

ADDENDUM NO. 01

Amendments to RFP/EPC Bidding Document for Engineering, Procurement and Construction (EPC) of Attabad Lake Hydropower Project (54 MW) Package-III: Electro-Mechanical Works

This Addendum No. 01 to RFP/EPC Bidding Document containing the following amendments to the EPC Bidding Document for Engineering, Procurement and Construction (EPC) of Attabad Lake Hydropower Project (54 MW) Package-III: Electro-Mechanical Works is issued pursuant to ITP 8.1 of Volume-I of RFP/EPC Bidding Document.

Volume I, Section II - Proposal Data Sheet (PDS), ITP 23.1 (Deadline for Submission of Proposals)

ITP No.	Instruction to Proposer	Amendment
ITP 22.1(b)	The original Proposal shall be submitted/uploaded on EPADS v2.0 at (www.vendors.epads.gov.pk/) Original Proposal Security / Proposal Security instrument amounting to Rs.120 Million shall be submitted to the address provided in PDS to ITP 23.1 on or before last date of submission or submission in person before the Proposal date and submission time. The Proposer shall provide complete searchable PDF version.	The original Proposal shall be submitted/uploaded on EPADS v2.0 at (www.vendors.epads.gov.pk/). Proposals not submitted / uploaded on EPADS v2.0 shall not be considered. In addition to the Proposals submitted/uploaded on EPADS v2.0, the Proposer shall submit three (03) hard copies of Technical proposal only, in strict accordance with the procedure set forth in ITP Clause 22.1(b). In case of discrepancy between files uploaded on EPADS v2.0 and hard copies, the content of files uploaded on EPADS v2.0 shall prevail. Original Proposal Security Instrument amounting to Rs.120 million shall be submitted to the address provided in PDS to ITP 23.1 on or before last date of submission or submission in person before the Proposal date and submission time. The Proposer shall provide complete searchable PDF version.

Volume I, Section II - Proposal Data Sheet (PDS), ITP 23.1 (Deadline for Submission of Proposals)

ITP No.	Instruction to Proposer	Amendment
ITP 23.1	The Proposal/Bids shall be submitted/uploaded on EPADS v2.0 at https://vendors.epads.gov.pk/ Proposal/Bids not submitted/uploaded on EPADS v2.0 shall not be accepted. For Proposal Submission Purposes (Original Bid Security) only, the Employer's address is:	The Proposal/Bids shall be submitted/uploaded on EPADS v2.0 at https://vendors.epads.gov.pk/ Proposal/Bids not submitted/uploaded on EPADS v2.0 shall not be accepted. For Proposal Submission Purposes (Technical Part and Original

	Water and Power Development Authority (WAPDA), WAPDA Auditorium, WAPDA House, Sharah-e-Quaid-e-Azam Lahore, Punjab, Pakistan Telephone: 0092-42-99204981 0092-42-3334481116 Electronic Mail Address: gmpna01@gmail.com , pdalhpp@gmail.com Date: May 14, 2026 Time: 1100 hrs.	Proposal Security) only, the Employer's address is: Water and Power Development Authority (WAPDA), WAPDA Auditorium, WAPDA House, Sharah-e-Quaid-e-Azam Lahore, Punjab, Pakistan Telephone: 0092-42-99204981 0092-42-3334481116 Electronic Mail Address: gmpna01@gmail.com , pdalhpp@gmail.com Date: June 16, 2026 Time: 1100 hrs.
Volume I, Section II - Proposal Data Sheet (PDS), ITP 26.1 (Opening of Technical Parts of Proposal)		
ITP 26.1	The Electronic Bids/Proposal Opening on EPADS v2.0 shall take place on: Date: May 14, 2026 Time: 1130 hrs. Venue: WAPDA Auditorium, WAPDA House, Sharah-e-Quaid-e-Azam Lahore, Punjab, Pakistan	The Electronic Bids/Proposal Opening on EPADS v2.0 shall take place on: Date: June 16, 2026 Time: 1130 hrs. Venue: WAPDA Auditorium, WAPDA House, Sharah-e-Quaid-e-Azam Lahore, Punjab, Pakistan

Volume I, Section IV - Proposal Forms, Table of Adjustment Data, Table Foreign Currency

The table referred to above shall be replaced with the table provided in **Annexure A**.

Volume I, Section IV - Proposal Forms, Table B: Summary of Payment Currencies

The table referred to above shall be replaced with the table provided in **Annexure B**.

Volume I, Section IV - Proposal Forms, Schedule of Payment for E&M Works, Price Schedule No. 01, Price Schedule No. 02 & Price Schedule No. 04

Activity No. 18 "132 kV Remote End Line Bays including Bus Bars and Civil Works" shall stand deleted in its entirety from the above-referred Price Schedules. The updated Price Schedules tables have been provided in **Annexure C**.

Volume I, Section IV - Proposal Forms, Method Statement for Key Construction Activities

The Key activity “33 kV Switchgear” in the above referred section shall stand deleted in its entirety.

Volume I, Section VIII- Particular Conditions of Contract, Part B - Special Provisions,

The following sub-clause is added after sub-clause 1.1.84 Milestones :

Sub-Clause 1.1.85 Accepted Contract Amount	“Accepted Contract Amount” means the proposal price, excluding provisional sums and the provision, if any for contingencies in the Schedule of Rates and Prices (if any), but including Daywork items.
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Volume I, Section VIII- Particular Conditions of Contract, Part B - Special Provisions, Sub-Clause 4.2.1 Performance Security

The referred Sub-Clause shall be substituted with the following:

Sub-Clause 4.2.1 “EPC Contractor’s Obligations”

The first paragraph has been substituted with the following:

“The EPC Contractor shall deliver the Performance Security to the Employer within 28 days after receipt of the Letter of Acceptance. The Performance Security shall be in the form of a Bank Guarantee issued by, at the option of the EPC Contractor, either (a) any Scheduled Bank in Pakistan or (b) a bank located outside Pakistan duly counter-guaranteed by a Scheduled Bank in Pakistan and shall be in the prescribed form.”

Volume I, Section VIII - Particular Conditions, Part B - Special Provision, Sub-Clause 10.1 Taking Over the Works and Sections

The table referred to above Sub-Clause shall be substituted in its entirety with the table provided in **Annexure D**.

Volume I, Section VIII - Particular Conditions of Contract, Part B - Special Provisions, Sub-Clause 14.2.1 Advance Payment Guarantee and 14.2.3 Re-payment of Advance Payment

The referred Sub-Clauses shall stand deleted in its entirety and be replaced with the following:

Sub-Clause 14.2.1 “Advance Payment Guarantee”

- In the First paragraph delete the words “equal to the advance payment” from the first sentence and replace with : “equal to the total amount of advance”
- In the second paragraph before “the advance payment has been repaid” add the words : “the total amount of”
- In the third paragraph before “the advance payment has been repaid” add the words : “the total amount of”
- In sub-paragraph (a) before “the advance payment has been repaid” add the words: “the total amount of”
- In the last sentence, before “the advance payment”, at the very end of sentence, add the words: “the first installment of”

The entity issuing the Advance Payment Guarantee and its form shall be as follows:

“The Advance Payment Guarantee shall be in the form of Bank Guarantee issued by (a) a Scheduled Bank in Pakistan or (b) a foreign bank duly counter-guaranteed by a Scheduled Bank in Pakistan. In case of Joint Venture, the Advance Payment Guarantee(s) shall be in the name of the Joint Venture or in the name of the Lead / Either firm of the JV or in ratio of shares of the individual JV Partners.

Sub-Clause 14.2.3 “Re-payment of Advance Payment”

Replace the text with the following:

“The Advance Payment shall be recovered in equal installments; first installment at the expiry of 4th month after the date of payment of Advance and last installment before the issuance of TOC of the Works as per Sub-Clause 10.1. The Advance Bank Guarantee may be reduced in proportion to the value of the Plant and Equipment delivered to the site, as evidenced in the shipping and delivery documents.

Volume I, Section VIII - Particular Conditions of Contract, Part B - Special Provisions, Sub-Clause 14.4 Schedule of Payments Advance Payment

This Sub-Clause shall be substituted with following:

The Foreign Currency Component Will be Paid in Equivalent Pak Rupee / Local Currency. The amount in Equivalent PKR / Local Currency shall be determined by applying TT&OD composite selling exchange rate published / authorized by State Bank of Pakistan (SBP) for the day 28 days prior to Contractor’s IPC / FPC submission date.

Schedule No. 01: Supply of Plant from Abroad (Pre-Engineered Structures) including Fixtures and other Materials, Goods and Spare Parts (if any) (Schedule of Price Basis)

In respect of Plant and Equipment supplied from Abroad, the following Payments shall be made:

- Sixty five Percent (65%) of the total or Pro Rata CIP Amount (Quoted Amount) upon incoterm "CIP" upon Delivery to the Carrier within Forty-Five (45) Days after successful Factory Acceptance Tests (FAT) and Certificate by Employer’s Representative and Receipt of Interim Payment Certificate and Shipping Document.
- Thirty Percent (30%) of the Total or Pro Rate CIP Amount (Quoted Amount) upon Incoterm "CIP (including all Costs of Logistics to site etc.)" after Delivery to Site (Attabad Lake HPP, District Hunza) within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.

- Two and a half Percent (2.5%) of the Total or Pro Rate CIP Amount (Quoted Amount), upon Issuance of the Taking Over Certificate, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Two and a half Percent (2.5%) of the Total or Pro Rate CIP Amount (Quoted Amount), upon Issuance of the Performance Certificate, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.

Schedule No. 02: Supply of Plant from within the Employer's Country (Pre-Engineered Structures) including Fixtures and other Materials, Goods and Spare Parts (if any) (Schedule of Price Basis)

In respect of Plant and Equipment supplied from within the Employer's country, the following Payments shall be made:

- Sixty Five Percent (65%) of the Total or Pro Rate Quoted Amount upon Incoterm "EXW", after successful Factory Acceptance Tests (FAT) and Certificate by Employer's Representative, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Thirty Percent (30%) of the Total or Pro Rate Quoted Amount upon after Delivery to Site (Attabad Lake HPP, District Hunza) within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Two and a half Percent (2.5%) of the Total or Pro Rate Quoted Amount, upon Issuance of the Taking Over Certificate, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Two and a half Percent (2.5%) of the Total or Pro Rate Quoted Amount, upon Issuance of the Performance Certificate, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.

Price Schedule No. 03: Design Services

The following payments shall be made:

- Twenty Five Percent (25%) of the Measured Value of Work performed by the Contractor, as identified in the said Program Level-I Design and other approved submittals, during the preceding month, as evidenced by the Employer's Authorization of the Contractor's Application, will be made Monthly within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Seventy Percent (70%) of the Measured Value of Work performed by the Contractor, as identified in the said Program Level-II Design and other approved submittals, during the preceding month, as evidenced by the Employer's Authorization of the Contractor's Application, will be made Monthly within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Two and a half Percent (2.5%) of the Total or Pro Rata Value of Design Services performed by the Contractor as evidenced by the Employer's Authorization of the Contractor's Monthly Applications, upon Issue of the Taking Over Certificate, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Two and a half Percent (2.5%) of the Total or Pro Rata value of Design Services performed by the Contractor as evidenced by the Employer's Authorization of the Contractor's Monthly Applications, upon Issue of the Performance Certificate, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.

Price Schedule No. 04: Installation and All Other Services

The following payments shall be made:

- Ninety Five Percent (95%) of the Measured or Pro Rata Value of Work performed by the Contractor, as identified in the Said Program of Performance, during the Preceding Month, as evidenced by the Employer's Authorization of the Contractor's Application, will be made Monthly within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Two and a half Percent (2.5%) of the Total or Pro Rata Value of Installation Services Performed by the Contractor as evidenced by the Employer's Authorization of the Contractor's Monthly Applications, upon Issue of the Taking Over Certificate, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.
- Two and a half Percent (2.5%) of the Total or Pro Rata Value of Installation Services performed by the Contractor as evidenced by the Employer's Authorization of the Contractor's Monthly Applications, upon Issue of the Performance Certificate, within Forty-Five (45) days after receipt of Interim Payment Certificate mentioned.

Volume I, Section VIII - Particular Conditions, Part A - Contract Data

Sr. No.	Data required	Sub-Clause	Provision of RFP/EPC Bidding Document	Amendment
41	Proportions or amounts of Local and Foreign Currencies are: Local: Foreign:	14.15(a)(i)	Table B - Summary of Payment Currencies.	Table C - Summary of Payment Currencies.

Volume I, Section VIII - Particular Conditions, Part A - Contract Data

Sr. No.	Data required	Sub-Clause	Provision of RFP/EPC Bidding Document	Amendment
42	Currencies and Proportions for Payment of Delay Damages	14.15(c)	Currency: PKR Proportions: Table B - Summary of Payment Currencies	Currency: PKR Proportions: Table C - Summary of Payment Currencies

Volume II, Part-I, Specific Provisions

Sub-Clause 1.1.1, Sub-Clause 1.2.1.6

All referred Sub Clauses pertaining to the **Remote End Line Bays** as discussed in the RFP / EPC Bidding Document shall stand deleted in their entirety.

In addition to the above, any other reference, requirement, Provision, Drawing, Specification, Schedule, Testing and Commissioning requirement, or scope related to the Remote End Line Bays mentioned anywhere else in the RFP / EPC Bidding Document shall be deemed deleted in their entirety and shall no longer form part of the scope under this Package.

