د افغانستان برېښنا شرکت

Da Afghanistan Breshna Sherkat - DABS

Da Afghanistan Breshna Sherkat (DABS)

Operational Division

Planning & Engineering Directorate

Head of Engineering

Survey & Design of Transmission Line Department

Project of U-Connection 2Km Transmission Line from Jawzjan-Mazarsharif 220KV transmission line to Aqcha New Substation

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1. Project scope

1.1 Project

The project covers the survey, design, manufacture, testing, supply, insurance, packing for export, shipment, delivery to site, unloading, provision of access roads, temporary permissions from the relevant land owners to construct the overhead line foundations/towers, civil works and erection and installation of equipment gantry to gantry, testing on completion, commissioning and setting to work for the project of overhead Transmission line from Mazr-e-sharif-substation to the planned 220 kV Aqcha substation for Approximately length of 2 Km. U connection type, double conductor per phase.

The project comprises the execution on a turnkey basis (loop in and loop out connection).

The connection Line should not cross-residential, Commercial, Governmental areas, or Agriculture land.

1.2 Introduction

Jawzjan is one of the most important provinces in the North of Afghanistan. Jawzjan is located on Turkmenistan's border. This province has a great deal of gas resources. Jawzjan is located between 37, 05, 52 and 36, 38, 09 north latitude and 65, 49, 58 and 18, 66, 05 east longitude. The height of the center of the province is 380 meters above the sea. Jawzjan is located 555 km far from the North of Kabul.

Balkh province is located in the east, Faryab in the west, and Sar-e-pul in the south of this province. Its area is estimated to be 11,291.5 square kilometers and

its population is 579,833 according to the estimated population of 2017 published by the National Statistics and Information Department.

Jawzjan is very hot in summer and cold in winter. In summer, the temperature reaches up to 48 degrees and in winter, the temperature reaches minus 15 degrees.

1.2.1 Districts of Jawzjan

Jawzjan province has 11 districts and Sheberghan is the center of Jawzjan. The names of the districts of Jawzjan are the following: Aqcha, Mardian, Mengajek, Khanqah, Faizabad, Khomab, Qarqin, Khawja Do koh, Darzab, and Qoshtepa. According to DABS's plan, Aqcha's new substation with 2x16 MVA capacity will supply electricity to Jawzjan's five districts (**Aqcha**, Mangjak, Mardian, Khanqah, and Faizabad) and they will connect to the national grid.

1.3 Benefits of the project.

The Project Development Objective (PDO) is to provide access to electricity for the households, institutions, and businesses in selected areas of Aqcha districts of Jawzjan province, Afghanistan. The higher level project construction objective is expected that functionalize government commitment to the overall objectives such as alleviating poverty and ensuring inclusivity of access to benefit all segments of the population. After the completion of this project, more than 50 percent of mentioned districts will connect to the national grid.

2. Scope of Supply and Services

The project will be implemented on a turn-key contract basis. This section sets out the scope of supply and services for the (220) kV make U connection type (double circuit, double conductor lattice towers) from the existing TL to the new Substation in Aqcha (loop in and loop out connection).

Generally it includes the following:

- surveys

- design
- supply
- services
- installation
- commissioning

All line components and services not explicitly mentioned but necessary for a turnkey type contract for the transmission line.

The scope of supply and services related to the 220 kV transmission line comprises of the following:

- familiarization with local conditions
- survey and verification of the proposed line route
- geodetic and geotechnical surveys (soil investigation) and other local investigations; including preparation of reports
- The integral design of all OHL components required to construct a functional 220 kV line is required. The studies shall include (but are not limited to) electrical, mechanical and civil works design. As a minimum they include preparation, submission and obtaining approval of all relevant design documents (main design, detailed design, fabrication drawings, as-built records), namely:
  - line design, including towers spotting, line profiles, clearance report; clearance drawings (internal - at the tower)
  - structural design and detailing of towers;
  - design of foundations
  - insulator sets and fittings; definition and utilization
  - conductor and OPGW system - electrical and mechanical calculations, fittings
  - OPGW fittings
  - earthing detailing
  - transposition scheme, if required
  - construction methodology design and documentation (stringing positions, sag-tension tables, site specific installation methodology)

- all line components: manufacture or procurement, factory testing, packing, insurance, shipment, custom clearance, unloading, storage, local transportation, delivery to site and site storage
- all required civil works, site preparation, access (permanent and temporary), storage yards, clearing, work areas, excavations
- supply of specific tools and equipment required for erection, tests and commissioning
- installation of foundations, erection of towers, installation of all required fittings, spacers, dampers, insulator strings, conductors, OPGW and earthing system and all specified tower furniture and signage.
- Installation all line and accessories from dead end towers to gantries
- connection to substation gantries, optical fiber connections to junction and termination boxes
- site tests for commissioning
- supply of spare parts and maintenance tools
- Training of Employer's personnel.
- Submission of documentation "as constructed" final documentation).
- Site restoration, removal of all storage yards, work areas, debris and Leftover construction materials; works as required to leave the site clean and in acceptable condition.

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Preliminary Surveys Report

Project of U-Connection 2Km Transmission Line from Jawzjan-Mazarsharif 220KV Transmission line to Aqcha New Substation

1. Report of preliminary surveys.

1.1 Survey details.

The route of 2KM transmission line from Jawzjan-Mazarsharif 220kV transmission line U-connection (circuit No. 216) to the Aqcha district crossroad new substation (2*16MVA) was surveyed. The connection started from tension tower No. 267 and after feeding the Aqcha new substation it will connect to tower No. 268, currently, tower No.268 is a suspension tower and it should be changed to a tension tower.

The GPS points of the towers have been shown on the following map. So the GPS points of Aqcha's new substation and towers are written on the below tables.

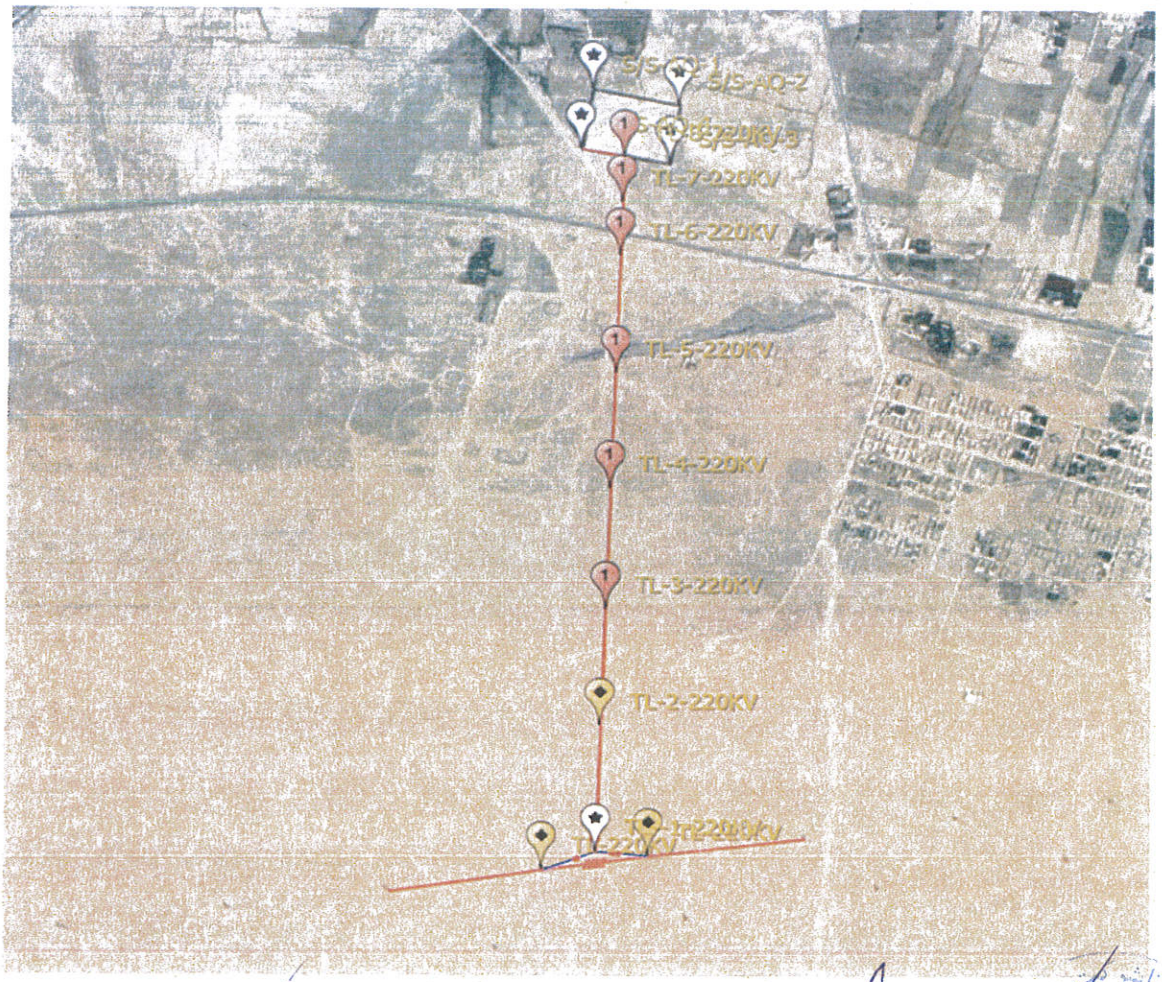

Figure. The coordinates of the towers' position of the transmission line from Jawzjan-Mazarsharif 220kV transmission line U-Connection to Aqcha new substation.

