






EN-G1

KM Regulation for Works in the Vicinity of Electricity Transmission Installations



Document Control

Directorate	Document Type	Document Title
Electricity Network Affairs	Guideline	KM Regulations for Works in the Vicinity of Electricity Transmission Installations
Issue Approval		
Prepared By	Reviewed By	Approved By
 Saleh Hamad AlMarri <i>Head Of Transmission O&M</i>	 Abdulaziz Faisal A. A. Talfat <i>Director, ET</i>	 Dr. Ahmad Ali Ahmed Alkuwari <i>Sector Director, ENA</i>
 Suha Khamis M KH Al-Sulaiti <i>Head of Transmission Network Planning</i>	 Aisha Ali M Y AlMohammadi <i>Director, EP</i>	
Signature:	Signature:	Signature:

Issue Record

Issue No.	Date	Reason for re-issuing Document
0.0	29.06.2006	First issue.
1.0	14.09.2014	Review and renaming of the document as part of continuous improvement & to incorporate new requirements of QRAIL
2.0	15.10.2020	Review of document as part of continuous improvement
<u>3.0</u>	<u>25.05.2025</u>	<u>Review of document as part of continuous improvement</u>
4.0		
5.0		

Key Words : Regulations, OHL, Cable, Wayleave, Roads, Pipeline, Gas, Rails

Review Frequency : Every Three Years

When this document is approved for publishing on the intranet, a copy of its Document Control page should be sent to the QA section who is custodian of KM quality management system.

Table of Contents		
<u>Contents</u>		<u>Page</u>
	Title Page	1
	Document Control & Issue Record Page	2
	Table of Contents	3
1	Introduction	4
2	Purpose	4
3	Scope	4
4	Responsibilities & Authorities	5
5	Abbreviations & Terminologies	5
6	Works in the Vicinity of Electricity Transmission Installations	6
6.1	Overhead Lines	6
6.2	Cable Circuits	14
6.3	Telecom	26
6.4	Substation	28
6.5	General Liabilities	28
	Addendum A – Tower Crash Protection	29
	Addendum B – Overhead line Guard wire Protection	30
	Addendum C – Cable Concrete Protection Slabs	31
	Addendum D – HDPE Type H Duct	32

1. INTRODUCTION

This document was issued as KAHRAMAA document with first issue in 2006 and revised in 2020 (Issue: 2) and re-named as: **"KM Regulations for Works in the Vicinity of Electricity Transmission Installations"**.

It is a KM regulation and procedure document set by KAHRAMAA for all authorities to follow. The document was originally issued in 12.05.1991 as a MEW (Ministry of Electricity and Water) Circular No. 6 for 1991.

Having considered,

- Law no. 5 for 1970 for determining the responsibilities of Ministers, defining the functions of Ministries and various Government Bodies;
- Law No. 11 of 1979 dealing with the protection of Public Utilities and the Ministerial Circular No. 06 of 1991;
- Law no. 3 of 1986 for re-organizing the Ministry of Electricity & Water and defining its functions;
- The Emiri Decree No. (3) of 1990 for appointing the Minister of the Municipal Affairs & Agriculture as the Acting Minister of Electricity & Water during the term of the vacancy of this post.
- The Ministerial Decision no. (12) Of 1990 dated 27.08.1990 for re-organizing the structure of the Ministry of Electricity & Water;
- Law No. 13 of 2024 dealing with the protection of Public Electrical and Water Installations;
- And aimed at the realization to protect KAHRAMAA installations and render guidance to other utilities and services, previous Ministerial Circular 6/1991 has been updated & revised and issued as: **"KM Regulations for Works in the Vicinity of Electricity Transmission Installations"**

2. PURPOSE

This document is issued by KAHRAMAA under the authority established by the Emiri Decree 2000. The purpose of the regulations is to:

- Prevent damages or interference to KM's medium, high & extra-high voltage installations.
- Ensure safe and continuous supply of electricity.
- Ensure safe working practices by contractors while working in the proximity of KAHRAMAA MV, HV & EHV installations.

The regulations stipulate the conditions for execution of public services works in the vicinity of MV, HV & EHV electricity transmission installations.

3. SCOPE

These regulations apply to the Electricity Transmission Medium, High & Extra High Voltage System assets of Electricity Networks Affairs - ENA. These regulations are relevant to all persons, organizations, and governmental bodies, involved in any type of work in the vicinity of Medium, High & Extra High Voltage installations of KAHRAMAA. This includes activities such as construction of roads, rails and infrastructure, new installations, maintenance and repair of utilities. These regulations aim to facilitate safe and efficient operations around KM Electricity Transmission assets.

3.1. Article (1)

To issue this circular under the titled subject “**KM Regulations for Works in the Vicinity of Electricity Transmission Installations**” with the aim to notify all authorities, persons, organizations and government bodies which carry out the supervision and execution of works for Public Services on roadways, public places or any other locations in State of Qatar. These works should conform with the requirements provided in their plans and relevant methods of execution, especially if they interfere with and/or affect the present and future MV, HV & EHV electricity transmission installations.

3.2. Article (2)

All Ministries, Government Departments, and Statutory Bodies, Organizations and persons concerned must comply strictly with the contents of the documents detailed in this circular, copy of which are enclosed in both Arabic and English languages. Also, all parties concerned must distribute this circular to all Directors and Managers of Projects, Consultants and Contractors currently engaged by them or to all prospective contractors.

3.3. Article (3)

Any questions on the contents of the circular can be directed to the Electricity Networks Affairs (ENA) directorate of KAHRAMAA.