Volume II, Part-I, Specific Provisions

Wherever the words “WAPDA” and/or “NGC” mentioned in the aforesaid document, the same shall be read and construed as “Employer” and/or “Employer’s Representative”, respectively.

Volume II, Part-I, Specific Provisions Sub-Clauses 1.14.4, 1.16.2.1.1 and 1.16.2.3.10

The above Sub-Clauses has been modified in the RFP / EPC Bidding Document.

Volume II, Part-I, Specific Provisions, Section 1, Scope of Work, Sub-Clause 1.2.1.5 132kV AIS Switchyard

Original (Data)	Amendment (Data)
a. 132 kV AIS Switchyard shall consist of Three (03) Transformer Bays (Generator Step Up Transformers), One (01) Power Transformer Bay and Two (02) 132 kV Transmission Line Bays. The 132 kV Transmission Line Bays shall be arranged in a One-and-a-Half Circuit Breaker Scheme. b. One (01) 132/33 kV Power Transformer with a Rating of 10/13 MVA. c. One (01) 33/11 kV Power Transformer with a Rating of 6.3 MVA. d. One (01) Emergency Diesel Generator Set with a Rating of 200 kVA. e. One (01) set of 110V DC System and UPS system complete with Batteries and Chargers. f. 33 kV Switchgear g. MV/LV Switchgear. h. Protection System.	a. 132 kV AIS Switchyard shall consist of Three (03) Transformer Bays (Generator Step Up Transformers), One (01) Power Transformer Bay and Three (03) 132 kV Transmission Line Bays. The 132 kV Transmission Line Bays shall be arranged in a One-and-a-Half Circuit Breaker Scheme. b. One (01) 132/11.5 kV Power Transformer with a Rating of 10/13 MVA. c. One (01) Emergency Diesel Generator Set with a Rating of 200 kVA. d. One (01) set of 110V DC System and UPS system complete with Batteries and Chargers. e. MV/LV Switchgear. f. Protection System. g. Substation Automation System (SAS)

i. Substation Automation System (SAS)	h. SCADA and Telecommunication System.
j. SCADA and Telecommunication System.	i. Equipment Protective Earthing connections, complete in all respect.
k. Equipment Protective Earthing connections, complete in all respect.	j. The specifications mentioned in the Employer's Requirements in respect of goods and materials to be provided and considered in the Works shall be new, unused, of the most recent or current models and shall incorporate all recent improvements in design and materials.
l. The specifications mentioned in the Employer's Requirements in respect of goods and materials to be provided and considered in the Works shall be new, unused, of the most recent or current models and shall incorporate all recent improvements in design and materials.	

Volume II, Part-I, Specific Provisions, Section 1, Scope of Work, Sub-Clause 1.16.2.3.10 132 kV Switchyard and 132 kV Line End Bays at Remote End

Original (Data)	Amendment (Data)
The 132 kV Switchyard shall be constructed nearby the plant which consist of three Transformer Bays, one Power Transformer Bay and two 132 kV Transmission Line Bays. The 132 kV Transmission Line Bays shall be arranged in breaker & half scheme. The Attabad Lake HPP will be interconnected to the proposed 132/66 kV Regional Grid Station at Aliabad and existing 11/33 kV Existing Grid Station at Sost. Two (2) 132 kV Remote End Line Bays shall be constructed at 132/66 kV Regional Grid Station, Aliabad. The interconnection with 132 kV switchyard and Power Plant shall be through 11kV Segregated Phase Bus. AC Auxiliary supply be fed from Power Plant through One (01) No. feeder and another feeder from 132 kV Switchyard Power Transformer (6.3 MVA). A complete DC system shall be installed in 132 kV Switchyard Control House Building.	The 132 kV Switchyard shall be constructed nearby the Power Plant which consist of three (03) Transformer Bays (Generator Step Up Transformers), one (01) Power Transformer Bay and three (03) 132 kV Transmission Line Bays. The 132 kV Transmission Line Bays shall be arranged in one and a half breaker scheme. The Attabad Lake HPP shall be interconnected to the proposed 132/66 kV Regional Grid Station at Aliabad and 132/11 kV Grid Station at Sost. The scope of Remote end bays including 132kV transmission lines shall be covered in separate package. The interconnection with 132 kV Switchyard and Power Plant shall be through 11kV Segregated Phase Bus (SPB). AC Auxiliary supply shall be fed from Power Plant through One (01) feeder and another feeder from 132 kV Switchyard Power Transformer (10/13 MVA). A complete DC system shall be installed in 132 kV Switchyard Control House Building.

Volume II, Part-II, Technical Provisions

Sub-Clause 6.3.3, Annexure-I: Technical Schedules (E&M Works) Point-6, 132 kV Switchyard and Remote End Line Bays.

The scope mentioned in the referred Sub-Clause pertaining to the **Remote End Line Bays** in the RFP / EPC Bidding Document shall stand deleted in their entirety.

In addition to the above, any other reference, requirement, provision, drawing, specification, schedule, testing and commissioning requirement, or scope related to the Remote End Line Bays mentioned anywhere else in the RFP / EPC Bidding Document shall also be deemed deleted and shall no longer form part of the scope under this Package.

Volume II, Part-II, Technical Provisions, Section 2: Hydraulic Steel Structures

The table provided in **Annexure E** shall be substituted under the referred section above as Sub-Clause 2.5 "Painting Schedule HSS Works" as Table 2-3 "Paint Schedule".

Volume II, Part-II, Technical Provisions, Section 3 Electrical Plant Equipment, Sub-Clause 3.5 Medium Voltage Switchgear, Sub-Clause 3.5.1 "Scope"

Original (Data)	Amendment (Data)
The Generator Circuit Breakers shall be of vacuum type as insulating and interrupting medium and complying with IEC 62271-100 standard and IEC 62271-200 standard. The Generator Circuit Breakers shall be suitable for synchronizing duties and provided with interlocks to avoid incorrect operation of the disconnector or the earth switches.	The 11 kV Switchgear shall be SF6 Gas type for generating units. All other except generating units shall be vacuum type as insulating and interrupting medium and complying with IEC 62271-100 standard and IEC 62271-200 Standard. The Generator Circuit Breakers shall be suitable for synchronizing duties and provided with interlocks to avoid incorrect operation of the Disconnecter or the Earth Switches.

Volume II, Part-II, Technical Provisions, Section 6: 132 kV Switchyard and 132 KV Remote End Line Bays, Sub-Clause 6.1 "Scope of Work"

The title of the above referred Section 6 shall be substituted with **"132 kV Switchyard"**, and the contents under Sub-Clause 6.1 "Scope of Work" shall stand replaced in their entirety with the text provided in **Annexure F**.

Volume II, Part-II, Technical Provisions, Section 6: 132 kV Switchyard and 132 KV Remote End Line Bays, Sub-Clause 6.7.2 “Ratings”

The value of “Minimum Creepage Distance, mm” under Sub-Clause 6.7.2 ‘Ratings’ contained a typographical error and shall be corrected as 4495 mm.

Volume II, Part-II, Technical Provisions, Sub-Clause 6.18 “Power Transformer (10/13 MVA, 132/33 KV)”

The title of the above referred Sub-Clause 6.18 has been changed to “**Power Transformer (10/13 MVA, 132/11.5 kV)**”. Also, the contents under Sub-Clause 6.18 “ Power Transformer” shall be substituted.

Volume II, Part-II, Technical Provisions, Sub-Clause 6.19 - “Power Transformer (6.3 MVA, 33/11 KV)”

The above referred Sub-Clause 6.19 shall stand deleted in its entirety.

Volume II, Part-II, Technical Provisions, Sub-Clause 6.20 - “35 KV Metal-Clad Switchgear”

The above referred Sub-Clause 6.20 shall stand deleted in its entirety.

Volume II, Part-II, Technical Provisions, Sub-Clause 6.22.3 “Mandatory Spare Parts for Remote End Line Bays (Aliabad)”

The above referred Sub-Clause 6.22.3 shall stand deleted in its entirety.

Volume II, Part-II, Technical Provisions, Sub-Clause 6.3 “Switchyard and Remote End Line Bays Design” & Sub-Clause 6.3.1 “General”

The title of the above referred Sub-Clause 6.3 shall be substituted with “**132 kV Switchyard Design**”, and the contents under Sub-Clause 6.3.1 “General” shall stand replaced in its entirety with the text provided below:

These Specifications cover the requirements for Design, Supply, Installation, Testing and Commissioning of Plant and Equipment for 132 kV Switchyard Attabad Lake HPP. The design of Civil Engineering Facilities associated with this Contract (Cable Trenches, Equipment Foundations, Earthwork, Control House Building, Guard Rooms, Metering Room, Boundary Walls, Drainage etc.) shall be the responsibility of Civil EPC Contractor and included in separate Package-I. The Single Line Diagram (SLD) and Equipment Arrangement Plans indicate the Details of Facilities to be carried out.

The EPC Contractor shall prepare detailed design drawings on the basis of information provided in the Employer's Requirements listed herein.

Volume II, Part-II, Technical Provisions, Sub-Clause 6.3.3 "Electrical Design Parameters"

In the paragraph of the above-referred Sub-Clause 6.3.3, the words "Remote End Line Bays" shall stand deleted in its entirety.

Volume II, Part-II, Technical Provisions, Sub-Clause 6.12.1 General, Serial No. 15

Original (Data)	Amendment (Data)
15. The numerical devices offered under this contract shall be of latest version, of proven design, having minimum of Five (05) years' operating experience in a well reputed power utility power systems of voltage level 132kV and above.	15. The numerical devices offered under this contract shall be of latest version, of proven design, having minimum of Five (05) years' operating experience in a well reputed power utility power systems of voltage level 132kV and above. However, the latest version of the same shall be offered/quoted along with valid type test reports for the relays, in accordance with the applicable IEC standards and the DISCO's type test policy. The relays shall be compatible with and meet the requirements for integration with the National Power Control Center.

Volume II, Part-II, Technical Provisions, Section 6: 132 kV Switchyard, Sub-Clause 6.14.4 Equipment Requirements at 132 kV Attabad Lake HPP Substation

The Sub-clause 6.14.4.1.2 & Sub-clause 6.14.4.2.2 shall be included under the above referred Sub-Clause 6.14.4 with the text provided in **Annexure G**.

Volume II, Part-II, Technical Provisions, Sub-Clause 6.14 Telecommunication and Scada System

The Sub-clause 6.14.5 & Sub-clause 6.14.6 shall stand deleted in their entirety under the above referred Sub-Clause 6.14.

Volume II, Part-II, Technical Provisions, Annexure-I: Technical Schedules (E&M Works), Section 6. 132 kV Switchyard and 132 kV Remote End Line Bays

The title of the above referred Section 6 shall be substituted with “**132 kV Switchyard**”.

Volume II, Part-II, Technical Provisions, Annexure-I: Technical Schedules (E&M Works), Section 3. Electrical Plant Equipment, Sub-Clause 3.5 Switchyard Power Transformer (10/13 MVA, 132/11.5 kV)

The title of the above referred Sub-clause shall be substituted with “**Switchyard Power Transformer (10/13 MVA, 132/11.5 kV)**”.

Volume II, Part-II, Technical Provisions, Sub-Clause 3.1.14, Fire Protection System

Original (Data)	Amendment (Data)
Generators shall be provided with a fire extinguishing system of inert gas and water spray type.	Generators shall be provided with a fire extinguishing system comprising CO ₂ inert gas and water spray type.

Volume II, Part-II, Technical Provisions, Section 1: Hydro-Mechanical Equipment, Sub-Clause 1.5.1, Cooling Water System

The above-referred Sub-Clause 1.5.1 “Cooling water system” shall be substituted with the text provided in the Annexure-H.

Volume II, Part-II, Technical Provisions, Sub-Clause 3.5.14.11-Table 3-9 Spare Parts and Tools

The Table 3-9 provided under the above referred Sub-Clause 3.5.14.11 “Spare Parts and Tools” shall be substituted with Table provided in Annexure-I.

Volume II, Part III, Conceptual Drawings

Drawing No. ALHPP-PPE-0501
 Drawing No. ALHPP-PPE-0502
 Drawing No. ALHPP-SY-0601
 Drawing No. ALHPP-SY-0602
 Drawing No. ALHPP-SY-0603

Drawing No. ALHPP-SY-0605

Drawing No. ALHPP-SY-0606

Drawing No. ALHPP-SY-0607

Drawing No. ALHPP-TC-0702

Drawing No. ALHPP-TC-0704

The above-mentioned Conceptual Drawings shall be substituted after deleting in their entirety of 132 kV Remote End Line Bays Conceptual Drawings in accordance with the Original Scope and shall be attached as **Annexure J**.

Drawing No. ALHPP-SY-0608 shall stand deleted in its entirety.

Other terms and conditions of the RFP/EPC Bidding Document shall remain unchanged.