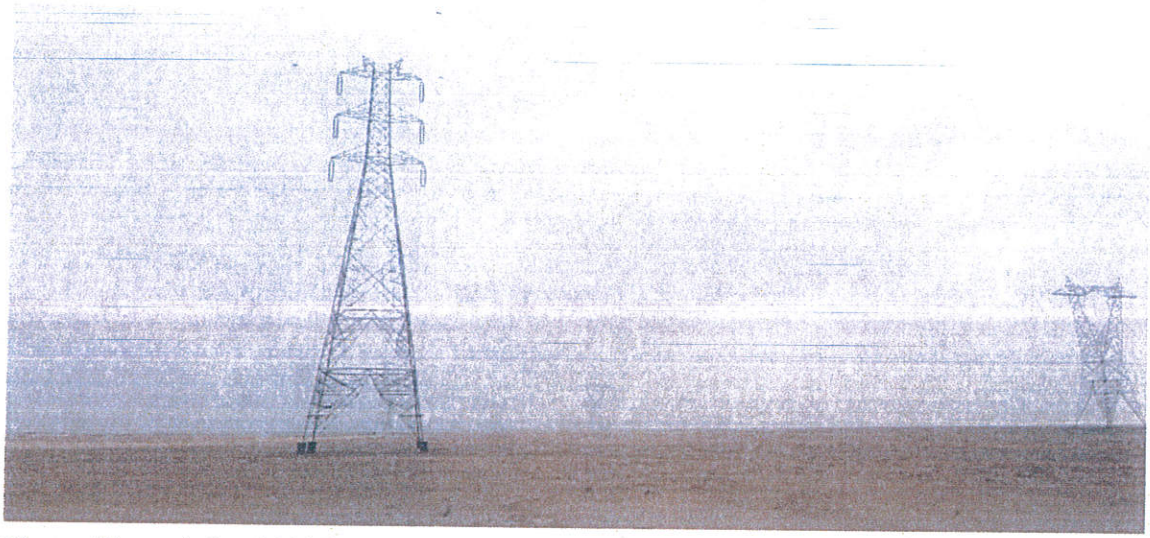

Figure. The existing 220 kV transmission line from Sheberghan to Mazar-e-Sharif

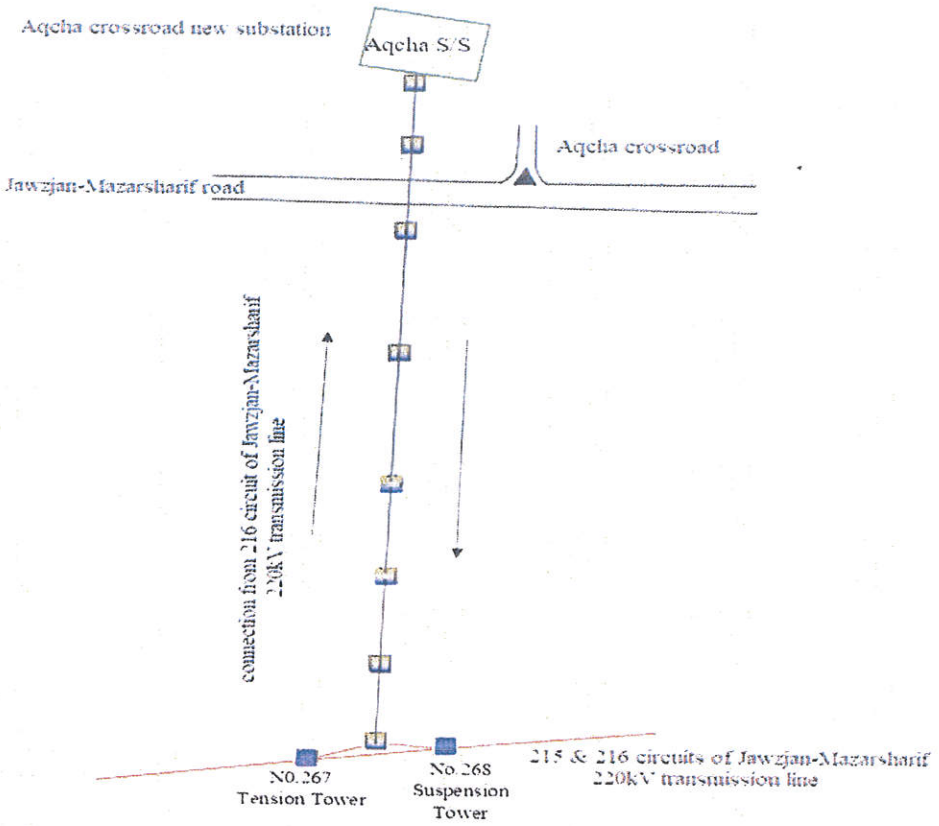

Figure 4. The Surveyed route for transmission line from Jawzjan-Mazarsharif 220kV transmission line U-Connection to Aqcha new substation

Substation Loop in Loop out (U connection) Aqcha GPS Points		
No.	E	N
1	E66°12'22.82"	N36°50'54.88"
2	E66°12'30.75"	N36°50'53.54"
3	E66°12'29.88"	N36°50'48.67"
4	E66°12'21.82"	N36°50'49.95"

Table 1. GPS points of Aqcha new substation (2*16MVA)

Table 2. GPS points of the route from Jawzjan-Mazarsharif 220kV transmission line U-Connection to Aqcha new substation

Loop in Loop out (U connection) Aqcha Transmission Line GPS Points		
No.	E	N
267	E66°12'18.74"	N36°49'50.22"
268	E66°12'28.33"	N36°49'51.37"
1	E66.206554°	N36.831041°
2	E66.206664°	N36.833921°
3	E66.206766°	N36.836606°
4	E66.206870°	N36.839383°
5	E66.206972°	N36.842032°
6	E66.207075°	N36.844733°
7	E66.207118°	N36.845963°
8	E66.207161°	N36.846994°

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Technical specification

Project of U-Connection 2Km Transmission Line from Jawzjan-Mazarsharif 220KV transmission line to Aqcha New Substation

1 - System and Line Data

Sr. No	Description/Details	Unit	Specified	Tendered
1	System Data			
1.1	Nominal Voltage	kV	220	
1.2	Maximum Voltage	kV	245	
1.3	Nominal Frequency	Hz	50	
1.4	1 min. Power Frequency withstand Voltage	kV	460	
1.5	Nominal Current (Single Phase)	A	As per conductors specified	
1.6	Nominal Transmission Capacity Per Circuit	MVA	N/A	
1.7	Rated Lightning Impulse Withstand Voltage	kV	1050	
1.8	Number of Conductors Per Phase in one circuit	No.	Twin conductor per phase	
2	Line Data			
2.1	From the --------- to --------- ---. ----- kV ---/C (----- Conductor/Phase) Transmission Line	km	As per limitation of project	
2.2	Average Span Length	m	250-300	
2.3	Nominal Al. Area of each ACSR Conductor	mm^2	158.1	
2.4	Nominal Area of OPGW	mm^2	109	

Table: 1.1- Design Data

Sr. No	Description/Details	Unit	Specified	Tendered
1	Load Factors			
1.1	Phase conductors at final maximum working tension based on ultimate strength at maximum working tension	%	70	
1.2	Overhead ground wire at final maximum working tension based on ultimate strength at minimum temperature	%	60	
1.3	Phase Conductors at everyday temperature (25°C) still air, final tension based on ultimate strength	%	Maximum 20	
1.4	Overhead ground wire at everyday temperature (25°C) still air, final tension based on ultimate strength	%	Maximum 20	
2	Working Conditions			
2.1	Minimum Temperature of phase conductors and Overhead ground wire	°C	-25	
2.2	Maximum Temperature of phase conductors and Overhead ground wire	°C	+75	
2.3	Maximum wind velocity (occurring at any temperature)	m/s	To be specified	
2.4	Wind pressure on projected area of tower load combination 1,2	N/m2	As per mechanical design	
2.5	Wind pressure on projected area of phase conductor and overhead ground wire (on total projected area of the conductor) load combination 1,2	N/m^2	As per mechanical design	
2.6	Wind force on single suspension or tension insulator string load combination 1,2	N/m^2	As per Mechanical design	

Table: 1.2- Design Spans

Sr. No	Description/Details	Unit	Specified	Tendered
1	Basic Span	m	To be specified	
2	Maximum weight span (suspension)	m	As required	
3	Maximum weight span (Tension)	m	As required	
4	Wind Span for all structure	m	As required	
5	Maximum span length as required	m	As required	
6	Minimum spacing between adjacent phase conductors	m	As required	
7	Minimum Shielding angle of OPGW	m	As Required	

Table: 1.3- Minimum Clearances (220kv)

Sr. No	Description/Details	Unit	Specified	Tendered
	Minimum clearance between live conductors and ground. Conductor at maximum working temperature in still air at a temperature of 75°C.			
1	Normal ground for pedestrian only	m	7.5	
2	Ground in urban areas normal conditions	m	7.5	
3	Highway / Road Crossing	m	7.5	
4	Power line Crossing at normal condition	m	4.58	
5	Telecommunication Line Crossing	m	3.5	
6	Trees Normal Condition	m	4.0	
7	Navigable waterways	m	20	
8	Live metal to structure and earthed fittings on suspension structures – Reduced wind (10m/sec, +10°C)	mm	1,850	
9	Live metal to structure and earthed fittings on suspension structures – Full wind	mm	700	
10	Clearance between jumper loops and other live metal parts to structure at tension structures in still air	mm	1,850	
11	Clearance between jumper loops and other live metal parts to structure at tension structure during 75° swing	mm	700	

Table: 1.4- Line Conductor

Sr. No	Description/Details	Unit	Data Required	Data Offered & Guaranteed
1	Manufacturer	Company	To be specified	
2	Conductor Type		ACSR	
3	Conductor Code Name		Wolf	
4	Stranding and wire diameter		To be specified	
4.1	Aluminum	No/mm	30 / 2.59	
4.2	Steel	No/mm	7 / 2.59	
5	Nominal Al. Cross sectional Area	mm^2	158.1	
6	Conductor Diameter(Approx.)	mm	18.1	
7	Ultimate Strength	KN	To be specified	
8	Modulus of Elasticity	N/mm^2	80541	
9	Coefficient of linear expansion/ thermal expansion coefficient.	/°C	17.87×10^{-6}	
10	Standard mass of conductor	Kg/km	To be specified	
11	Electrical DC Resistance at 20°C	Ohm/km	0.1829	
12	Standard up jointed length per drum	m	To be specified	
13	Applicable Standards		BS 215 Part 2, IEC 60888, 60889, 61089, EN50182	

Table:1.5 Stockbridge Vibration Dampers for ACSR "Wolf" 158.1mm2 Conductors

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		To be specified	
3	Material		To be specified	
3.1	Mass of vibration damper:		forged steel or malleable cast iron	
3.2	Spring element		hot-dip galvanized steel wires	
3.3	Clamps		corrosion-resistant, high-strength aluminum alloy (AlMgSi), drop-forged	
3.4	Screw		steel, hot-dip galvanized	
4	Cross section of Conductor	mm^2	158.1	
5	Applicable standard(s)		DIN 48204	

Table 1.6- Mid span Joint for ACSR "Wolf" 158.1mm2 Conductors

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		Compression type	
3	Body Material		corrosion-resistant, high-strength aluminum alloy (AlMgSi)	
4	Drop – forget screw		Hot dip galvanized steel	

4	Cross section of conductor	mm²	158.1	
5	Applicable standard(s)		DIN 48204	

Table 1.7- Repair Sleeves for ACSR "Wolf" 158.1 mm2 Conductors

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		Compression	
3	Body Material		compression type, of material which is best suitable for the con-ductor material	
4	Cross section of conductor	mm²	158.1	
5	Applicable standard(s)		DIN 48204	

Table1.8- Suspension Clamps for ACSR "Wolf" 158.1 mm2 Conductors

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		to be specified	
3	Material		to be specified	
3.1	Body		corrosion-resistant high-strength aluminum alloy (AlMgSi), drop-forged	
3.2	Screw		steel, hot-dip galvanized	
4	Cross section of conductor	mm²	158.1	
5	Applicable standard(s)		DIN 48204	

Table 1.9- Tension Clamps for ACSR "Wolf" 158.1mm2 Conductors

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		Compression	
3	Material			
3.1	Body		corrosion-resistant high-strength aluminum alloy (AlMgSi), drop-forged	
3.2	Screw		steel, hot-dip galvanized	
4	Cross section of conductor	mm^2	158.1	
5	Applicable standard(s)		DIN 48204	