4. RESPONSIBILITIES & AUTHORITIES

KAHRAMAA is the responsible authority for the enforcement, interpretation and update of these regulations. For all matters relating to these regulations, please contact the Electricity Networks Affairs (ENA) directorate of KAHRAMAA.

5. ABBREVIATION AND TERMINOLOGY

KM	:	KAHRAMAA
MV	:	Medium Voltage ($1\text{kV} \leq \text{MV} \leq 33\text{kV}$)
HV	:	High Voltage ($33\text{kV} < \text{HV} \leq 132\text{kV}$)
EHV	:	Extra High Voltage ($\text{EHV} > 132\text{kV}$)
ROW	:	Right of Way / Wayleave / Reservation
ESIS	:	Electronic Service Information Sheet
RO	:	Road Opening Permit
ENA	:	Electricity Networks Affairs
ET	:	Electricity Transmission Department
EP	:	Electricity Network Planning Department

6. WORK IN THE VICINITY OF ELECTRICITY TRANSMISSION INSTALLATIONS

This regulation provides rules for planning and construction of Roadways, Rails, Pipelines, Buildings, Structures and other works in the vicinity of MV, HV & EHV installations of KAHRAMAA. These rules cover the following Electricity Transmission Installations:

- Overhead lines – 400kV, 220kV, 132kV, 66kV & 33kV
- Cable installations – 400kV, 220kV, 132kV, 66kV & 33kV (including associated pilot and Fiber Optic cables either laid alongside of power cables or laid independently of power cables)
- Primary substations – 400kV, 220kV, 132kV, 66kV & 33kV

All activities in the vicinity of MV, HV & EHV installations are subject to prior approval of ENA, KAHRAMAA. Compliance with these rules alone does not absolve the responsibility of the concerned party from obtaining the necessary approvals from the concerned section of KM & other state departments. Approval of such works in the vicinity of Overhead lines and Cables to the contractor shall be in the form of Electronic Service Information Sheets (ESIS) supported by relevant documents as per the procedures, prior to the establishment of any work within the boundary limits and time period as described therein.

For any queries related to the MV, HV & EHV installations, please contact the Electricity Network Planning Department (EP) of ENA for existing record drawings and for future proposals. The Electricity Transmission Department (ET) of ENA is responsible for the issuance and renewal of ESIS.

6.1 OVERHEAD LINES

6.1.1. General Requirements & Definitions

- 6.1.1.1. KAHRAMAA has the right of way (ROW) of 25 meters for 33kV/66kV/132kV, 35 meters for 220kV and 50 meters for 400kV (mandatory requirements) widths on either side of the center line of overhead transmission lines unless otherwise defined for specific locations. Right of Way for transmission lines operating at voltages other than these levels will be advised when they are added to the system.
- 6.1.1.2. Other than the roadways and boundary fences of security establishments, any temporary or permanent structures, buildings, parapet walls, etc. shall not be permitted within the above way leave limits. With regard to services crossing the way leave, they shall be undergrounded and kept minimum 25 meters, 35 meters and 50 meters away from the nearest tower foundation of 33kV/66kV/132kV, 220kV and 400kV overhead lines respectively.
- 6.1.1.3. The nearest side of the road (except Expressways) reservation to the nearest tower foundation shall be at least 25, 35 and 50 meters for 33kV/66kV/132kV, 220kV and 400kV overhead lines respectively.

The vertical clearance from finished road level (FRL) to bottom conductor shall be minimum 8.0 meters (for 33kV, 66kV & 132kV), 9.0 meters (for 220kV) and 11.0 meters (for 400kV).

- 6.1.1.4. The pipelines (water, oil/gas etc.) crossing the wayleaves of 33kV/66kV/132kV, 220kV, and 400kV should be a minimum of 25, 35, and 50 meters away from the nearest base of the tower leg, respectively. If it is not feasible to avoid parallel running of the metallic pipelines, cables and fences with overhead lines within the wayleave or outside the wayleave, approval must be obtained from the Sector Director – ENA, KM. This approval will be granted after ensuring that responsible authorities comply with KM requirements to counter the detrimental effects of their services or infrastructure on overhead lines and vice versa. This must be proven by measurements and calculations that the interference effects are within permissible limits. Cathodic Protection for the Pipelines must not adversely affect any KM installations such as Overhead line Pylon Foundations and Earthing. All pipelines must be underground within the defined way leave (ROW) of the overhead lines.
- 6.1.1.5. The use of OHL wayleave (ROW) as a road or vehicle track is not allowed for public vehicles. Driving any type of vehicle through OHL Towers is strictly prohibited. Dumping of rubbish / debris is prohibited within the limits of way leaves and it is the Government rule “Not to discharge rubbish / liquid except in allocated areas”.
- 6.1.1.6. Parking of vehicle: Parking of Light / Heavy Vehicles in the Transmission services (Cable / OHL) corridor is prohibited.
- 6.1.1.7. All excavations within the wayleave shall be backfilled and compacted to withstand the loads of maintenance machinery having a G.V.W of up to 40 tons. All excess material shall be removed and the surface reinstated to the original condition to permit free access of maintenance vehicles/machinery. The backfilling shall be carried out as per the Civil Engineering Standards followed by the Public Works Authority (PWA) for back filling and compaction. A compaction certificate shall be obtained by the contractor from the approved laboratory/consultant and shall be submitted to the Electricity Transmission Department of KM along with the completion certificate and As-Built Drawings/Documents for the work within the OHL wayleave (ROW), duly signed by the client, consultant and the contractor. This should state that KM requirements are completed with the provisions of “KM Regulations for Works in the Vicinity of Electricity Transmission Installations” in accordance with the Checklist Form provided by KM.
- 6.1.1.8. Two weeks prior to the commencement of any work within the wayleave, the contractor shall advise the Operation & Maintenance Section of the Electricity Transmission Department of KAHRAMAA and obtain an Electronic Service Information Sheet (ESIS) from the concerned O&M Engineer. The Electricity Transmission Department reserves the right to stop any construction activities within the wayleave limits in the absence of the Service Information Sheet or works which are carried out in a manner contrary to the instruction

given in the Service Information Sheet or have not obtained the necessary approval of the appropriate KM Department as required under different clauses of the Regulation.

