Transmission Poles/Towers Audit Form

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Electrical Power Transmission (EE-352)

Part 1 – Parameter Estimation

S No	Parameter	Location#1	Location#2	Location#3	Location#4
1	Location	Karachi University Botanical Garden	Suparco Road	Al-Jadeed Supermarket	Continental Bakers, Gulistan e Johar
2	Type of Conductor support (Tower/Pole)	Lattice Tower	RCC Pole	RCC Double	Steel Lattice
3	Height of Tower (approx. m/ft)	65 ft	200 ft	180 ft	60 ft
4	Voltage level (AC/DC)	AC	AC	AC	AC
5	Line Voltage (kV)	132	132	132	132
6	Arcing Horn (present/absent)	Present	Present	Present	Present
7	Line Configuration (horizontal or vertical parallel)	Vertical	Vertical	Vertical	Vertical
8	Conductor cross sectional area (approx.)	300 sq mm	300 sq mm	300 sq mm	300 sq mm
9	Spacing between phase conductors	8ft	6ft	8ft	6ft
10	Type of Circuit (single/double/multiple)	Double	Double	Double	Double
11	Earth Wire (present/absent)	Present	Present	Present	Present

S No	Parameter	Location#1	Location#2	Location#3	Location#4
12	Types of conductors (single/bundled)	Single	Single	Single	Single
13	Bundled Conductors (triangular/rectangular spaced)	-	-	-	-
14	Spacing between bundled conductors	-	-	-	-
15	Types of insulators (suspended/strain/both/others)	Double Array Strain	Double Array Strain	Double Array Strain	Double Array Strain
16	Number of insulator discs in one string	14	20	20	12
17	Sag (approx., m/ft)	5ft	8ft	5ft	3ft
18	Ground clearance (m/ft)	30 ft	120 ft	120 ft	37ft
19	Conductor support Level (equal/unequal)	Equal	Equal	Equal	Unequal
20	Distance between towers/length of span (approx., m/ft)	200m	200m	200m	250m
21	Loading Factors (yes/no)	Yes	Yes	Yes	Yes
22	Vibrations (resonant/galloping/ dancing)	Resonant	Resonant	Resonant	Resonant
23	Type of dampers	Stock Bridge	Stock Bridge	Stock Bridge	Stock Bridge

S No	Parameter	Location#1	Location#2	Location#3	Location#4
24	Length of cross arms (approx., m/ft)	12 ft	25 ft	22 ft	20 ft
25	Distance between cross arm and tower (if applicable)	6 ft	12 ft	8 ft	8 ft
26	Total number of spacers between two towers.	0	0	0	0
27	Guard Ring/Corona Ring	Present	Present	Present	Present
28	Temperature ($°C$)	30	31	30	30
29	Wind pressure (MPa)	0.1	0.1	0.1	0.1
30	Wind Velocity (kmph)	35	37	34	35
31	Humidity (%)	65%	65%	65%	65%

Q1: [CLO-3]. **Explain** the environmental impacts from the electric power transmission networks for all the four locations you visited

a. <u>The effects of electric and magnetic fields:</u>

Location 1:
The high voltage gradients of the EHV lines have the potential to cause the air around the phase conductors to degrade. Corona loss, electromagnetic interference (EMI), radio noise, television interference, auditory noise, and ozone production could then follow from these failures.

Location 2:
Due to its undesired electromagnetic radiation emissions in the radio frequency region, radio noise disrupts present radio communications. One possible explanation is corona on EHV transmission wires.

Location 3:
Similar to radio noise, auditory noise is also caused by high-field gradients. It produces air pressure waves with frequencies that are audible to humans. The sound is audible and sounds like a hum or crackling sound. It is especially prominent at night.

Location 4:
When equipment is not grounded near high-voltage lines, an oscillating electric field results. The line designer is responsible for ensuring that the line height is adequate to keep the discharge current below the proper levels for all devices situated inside the right-of-way.