General Manager / PD Projects
Northern Areas (WAPDA),

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2640625, (0092)-333-4229545
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(0092)-333-4481116

Electronic mail address:
gmpna01@gmail.com or
pdalhpp@gmail.com

Table of Adjustment Data

Table B: Foreign Currency

Index code	Index description	Source of index*	Base value and Date*	Proposer's related source currency in Type / Amount	Equivalent in FC1	Proposer's Proposed Weighting
a	Non-Adjustable (50%)	—	—	—		a : 0.5*
b	Labor: Expatriates					b: 0.03-0.05*
c	Local					c: 0.12-0.15*
d	Material :					d: 0.25-0.3
d-1	Material (1)					d-1: _____*
d-2	Material (2)					d-2: _____*
e	Machinery & Equipment					e: 0.05-0.07*
				Total		1.00

* To be specified by the Proposers. Whereas "a" is a fixed percentage, while the Proposer should specify range within maximum percentage allowed for material and labour for b, c, d, e, f, g & h such that the total weighting = 1.00.

ANNEXURE B

Table C: Summary of Payment Currencies

Table: Alternative A

Foreign currency requirement shall be in the portion of Proposal Price (excluding Provisional Sum) for such that Foreign Currency requirement shall not be more than 80%.

For _____ *[insert name of Section of the Works]*

Name of payment currency	A Amount of currency	B Rate of exchange (local currency per unit of foreign)	C Local currency equivalent $C = A \times B$	D Percentage of Proposal Price (PP) $100 \times C / PP$
Local currency		1.00		20% or greater
Foreign currency		*		80% or less
Proposal Price (excluding provisional sums)				100.00

Note:

*The Conversion for Proposal evaluation shall be made on TT&OD composite selling exchange rate published / authorized by State Bank of Pakistan (SBP) for the day of deadline for submission of Proposals.

ANNEXURE C

Schedule of Payment for E&M Works

Price Schedule No. 01: Supply of Plant from Abroad (Pre-Engineered Structures) including Fixtures and other Materials, Goods and Spare Parts (if any) (Schedule of Price basis)

[Note: To be completed / updated by the Proposer.]

Activity No.	Description of Activity	Unit Price (US\$)	Qty	Total CIP (US\$) Excluding Sales Tax	Custom Duty (PKR)
1	2	3	4	5=3x4	6
.1	Vertical Francis Turbines				
2	Governors				
3	Main Inlet Valves				
4	Powerhouse Overhead Cranes				
5	Gantry and Mobiles Cranes				
6	Mechanical Auxiliaries				
7	Mechanical Workshop Equipment				
8	Generators & Auxiliaries				
9	Excitation System				
10	Generator Step up Transformers				
11	Power Transformer				
12	Auxiliary Transformers				
13	Segregated Phase Bus				
14	Power and Control Cables				
15	Medium Voltage Switchgear				
16	Low Voltage Switchgear				
17	132 kV Switchyard / Equipment				
18	SCADA System				
19	DC and UPS system				
20	Emergency Diesel Generators				
21	Plant Control and Instrumentation System				
22	Telecommunication System				
23	Protection System				
24	Grounding System				
25	Mandatory Spare Parts				

Activity No.	Description of Activity	Unit Price (US\$)	Qty	Total CIP (US\$) Excluding Sales Tax	Custom Duty (PKR)
1	2	3	4	5=3x4	6
Total Price of Activities carried forward to Schedule No. 5 Summary (excluding Custom Duty), Page ____					
Total Custom duties					

Name of Proposer _____

Signature of Proposer _____

Schedule of Payment for E&M Works

Price Schedule No. 02: Supply of Plant from within the Employer's Country (Pre-Engineered Structures) including Fixtures and other Materials, Goods and Spare Parts (if any) (Schedule of Price basis)

[Note: To be completed / updated by the Proposer.]

Activity No.	Description of Activity	Unit Price (PKR)	Qty	Total PKR
1	2	3	4	5=3x4
1	Vertical Francis Turbines			
2	Governors			
3	Main Inlet Valves			
4	Powerhouse Overhead Cranes			
5	Gantry and Mobiles Cranes			
6	Mechanical Auxiliaries			
7	Mechanical Workshop Equipment			
8	Generators & Auxiliaries			
9	Excitation System			
10	Generator Step up Transformers			
11	Power Transformer			
12	Auxiliary Transformers			
13	Segregated Phase Bus			
14	Power and Control Cables			
15	Medium Voltage Switchgear			
16	Low Voltage Switchgear			
17	132 kV Switchyard/Equipment			
18	SCADA System			
19	DC and UPS system			
20	Emergency Diesel Generators			
21	Plant Control and Instrumentation System			
22	Telecommunication System			
23	Protection System			
24	Grounding System			
25	Mandatory Spare Parts			
Total Price of Activities carried forward to Schedule No. 5 Summary, Page ____				

Note 1: The scope mentioned above shall be read in conjunction with the applicable Employer's Requirements, missing items can be added in the schedules 1 & 2 as per employer's requirements.

Note 2: Weightages in %age to Contract Price excluding Provisional Sums for all Activities put together shall be 100%.

Note 3: The Proposer shall quote/ include the price of FAT (Factory Acceptance Tests) in the above Price Schedules 1 & 2.

Name of Proposer _____

Signature of Proposer _____

Schedule of Payment for E&M Works

Price Schedule No. 04: Installation and All other Services

[Note: To be completed / updated by the Proposer.]

Activity No.	Description of Activity	Unit Price (PKR)	Qty	Total PKR
1	2	3	4	5=3x4
1	Vertical Francis Turbines			
2	Governors			
3	Main Inlet Valves			
4	Powerhouse Overhead Cranes			
5	Gantry and Mobiles Cranes			
6	Mechanical Auxiliaries			
7	Mechanical Workshop Equipment			
8	Generators & Auxiliaries			
9	Excitation System			
10	Generator Step up Transformers			
11	Power Transformer			
12	Auxiliary Transformers			
13	Segregated Phase Bus			
14	Power and Control Cables			
15	Medium Voltage Switchgear			
16	Low Voltage Switchgear			
17	132 kV Switchyard/Equipment			
18				
19	SCADA System			
20	DC and UPS system			
21	Emergency Diesel Generators			
22	Plant Control and Instrumentation System			
23	Telecommunication System			
24	Protection System			

Activity No.	Description of Activity	Unit Price (PKR)	Qty	Total PKR
1	2	3	4	5=3x4
25	Grounding System			
26	Testing and Commissioning			
27	Employer's Staff Trainings			
28	Operation and Maintenance for DNP			
Total Price of Activities carried forward to Schedule No. 05 Summary, Page ____				

Name of Proposer _____

Signature of Proposer _____

ANNEXURE D

Sub-Clause 10.1

Taking Over the Works and Sections

The following text has been included as Sub Paragraph (iii)

The Works shall be divided into Five (05) Sections. One Unit consist complete turbine Generator Unit (s) including all associated Systems.

In order to render the Unit (s) fit for its purpose and capable to generate Electrical Output that can be dispatched through the Interconnection and Transmission Facilities to the Regional Grid/Load Centers.

Section No.	E&M Works	Time for Completion
1	Execution of Successful Completion of First Unit and all Auxiliaries necessary, 132 kV Switchyard, fit for intended / Commercial Purpose. The Tests on Completion have also been satisfactorily completed	37 Months from the Date of Commencement
2	Execution of Successful Completion of Second Unit and all Auxiliaries necessary, 132 kV Switchyard, fit for Intended/ Commercial Purpose. The Tests on Completion have also been Satisfactorily Completed.	39 Months from the Date of Commencement

	3	Execution of Successful Completion of the Third Unit and all Auxiliaries necessary, 132 kV Switchyard, fit for Intended/ Commercial Purpose. The Tests on Completion have also been Satisfactorily Completed.	41 Months from the Date of Commencement
	4	Power Intake and Sediment Flushing Intake Hydraulic Gates, Trash Racks, Stoplogs and their Associated Equipment, HSS and Gantry Crane	36 Months from the Date of Commencement
	5	Execution of successful Completion of remaining Balance Of Plant Mechanical Works including Bridge Cranes, Workshops, Fire Detection and Fire Fighting system (For Generators), Drainage and Dewatering system, Oil Filtration system, Compressed Air system, Complete 132 kV Switchyard and Balance of Plant for Electrical Works, SCADA System,	42 Months from the Date of Commencement

	Telecommunication System, DG Set and other Whole of the Works mentioned in Employer's Requirement. The Tests on Completion have also been Satisfactorily Completed on these Systems.
Note: All the Prerequisites / Activities outlined in each Section for Powerhouse Electro-Mechanical Works shall be completed prior to the Issuance of the TOC (Taking Over Certificate) in accordance with the provisions of Sub-Clause 10.1 of GCC.	

ANNEXURE E

2.5 Painting Schedule for HSS Works

Table 2-3 Paint Schedule

Type	Item / Part	Surface Preparation	Paint System	Dry Film Thickness μm
A	Steel Structures which are constantly in contact with water and not exposed to UV-rays; e.g., Gates incl. Armatures, Interior Surfaces of Steel Lining, Valves and Trash Racks	Sa 2.5	Prime Coat: 1x Zinc-Rich Epoxy Primer Intermediate and Finish Coat: 3x High Build-Epoxy Paint	min. 60, max. 120 μm 3 x 150 = 450 μm Total Min. 510 μm
B	Exterior Surfaces of Equipment exposed to UV-rays including: Gates, Stoplogs, Hoisting Equipment, Valves, Cranes, Piping, Electric Motors and all other Steel Structures	Sa 2.5	Prime Coat: 1x Zinc-Rich Epoxy Primer Intermediate Coat: 2x Epoxy Micaceous Iron Oxide Paint Finish Coat: 1x Epoxy Micaceous Iron Oxide Paint of different color	min. 60, max. 120 μm 2 x 80 = 160 μm 80 μm Total Min. 300 μm
C	Indoor Steel Structures like Exterior Surfaces of Valves and Piping, Cranes and Electric Motors etc.	Sa 2.5	Prime Coat: 1x Zinc-Rich Epoxy Primer Intermediate Coat: 1x Epoxy Micaceous Iron Oxide Paint Finish Coat: 1x 2-Pack Polyurethane or Epoxy Paint	Min. 60 μm , Max. 120 μm 80 μm 80 μm Total Min. 220 μm
D	Control Boards, Panels, Cubicles	Sa 3	Prime Coat:	

Type	Item / Part	Surface Preparation	Paint System	Dry Film Thickness μm
			2x Epoxy Zinc-Phosphate Primer Finish Coat: 2x Epoxy Paint	2 x 40 = 80 μm 2 x 60 = 120 Total Min. 200 μm
E	Surfaces of Steel Structures to be Embedded in Concrete	Degreasing	Primer Coat: 1x Zinc-Rich Epoxy Primer	Min. 60 μm

SECTION 6 132 kV SWITCHYARD**6.1 SCOPE OF WORK**

The Design, Supply, Installation, Testing and Commissioning of Plant & Equipment for 132 kV switchyard at Attabad Lake HPP which consist of Three (03) Transformer Bays (Generator Step Up Transformers), One (01) Power Transformer Bay and Three (03) 132 kV Transmission Line Bays. The 132 Kv Transmission Line bays shall be arranged in One-and-a-Half Circuit Breaker Scheme . The Attabad Lake Hydropower Project (54 MW) shall be interconnected to the proposed 132/66 kV Regional Grid Station at Aliabad and 132/11 kV Grid Station at Sost. One Double Circuit 132 kV Transmission Line about 14.5 km long from 132 kV Switchyard of Attabad Lake HPP to proposed 132/66 kV Regional Grid Station Aliabad and one 132 kV Single Circuit Transmission Line about 70 km long from 132 kV Switchyard of Attabad Lake HPP to 132/11 kV Grid Station at Sost have been proposed for dispersal of energy generated at Attabad Lake HPP. The synchronization with the Gilgit Regional Grid system is proposed to be carried out in the Attabad Lake HPP Powerhouse Control Room. The scope of Remote end bays including 132kV transmission lines shall be covered in separate package.

The interconnection with 132 kV Switchyard and Power Plant of Attabad Lake HPP shall be through 11 kV Segregated Phase Bus in underground trench. The AC auxiliary supply shall be fed from Power Plant through One (01) feeder and the other feeder shall be taken from 132 kV Switchyard. The complete DC Supply System shall be installed in 132 kV Switchyard Control House Building.

The scope of Facilities includes Design, Manufacture, Supply, Insurance to Site, Delivery to wharf at Sea Port in Pakistan, unloading and loading at Sea Port, Transportation to the 132 kV Switchyard site, Unloading and Storage at Site, Installation, Testing and Commissioning of Plant & Equipment for 132 kV Switchyard as specified in the Employer's Requirements.

All Materials, Tools, Equipment and Services, necessary for the reliable and safe operation of the 132 kV Switchyard, whether specified in the Document or not, shall be included in the Proposal except items specifically excluded from the scope of Facilities as listed in this Section.

The Type Tests Reports for all the specified Equipment including Circuit Breakers, Disconnectors & Earthing Switches, Current Transformers, CCVTs, Surge Arresters, Protection System, Line Traps, Line Matching Units, Power Line Carrier and Protection Signaling Equipment from any of the specified Independent Authority/Independent Laboratory pursuant to Employer's Requirement shall be provided for all the specified Type Tests specific to the offered Equipment. In case the Type Test Reports are not available, these tests shall be carried out in accordance with the relevant Employer's Requirement in the presence of the Employer and Employer's Representative at no additional cost to the Employer, at the time of routine tests at the Manufacturer's Workshop. If facilities for type tests are not available at manufacturer's premises, these tests shall be got carried out from one of the Independent Laboratories specified in the Employer's Requirement.