6.1.2. Road Construction

6.1.2.1. General Conditions shall be applicable for all road construction (whether Expressway or Not Expressway)

- 1) The contractor shall coordinate with the Electricity Network Planning Department (EP) of ENA to collect *plan & profile* drawings from the GIS unit. It is the responsibility of the contractor to verify the received data at site before superimposing it with the road to determine the vertical and horizontal clearances.
- 2) The finished road level (FRL) shall have a specific minimum clearance below the bottom conductor of the overhead line under the designed operating conditions. This mandatory requirement depends on the line voltage and other design parameters.
- 3) Direct height measurements at the site can be misleading, as the height of the conductor along the profile varies considerably when operating at maximum design temperature. Therefore, the Electricity Transmission Department (ET) of KM should be consulted to obtain the design values for each individual case and the applicable minimum clearance.
- 4) Vertical clearance shall be measured from the finished road level (FRL) to the bottom conductor as per KM requirements.
- 5) If the vertical clearances are not achieved with the minimum requirements, the client will be responsible for submitting the proposal or proposals to the Director - ET department, to achieve the required vertical clearances without any cost impact to KM.
- 6) Horizontal clearances shall be measured from the nearest side of the road to the nearest tower foundation as per KM requirements.
- 7) If the horizontal clearances are not achieved, the client shall raise a Special Approval request to the Director - ET department.
- 8) If any outage is required by the client to finalize the work, the client shall raise official request to the Director - ET department. The approval of the outage will depend on the System Control decisions.
- 9) The contractor should provide permanent access to KM Substations and Overhead lines.
- 10) Free access from the roadways to the maintenance tracks shall be provided. The access should be properly ramped and compacted to

suit the maintenance vehicles with Gross Vehicle Weight (G.V.W) of up to 40 tons. Barrier gates shall also be provided as required.

- 11) Guard wire and poles of approved type (Addendum-B), strictly in accordance with KM standard drawing and specification, shall be erected by the contractor at 75 meters, or as directed by KM, ahead of the crossing point of the line. The poles shall be galvanized and painted with red & white strips. The Red and White paint shall be of reflective florescent type. Guard wire height shall be based on 3.7 m, 5.2 m and 6.4 m clearances below the level of the lowest conductor under rated operating conditions for the 33kV/66kV/132kV, 220kV and 400kV overhead lines respectively. The guard wires carrying approved type warning shall be strung across the roadway at the abovementioned minimum clearance (mandatory requirement) below the level of the lowest conductor under rated operating conditions/temperatures. Every installation shall be subject to prior approval of the Electricity Transmission Department (ET) of KM.
- 12) Permanent guard wire poles shall be installed by the contractor before opening the road. The contractor shall submit a request for KM inspection and approval before opening the road, whether completely or partially.
- 13) Depending on the site conditions, the contractor shall install concrete barrier protection around the guard wire poles & galvanized steel stay-wires if required, without any cost impact on KM.
- 14) Guard wires and poles must be erected by the contractor before any work begins within the 25-, 35- and 50-meters wayleave limits for 33kV/66kV/132kV, 220 kV and 400 kV respectively.
- 15) Construction of roundabout or part thereof or T-offs or road junctions within wayleave (ROW) limits is not permitted.
- 16) Traffic Signals, Road Sign Boards or Substation for streetlights are not permitted within OHL wayleave (ROW)..
- 17) For any change in the SoW, the Client/Consultant/Contractor shall coordinate with the KM concerned department and get approval for any change which may affect the transmission network.
- 18) Construction of any kind of Civil Structure is not allowed in the OHL wayleave (ROW).
- 19) Construction of underground chambers or manholes are not permitted within OHL wayleave limits (ROW). In specific and special cases, the Sector Director of ENA may approve such construction only after ensuring compliance with KM requirements, achieving a minimum horizontal distance of 6 meters from the LIVE conductor on either side for 33kV, 66kV & 132kV and 10 meters from the LIVE conductor on either side for 220kV & 400kV overhead lines.

- 20) If any utility services / diversions are included in the proposed road work contract, clearance details of the services, (Water, Drainage, Storm Water, Irrigation Pipelines etc. Ooredoo duct, Electricity HV and LV) Crossing details shall be submitted by the Client or the Consultant.
- 21) Clearance details from the proposed bridge, ramp, and side wall of the ramp, bridge pillar / pier, roundabout and underpass to the transmission lines, crossing and protection details shall be submitted.

6.1.2.2. All Roads Except Expressways

- 1) The vertical clearance from finished road level to bottom conductor shall be minimum 8.0 meters (for 33kV, 66kV & 132kV), 9.0 meters (for 220kV) and 11.0 meters (for 400kV).
- 2) The nearest side of the road (except Expressways) reservation to the nearest Tower Foundation shall be at least 25, 35 and 50 meters for 33kV/66kV/132kV, 220kV and 400kV overhead lines respectively.
- 3) The installation of crash barriers (Addendum-A), if required, shall be installed around the tower foundation and the distance from the nearest point of the tower foundation shall be proposed by the Consultant and approved by ET OHL Unit of KM.
- 4) The installation of steel guard rail, if required, shall be installed by the contractor for tower protection without any cost impact on KM.