Tabl.1.10- Inspection Tests at Manufacturer's Plant

Sr. No.	Description	Standards
1	Clamps and Joints	
1.1	Mechanical and electrical type tests	BS 3288, BS 729, ISO, IEC 61109
1.2	galvanizing and mechanical routine tests	BS 3288, BS 729, ISO, IEC 61109

2- Insulators:

Table:2- 1 .Suspension Insulator (Composite Long Rod) for 220kv

Sr. No.	Description/Details	Unit	Specified	Tendered

1	Manufacturer		To be specified	
2	Manufacturer's Type and references		IEC HT- Silicon Rubber	
3	Insulator Type		Composite Long Rod	
4	Normal Voltage	kV	220	
5	Maximum Voltage	kV	245	
6	System Frequency	Hz	50	
7	Rated impulse withstand voltage (Peak)	kV	1050	
8	Rated 1 min power frequency withstand voltage (Peak)	kV	460	
9	Minimum Mechanical Failing Load for fittings and Insulators	kN	160	
10	Outside diameter of unit	mm	As per design	
11	Minimum creepage distance	mm/kV	25	
12	Minimum protective leakage path	%	To be specified	
13	Applicable standard		DIN 48013, IEC 60016, 60305, 60430,060815	

Table: 2.2 Tension Insulator (Composite Long Rod) for 220kv

Sr. No.	Description/Details	Unit	Specified	Tendered

1	Manufacturer		To be specified	
2	Manufacturer's Type and references		IEC HT- Silicon Rubber	
3	Insulator Type		Composite Long Rod	
4	Normal Voltage	kV	220	
5	Maximum Voltage	kV	245	
6	System Frequency	Hz	50	
7	Rated impulse withstand voltage (Peak)	kV	1050	
8	Rated 1 min power frequency withstand voltage (Peak)	kV	460	
9	Minimum Mechanical Failing Load for fittings and Insulators	kN	210	
10	Outside diameter of unit	Mm	As per design	
11	Minimum creepage distance	mm/kV	25	
12	Minimum protective leakage path	%	To be specified	
13	Applicable standard		DIN 48013, IEC 60016, 60305, 60430,060815	

3- Optical Fiber Ground Wire:

Table: 3-1. Optical Fiber Ground Wire (OPGW)

Sr. No.	Description/Details	Unit	Specified	Tendered

1	Manufacturer		To be specified	
2	Manufacturer's Type and references		ACSR/AW nf 48	
3	Fiber Type		Single mode	
4	Constructional Data			
4.1	Optical Unit			
4.1.1	Number of Fiber		48	
4.1.2	Tube Diameter	mm	13.8	
4.2	Armoring			
4.2.1	Aluminum alloy wires	No/mm	6.30	
4.2.2	Aluminum clad steel wires	No/mm	6/4.1	
4.3	Cable Overall			
4.3.1	Nominal diameter	mm	13.8	
4.3.2	Weight	kg/km	660	
4.3.3	Cross sectional area	mm^2	109	
5	Breaking Load	kN	85.65	
6	Final modulus of elasticity	kN/mm^2	162	
7	Permanent elongation due to creepage	%	0	
8	Short time current (1s)	KA	9.31	
9	Short time current capacity(50˚c–200˚c)	$KA^2.t$	$86.7kA^2S$	
10	wavelength	nm	1324	
11	Attenuation	(dB/km)	≤ 0.34	
12	Elongation coefficient	/°C	13.8. x 10-6	
13	Rated DC Resistance at 20C	Ohm/km	0.57	
14	Standard length per drum	m	4000	
15	Minimum bending radius			
15.1	During installation	mm	To be specified	
15.2	After installation	mm	To be specified	
16	**Applicable Standards**			
16.1	Aluminum alloy wires		IEC 60104 type A	
16.2	Aluminum clad steel wires		IEC 61232	
16.3	Cable Construction		IEC 61089	
16.4	Optical Unit		ITU-T-G 652	

Table: 3-2. Joint box for OPGW 48 Fiber

Joint box shall be made of aluminum ally shield with stainless steel part
Joint box shall support at least 48 core fiber
Joint box shall fulfill IP68(international protection) water proof (continues immersion)
Applicable temperature of -40 to 80 Celsius
Fiber bending radios of ≥ 45mm
Retaining fiber length of ≥ 1.5m
Fiber bending additional attenuation ≤ 0.01db
Joint box shall be used for at least 25y in different environments

Table: 3-3. Tension Clamps for OPGW 48 fiber

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		Compression	
3	Material			
3.1	Body		corrosion-resistant high-strength aluminum alloy (AlMgSi), drop-forged	
3.2	Screw		steel, hot-dip galvanized	
4	Nominal Cross-section of OPGW	mm²	109	
5	Ultimate tensile strength	KN	95% OF OPGW	
6	Applicable standard(s)		DIN 48204	

Table: 3-3 Suspension Clamps for OPGW 48 fiber

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		to be specified	
3	Material			
3.1	Body		corrosion-resistant high-strength aluminum alloy (AlMgSi), drop-forged	
3.2	Screw		steel, hot-dip galvanized	
4	Nominal Cross-section of OPGW	mm²	109	

5	Ultimate tensile strength	KN	to be specified	
6	Applicable standard(s)		DIN 48204	

Table.3-4.Termination Kit for Optical Fiber Ground Wire (OPGW)

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Manufacturer's Type and references		ACSR/AW –nf 48	
3	Fiber Type		Single mode	
4	Constructional Data			
4.1	Optical Unit			
4.1.1	Number of Fiber		48	
4.1.2	Tube Diameter		To be specified	
4.2	Sheath and physical characteristics			
4.2.1	Cable components		all dielectric	
4.2.2	Filling compound		to be specified	
4.2.3	Inner sheath material		to be specified	
4.2.4	Inner sheath diameter	mm	to be specified	
4.2.5	Water-blocking tape		to be specified	
4.2.6	Outer sheath material		to be specified	

4.2.7	Nominal diameter	mm	to be specified	
4.3	Minimum bending radius			
4.3.1	During installation	mm	To be specified	
4.3.2	After installation	mm	To be specified	
4.4	Maximum Tension			
4.4.1	Maximum pulling Tension	N	To be specified	
4.4.2	Maximum installation load	N	To be specified	
5	Applicable Standards		ITU-T-G 652, 60104 type A, 61232, 61089, 60793, 60794, ASTM-D 1248, 1765	
Note : The termination, splices etc. kit shall be matched the OPGW cable in shape and fiber optic characteristics.				

Table .3-5. Stockbridge Vibration Dampers for OPGW

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		To be specified	
3	Material		To be specified	
3.1	Mass of vibration damper:		forged steel or malleable cast iron	
3.2	Spring element		hot-dip galvanized steel wires	
3.3	Clamps		corrosion-resistant, high-strength aluminum	

			alloy (AlMgSi), drop-forged	
3.4	Screw		steel, hot-dip galvanized	
4	Cross section of OPGW	mm^2	109	
5	Applicable standard(s)		DIN 48204	

Table:3- 6. Inspection Tests at Manufacturer's Plant

Sr. No.	Description	Standards
1	**OPGW**	
2	Mechanical test, resistivity test, ultimate tensile strength test	IEC 209, BS 2627
3	Optical Fiber test	IEC60793-7, ITU-TG652
4	Cable Test	IEC61089, TEEE1138, IEC60794
5	OPGW Test for Wires	TEC61232
6	**Clamps**	
7	Mechanical and electrical type tests, galvanizing and mechanical routine tests	BS 3288, BS 729, ISO, IEC 61109

4- Tower Grounding:

Table: 4-1. Materials for Tower Grounding

Sr. No.	Description/Details	Unit	Specified	Tendered
1	Manufacturer		To be specified	
2	Type		To be specified	
3	Material			
3.1	Ground Rods		To be specified	
3.2	Galvanized steel angle		To be specified	
3.3	Copper / Galvanized steel ground wire	mm^2	48/Cu, 100/Fe	

8/12/2023

OPGW fibers Specification

SCADA Department
DABS

Single Mode Fiber

General:

Due to increase in demand for electricity and development of power grids there is need for centralized control and data acquisition of power systems to shorten the distance between technical teams and work area. That is why EMS, DMS, voice and protection system and smart metering for decreasing technical loses and other new technologies need a clear regulation for installation of optical ground wires in all DABS Transmission lines. OPGW is one of the most reliable use of fiber optic for telecommunication purposes such that power cable manufacturers are not only producing OPGW but also ACSR conductors containing Fibers.

As per dabs recommendation OPGW shall contain at least 48 core fibers. Fiber optic used in OPGW shall be manufactured within consideration of most new version of standards specially ANSI/EIA/TIA 598, ITU-T G.652D 2016 and IEC 6079(3&4) regulations.

Fiber shall be optimized for long haul and high date rate networks.

Factory Acceptance Test:

10% of supplied drums should be selected for the test any failure will make the whole batch failed.

Chromatic Dispersion, cutoff wavelength, and geometry tests should be done on 10% fiber cores of selected drum.

Attenuation test should be done for 100% of fiber cores of each selected drum

Site Acceptance Test:

OPGW should be tested END to END in presence of DABS HV & SCADA team for acceptance.

1402/05/23

Required specifications

DABS specified Fiber is a single mode fiber type in accordance to ITU-T G.652D 2016 regulation.

The table below summarize the recommended values for a number of categories of fibers that satisfy the objectives of this document.

Table No.1

Attributes	Details	Value	Test Standard
Mode field diameter	Wavelength 1310	8.6-9.2 µm	60793-1-45
	nominal values Tolerance	± 0.4 µm	
Cladding diameter	Nominal	125 µm	60793-1-20
	Tolerance	± 0.7 µm	
Coating diameter	Minimum	245 ± 10 µm	60793-1-21
Core and Cladding concentricity error	Maximum	0.6 µm	60793-1-20
Cladding non-circularity	Maximum	1%	
Cable cut-off wavelength	Maximum	1260 nm	60793-1-44
Proof Stress	Minimum	0.69 GPa	60793-1-30
Macrobend loss	Diameter	50 mm	60793-1-47
	Number of turns	100	
	Maximum at 1550 nm	0.05 dB	
Attenuation	Maximum at 1550 nm	≤0.20dB/km	60793-1-40
Zero Dispersion Slope	Maximum	≤0.092ps/nm^2 .km	
Chromatic dispersion	Wavelength range: 1288-1339 nm 1550nm	≤3.5 ps/nm.km ≤18 ps/nm.km	60793-1-42
PMD	Maximum	0.2 ps/sqrt(km)	60793-1-48
Point discontinuity	@1310, 1550 nm	≤ 0.05 dB	----------

1402/05/23

Temperature	155nm – 1650nm	-60 C° to + 85 C° ≤ 0.05 dB/km	60793-1-52
Coating strip force	Nominal values	3N ≥ CSF ≤ 8.9N	60793-1-32

Joint Box:

Joint box shall be designed for OPGW in - OPGW out splice condition. Joint box is used along transmission line route where there is no other types of cable to connect with the OPGW.

Joint box shall fulfill specification mentioned in this document in order to reduce risk for damage to fiber and increase in attenuation specially loses caused by bending of fiber inside the organizer.

