2	Sandstone Unit 2	16
2.3.3	Shale unit	17

### **CHAPTER 3**

#### **GENERALIZED OVERVIEW OF TUNNELS**

3.1	Introduction to tunnels	18
3.1.1	Pressure tunnels	18
3.2	Methods for tunnelling	19
3.2.1	Probe drilling	19
3.2.2	Excavation	20
3.2.3	Grouting	21
3.2.3.1	Types of grouting methods	22
3.2.4	Supporting	22
3.2.4.1	Rock bolts	23
3.2.4.2	Shotcrete	23
3.2.5	Transportation of muck	24
3.2.6	Lining	24
3.2.6.1	Wire mesh	25
3.2.6.1.1	Chain link mesh	25
3.2.6.1.2	Weld mesh	25
3.2.7	Draining	26
3.2.7.1	Sumps & Pumps	26
3.2.7.2	Grouting	26
3.2.7.3	Pilot tunnel	26
3.2.8	Ventilation	26
3.2.8.1	Blow-In method	26
3.2.8.2	Exhaust method	26
3.3	Forms of tunnels	27
3.3.1	Cut and Cover construction	27
3.3.2	Tunnelling through bedrock	28
3.3.2.1	Soft soil tunnelling	28
3.3.2.2	Hard rock tunnelling	30

3.3.2.2.1	Drill and Blast/Road headers	30
3.4	Rock Tunnel support system	33
3.5	Rock Quality Index	34
3.5.1	Rock Quality Designation (RQD)	35
3.5.1.1	Jn (Joint Set Number)	36
3.5.1.2	Jr (Joint Roughness Number)	37
3.5.1.3	Ja (Joint Alteration Number)	38
3.5.1.4	Jw (Joint Water Reduction Factor)	40
3.5.1.5	SRF (Stress Reduction Factor)	40

## **CHAPTER 4**

### **C2 SITE TUNNEL ANALYSIS**

4.1	Rock Quality	43
4.2	Rock support measured used during construction	43
4.2.1	Sprayed concrete (Shotcrete)	43
4.2.2	Rock anchors	44
4.2.2.1	Fully grouted rock bolts	44
4.2.2.1.1	Installation of Fully Cemented-Grouted rock bolts	44
4.2.2.2	Swellex rock bolts	45
4.2.2.3	Self-Drilling rock bolts	46
4.2.3	Reinforced Ribs of Shotcrete (RRS)	46
4.2.3.1	Single Layer RRS	46
4.2.3.2	Double Layer RRS	47
4.2.3.3	Project Specific RRS	47
4.2.4	Lattice Girders	48
4.2.5	Reinforced Inverts	49
4.2.6	Spiling (Light Umbrella Arches)	49
4.2.7	Pipe Canopy (Heavy umbrella Arch)	50
4.2.7.1	New system	50
4.2.7.2	Old system	51
4.2.8	Face Dowels	52
4.2.9	Water drainage	53
4.3	Challenges during construction	53
4.3.1	1st Instability	54

4.3.1.1	Rehabilitation	55
4.3.1.2	Causes of failure	57
4.2.1.3	Excavation under collapse zone	57
4.3.2	2nd Instability	58
4.3.2.1	Rehabilitation	58
4.3.2.2	Causes of failure	59
4.3.3	3rd Instability	61
4.3.3.1	Rehabilitation	61
4.3.3.2	Causes of failure	62
4.3.3.3	Subsequent excavation and tunnel support inside the JRFZ	63
4.3.4	4th Instability	65
4.3.4.1	Rehabilitation	65
4.3.4.2	Causes of failure	67
4.4	Pre-excavation grouting methodology	68
	<b>CONCLUSION</b>	71
	<b>REFERENCES</b>	72
	<b>APPENDICES</b>	75