6.1.2.3. Expressways

The construction of any new Expressway shall conform to the guidelines as detailed in the following paragraphs:

1. The Minimum horizontal and vertical clearances from the finished road level (FRL), as explained in Para 6.1.2.1, shall be as per the following:

System Voltage	Vertical (top pavement to the lowest conductor)	Horizontal (nearest side of road to nearest tower foundation)
400kV	17m	70 m
220kV	16m	60 m
132/66/33 kV	14m	50 m

2. The installation of crash barriers (Addendum-A), if required, shall be 25 meters from the nearest point of the tower foundation.

3. The installation of steel guard rail, if required, shall be installed by the contractor for tower protection without any cost impact on KM.
4. The expressways shall be designed to run with minimum interference to the overhead lines, preferably perpendicular to the line when crossing.

6.1.3. Pipelines

- 6.1.3.1 Pipelines should not be laid parallel to the overhead line within the limits of a wayleave (ROW).
- 6.1.3.2 All pipes within the wayleave must be buried and adequately protected against the weight of heavy maintenance machinery used for overhead lines having G.V.W of up to 40 tons. If Cathodic Protection for pipelines is necessary, it should not affect the foundations and earthing systems of overhead lines or interfere with the protection systems of transmission lines
- 6.1.3.3 Pipeline crossing the 33kV/66kV/132kV, 220kV and 400kV transmission lines way leave (ROW) must be at least 25, 35 and 50 meters away from the nearest base of tower leg, respectively.
- 6.1.3.4 Construction of underground chambers or manholes are not permitted within OHL wayleave limits (ROW). In specific and special cases, the Sector Director of ENA may approve such construction only after ensuring compliance with KM requirements, achieving a minimum horizontal distance of 6 meters from the LIVE conductor on either side for 33kV, 66kV & 132kV and 10 meters from the LIVE conductor on either side for 220kV & 400kV overhead lines.

6.1.4. Boundary Fences

- 6.1.4.1 Boundary fences should not be laid parallel to the overhead line within the limits of a wayleave (ROW). The safe distance for proposed fences running parallel to the transmission overhead lines should be proved safe by calculations, by the contractor or their consultants.
- 6.1.4.2 Fences running parallel to the transmission lines or crossing the wayleave (ROW) of lines should be earthed using appropriate means to avoid any electrical accidents while working on the fences.
- 6.1.4.3 For the fences running parallel to the transmission lines within the wayleave (ROW) of lines, it should be achieving the horizontal distance at the tower location by using U-Shape fence arrangements or keeping plastic barriers instead of fence nearby towers.
- 6.1.4.4 The Plastic Barrier should be filled partially with the sand and the necessary flashing lamps should be provided by the contractor. It is the full responsibility of the client/contractor to maintain the plastic barriers & flashing lamps in good condition and to do any

rectifications whenever required without any cost impact on KAHRAMAA.

- 6.1.4.5 During the emergency case requiring maintenance work, the client/contractor and re-fixing is fully responsible for clearing the site by dismantling and re-fixing the fence within the OHL wayleave. This must be done whenever KAHRAMAA faces any problem carrying out the required maintenance, without any cost impact on KAHRAMAA.
- 6.1.4.6 Access gates without horizontal top beams shall be provided at the points of crossing of way leaves.
- 6.1.4.7 Free access for the maintenance staff should be arranged on a day and night basis.

6.1.5. Gardens & Landscaping

Development of gardens, landscaping, planting of trees, etc. within the limits of OHL wayleaves (ROW) is strictly prohibited.

6.1.6. Street Lighting

Street Lighting columns and overhead wires are not permitted within the way leave.

- 6.1.6.1 Where due to lighting and traffic safety requirements the street lighting columns are essential within the overhead lines wayleave (ROW), in specific and special cases, the Sector Director of ENA shall accord the approval only after establishing that no other alternatives are practicable and that the responsible authorities shall comply with the KM requirements.
- 6.1.6.2 Only streetlight pole with maximum height of 6 meters maybe allowed within a minimum horizontal distance of 6 meters from the LIVE conductor either side.
- 6.1.6.3 High mast streetlight poles with a height of more than 6 meters within the limits of OHL wayleaves (ROW) are strictly prohibited.
- 6.1.6.4 Only maintenance activities for streetlight poles which are located within the OHL wayleave and comply with items # 6.1.6.2 & 6.1.6.3 can be carried out with strict arrangements and in the presence of Contractor Safety Officer after getting ESIS from the ET OHL unit of KM.
- 6.1.6.5 Each streetlight pole within OHL wayleave (ROW) should be individually earthed in addition to the common earth.

6.1.7. Installations of Plant Outside the Wayleave which may Influence EHV / HV / MV Services

- 6.1.7.1 Firing ranges shall be located at a safe distance from electrical installations (transmission lines and substations) to prevent any danger to KAHRAMAA personnel and the installations.
- 6.1.7.2 Ammunition stores shall be located far enough from the KAHRAMAA installations to ensure that any accidental incidents do not cause damage to MV, HV or EHV installations.
- 6.1.7.3 Radar and similar radiating installations shall be located at a distance that ensures the radiation level at the site of KM installations is within acceptable limits. This is to ensure the safety of personnel and to avoid mutual interference between installations.
- 6.1.7.4 High structures, whether temporary or permanent, are not permitted to be constructed within a distance equal to their falling distance plus 6 meters from the nearest overhead line conductor deflection under "full swing" design conditions.