Table No.2

NO	Attributes	Details
1	Input type	2 entry ports, designed for OPGW in OPGW out.
2	Parts and materials	Acid proof stainless steel closure, mounting brackets, earthing contact, stainless steel nuts and bolts.
3	Fiber count	At least 48 core fibers.
4	Protection sleeves	50 splice protection sleeves each 60mm.
5	No of Trays	2 tray (24 splice/tray)
6	IP	Joint box shall fulfill IP68
7	Sealing	Joint box shall contain cable glands and heavy walled heat shrinkable tube for sealing OPGW lines. Gasket for closure sealing.
8	Applicable temperature	temperature of -40 to +80 Celsius.
9	Fiber bending radios	≥45mm
10	Retaining fiber length	≥1.5m

11	Fiber bending attenuation	≤0.01dB
12	Life time	Joint box shall work for at least 25y in different environments without any major issue
13	Corrosions standard tests	Sulphur dioxide EN ISO 7384, ISO 3231, and salty mist IEC 60068-2-52.

Note: Joint box or Terminal box trays and sleeves are related to No of Fibers.

Acronyms:

EMS: energy management system

DMS: Distribution management system

OPGW: Optical ground wire

DABS: da Afghanistan Breshna Sherkat

ITU: international telecommunication union

ANSI: American national safety institute

ADSS: all dielectric self-support cable

IP68: international protection degree, 6 stand for No ingress of dust and 8 stand for continuous immersion in water.

برښنا
د افغانستان برښنا شرکت

Da Afghanistan Breshna Sherkat
Operational Department (COO)
Deputy of Engineering and Technical Study
Survey and Design of Transmission Line Department

Timeline schadule for porcurement and Implementation Plan of (Aqcha-TL-Project)

NO	Activity Description	first month				second month				third month				fourth month				fifth month				Sixth month				seventh month				eight mont				tenth month				Remarks
		w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	
1	procurement process																																					
2	Fundamental and main survey by contractor																																					
3	Fundamental and main Design of the project																																					
4	Site Preparation																																					
5	Digging for SP and TP of Towers foundation																																					
6	Transformation of project equipment in the site																																					
7	Installation of Tower's body																																					
8	Cross Arms ,Insulators aluminium conductor and OPGW Installation																																					
9	Test,comessioning and and energizing of the project																																					
10	Handover of the Project																																					

Note: The timeline is applicable at the beginning of the procurement process .

7. Load flow study document.

2.1 Study Methodology

The Scope of this Study is to assess the technical viability of the proposed 2k-M Lillo Connection between Jowzjan-Mazar lines To Aqcha SS.

Special network analysis software, ETAP, was employed in this study. Typical electricity

networks' qualitative parameters were considered. These are explained below.

2.1.1 Voltage Fluctuations

Bus Voltages for the normal operation were kept between 105% and 95% (+/- 5 %)

Bus Voltages outside these ranges were considered over and under–voltages respectively.

2.1.2 Loading Profiles

ii. Acceptable loading level limits of feeders were set at 70% and 120% of nominal conductor

Thermal ratings for Normal and Emergency operation respectively.

iii. Loadings above these limits during the respective operational conditions were considered as

Overloading of the feeders.

2.2 Assumptions for the Study

The following Assumption were made for this study

1. Surkhan Substation is considered as slack bus for this study (the sending voltage at Surkhan

Substation is considered to be 1 per unit).

2. Aqcha Substation is loaded up to the current rated capacity.

2.3 Cases Considered for Study

The following One Scenarios and3 Cases were considered for this study:

The connection of 2 km TL ,Aqcha 220/20 KV Substation to the existing 220kVShaberghan

Bus through wolf conductor (158.1mm2) single circuit and single conductor, (26.6) km TL.

The Following two scenarios were considered for this study:

Load flow analysis was conducted for the above-mentioned scenarios and cases, the detailed load

Flow analysis is described in the next section.

3. Results of the Study's

Power flow analysis was conducted for mentioned scenario and cases using ETAP software.

Voltage profile, transmission line loading, and energy losses were analyzed below to identify

Network constraints. Proposed network interventions were employed to resolve the constraints.