<u>The visual effects of the design:</u>

Location 1:
Sparks will fly if someone touches a metal object near a gearbox line.

Location 2:
Pole fires, dead tree burning, and fuel ignition via spark discharge.

Location 3:
Consequences of a corona discharge, such as line losses and aural noise.

Location 4:
Electrical device interference.

The effects of physical location:

Location 1:
Since there are numerous plantations, anything can go wrong.

Location 2:
Strong gusts, lightning strikes, heavy downpours, salt accumulation on overhead wires and conductors, etc. These environmental conditions cause disruptions to the power supply and damage to electrical systems.

Location 3:
A break in neutral could lead to a hazardous situation because it is in the centre of the road.

Location 4:
A short circuit caused by two conducting pathways coming into touch can cause flashovers, sparks, and fire—as we regularly witness in the news when building and shopping centre fires occur.

Q2-[CLO-4]: what **initiative** you have been taken at electrical power transmission system sites to solve/ handle the health and safety issues with regard to solution of the complex engineering problem OR
Which **resources** you have been **used** at electrical power transmission system site visit to solve/handle the health and safety issues with regard to solution of the complex engineering problem

Location 1:
Due to legal constraints and public concerns, the substation designer must take techniques to lower EMF levels into account.

Location 2:
Design criteria have been developed in order to construct EHV transmission lines with the highest level of guaranteed protection of people against potential health concerns.

Location 3:
Clearing fields featuring longer-span transmission structures.

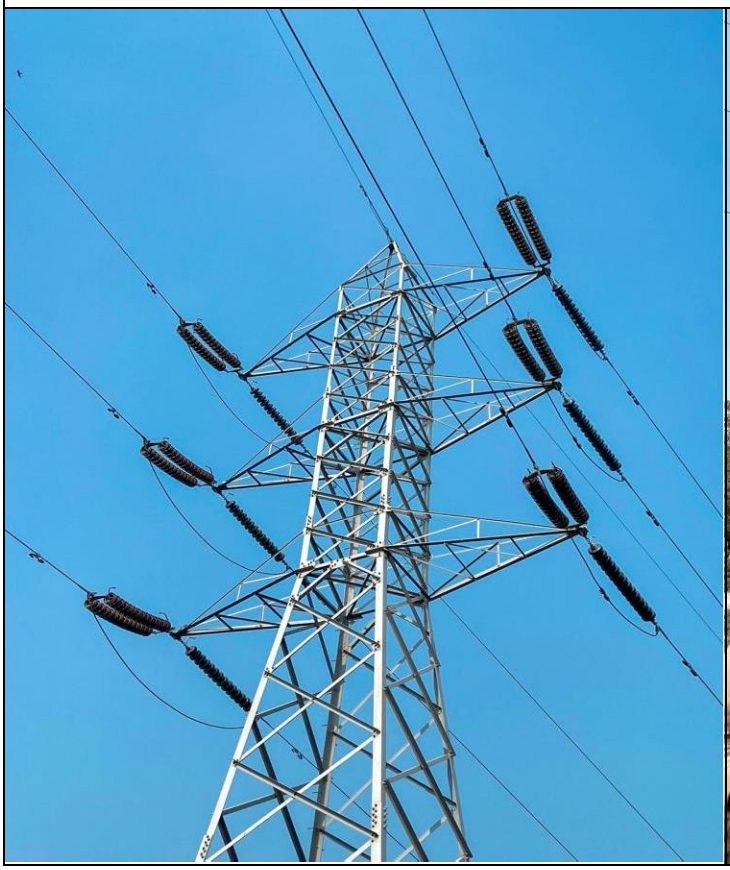
Location 4:
Changes in pole placement and span length can lessen the need to remove trees.