The Facilities shall also include provision of Spare Parts, Erection and Testing Equipment and Maintenance Tools, and Training of the Employer's Staff in accordance with the requirements listed in the Employer's Requirement.

The Facilities have been provided in Specifications, Drawings and indicated in the Single Line Diagram, 132 kV Switchyard Layout and other relevant Drawings, shall also help in understanding the scope of work for 132 kV Switchyard.

a) The 132 kV Switchyard Equipment to be provided, Installed, Tested and Commissioned at the 132 kV Switchyard includes but is not limited to the following:

1. Circuit Breakers.
2. Disconnectors.
3. Disconnectors with Earthing Switches.
4. Current Transformers.
5. Capacitor Voltage Transformers.
6. Surge Arresters.
7. Line Traps/Fiber.
8. High voltage Bus Work.
9. Steel Structures.
10. Switchyard Grounding System (Only Equipment Protective Earthing Connection).
11. Paging System.
12. Secure Metering System.
13. Relay Boards and Protective Relaying Systems.
14. Control and Small Power Cables.
15. AC Auxiliary Supply Board and DC Supply System.
16. Telecommunication and SCADA Systems.
17. Testing and Maintenance Equipment.
18. CCTV System and PAS System as per specifications mentioned in the Section 5 of this Document.
19. All other Auxiliary items for the completion of work including testing Devices, Equipment and Spare Parts as listed in the Specifications.
20. Cable Trays, Ladders, Conduits and Accessories inside the 132 kV Switchyard and Control House Building/Generator Room.
21. Any other item which is not included here but is necessary for integrated operation of the Plant as advised by the Employer

The Civil Works required for all the above-mentioned facilities shall not be a part of E&M EPC Contractor's Scope. The Civil Works Scope for above mentioned facilities shall be provided by Civil EPC Contractor (Package-I)

The Technical Provisions of various Equipment have been given in the relevant sections.

16.14.4.1.2 Attabad Lake HPP Substation - 132 kV Sost Substation

- a. Redundant (Two Units) Digital Power Line Carrier (DPLC) terminal ($\geq 40W$) and Digital Protection Signaling Equipment (DPSE) installed in Swing Rack cabinet at 132 kV Attabad Lake HPP Substation.
- b. One Set (Each Set comprising Two Units) of Line Traps for Phase-Phase Coupling.
- c. One set (Each Set comprising Two Units) of LMUs for Phase-Phase Coupling with Coupling Filters, hybrid Transformer, Protection Circuits, Interface for through connection of existing PLC Channels and all Materials required for a Complete Installation.
- d. One Length of Coaxial Cable to connect LMU with associated DPLC terminals and between both LMUs.
- e. Teleprotection interconnection cables between DPSE and the relay panels and terminated at both ends.
- f. All other ancillary material comprising Cables, Connectors, MDF Modules, lumpers, Harnesses, Mounting Frames, Fuses, Relays, nuts, Bolts etc. required for complete installation and fully functional DPLC and PSE links.

16.14.4.2.2 Attabad Lake HPP Substation - 132kV Sost Substation

- a) OLTE Equipment in (1+1) configuration with Equipment Rack and installed in a Swing Rack Cabinet.
- b) The Digital Access Multiplexer ((DAM) & CC/Add-Drop Multiplexer ADM) equipped with specified user interfaces and installed in OLTE cabinet.
- c) DPSE for Transmission over OLTE and installed in OLTE/separate swing rack cabinet for tele-protection.
- d) One length approach Fiber Optic Cable (FOC) with 24 fibers.
- e) Optical Distribution Frame (ODF) for termination of 48 fibers.
- f) Teleprotection interconnection cables between DPSE and the relay panels and terminated at each end.
- g) Amplifies/Repeater (if required)
- h) All other ancillary material comprising Cables, Connectors, MDF Modules, Jumpers, Harnesses, Mounting Frames, Fuses, Relays, Nuts, Bolts etc. required for complete installation and fully functional fiber optic link.

1.5.1 Cooling Water System**1.5.1.1 General**

This specifies the requirements for the design, engineering, manufacture, works testing, packing, transport, storage at site, install, test and commission, acceptance testing, warranty and other services specified or required in these specifications for the supply of cooling water system for the turbine and generator units.

1.5.1.2 Description

The cooling water system shall be provided for the following components:

- Generator oil coolers.
- Oil coolers of turbine and generator bearings.
- Turbine shaft seal (if applicable).
- Governor oil cooler (if applicable).

The close loop cooling system shall be provided for each unit of the power plant; however, the EPC Contractor must carry out his own water, petrographic and sedimentation analysis where necessary for verification and confirmation of contractual guarantees. The EPC Contractor shall be required to take sedimentation into consideration in the design of the cooling water system. The Contractor shall determine the flow requirements for cooling water system of each unit and size all associated equipment accordingly.

For safe and steady operation, standby arrangement for pump for redundancy shall be provided. The Contractor shall design the complete cooling water system for ease of cleaning and maintenance.

The cooling water systems shall be complete in all respects and include but not be limited to: heat exchangers, horizontal shaft centrifugal pumps with electric motors (1 working + 1 standby) for each unit, air and oil coolers, duplex filters motor operated control valves, flow meters, makeup water tanks, expansion vessels, check valves, discharge valves, all interconnected piping, instrumentation with cabling, wiring, panels, etc.

The P&ID, system description, detailed arrangement and specifications of cooling water equipment shall be submitted by the Contractor for Employer's approval during design phase.

Based on the requirements, the Proposer shall develop and detail the cooling water system in his Proposal.

Cooling clean water connections shall be such that refilling can be provided through direct couplings to the water supply storage tank provided by the Contractor using fixed pipes. The material size and location of storage tank shall be finalized in detail design after getting approval from the Employer.

1.5.1.3 Tubular Heat Exchanger

The tubular heat exchangers shall be arranged in the tailrace pond. The heat exchanging elements, tubes and water boxes shall be of corrosion resistant metal.

Provisions shall be made to allow easy cleaning of the primary circuit side of the heat exchanger. Drain sockets with valves and pipe connections through to the drainage gallery shall be foreseen.

A temperature indicator and remote temperature detector shall be provided. The heat exchangers shall be designed and tested according to an approved pressure vessel code.

Two sets of special cleaning brushes and of all other necessary equipment to carry out effective cleaning shall be included in the scope of supply.

1.5.1.4 Pumps

The operating range of cooling water pump shall also cover the required cooling water demand in the case only one turbine is in operation. The delivery head of the pump shall be designed to allow for a safety margin to all cooling water consumers.

The pump shall be standard units of a reputable manufacturer and shall conform to the requirements of the standards as prescribed in these specifications. Pump performance curves shall be submitted during basic design.

1.5.1.5 Expansion Vessel

In order to compensate for the pressure fluctuation during operation, the closed loop circuit shall be provided with a pressurized closed expansion vessel of bladder type or piston type with suitable capacity at the selected pressure. The vessel or the filling system shall be provided with automatic filling valve and safety valve, and a volume meter in the filling line for monitoring of the volume of water introduced in the closed loop circuits. Pressure gauge and pressure switch for remote alarm indication shall be provided at the expansion vessel.

1.5.1.6 Piping and Valves

The design of the piping shall ensure that the water flow velocity under normal operating conditions does not exceed 2 m/s. Welding of pipe joints and painting of the pipes shall be done in the shop as far as practicable. A sufficient quantity of flanged connections and threaded unions shall be provided to allow dismantling and replacement of piping without welding work. The connecting pipes of each unit of equipment shall be equipped with shut-off valves. The pipes shall be so arranged that no excessive vibrations or forces can occur and provisions shall be made to prevent pulsations.

1.5.1.7 Tests

The Contractor shall submit detailed testing and commissioning plan / protocol including factory acceptance tests (FATs), site testing & commissioning in accordance with following requirement and latest applicable international standards for approval of the Employer. Testing shall be carried out as per the approved plan.

a) Assembly and Tests in the Workshop

The Contractor shall prepare a table, listing all components to be tested and the tests to be performed. The Employer reserves the right to request additional tests if necessary. Test certificates for materials and equipment shall be provided in triplicate to the Employer.

Shop tests shall include the following:

- Hydraulic pressure tests on all components under internal pressure. The test pressure shall be 1.5 of the design pressures.

- Routine tests on purchased equipment.
- Insulation tests, operating tests, heating tests, load tests, etc. on electric motors, and other electrical and mechanical components.

All plant shall be assembled for the inspection of functional tests. Exceptions may be permitted if approved by the Employer. All parts shall be correctly doweled and matchmarked to facilitate assembly at the Site. The Contractor shall intimate the Employer Requirements in writing of the date and place of inspection and testing not less than two weeks before the parts are ready, and give the Employer full facilities for conducting or witnessing the tests. Three copies of the test reports shall be provided to the Employer.

At least the following components shall be assembled and presented to the Employer:

- Pump sets.
- Automatic strainers.
- Control valves.
- Non-return valves.
- Safety valves.
- Local control board.
- Heat exchangers.

The tests shall include the following:

- Check of conformity with approved documents.
- Operation of electric motors, limit switches, etc.
- Hydraulic pressure test.
- Setting and calibration of safety valves.
- Seal leakage check.

When the plant has passed the tests to the Employer satisfaction, he will confirm that it is satisfactory, and that it can be disassembled, painted and packed for shipment.

b) Tests at Site

i. Commissioning Tests

The Contractor shall conduct the following commissioning tests to ensure that the equipment has been correctly installed, all necessary adjustments and settings been made, and that it is in sound condition to operate. The site tests are subdivided in preliminary tests, and operation and performance tests.

ii. Preliminary Tests

- Electrical check of correct wiring and cabling
- Testing and setting of pressure switches, pressure transmitters and limit switches
- Measuring of insulation level on electrical plant

- Functional tests of the valves
- Ultrasonic testing of cooling water pipelines
- iii. Operation and Performance Tests
 - Leakage test
 - Final adjustment of pressure switches, indication instruments and interlocking devices.
 - Pump performance tests

1.5.1.8 Trial Operation

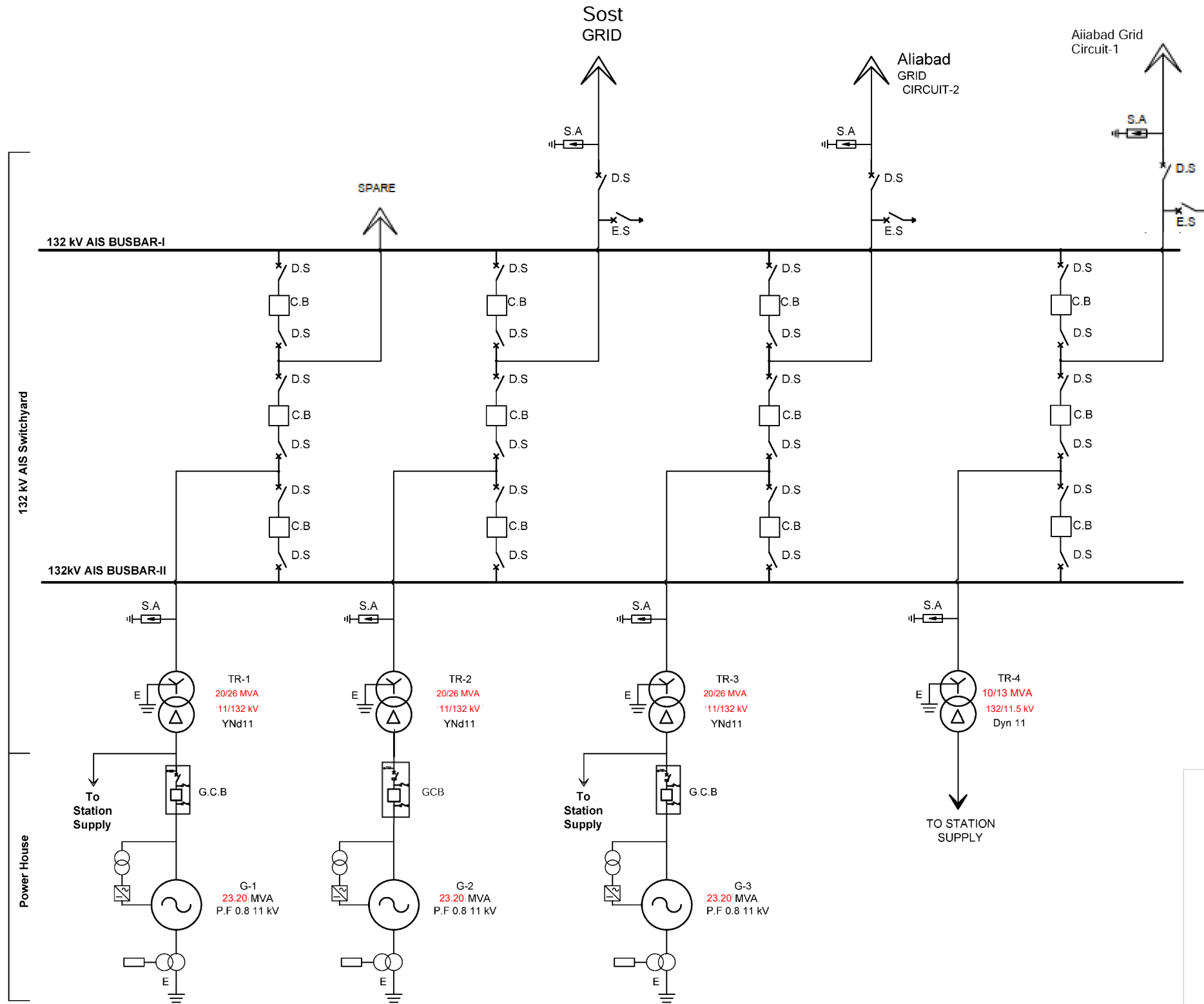
After successful completion of all commissioning tests, the cooling water systems shall be subject to a Trial Run. Trial Run Operation shall be carried out under the supervision and responsibility of the Contractor.