3.1 Power flow result

3.1.1 Voltage Profiles70% load:

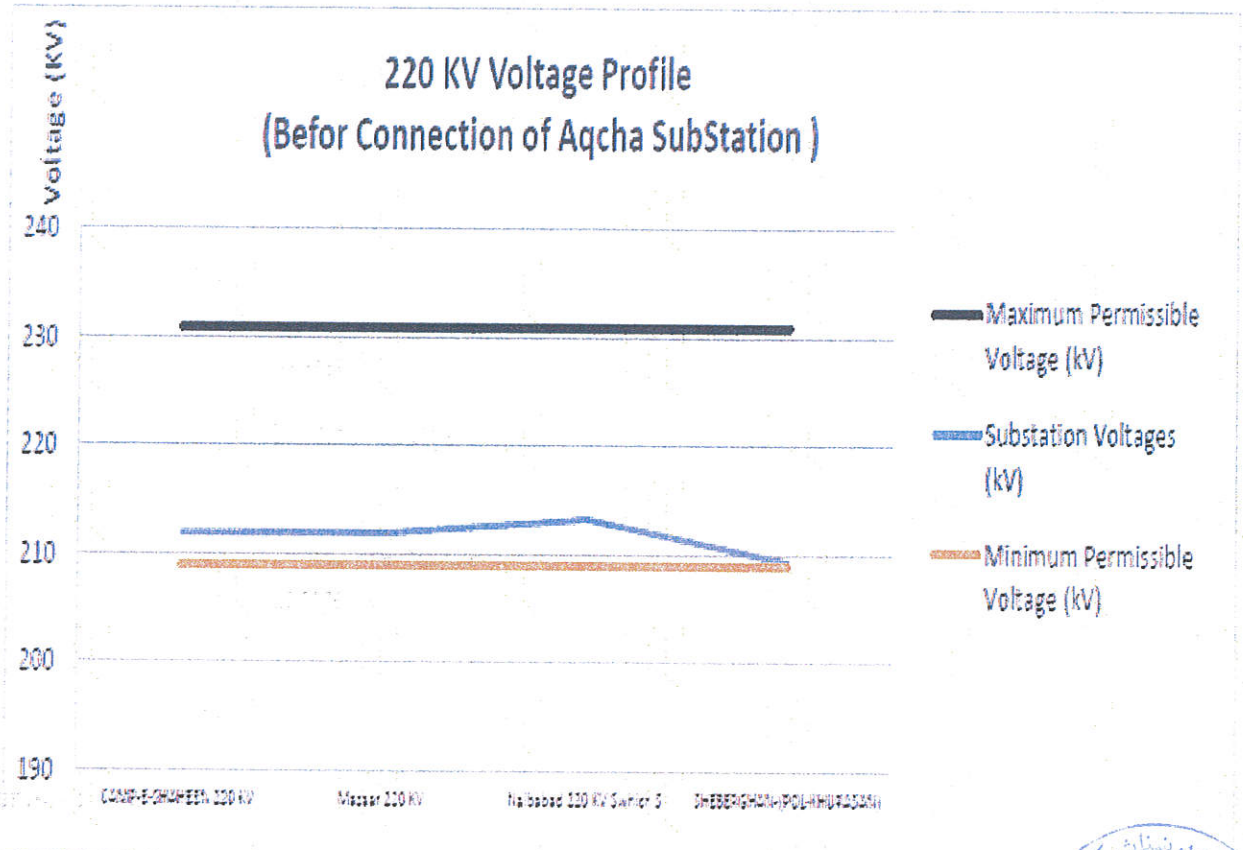


Figure 3.1.1

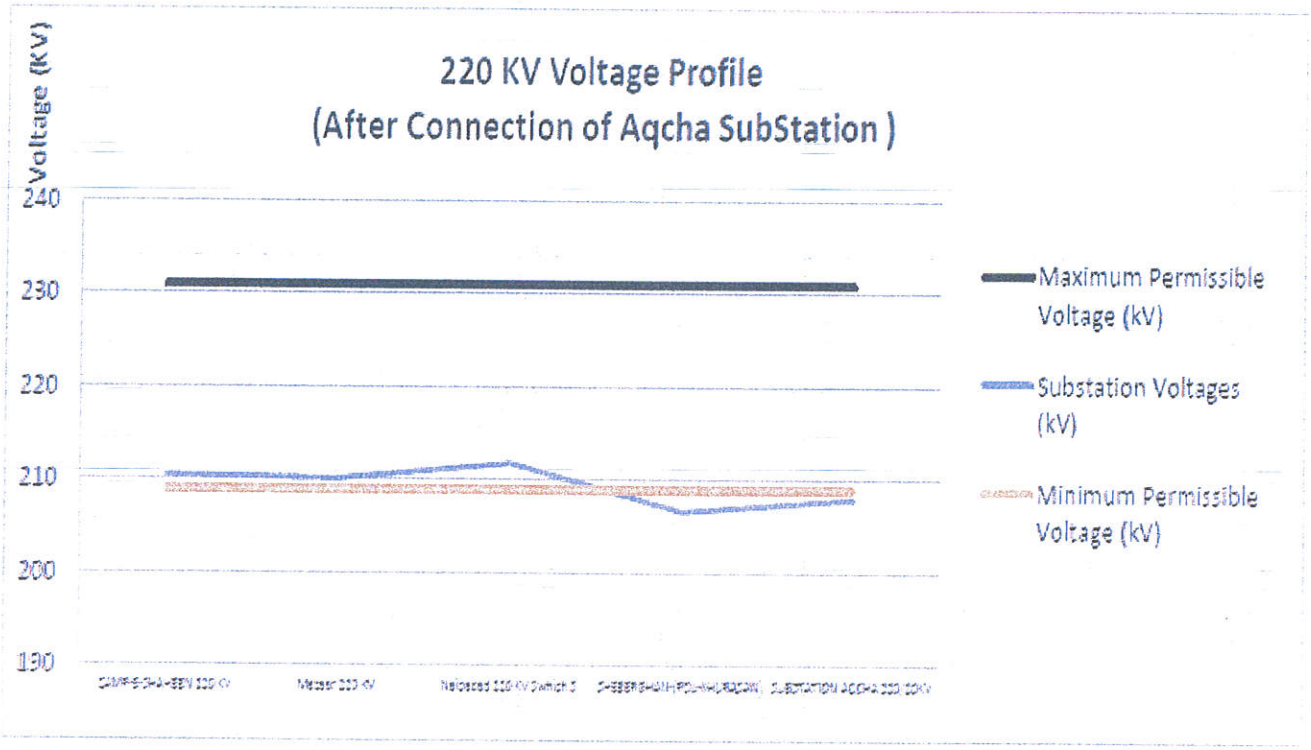


Figure of 3 1.2

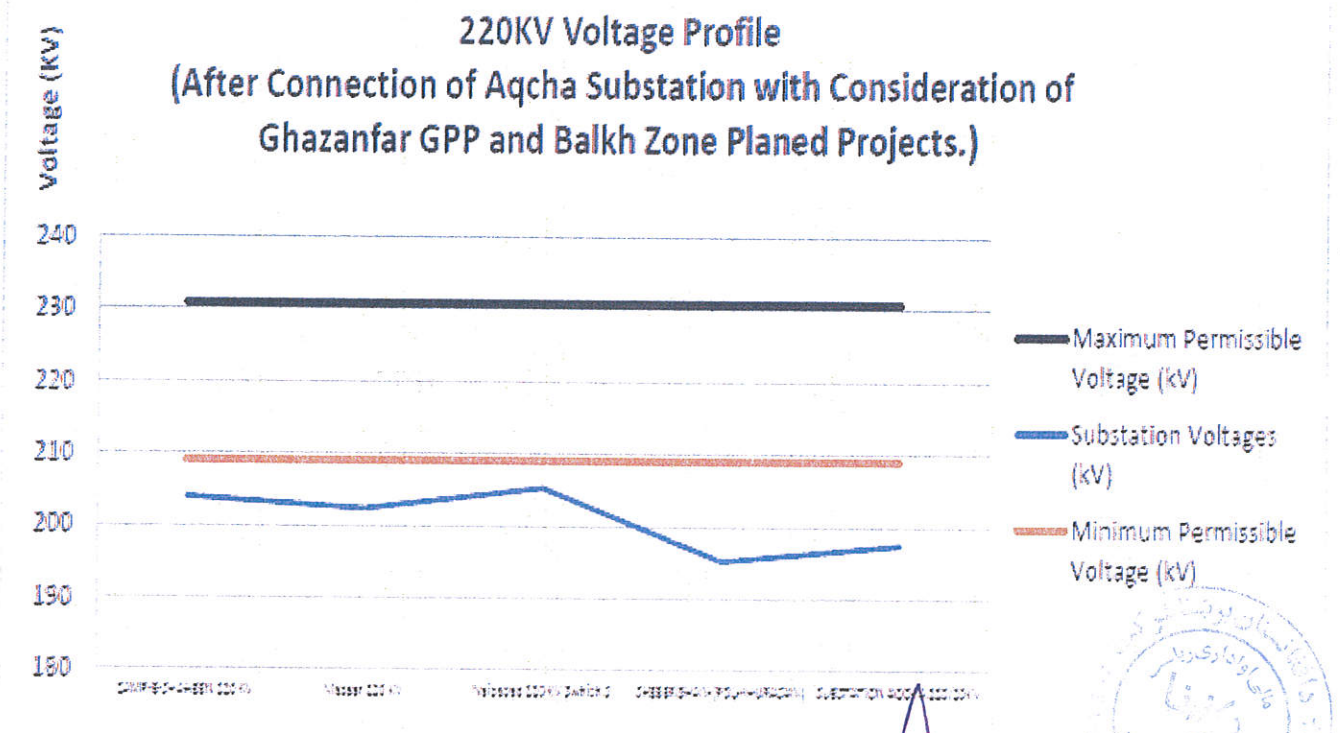


Figure 3.1.3

Voltage Profiles 60% load:

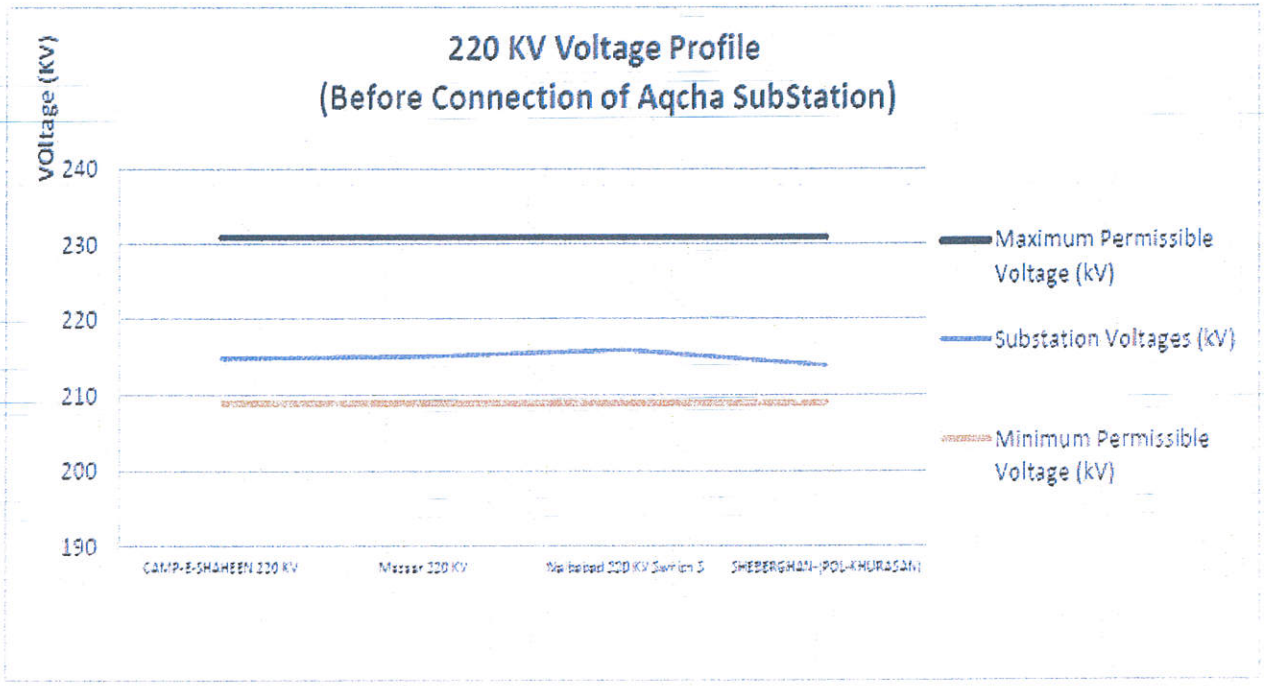


Figure 3.1.4

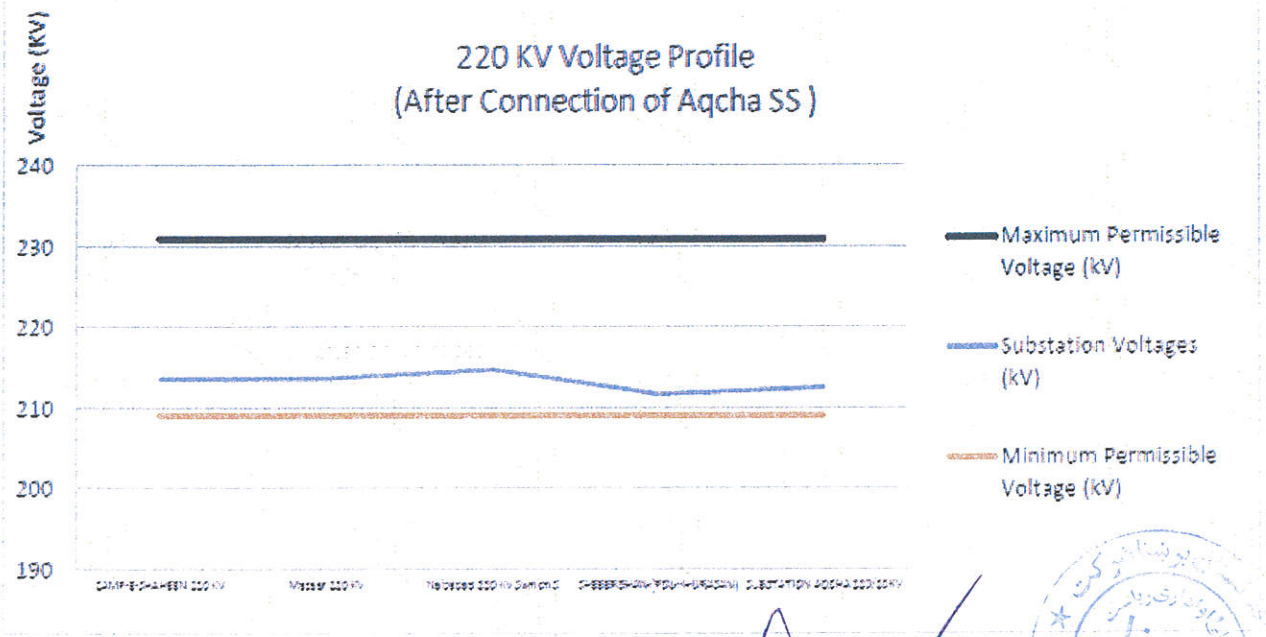


Figure of 3.1.5

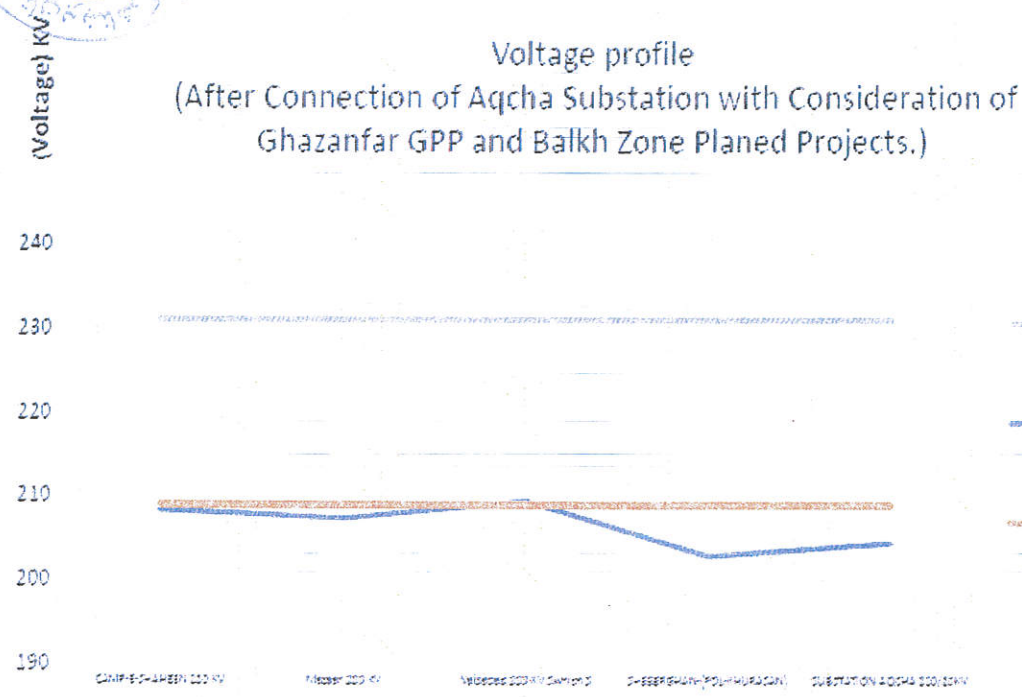


Figure of 3.1.6

Voltage Profiles 50% load

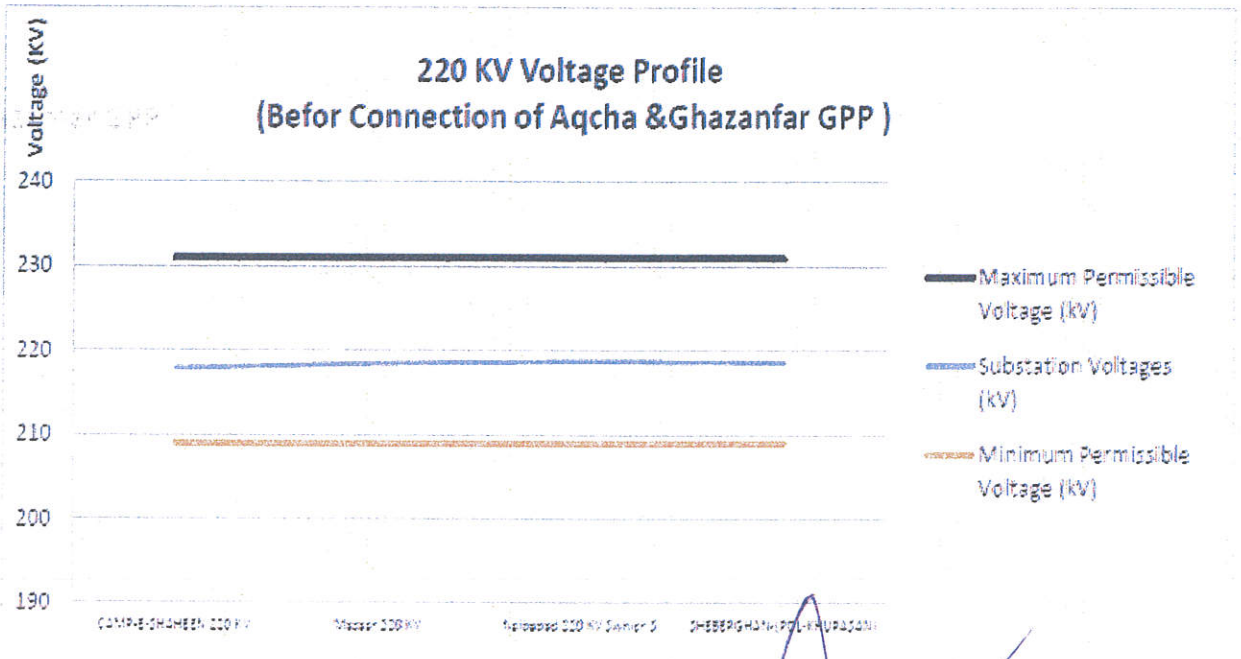


Figure of 3.1.7

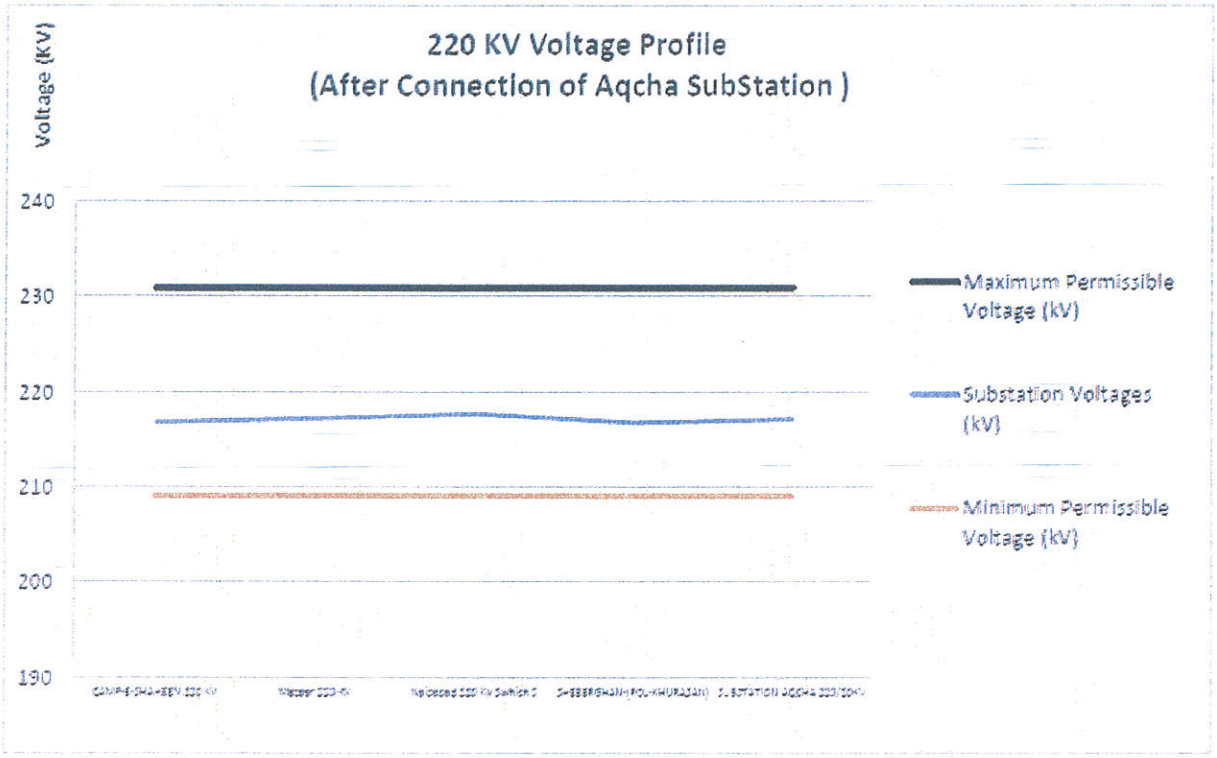


Figure 3.1.8

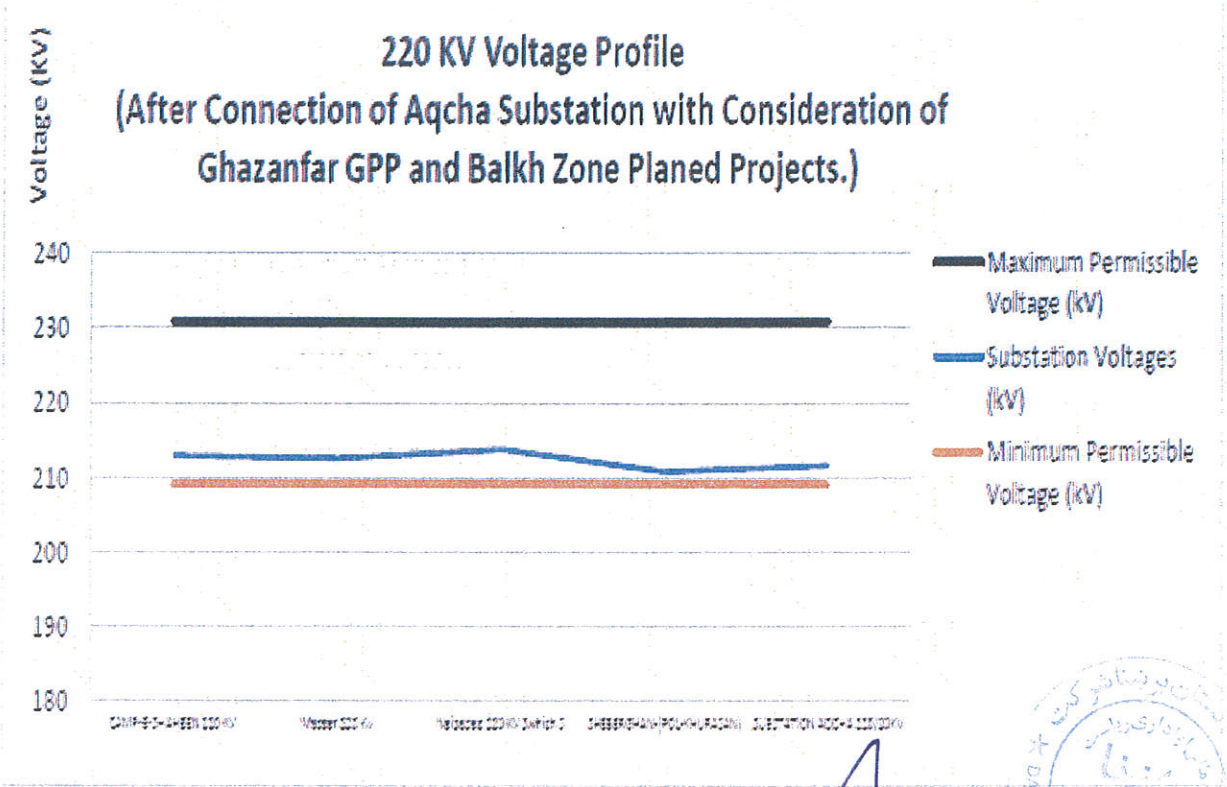


Figure 3.1.9

The Above figures (3, 1, 2- 3, 1, 3 & 3, 1, 6) show that the voltage of substations is out of the (+/-

5%) of the rated voltage.