6.1.8. Passage of High Loads under the Overhead Lines

The transporter or the end user of transported goods must check the height of the cargo to ensure it can be safely transported under the lines, in consultation with the O&M section of the Electricity Transmission Department of KAHRAMAA. The Head of O&M (Electricity Transmission Department) must be notified at least 14 days in advance about the proposed movement of "High Load" under the lines to study its feasibility. The end user/transporter must provide all necessary assistance and support to facilitate the safe passage of the loads. The end user must coordinate with different departments and other utilities/law enforcement agencies as needed.

6.1.9. Rails

The construction of railway lines shall conform to the guidelines as detailed below:

- 6.1.9.1 The finished rail tracks shall have a specific minimum clearance (mandatory requirement) below the bottom conductor of overhead line, under the designed operating conditions. Such clearance depends on the line voltage and other design parameters as detailed below.

System Voltage	Horizontal Clearance at crossing points (Outer Edge of Tower & Rail Alignment)	Vertical Clearance (Lowest Conductor to Top of Rail track)
66KV / 132kV	50 Meter	16 Meter
220kV	60 Meter	17 Meter
400 kV	70 Meter	18 Meter

- 6.1.9.2 The safe distance for proposed rails running parallel to the power transmission overhead lines shall be proved for safety by calculations (induction effect), by the Consultants of the project. All such cases shall be raised to KM for review and approval. The Sector Director of ENA shall accord the approval for all cases of parallel operation of rails with transmission overhead lines.
- 6.1.9.3 Angle of crossing of rails with power transmission lines shall preferably be at right angle (90°) to the overhead line. In specific cases only if this angle of approach is not achieved, then angle of approach shall be between 60° and 120°.

6.2. CABLE CIRCUITS

6.2.1. General Requirements & Definitions

- 6.2.1.1. This heading covers all types of MV/HV/EHV cables (Power, Pilot, Telemetry and Fiber Optic) which are installed beneath the ground level.
- 6.2.1.2. Typically, the cables are 'off road' installations, except at road crossings where the cables are inside concrete ducts filled with BENTONITE Mixture. There are a few exceptions where some of the cable circuits are allowed to remain along the extended carriageway with certain conditions by prior agreement.
- 6.2.1.3. The cable routes should be free of any permanent temporary structures. KM reserves the right to excavate along the cable route for necessary repair work.
- 6.2.1.4. Cables are normally buried directly in the ground in trenches located as per applicable Road Hierarchy or inside open ground in the desert i.e., inside the carriageway, under the pavement, across the road, inside ducts, or in the desert, protected by suitable cable tiles (for typical drawing see Addendum-C). Wherever cables have been laid / installed, KM has the ROW along the cable routes; the horizontal width of the ROW is generally 1 to 4 meters depending on the installation arrangement.
- 6.2.1.5. Submarine cables are normally buried 1.1 meters below seabed. The horizontal distance between phases in the sea is 50 meters and gradually reduces to 5 meters when approaching seashore. The ROW is 200 meters for one Submarine cable circuit. For submarine

cables, 60-meter horizontal clearance from boundary of ROW is required for any installation.

- 6.2.1.6. Although KM can furnish reasonably accurate drawings/records of the routes of these cables, the responsibility of positively ascertaining the location and depth of a cable rests with the parties involved with the works at the vicinity of the cables.
- 6.2.1.7. Usually, KM Data Base maintains records of cables installed in the ground. The records are reasonably accurate but, not a guarantee of the precise location and depth of the cable. It is possible that some cable circuits have not been entered into the records or that they are in the process of being entered into the records.
- 6.2.1.8. The existence of MV/HV/EHV cables beneath the ground shall be ascertained by taking trial holes over the cable route, without depending on the available records.
- 6.2.1.9. Usually, the cables are buried such that the average depth from the ground level to the top of the cable protective tile is between 0.8 to 1.0 meters. The location of the cable along the route is usually identified with cable route markers but, the accuracy of information is not guaranteed as it is possible that the cable route markers may have been shifted by others without approval of KM.
- 6.2.1.10. Within the cable reserves no excavation will be allowed except for the crossing of other services e.g. telephone lines, pipelines or making trial holes for the positive identification of the cable.
- 6.2.1.11. Excavations, which are parallel and very close to the cable route but outside the ROW will be allowed only if the total length of traverse is not more than 500 m and there is no danger of the existing installation from collapse. Where the proposed new service very close to the route extends for more than 500 m, the concerned utility shall produce induced voltage calculations to confirm that their installation is safe from Induced voltages and Step & Touch voltages.
- 6.2.1.12. Foundations and civil structures (temporary or permanent) will not be permitted in the close proximity to the cable circuit. A minimum horizontal distance of 1.5 m from such structures to the nearest edge of the cable trench shall be observed provided that excavations for such structures are not deeper than the bottom level of the cable trench. For deep excavations below the level of cable trench, advice of KM shall be sought to establish the horizontal distance that could be permitted.
- 6.2.1.13. Any posts of the fences and sign boards crossing the cables way leave should be erected outside the way leave limits.
- 6.2.1.14. KM should be informed of all the development work which involves the cable reservation and specific approval should be obtained prior to detailing any work in these areas. The Operation and Maintenance (O&M) Section of the Electricity Transmission Department shall be informed 14 days prior to commencement of any excavation work in the vicinity of cables and necessary

Electronic Service Information Sheet (ESIS) / Clearance shall be obtained.