ANNEXURE I

Table 3-9 Spare Parts and Tools

Description	Unit	QTY
Mandatory spare parts (for each type used)		
Main contacts for three poles complete with springs, bolts, nuts etc.	Sets	4
Closing and opening trip coils of each type used	Sets	4
Drive motor of each type used	Sets	4
Breaker ON/OFF control switches	Sets	4
Miniature circuit breakers (MCBs) used in control/interlock circuits of each type/rating	Sets	5
Single-phase current transformer of each type used	Sets	3
Single-phase voltage transformer of each type used	Sets	3
Single-phase lightning arrester of each type used	Sets	3
Trip units (LSIG) of each type used	Sets	5
Indicating and measuring instruments each type i.e., voltmeters, ammeters and indication lights etc.	Sets	2
Anti-condensation heaters of each type and rating.	Sets	1
Maintenance Equipment		
Intelligent Instrument Transformer check device	Sets	1
Testing equipment for circuit breakers characteristics	Sets	1
Ratio automatic measuring instrument	Sets	1
Phase shifter	Sets	1
SF6 gas leakage test set luma sense Model 3434i complete sets with all accessoires	Sets	1
Circuit Breaker test set omicron model cibano 500 advanced package VE000901 (complete with all connection cables, registered software's, modules etc)	Sets	1
Tools		
Circuit breaker handling truck/trolley of each type used	Sets	1
Feeder grounding trucks/trolleys with VTs of each type used	Sets	2
Remote controlled racking assembly as per requirement cord and control station of each type used	Sets	1

Description	Unit	QTY
Temporary earthing sticks with accessories of each type used	Sets	2
Special tools for dismantling and maintenance	Lot	1



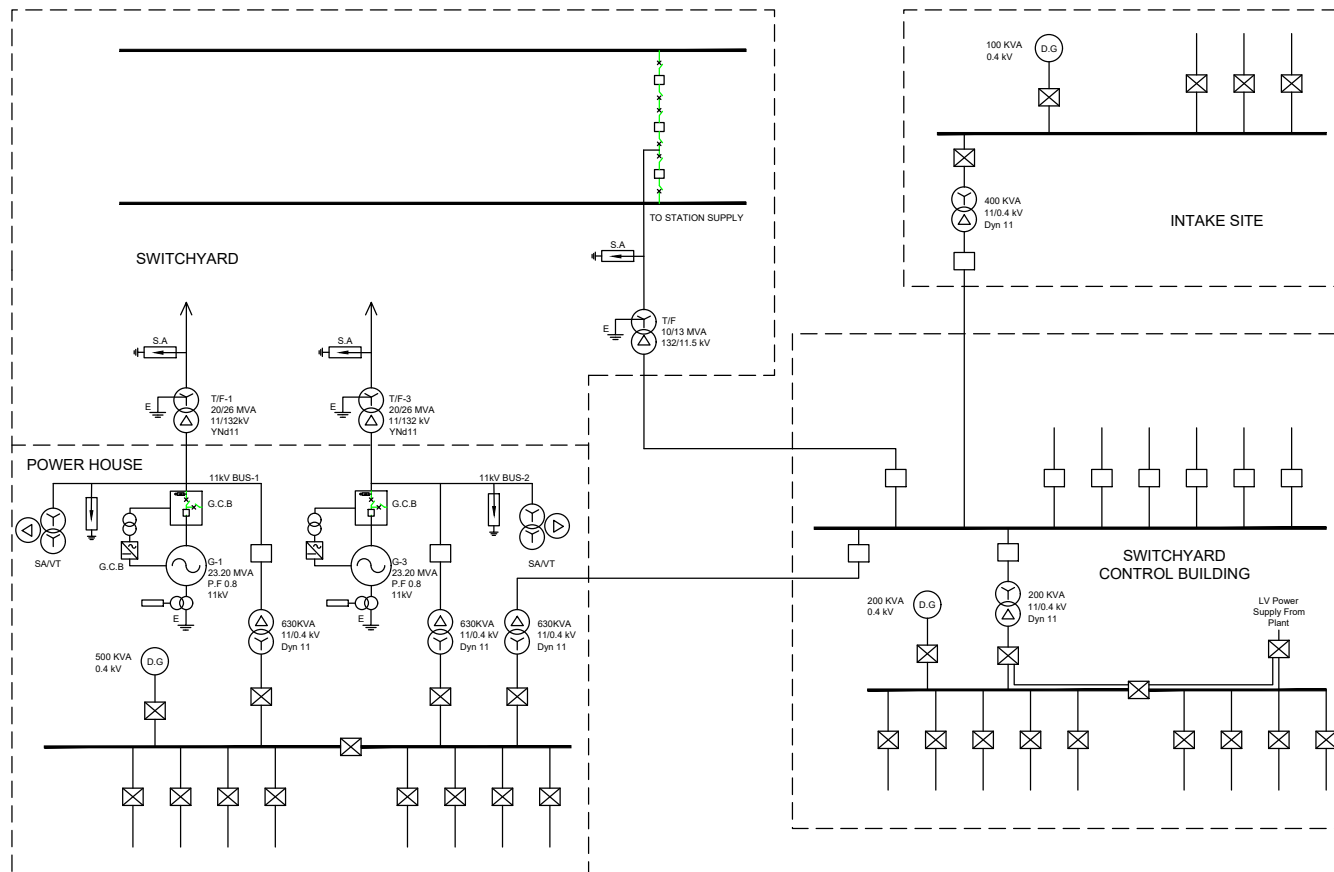
LEGEND:	
SYMBOL	DESCRIPTION
	3~ GENERATOR
	132 kV CIRCUIT BREAKER
	TRANSFORMER
	TRANSMISSION LINE
	SURGE ARRESTER
	EARTH/GROUND
	NEUTRAL GROUND RESISTOR
	EARTHING SWITCH
	DISCONNECTOR SWITCH
	11 kV GENERATOR C.B

DISCLAIMER:

THIS IS CONCEPT LEVEL DRAWING WITH NO GUARANTEE OF COMPLETENESS OR PRECISION. EPC CONTRACTOR WILL BE FULLY RESPONSIBLE FOR THE DETAIL DESIGN AND PREPARATION OF REQUIRED DRAWINGS TO ENSURE THE APPROPRIATE CONSTRUCTION, FUNCTIONALITY & EFFECTIVE OPERATION OF THE PROJECT (AS PER CONTRACT).

- NOTES:**
- DRAWING SHOWS THE BASIC CONCEPT OF ELECTRICAL SYSTEM. FINAL DESIGN SHALL BE DEVELOPED BY CONTRACTOR DURING DETAIL DESIGN STAGE.
 - FINAL RATINGS OF VARIOUS EQUIPMENT SHALL BE DETERMINED ON DETAILED DESIGN STAGE.
 - THIS DRAWING IS PREPARED BASED ON FEASIBILITY DRAWING NO. AFS-EM-451.

CLIENT: PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY		CONSULTANT: ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS JOINT VENTURE OF: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. (LEAD FIRM) ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD. PAKISTAN ENGINEERING SERVICES (PVT.) LTD. BARQAAB CONSULTING SERVICES (PVT.) LTD. DOLSAR ENGINEERING INC.CO.										04					DRAWN	ASIF SAMI	MAIN SINGLE LINE DIAGRAM			SCALE
03						RECOMMENDED	-	AS SHOWN														
02						CHD./VER.	-															
01																						
REV.	DATE	DESCRIPTION			APPROVED	APPROVED	-	DATE :	MARCH, 2026	DRAWING No.	ALHPP-PPE-0501	REV.										

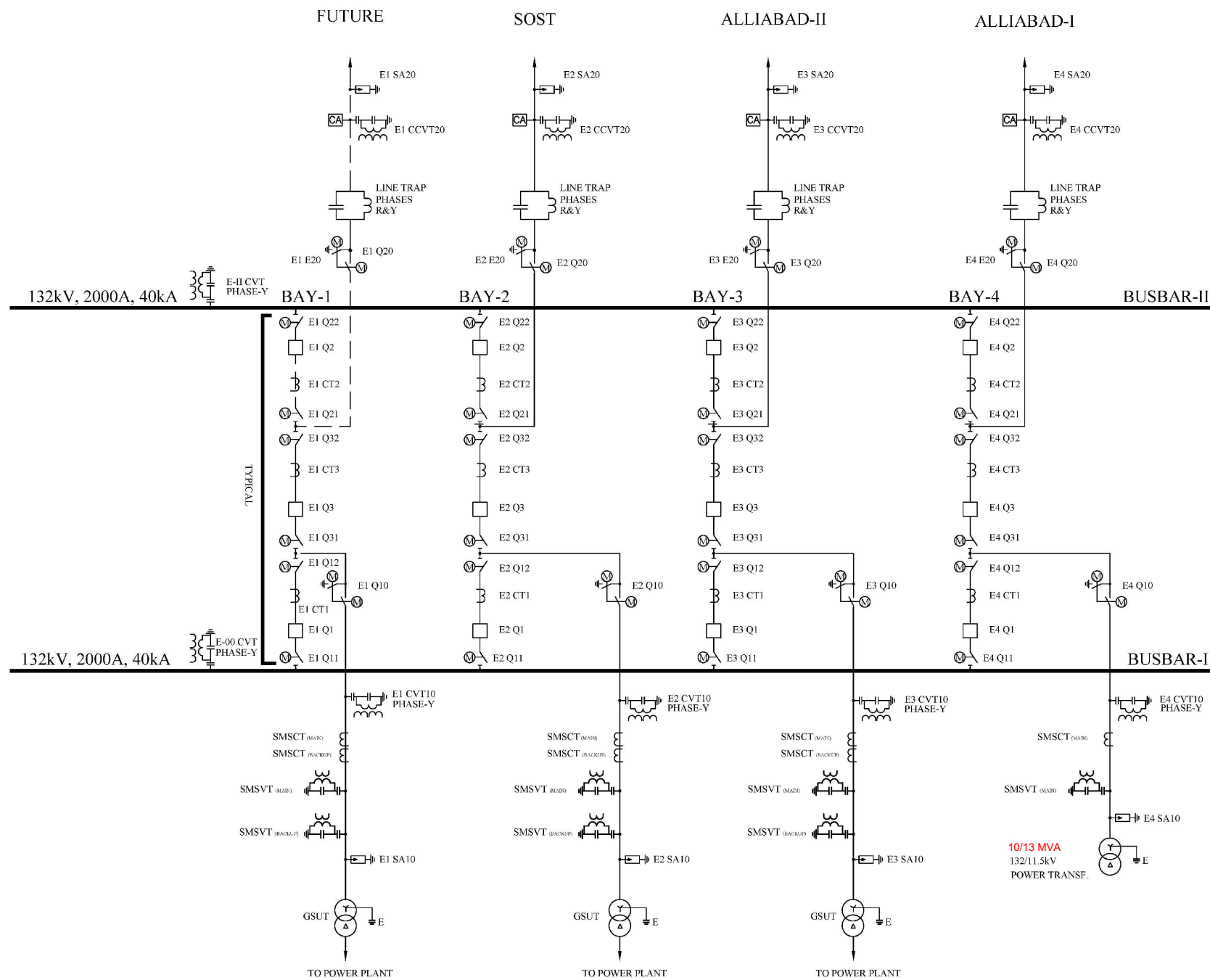


LEGEND:	
SYMBOL	DESCRIPTION
	MV CIRCUIT BREAKER
	LV CIRCUIT BREAKER
	TRANSFORMER
	DIESEL GENERATOR
N.C	NORMALLY CLOSE
N.O	NORMALLY OPEN

DISCLAIMER:
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- NOTES:**
- DRAWING SHOWS THE BASIC CONCEPT OF ELECTRICAL SYSTEM. FINAL DESIGN SHALL BE DEVELOPED BY CONTRACTOR DURING DETAIL DESIGN STAGE.
 - FINAL RATINGS OF VARIOUS EQUIPMENT SHALL BE DETERMINED ON DETAILED DESIGN STAGE.
 - THE NUMBER OF CIRCUITS FOR 11kV & 400V SUPPLY SHALL BE DETERMINED BY THE ENGINEER/CONTRACTOR BASED ON THE AUXILIARY LOAD OF THE PLANT.
 - THIS DRAWING IS PREPARED BASED ON FEASIBILITY DRAWING NO. AFS-EM-452.