3, 2, 1-Transmission line loading for 70%

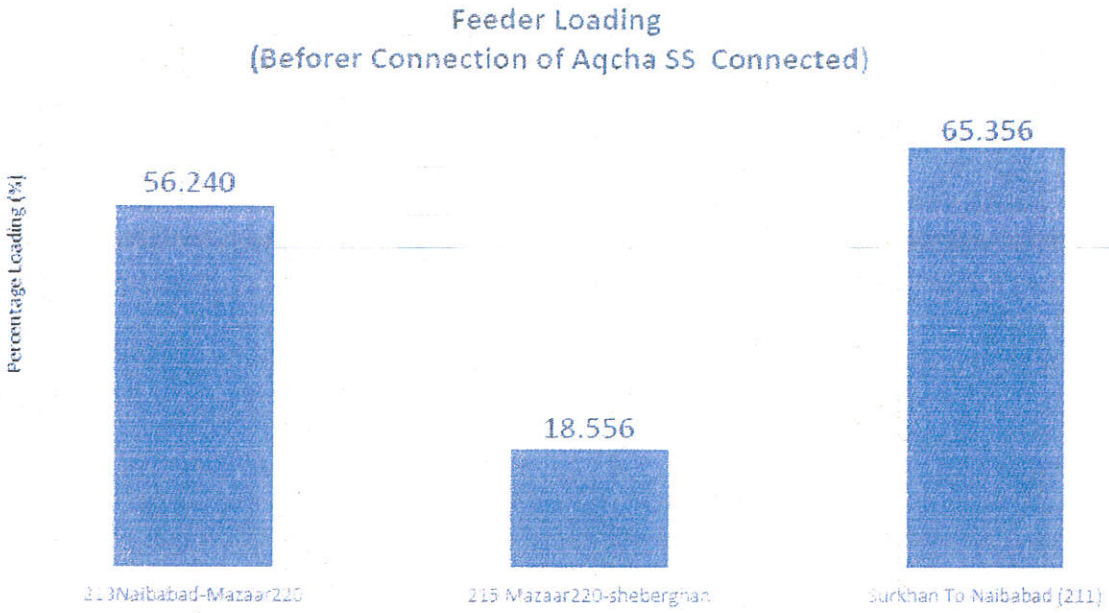


Figure 3.2.1

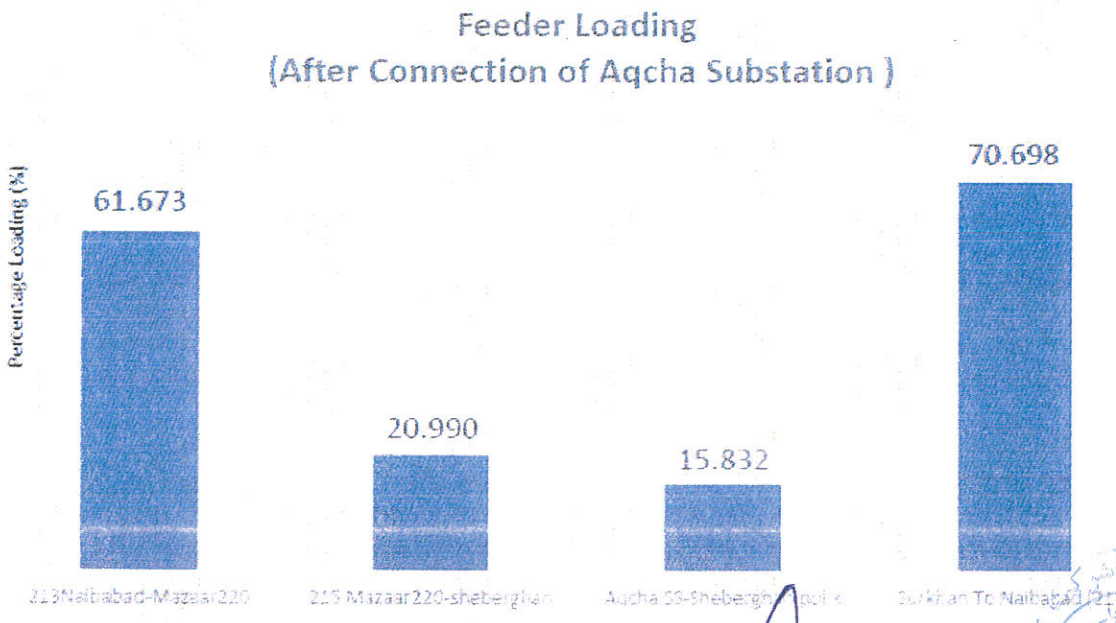


Figure 3.2.2

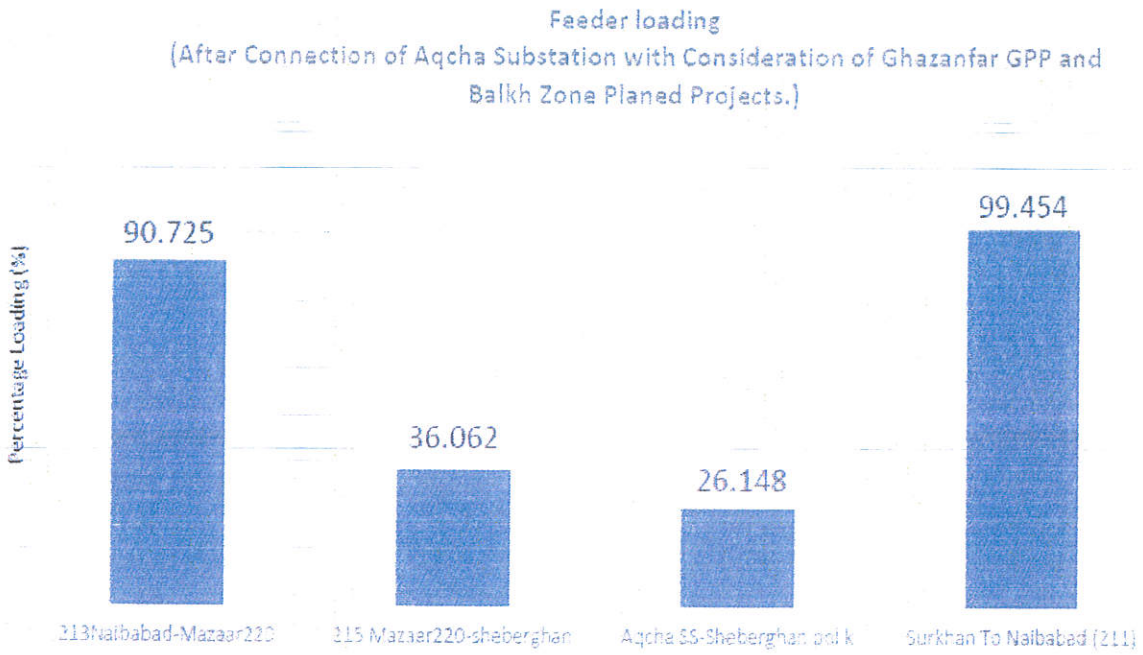


Figure 3.2.3

Transmission line loading for 60%

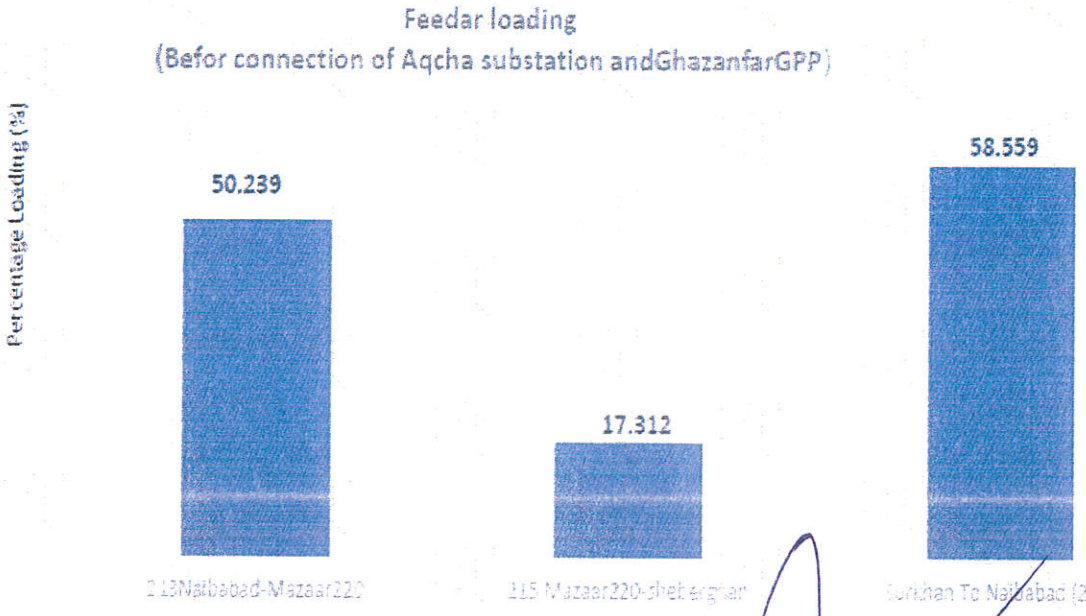


Figure 3.2.4

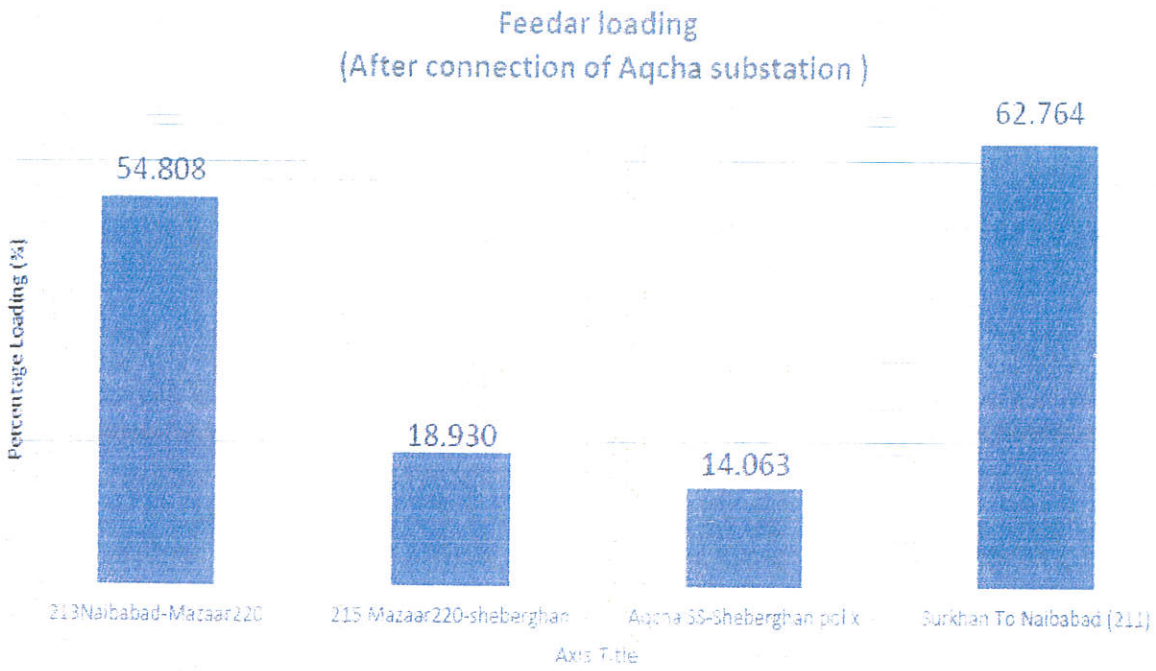


Figure 3.2.5

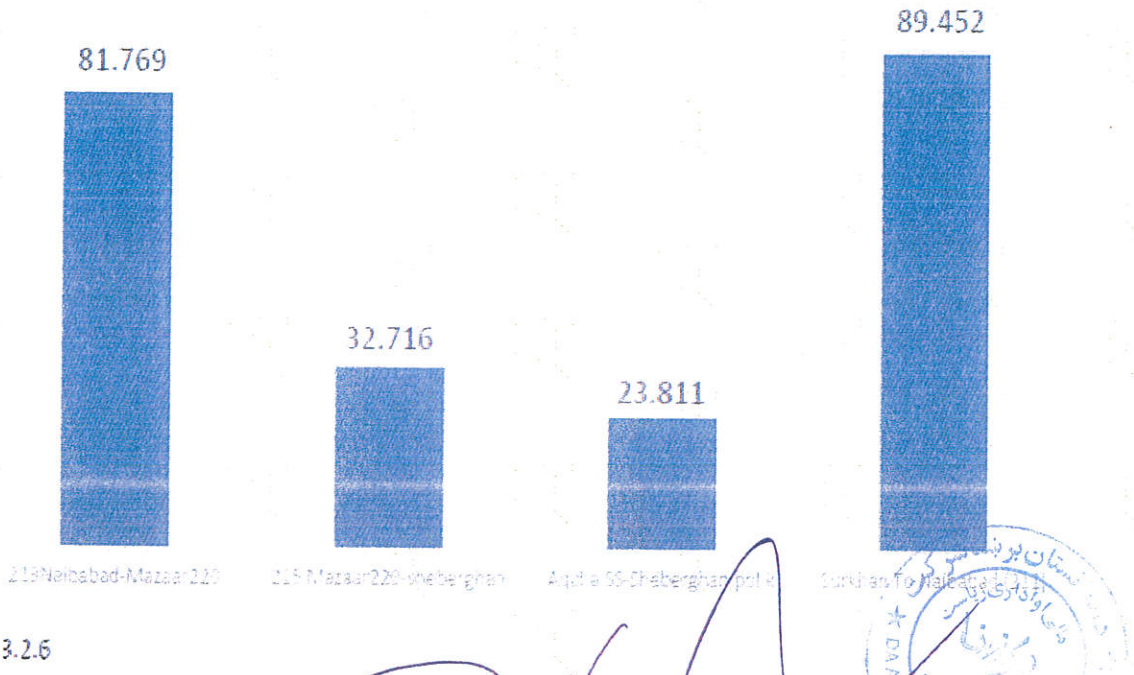


Figure 3.2.6

Transmission line loading for 50%

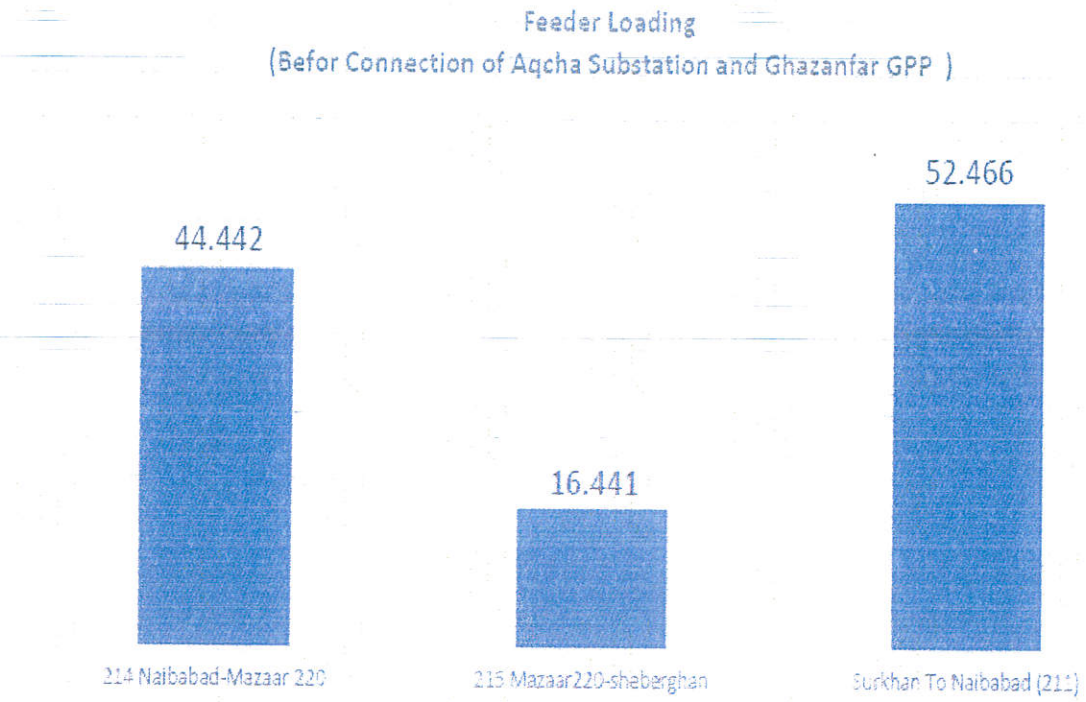
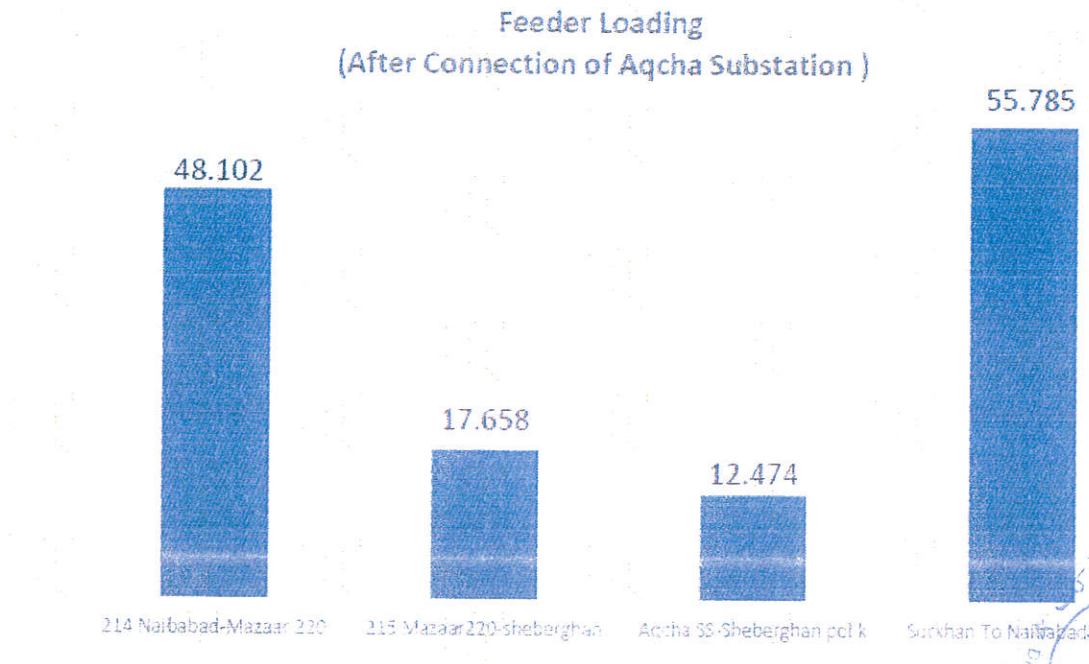


Figure 3.2.7



Figher 3.2.8

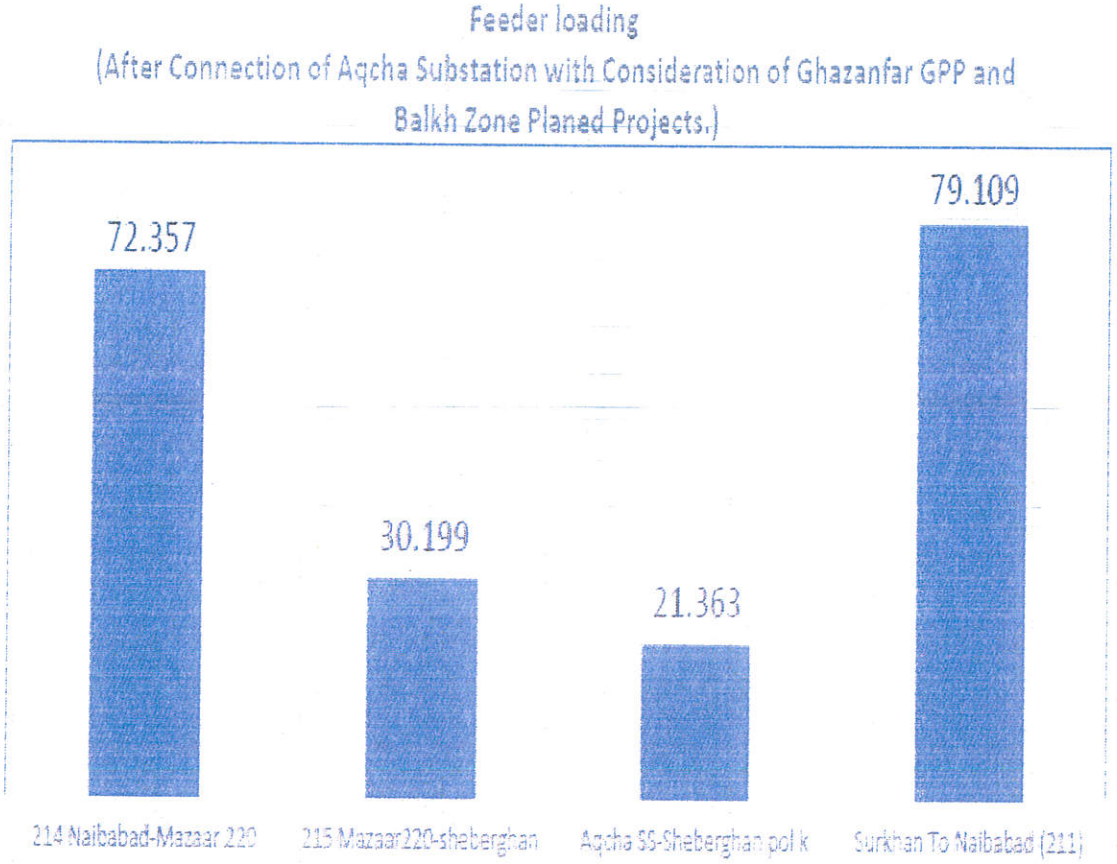

Feeder loading
(After Connection of Aqcha Substation with Consideration of Ghazanfar GPP and Balkh Zone Planed Projects.)
72.357
30.199
21.363
79.109
214 Naibabad-Mazaar 220
215 Mazaar220-sheberghan
Aqcha 66-Sheberghan pol k
Surkhan To Naibabad (211)

Figure 3.2.9

3.3.1Power and Energy Losses for the Following Scenarios:

In different Scenarios and Cases of When Surkhan, Naibabad,-Mazar-Sheberghan Substation Connected As shown in bellow table.

Summary of Losses						
No	Load percentage	Scenario	Cases	Peak Demand (MW)	Total Transmission Power Losses %	Total Transmission Energy Losses %
1	70%	When Surkhan to Naibabad,-Mazar-Sheberghan TL are Connected	Before connection of Aqcha Substation	167253.2	0.66	0.6
2			After connection of Aqcha Substation	219556	0.68	0.62
3			After Connection of Aqcha Substation with Consideration of Ghazanfar GPP and Balkh Zone Planed Projects.	314665.2	1.22	1.11