<b>FIGURES</b>		<b>Page</b>
Figure 1.1	Parts of Tunnel	5
Figure 1.2	Side View of under-construction Tunnel	5
Figure 1.3	Location of NJHPP (tunnel)	7
Figure 2.1	Tectonics around the Project Location	11
Figure 2.2	Plan and Profile of Jhelum valley crossing with Geology and Tectonics Features (Units of measurement, elevation and stationing in meters)	12
Figure 2.3	Structural domains in Jhelum River crossing	13
Figure 2.4	Joints in shale (red arrow) and sandstone (blue arrow) of Murree Formation	16
Figure 2.5	Sandstone beds (blue arrows) in Murree Formation	16
Figure 2.6	Calcite filling between shales and sandstone in Murree Formation	17
Figure 3.1	A typical tunnel inside a mountain	19
Figure 3.2	Probe drilling	20
Figure 3.3	Ongoing tunnel excavation, Abbottabad	20
Figure 3.4	Common grout mixture	21
Figure 3.5	Rock bolt installation at C2 site, Majhoi, Muzaffarabad	23
Figure 3.6	Yellow circle shows a rock bolt at C2 site, Addit 4, Majhoi	23
Figure 3.7	Shotcrete	24
Figure 3.8	Cast pipeline	25
Figure 3.9	Weldmesh at C2 site, NJHPP, Majhoi, Muzaffarabad	25
Figure 3.10	Visualization of cut cover construction	28
Figure 3.11	General TBM	29
Figure 3.12	Excavating Machine	29
Figure 3.13	Earth pressure balance machine	30
Figure 3.14	Example of drill and blast schematics	32
Figure 3.15	Slurry machine; bentonite slurry is pumped to plenum chamber and mixes with spoil cut at the face; Mixture is removed for separation and treatment before recycling	33

Figure 3.16	Principle of EPBM. Cuts while (with additives as necessary) is removed by a screw device with the pressure monitored and maintained	33
Figure 3.17	Single shield rock TBM. Rock cut from the face is mucked out And TBM pushed forward against the liner erected to the rear of the shield. Other rock TBM use gripper pushed against the walls of the tunnel and use this as the reaction force for advancing the TBM	33
Figure 3.18	Procedure for measurement and calculation of RQD	36
Figure 4.1	Installation of rock bolts	45
Figure 4.2	Swellex rock bolts	45
Figure 4.3	Single layer RRS with same length swellex bolts	47
Figure 4.4	A project specific RRS	47
Figure 4.5	Lattice Girders at the portals of Addits (A2, A3, A4 & A4a) & Tunnel (T3aL-T3bL)	48
Figure 4.6	Shotcrete being sprayed on Lattice Girder	48
Figure 4.7	RRS fixed in free part of the spilings	50
Figure 4.8	Pipe canopy installation with new system	51
Figure 4.9	Faced Dowels in tunnel face	53
Figure 4.10	Deposit of Muck material on top of collapse debris	55
Figure 4.11	shotcrete wall and grouting works	56
Figure 4.12	Concrete backfilling operations in the roof collapse	56
Figure 4.13	Chemical (PU) grouting operations	56
Figure 4.14	Buttressing the tunnel face with muck material and sand bags to arrest the ground failure	59
Figure 4.15	Exposed rock mass and damage the initial support after poor blasting of tunnel plug (temporary)	59
Figure 4.16	Sequence of rock mass failure (0) before geological mapping (1) face sliding failure (2) face sliding and chimney failure	60
Figure 4.17	Flooded invert during initial rehabilitation works	61
Figure 4.18	Diversion of water through channelling	62
Figure 4.19	Complete tunnel plugs for remediation grouting	62

Figure 4.20	Construction of permanent invert with Lattice Girder Reinforcement	64
Figure 4.21	Shotcrete blowout and water ingress from various points	65
Figure 4.22	Seriously damaged sidewall	65
Figure 4.23	Restoration of sidewall with shotcrete and wire mesh	66
Figure 4.24	Downstream of Concrete gallery	67
Figure 4.25	General criteria for pre-excavation grouting	69
Figure 4.26	Typical pre-excavation grouting around tunnel profile	70

<b>TABLES</b>		<b>Page</b>
Table 2.1	Stratigraphic sequence found in the project of C2 Majhoi	14
Table 3.1	Options for tunnelling (After Muir Wood, 2000)	30
Table 3.2	RQD values	36
Table 3.3	Joint set number values	37
Table 3.4	Joint Roughness Values (Rock Wall Contact before 10 cm shear deformation)	38
Table 3.5	Joint Roughness Values (No Rock Wall Contact when sheared)	38
Table 3.6	Joint Alteration Values (Rock Wall Contact)	39
Table 3.7	Joint Alteration Values (Rock Wall Contact before 10 cm shear)	39
Table 3.8	Joint Alteration Values (No Rock Wall Contact when sheared)	40
Table 3.9	Joint Water Reduction Values	40
Table 3.10	Showing Stress Reduction Factor (a)	41
Table 3.11	Showing Stress Reduction Factor (b)	42
Table 3.12	Showing Stress Reduction Factor (c)	42
Table 3.13	Showing Stress Reduction Factor (d)	42
Table 4.1	Pipe canopy installation with New System	50
Table 4.2	Pipe canopy installation with old system	51
Table 4.3	Failures faced during construction & their respective sections	54