CLIENT:  PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY		CONSULTANT:  ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS JOINT VENTURE OF:  NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. (LEAD FIRM)  ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD.  PAKISTAN ENGINEERING SERVICES (PVT.) LTD.  BARGAMB CONSULTING SERVICES (PVT.) LTD.  DOLSAAR ENGINEERING INC. CO.		04 03 02 01			DRAWN RECOMMENDED CHD./VER. APPROVED	ASIF SAMI - - -	AC SUPPLY SYSTEM (OVERALL SCHEME)		SCALE AS SHOWN
PROJECT: ATTABAD LAKE HYDROPOWER PROJECT (54 MW)				REV. DATE DESCRIPTION APPROVED	APPROVED	DATE : MARCH, 2026	DRAWING No. ALHPP-PPE-0502	REV. ↕			



LEGEND:-

SYMEOLS	DESCRIPTION	132kV
	POWER TRANSFORMER (PTR), STATION AUXILIARY TRANSFORMER (PMT)	10/13 MVA
	CIRCUIT BREAKER	2000A, 40kA
	MOTOR OPERATED DISCONNECTOR	2000A, 40kA
	DISCONNECTOR WITH EARTHING SWITCH (MOTOR OPERATED)	2000A, 40kA
	CURRENT TRANSFORMER	FOR CB 1600/800/400/150/1A SIDE CT 1600/800/400/150/1A SIDE CT SMS CT 1600/400/150/1A
	CAPACITOR VOLTAGE TRANSFORMER (CVT) SMS	132kV/√3/110/√3 V, 110V 0.2 + 3P, 3P
	CURRENT TRANSFORMER (CT) SMS	
	SURGE ARRESTER	120kV, 98kV
	LINE TRAP	-
	SECURE METERING SYSTEM VOLTAGE TRANSFORMER (SMSVT)	132kV/√3/110/√3 V, 110V 0.2
	COUPLING CAPACITOR VOLTAGE TRANSFORMER (CCVT) WITH CARRIER FREQUENCY FACILITY	132kV/√3/110/√3 V, 110V 0.2 + 3P, 3P

LEGEND:-

—————	SCOPE OF WORK
-----	FOR FUTURE

NOTES:

- ALL 5P20 CLASS CTs SHALL BE AS PER IEC 61869-2.
- 132kV BAY EQUIPMENT ARE RATED 2000A, 40kA.

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CLIENT:  PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY	CONSULTANT:  ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS JOINT VENTURE OF:  NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. (LEAD FIRM)  ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD. PAKISTAN ENGINEERING SERVICES (PVT.) LTD.  BARQAAB CONSULTING SERVICES (PVT.) LTD. DOLBAR ENGINEERING INC. CO.	04				DRAWN	ASIF SAMI	132 kV SWITCHYARD SINGLE LINE DIAGRAM	SCALE
		03				RECOMMENDED	-		AS SHOWN
		02				CHD./VER.	-		
		01				APPROVED	-		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	-		

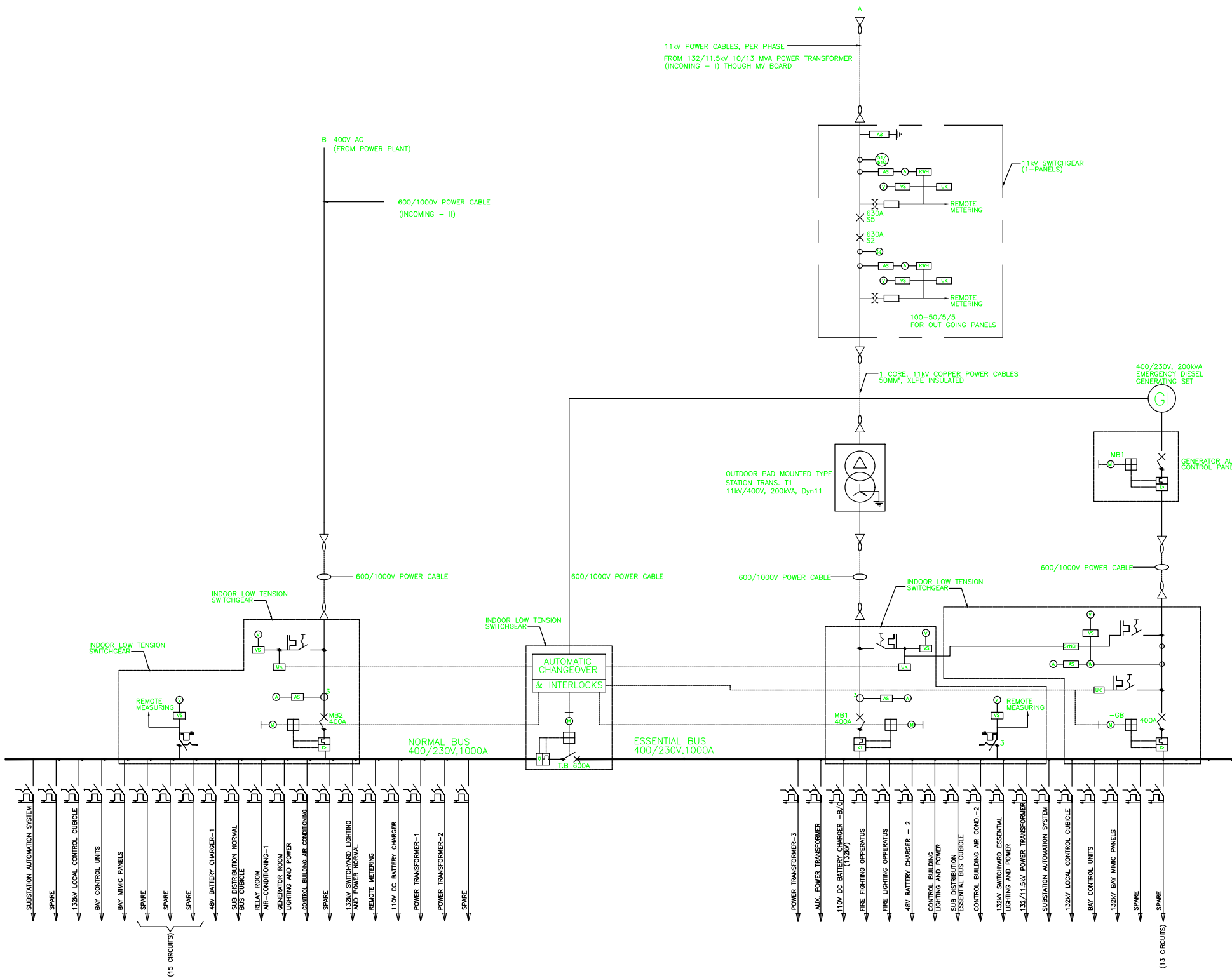


NOTES:

- DISCLAIMER:**

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CLIENT:  PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY	CONSULTANT:  ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS JOINT VENTURE OF:  NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. (LEAD FIRM)  ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD.  PAKISTAN ENGINEERING SERVICES (PVT.) LTD.  DOLARSAR CONSULTING SERVICES (PVT.) LTD.  DOLARSAR ENGINEERING INC.CO.				04				DRAWN	ASIF SAMI	132 kV SWITCHYARD EQUIPMENT ARRANGEMENT PLAN		SCALE			
					03				RECOMMENDED	-			AS SHOWN			
					02				CHD./VER.	-						
					01				APPROVED	-						
					PROJECT: ATTABAD LAKE HYDROPOWER PROJECT (54 MW)					REV.	DATE	DESCRIPTION	APPROVED	APPROVED	-	DATE :



LEGEND:-

SYMBOL	DESCRIPTION
(M)	MOTOR OPERATED CONTROL
	MOLDED CASE CIRCUIT BREAKER
(G1)	DIESEL GENERATING SET
(50)	DEFINITE TIME OVER CURRENT RELAY
(50/G)	GROUND FAULT RELAY
(87)	POWER TRANSFORMER DIFFERENTIAL CURRENT PROTECTION
	STATION AUXILIARY TRANSFORMER
SYNH	SYNCHROSCOPE
(W)	WATT - METER
VS	VOLT METER SELECTOR SWITCH
AS	AMMETER SELECTOR SWITCH
KWH	KILOWATT - HOUR METER
VH	VAR - HOUR METER
U<	UNDER VOLTAGE RELAY
	RESISTOR
SA	SURGE ARRESTOR
	AIR CIRCUIT BREAKER (MOTOR OPERATED)
	CURRENT TRANSFORMER
(A)	AMMETER
(V)	VOLTMETER
	VACUUM CIRCUIT BREAKER (11kV)
	POTENTIAL TRANSFORMER
G.B	GENERATOR BREAKER
M.B	MAIN BREAKER
T.B	TIE BREAKER

- NOTES:
- THIS DRAWING SHOWS ONLY TYPICAL AC OUTGOING CIRCUITS.
 - EMERGENCY DIESEL GENERATING SET SHALL BE SUPPLIED COMPLETE WITH CONTROL, PROTECTION, METERING, INDICATION AND ANNUNCIATION SYSTEMS AS SPECIFIED.
 - FOLLOWING REMOTE CONTROLS OF THE DIESEL GENERATOR/DIESEL ENGINE SHALL BE PROVIDED ON THE DIESEL GENERATOR PANEL IN CONTROL ROOM:
A) DIESEL GENERATOR START.
B) GENERATOR STOP.
C) VOLTAGE AND CURRENT INDICATION.
D) FREQUENCY INDICATION.
 - DETAILS FOR CONTROL, METERING, INDICATIONS AND OTHER INSTRUMENTS RELEVANT TO AC SYSTEM SHALL BE FINALIZED AT THE DETAIL DESIGN STAGE.
 - THE SIZES OF THE CABLES ON THIS DRAWING ARE APPROXIMATE SIZES. THE CONTRACTOR SHALL SUBMIT CALCULATIONS FOR APPROVAL OF THE EMPLOYER'S REPRESENTATIVE FOR THE SELECTION OF CABLES STAGE.
 - THE CONTRACTOR SHALL PROVIDE SUB-DISTRIBUTION BOARDS AS SPECIFIED / REQUIRED BY THE EMPLOYER'S REPRESENTATIVE.
 - THE SIZE OF BUSBAR AND MCBs SHALL BE DETERMINED BY THE CONTRACTOR AND SHALL BE SUBJECT TO APPROVAL BY THE EMPLOYER'S REPRESENTATIVE. FRAME SIZES OF MCBs SHALL BE 250A MINIMUM.
 - BCU SHALL BE PROVIDED TO COVER ALL 11kV SWGR SIGNALS TO SAS.
 - ENERGY METERS FOR 400V SHALL BE HOUSED IN EACH PAD MOUNTED TRANSFORMER.

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CLIENT: **PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY**

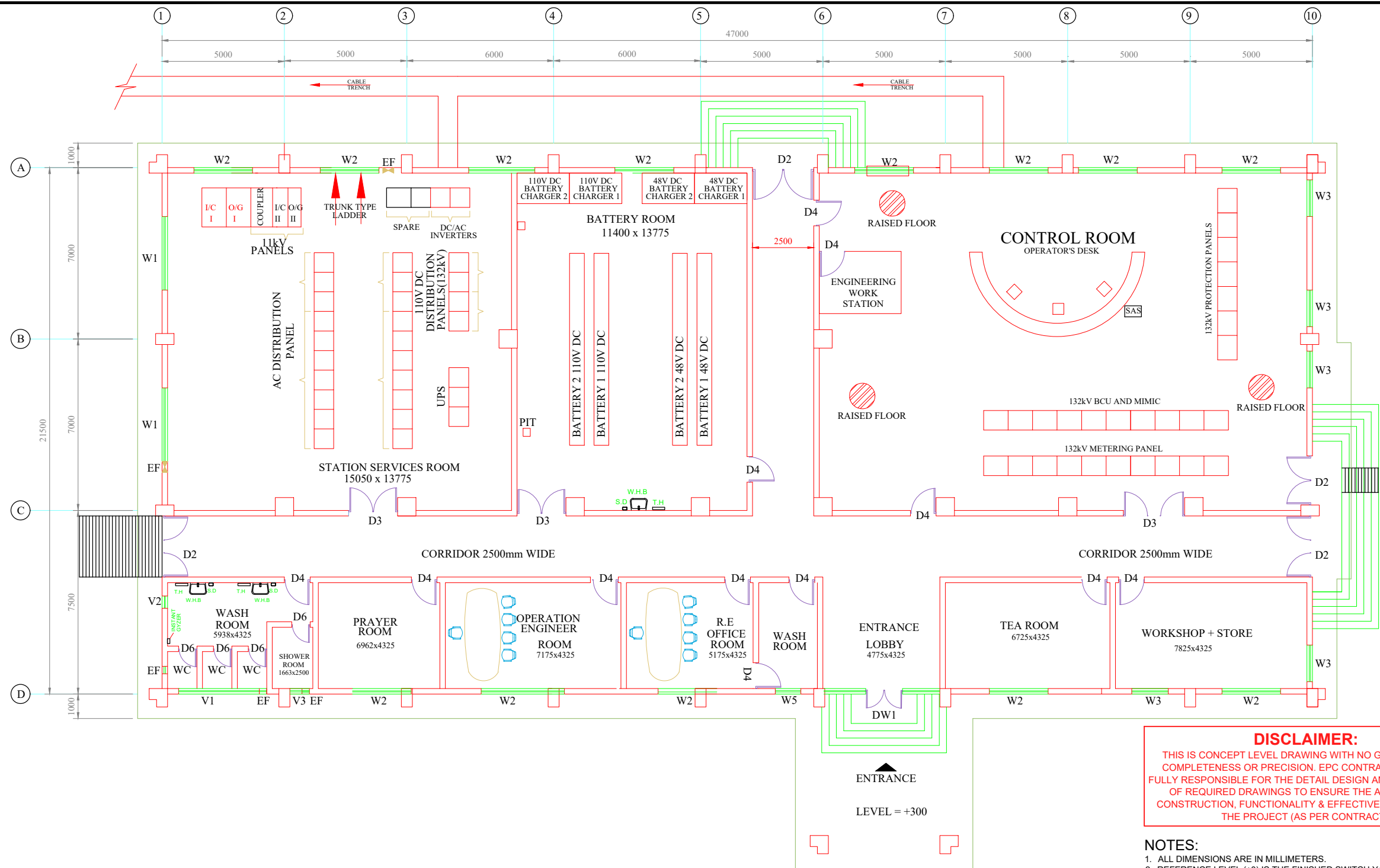
PROJECT: **ATTABAD LAKE HYDROPOWER PROJECT (54 MW)**