- 6.2.1.15. The use of mechanical excavators shall not be permitted for excavation work approaching three meters to the cable reservations and within ROW. All excavations shall be done manually. Limited use of jackhammer under direct supervision may be allowed by KM.
- 6.2.1.16. Excavation approaching three meters to ROW and deeper than 1.1 meters shall be protected by shuttering to prevent collapse of soil protecting the cable circuits.
- 6.2.1.17. The excavation Contractor shall provide a competent person (approved by KM) at site at all times to receive the instruction from the representative of KM concerning requirements to safeguard the integrity of the cables.
- 6.2.1.18. Removing Cable protective tiles and exposing the cable installation is not allowed unless the Contractor has been served with a Safety Document as per the rules and regulations of KM supported by an approved method statement concerning the procedure protecting the cable installation. The exposed cables shall be normalized exactly to the original condition. Usually, the cables are embedded in dune sand or inside stabilized backfill below the cable tiles. The bedding below the cable tiles, installation cable tiles, Backfilling and Reinstatement above the cable tiles shall be supervised by an authorized person on behalf of KM. Any dislocated cable route markers shall also be reinstated.
- 6.2.1.19. Any damage to the installation will be subject to a claim for reimbursement of the cost of repairs including the consequential loss against the contractor.
- 6.2.1.20. When the cables are running parallel to the MV/HV/EHV OH lines or crossing them, the impact of fault on lines and vice versa shall be studied and provided to KAHRAMAA before commencing any excavations.
- 6.2.1.21. In case any of the existing MV/HV/EHV overhead lines (whether completely or partially) are proposed to be replaced by cable circuits, following maximum achievable ratings for cables shall be taken into consideration.
 - 1000 MVA for 400kV.
 - 515 MVA for 220kV.
 - 250 MVA for 132kV.
 - 120 MVA for 66kV.
- 6.2.1.22. Cable ESIS shall be obtained for activity 04 meters from edge of EHV Cable circuit.

6.2.2 Accessing Cable Tunnels

- 6.2.2.1 All entrants must undergo the Utility Tunnel Safety Induction by KM HSE Department.
- 6.2.2.2 Coordinate with KM General Service and obtain access permission.
- 6.2.2.3 Obtain LOA from ET & ED O&M Cable unit (Transmission & Distribution) to access the cable tunnel & for work to be carried out.
- 6.2.2.4 LOA holders should inform KM System Control before Entry and Exit of the Tunnel.
- 6.2.2.5 Working Personnels inside Tunnel should possess a third-party Confined Space Entry certification.
- 6.2.2.6 One team member must remain outside the tunnel as a standby person while the team is inside. This person must hold third-party certification as a Hole / Tunnel Watcher.
- 6.2.2.7 Ensure Proper ventilation is made inside Tunnel.
- 6.2.2.8 Gas Test must be performed by third party certified Gas tester to ensure safe to enter the Tunnel.
- 6.2.2.9 Work to be carried out as per the approved Method Statement and KM Safety Regulations.
- 6.2.2.10 All entrants must adhere to the Tunnel Entry/Exit Procedure, Emergency Response Procedures, and Safe System of Work Procedures.
- 6.2.2.11 Inform KM two (02) working days in advance and arrange inspection inside Tunnel with KM Patrolling team (Transmission & Distribution) after completion of work.
- 6.2.2.12 Submit the LOA to KM ET and ED O&M Cable unit (Transmission & Distribution) for cancellation after completion of the work with concurrence signature based on the site inspection by KM team.
- 6.2.2.13 Coordinate with KM General service to close access permission.

6.2.3. New Roadways

Cable reservations are either provided along the central reservation or at the edge of the roadway. The development of existing roadways in some cases has encroached cable reservations. In such cases the existing cables shall be diverted and rerouted as off-road installations free of cost to KM. System outages for such work shall be between the 1st week of October to 31st March of the following year subject to prior agreement with KM. As built drawings of diverted / rerouted cables shall be submitted to KM for review and record.

Following KM cable diversion general requirements shall be implemented:

Keeping cables under carriageway for short lengths (maximum 500meter per circuit inclusive of all Ashghal& Rail Projects) and road crossings

- 6.2.3.1 Cable sheath test has to be carried out before and after completion road works and sheath fault located to be repaired by Ashghal Contractor by KM approved electrical subcontractor for retaining cable under carriageway that exceeds 200 meters in length.
- 6.2.3.2 The Link Boxes falling under carriageway shall be shift out of carriageway by KM approved electrical contractor, and to be leveled to match with finished ground level (link boxes to be shifted out of carriageway by KM main contractor if cable circuits under warranty)
- 6.2.3.3 The contractor has to ensure that all the existing Link Box pit/PD pit/FO pits within the LOW shall be in accessible location and to be leveled to match with finished ground level.
- 6.2.3.4 Link Box raising & lowering work shall be reviewed by KM ET O&M cable unit and work shall be carried out by KM approved contractor. (Maximum allowed tolerance for link box raising/lowering is 50CM)
- 6.2.3.5 Maximum allowed length of EHV cable under carriage way is 500mtr only (Ref # MOU Clause No. 2.3)
- 6.2.3.6 Cables to be protected by additional concrete slabs at shallow locations only (if cable tiles from the final level is less than 70 cm).
- 6.2.3.7 Accessible HDPE type H spare ducts (250mm dia.) to be provided in parallel with cables crossings under carriage way (50% of circuits numbers with minimum one spare H duct)
- 6.2.3.8 All proposed Type H duct crossing existing EHV/HV cable to be constructed bottom of EHV cable with min 60cm vertical clearance between bottom of existing cable bedding to top of proposed Type H duct.
- 6.2.3.9 Disturbed/removed Cable route markers have to be reinstated as per KM standard.
- 6.2.3.10 Existing EHV Cable/Joint Bay buried level cannot be altered, FRL should maintain existing cable buried level as per KM standard.
- 6.2.3.11 Since EHV cables are affected in the proposed project location, coordination with KM transmission cable unit is required during construction stage until project completion.
- 6.2.3.12 Prior to commence site activities, the latest transmission network Details/As built dwg to be obtained from KM, and cable route, all Link box/FO/PD pits locations shall be identified and protected with barricades.
- 6.2.3.13 All proposed manhole/permanent foundation or structure/ road gullies or grated channel shall be min 1.5 meter away from edge of EHV cable route.
- 6.2.3.14 Construction of spare ducts above EHV / HV cable Joint Bays & any utility crossing above/below Joint Bay is strictly prohibited.