4	60%	When Surkhan to Naibabad,-Mazar-Sheberghan TL are Connected	Before connection of Aqcha Substation	152308.4	0.58	0.53
5			After connection of Aqcha Substation	200976.4	0.59	0.54
6			After Connection of Aqcha Substation with Consideration of Ghazanfar GPP and Balkh Zone Planed Projects.	296320.8	1.08	0.97
7	50%	When Surkhan to Naibabad,-Mazar-Sheberghan TL are Connected	Before connection of Aqcha Substation	134006.7	0.52	0.47
8			After connection of Aqcha Substation	177879.6	0.52	0.47
9			After Connection of Aqcha Substation with Consideration of Ghazanfar GPP and Balkh Zone Planed Projects.	273501.4	0.94	0.85

4. Conclusion:

The load flow analysis using ETAP software has shown that Wolf conductor (158.1mm2) Single Circuit and double Conductor transmission line can be used to interconnect the Planned 2 k M Lillo Connection of Aqcha SS to Mazar-Sheberghan existing TL.

Some scenarios and cases were considered for this study, and share the result for a comprehensive and better understanding of the present situation of some parts of the NEPS grid and the results have tabulated in above profiles and Graphs, moreover in (70% &60%) rated load of the system the voltage at some SS is outside of the (-/+5) % minimum permissible Voltage range but in 50 % load voltage is inside the rated voltage. Therefore, our focus is just on studying and analyzing of mentioned TL. Hence, the compensation of reactive power depends on long-term planning.