CONSULTANT: **ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS**

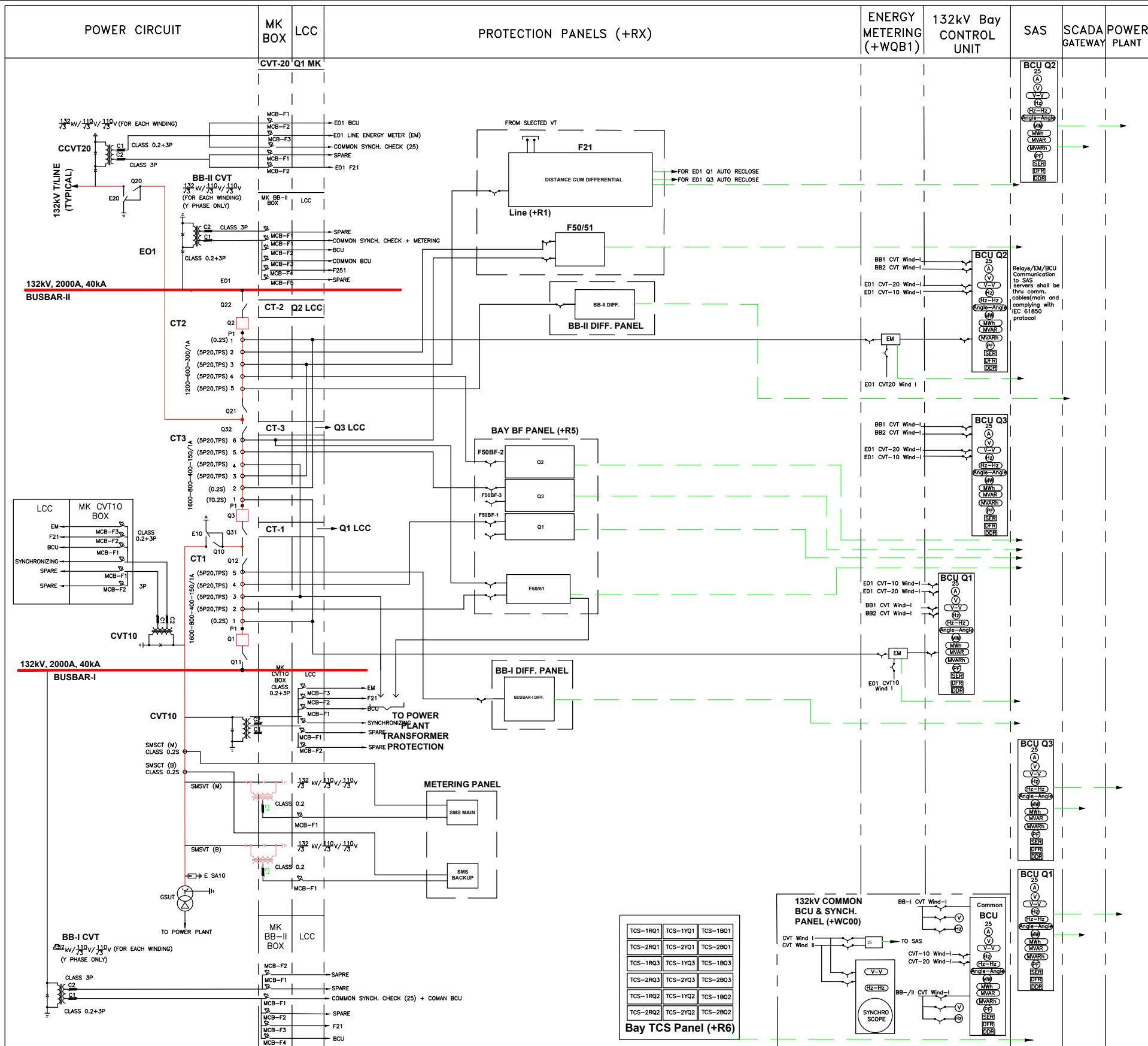
JOINT VENTURE OF:
NATIONAL ENGINEERING SERVICES (PAKISTAN (PVT.) LTD. (LEAD FIRM))
ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD.
PAKISTAN ENGINEERING SERVICES (PVT.) LTD.
BARQAAB CONSULTING SERVICES (PVT.) LTD.
DOLSAR ENGINEERING INC. CO.

04				DRAWN	ASIF SAMI
03				RECOMMENDED	-
02				CHD./VER.	-
01				APPROVED	-
REV.	DATE	DESCRIPTION	APPROVED	APPROVED	

132 kV SWITCHYARD AC AUXILIARY SERVICES SYSTEM (TYPICAL)		SCALE
DATE : MARCH, 2023	DRAWING No. ALHPP-SY-0603	REV.



CLIENT:  PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY	CONSULTANT: ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS JOINT VENTURE OF: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.(LEAD FIRM) ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD. PAKISTAN ENGINEERING SERVICES (PVT.) LTD. DOLSAAR ENGINEERING INC.CO. BARQAAB CONSULTING SERVICES (PVT.) LTD.	04					DRAWN	ASIF SAMI	132 kV SWITCHYARD CONTROL HOUSE BUILDING LAYOUT PLAN SCALE AS SHOWN		
		03						RECOMMENDED		-	
		02						CHD./VER.		-	
		01									
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	-				
PROJECT: ATTABAD LAKE HYDROPOWER PROJECT (54 MW)								DATE : MARCH, 2023		DRAWING No. ALHPP-SY-0605	REV. 



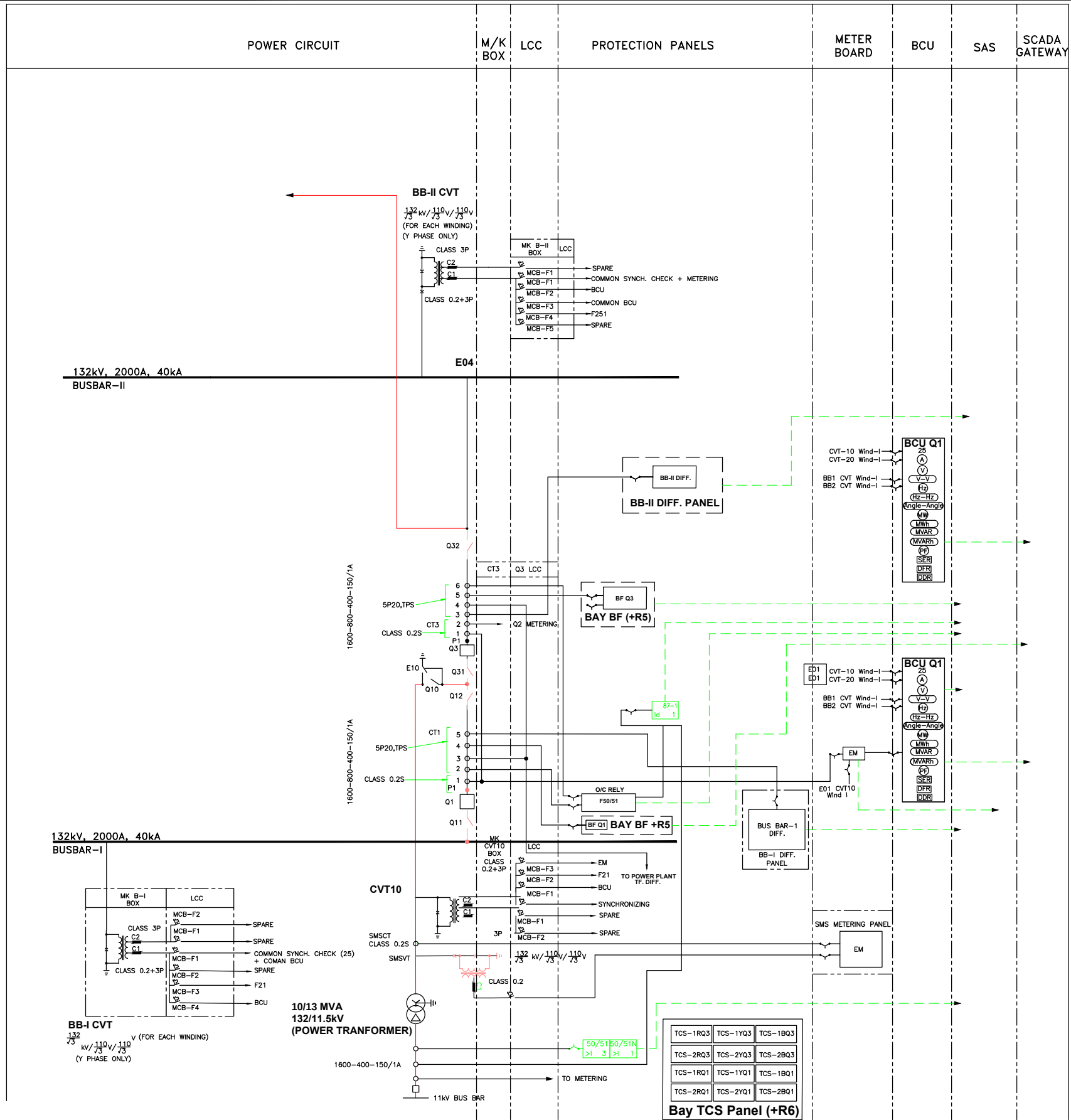
LEGEND :-			
ITEM	DESCRIPTION	ITEM	DESCRIPTION
21	Distance cum differential relay	95	CT Supervision Relay
24	Volts per hertz/Over excitation	Angle	Phase Angle Meter/Angle measurement
25	Synchronism-check device	A	Ammeter/Ampere Measurement
50	Instantaneous Overcurrent Relay	⊖	Frequency Meter/Frequency measurement
50N	Neutral Instantaneous Overcurrent	⊖	Double Frequency Meter/Double Frequency measurement
50BF	Breaker Failure Relay	⊖	Megawatt Meter/MW Power measurement
50EF	End Fault Protection	⊖	Megawattour Meter/MWh Energy Measurement
51	AC Time Overcurrent Relay	⊖	Megavar Meter/MVAR Power measurement
51N	Neutral Time Overcurrent	⊖	Megawattour Meter/MVARh Energy measurement
67	AC Directional Overcurrent	⊖	Power Factor Meter/PF Measurement
67N	Neutral Directional Overcurrent	⊖	Voltmeter/Voltage Measurement
68	Power Swing Blocking	⊖	Double Voltmeter
74	Alarm Relay	BCU	Bay Controller Unit
79	Auto Reclose	⊖	Dynamic Disturbance Recorder
81	Frequency	⊖	Digital Fault Recorder
86	Lock-out Relay	⊖	Energy Meter
87B	Busbar Differential Relay	FL	Distance Fault Locator
94	Self Reset/Tripping Relay	PQM	Power Quality Monitor
FR	Fault Recorder	⊖	Sequence of Events Recorder
---	Panel	SOTF	Switch On To Fault
.....	Status/Control/Metering To SAS/SCADA	TCS	Trip Circuit Supervision Relay
⚡	Test Switch	VTFF	VT Fuse Fail

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- NOTES.**
1. POSITION SCHEMES ARE BASED ON MULTIFUNCTION RELAYS. HOWEVER IF SOME FUNCTIONS ARE NOT POSSIBLE TO ACCOMMODATE WITHIN RELAY SEPARATE RELAY SHALL BE PROVIDED.
 2. ALL FOUR CVTs SHALL BE PROVIDED TO BCU FOR SYNCHROCHECK AND FOR SPECIFIC BREAKER VT SELECTION SHALL BE WITHIN BCU.
 3. CVT MCB SHALL BE PROVIDED BEFORE BCU, RELAY & ENERGY METER.
 4. BCU SHALL BE PROVIDED PER CIRCUIT BREAKER.
 5. E01, E02 & E03 ARE TYPICAL.