- 6.2.3.15 Prior to starting Cable slab protection/spare duct and link box shifting, contractor has to approach KM transmission cable unit and necessary KM safety documents shall be obtained (PTW, LOA & SIS).
- 6.2.3.16 Cables should not be exposed and all the activities within EHV reservation or crossing EHV shall be strictly as per KM procedure. (ET-P13 – Service information Sheet (SIS), ET-P15- Project execution and KM rules and Regulation.

Transmission Cables Diversion Requirements

- 6.2.3.17 Existing bonding scheme and ampacity should not be changed, accordingly Joint Bay location & diversion cable length to be proposed. (KM approved electrical contractor must study the proposal & revise according to match with existing section length & bonding system)
- 6.2.3.18 All proposed minor/major sections to be identical in length and should match with existing section length.
- 6.2.3.19 Proposed diverted cable circuit 1&2 to be laid on either side of the road.
- 6.2.3.20 All diverted cables must be laid only in the KM approved transmission corridor and proposed Joint Bay should not fall under asphalt & proposed Joint Bay should be min 15meter away from cable bending.
- 6.2.3.21 Proposed underground power cable diversion portion schematic diagram/bonding system should match with latest As-Built Bonding Scheme.
- 6.2.3.22 Confirmation that the proposed cable route should be at least 1.5 meters away from any installation or foundations and have no conflict with private properties and commitment to shift any cable if wrongly installed inside the private property.
- 6.2.3.23 Diversions cable route lengths should not affect the exiting earthing system, diversion to be extended even out of LOW to the nearest existing joint or cable sealing end as additional joints are not allowed (maximum extension 200m. to the nearest existing joints or cable sealing ends).
- 6.2.3.24 Under warranty cable circuits to be diverted only by original installation contractor.
- 6.2.3.25 Cable current carrying capacity to be maintained and accordingly, changing the existing depth of cables is not allowed.
- 6.2.3.26 New cables, joints and accessories should be from KM approved supplier (should match with the existing), supported by type and FAT tests. All Materials and test reports shall be approved by KM. The FAT will be attended by KM.
- 6.2.3.27 All civil and electrical works associated with the diversion shall be carried out by an Electrical Contractor acceptable and approved by KM.

- 6.2.3.28 Cable backfilling materials should be identical with the existing backfill materials.
- 6.2.3.29 All pre-commissioning tests including HVAC and its related substation works are mandatory. The substation work like degassing, gassing and VT dismantling and installation shall be carried out by switchgear manufacturer specialists without any impact cost to KM.
- 6.2.3.30 Two (02) years' warranty from the electrical work contractor shall be provided for the diverted sections of cables from date of energization. During this period the Contractor shall be responsible for rectifying any failure except third party damages.
- 6.2.3.31 All activities within EHV reservation shall be strictly as per Procedure, ET-P13: SIS, ET-P15: Project Execution and KM Rules & Regulations.
- 6.2.3.32 All the works should be supervised by an Electrical Consulting Engineer approved by KAHRAMAA. (Please furnish CV for review). Provision shall be made for daily on-site route patrolling by the Consultant to ensure that there will be no unauthorized activities over the cable route [ET-P14/WI] during the execution of the diversion works.
- 6.2.3.33 Diversion works shall be carried out during KM outage window, from 1st week of October to 31st of March of the following year, one cable circuit at a time.
- 6.2.3.34 Link boxes shall be leveled to match the finished roads level.
- 6.2.3.35 For proposed new cables road crossing additional spare or where road to widening the existing spare ducts to extended type H duct to be installed, Duct banks for new proposal crossing should be type H duct (250mmdia).
- 6.2.3.36 It is the responsibility of the consultant to coordinate with other projects for tie in points, identify clashes if any and inform ASHGHAL for action.
- 6.2.3.37 The cost of all electrical infrastructure works which are required to the affected services, such as diversion, realignment, additional ducts (EHV/HV/MV/LV) etc. will be carried in your project, including the supply of material and civil/electrical works. All the work should be carried out in accordance with KM standards and specifications with the approved procedure and by the approved contractor.
- 6.2.3.38 Existing EHV Cable/Joint Bay buried level cannot be altered, finished level should maintain existing cable buried level.
- 6.2.3.39 All recovered cables and associated accessories shall be returned to KM stores as per KM procedure.