Part 2 – Attributes and Recommendations

Location#	Attributes	Recommendations
1	• Lattice pole that can bear voltage up to 132kV • It consists of double circuitry, single conductor and 12 discs suspension insulator. • Tower is installed at optimum height for transmission in area • Stock Bridge damper is present to reduce vibrations in conductor.	• Earth wire must be installed to ensure safety of insulator and conductor. • Conductor's ground clearance must be increased for safety of buildings and residential towers.
2	• A RCC pole having 132kV line multiple insulators. • It has double circuitry, single conductor and suspension and strain type insulators. • Guard ring is also present for insulator protection. • Conductors have stock bridge damper for vibration reduction	• Trees and other stuff (present below tower) must be removed to avoid power breakdown and failure
Location#	**Attributes**	**Recommendations**
3	• A RCC pole having 132kV line multiple insulators. • It has double circuitry, single conductor and suspension and strain type insulators. • Guard ring is also present for insulator protection. • Conductors have stock bridge damper for vibration reduction	• Ground clearance must be increased so conductor may not touch tall apartments and houses. • Trees and other stuff (present below tower) must be removed to avoid power breakdown and failure.
4	• Lattice pole that can bear voltage up to 132kV • It consists of double circuitry, single conductor and 12 discs suspension insulator. • Tower is installed at optimum height for transmission in area • Stock Bridge damer is present to reduce vibrations in conductor. • It was feeding another transmission line fron one circuit of strucrure	• Ground clearance must be increased so conductor may not touch tall apartments and houses. • Trees and other stuff (present below tower) must be removed to avoid power breakdown and failure.

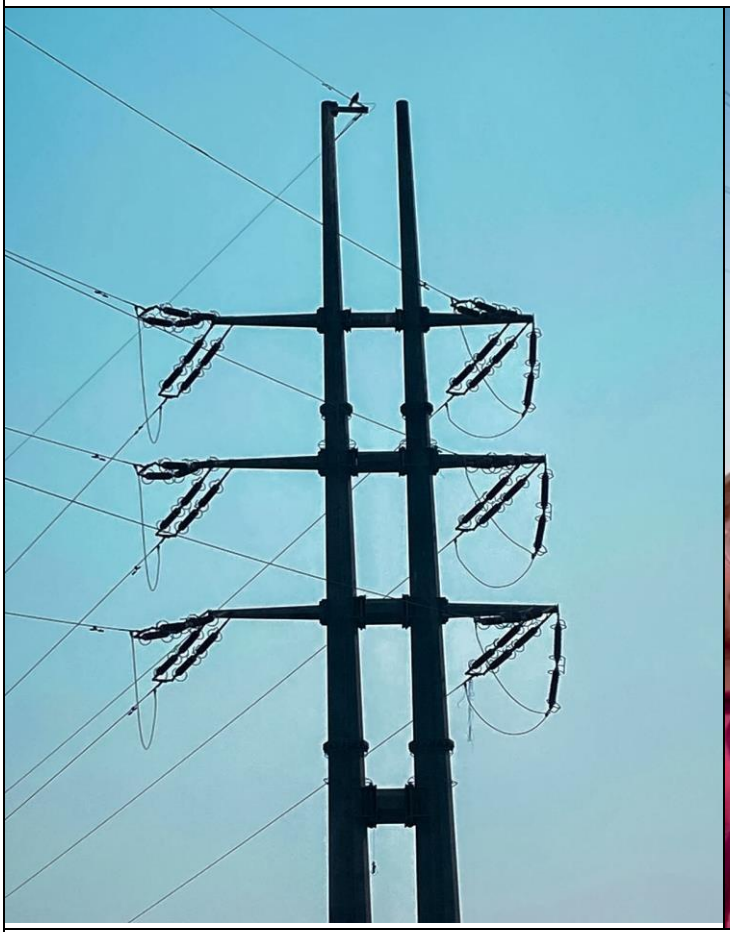
Part 3 – Pole/Tower Pictures along with student(s)

Location#1



Location#2

Location#3



Location#4