SHEET NO. 1 OF 2

CLIENT:  PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY	CONSULTANT: ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS JOINT VENTURE OF: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. (LEAD FIRM) ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD. PAKISTAN ENGINEERING SERVICES (PVT.) LTD. BARQAAB CONSULTING SERVICES (PVT.) LTD. DOLSAAR ENGINEERING INC.CO.					04				DRAWN	ASIF SAMI	PROTECTION & METERING SYSTEM 132kV SINGLE LINE DIAGRAM		SCALE		
						03				RECOMMENDED	-			AS SHOWN		
						02				CHD./VER.	-			REV.		
								01				APPROVED	-	DATE : MARCH, 2023	DRAWING No. ALHPP-SY-0606	
								REV.	DATE	DESCRIPTION	APPROVED	APPROVED	-			



LEGEND :-

ITEM	DESCRIPTION
21	Distance cum differential relay
24	Volts per hertz/Over excitation
25	Synchronism-check device
50	Instantaneous Overcurrent Relay
50N	Neutral Instantaneous Overcurrent
50BF	Breaker Failure Relay
50EF	End Fault Protection
51	AC Time Overcurrent Relay
51N	Neutral Time Overcurrent
67	AC Directional Overcurrent
67N	Neutral Directional Overcurrent
68	Power Swing Blocking
74	Alarm Relay
79	Auto Reclose
81	Frequency
86	Lock-out Relay
87B	Busbar Differential Relay
94	Self Reset/Tripping Relay
FR	Fault Recorder
Panel	Panel
.....	Status/Control/Metering To SAS/SCADA
Test Switch	Test Switch

LEGEND :-

ITEM	DESCRIPTION
95	CT Supervision Relay
Angle	Phase Angle Meter/Angle measurement
A	Ammeter/Ampere Measurement
Hz	Frequency Meter/Frequency measurement
Hz-Hz	Double Frequency Meter/Double Frequency measurement
MW	Megawatt Meter/MW Power measurement
MWh	Megawatthour Meter/MWh Energy Measurement
MVAR	Megavar Meter/MVAR Power measurement
MVARh	Megawatthour Meter/MVARh Energy measurement
PF	Power Factor Meter/PF Measurement
V	Voltmeter/Voltage Measurement
V-V	Double Voltmeter
BCU	Bay Controller Unit
EDR	Dynamic Disturbance Recorder
DFR	Digital Fault Recorder
EM	Energy Meter
FL	Distance Fault Locator
PQM	Power Quality Monitor
SER	Sequence of Events Recorder
SOTF	Switch On To Fault
TCS	Trip Circuit Supervision Relay
VTFF	VT Fuse Fail

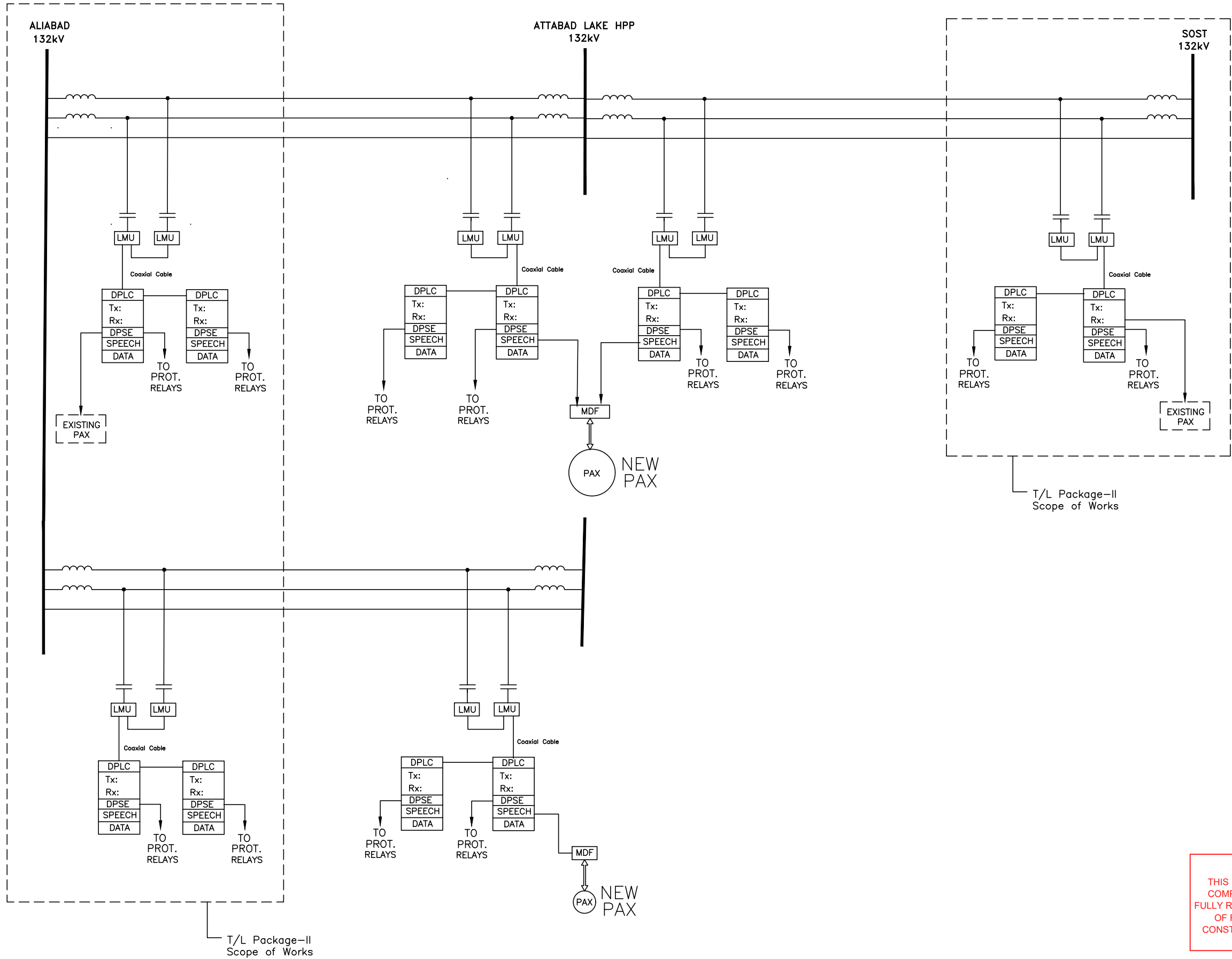
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NOTES :-

- POSITION SCHEMES ARE BASED ON MULTIFUNCTION RELAYS. HOWEVER IF SOME FUNCTIONS ARE NOT POSSIBLE TO ACCOMMODATE WITHIN RELAY SEPARATE RELAY SHALL BE PROVIDED.
- ALL CVTs SHALL BE PROVIDED TO BCU FOR SYNCHROCHECK AND FOR SPECIFIC BREAKER VT SELECTION SHALL BE WITHIN BCU.
- CVT MCB SHALL BE PROVIDED BEFORE BCU, RELAY & ENERGY METER.
- BCU SHALL BE PROVIDED PER CIRCUIT BREAKER.

SHEET NO. 2 OF 2

CLIENT:  PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY	CONSULTANT:  ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS JOINT VENTURE OF: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. (LEAD FIRM) ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD. PAKISTAN ENGINEERING SERVICES (PVT.) LTD. BAROAB CONSULTING SERVICES (PVT.) LTD. DOLSAAR ENGINEERING INC.CO.	04 03 02 01 REV. DATE DESCRIPTION APPROVED	DRAWN ASIF SAMI RECOMMENDED - CHD./VER. - APPROVED -	PROTECTION & METERING SYSTEM 132kV POWER TRANSFORMER SINGLE LINE DIAGRAM DATE : MARCH, 2023 DRAWING No. ALHPP-SY-0607	SCALE AS SHOWN REV. 
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LEGEND:

SYMBOL	DESCRIPTION
	LINE TRAP
	CCVT/CVT
	LINE MATCHING UNIT
	DIGITAL PLC TERMINAL Tx: f2 Rx: f1 PSE SPEECH DATA
	MAIN DISTRIBUTION FRAME
	PRIVATE AUTOMATIC EXCHANGE
	VF CHANNELS
	EXISTING EQUIPMENT

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CLIENT:



PAKISTAN
WATER & POWER
DEVELOPMENT AUTHORITY

PROJECT:

ATTABAD LAKE HYDROPOWER
PROJECT (54 MW)

CONSULTANT:



ATTABAD HYDROPOWER
MANAGEMENT CONSULTANTS

JOINT VENTURE OF:
NATIONAL ENGINEERING SERVICES
PAKISTAN (PVT.) LTD. (LEAD FIRM)



ASSOCIATED CONSULTING ENGINEERS
(PVT.) LTD.
PAKISTAN ENGINEERING SERVICES
(PVT.) LTD.



BARQAAB CONSULTING SERVICES
(PVT.) LTD.
DOLSAR ENGINEERING INC.CO.

04

03

02

01

REV.

DATE

DESCRIPTION

DRAWN

ASIF SAMI

RECOMMENDED

CHD./VER.

APPROVED

DATE :

MARCH, 2026

DRAWING No.

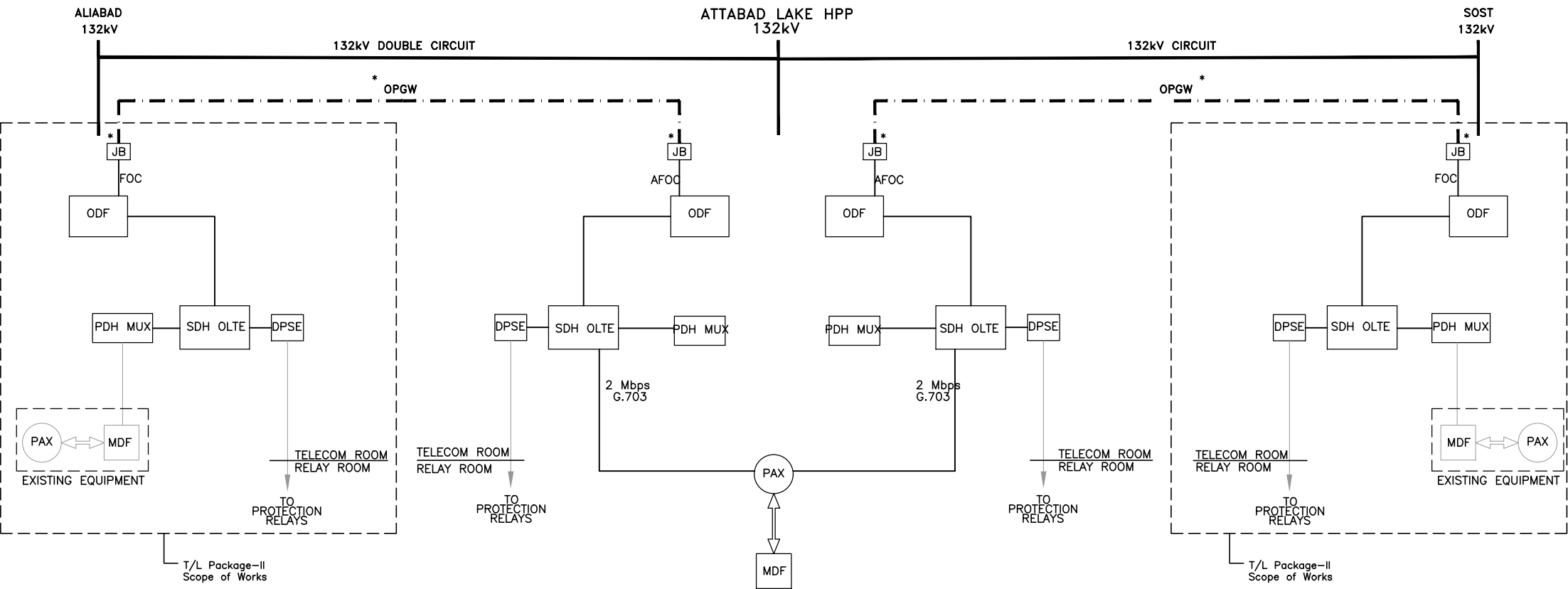
ALHPP-TC-0702

SCALE

AS SHOWN

REV.





LEGEND:	
SYMBOL	DESCRIPTION
	OPGW CABLE
	JUNCTION BOX OP6W/FOC
	JUNCTION BOX OP6W/OPGW/OPGW
	OPTICAL AMPLIFIER 1+1
	OPTICAL LINE TERMINAL EQUIPMENT 1+1
	DIGITAL MULTIPLEXER
	DIGITAL PROTECTION SIGNALLING EQUIPMENT
	VF CHANNELS
	PRIVATE AUTOMATIC EXCHANGE
	OPTICAL DISTRIBUTION FRAME
	FIBER OPTIC APPROACH CABLE
	TO BE SUPPLIED BY OTHERS

DISCLAIMER:
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CLIENT:  PAKISTAN WATER & POWER DEVELOPMENT AUTHORITY		CONSULTANT:  ATTABAD HYDROPOWER MANAGEMENT CONSULTANTS JOINT VENTURE OF:  NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. (LEAD FIRM)  ASSOCIATED CONSULTING ENGINEERS (PVT.) LTD.  PAKISTAN ENGINEERING SERVICES (PVT.) LTD.  BARQAAB CONSULTING SERVICES (PVT.) LTD.  DOLSAR ENGINEERING INC.CO.						04					DRAWN	ASIF SAMI	132 kV SWITCHYARD FIBER OPTIC SYSTEM		SCALE
03						RECOMMENDED	-	AS SHOWN									
02						CHD./VER.	-										
PROJECT:	ATTABAD LAKE HYDROPOWER PROJECT (54 MW)	01								DATE :	DRAWING No.	REV.					
										MARCH, 2026	ALHPP-TC-0704						
		REV.	DATE	DESCRIPTION		APPROVED	APPROVED										