6.2.4. Landscape Works within Transmission Cable Wayleave

- 6.2.4.1 Unhindered access to KME for laying new cables, emergencies, and essential maintenance of cables & reinstatement of Shared path/Cycle track and plants within electrical corridors shall be done by PWA.
- 6.2.4.2 Cycle track or share path are not allowed above EHV cable Joint Bay and Link Box/PD/FO pits.
- 6.2.4.3 The contractor shall ensure that all the existing Link Box pit/PD pit/FO pits within the LOW shall be in an accessible location and to be leveled to match with finished ground level.
- 6.2.4.4 Link Box raising & lowering work shall be reviewed by KM ET O&M cable unit and work shall be carried out by KM approved contractor. (Maximum allowed tolerance for link box raising/lowering is 50CM)
- 6.2.4.5 Disturbed/removed Cable route markers to be reinstated as per KM standard.
- 6.2.4.6 Since the large span of EHV cable affected in the proposed project location, coordination with KM transmission cable unit is required during construction stage until project completion.
- 6.2.4.7 Prior to commence site activities, latest transmission network Details/As built dwg to be obtained from KM & Cable route, all Link box/FO/PD pits locations to be identified & protected with barricades.
- 6.2.4.8 Deep rooted trees/large shrubs shall not be planted above EHV cable route, min 2-meter clearance to be maintained from Edge of cable route & root barrier to be provided.
- 6.2.4.9 Only shallow rooted shrubs/low shrubs, grass planting allowed above cable route.
- 6.2.4.10 NO Landscaping/Beautification works above LB/PD/FO pits. (Min 5-meter horizontal clearance to be maintained from surrounding)
- 6.2.4.11 Not permitted for backfilling above EHV cable route (existing cable buried level cannot be altered).
- 6.2.4.12 All proposed pipelines/manhole/permanent structure/foundation/lighting within 1mtr of EHV cable route to be removed, if any. min 1-meter clearance to be maintained from edge of EHV cable tiles/route.
- 6.2.4.13 Irrigation pipeline shall not be installed along with cable route, only crossing allowed & NO irrigation tape or water sprinkler installation nearby KM manholes (LB/PD/FO).
- 6.2.4.14 Cables should not be exposed and all the activities within EHV reservation or crossing EHV shall be strictly as per KM procedure. (ET-P13 – Service information Sheet (SIS), ET-P15- Project execution and KM Rules and Regulation.

6.2.5 Rails

The construction of railway lines shall conform to the guidelines as detailed below in addition to the General Requirements.

- 6.2.5.1 In case the existing cables shall be diverted and rerouted for rails installations, these shall be done without any cost impact on KM. System outages for such works shall be between the 1st week of October to 31st March of the following year, subject to prior agreement with KM. As built drawings of diverted / rerouted cables shall be submitted to KM for review and record.
- 6.2.5.2 In the event of any impact to ET cable networks, a comprehensive and detailed proposal must be submitted to the ET Operations & Maintenance Unit for a thorough technical review and formal approval during the Rail design stage.
- 6.2.5.3 All proposed permanent installations, including foundation construction, must strictly adhere to the "KM Regulations for Works in the Vicinity of Electricity Transmission Installations" EN-G1 (Issue: 3). An accessible Type H HDPE duct bank shall be installed along the cable route, extending up to the ET Corridor on both sides for the location where Rail crossing with ET cable.
- 6.2.5.4 Rail tracks shall not be constructed underneath existing EHV Cable Joint bays.
- 6.2.5.5 Sheath testing of the EHV cables within the proposed Rail corridor (ROW) shall be conducted both prior to the commencement of work and after its completion. Any identified sheath faults must be rectified by the designated rail contractor.
- 6.2.5.6 The affected link box pit and PD box pit shall be relocated accordingly.
- 6.2.5.7 A joint site inspection involving KM, the contractor, and the supervisory consultant shall be conducted before the commencement of work to document the positions of route markers, link pits, and PD pits. These shall be re-verified upon completion of the work.
- 6.2.5.8 All EHV cable-related works shall be executed exclusively by a KM ET approved electrical subcontractor.
- 6.2.5.9 Any cable requiring diversion due to the proposed rail tracks shall be rerouted from joint bay to joint bay and must match with existing section length & bonding system.
- 6.2.5.10 Additional backfilling along the cable route is not permitted, as it may adversely affect cable ampacity.
- 6.2.5.11 Mechanical load calculations at rail track crossing locations along the cable route, as well as cable protection measures, shall be reviewed and validated by a qualified expert team.
- 6.2.5.12 A formal commitment from the Qatar Rail shall be secured at the earliest to ensure access to the EHV cables for outer sheath repairs and fault rectification, supported by a streamlined documentation process.

In the event of emergency fault repairs involving affected power cables, Qatar Rail shall ensure 24/7 access and implement an efficient emergency work permit issuance process to enable immediate fault response without delay.

For outer sheath verification of affected power cables conducted exclusively through existing link boxes without excavation or occupancy, Qatar Rail shall facilitate the provision of required documentation for access with minimal processing time and administrative burden.

6.2.6 Explanatory Notes Concerning MV/HV/EHV Cable Installations

Wherever the existing cable installations may be affected by the proposed development work, the requesting authority shall make an application to KM for *Electronic Service Information Sheet* (ESIS) and carry out initial investigations by taking *Trial Holes* along the MV/HV/EHV cable route to ascertain the exact position of cables and the depth to the top of cable cover. The investigation should generally be undertaken prior to the award of Contract by the concerned Authority.

In the event MV/HV/EHV installations are within the proposed development work the requesting authority shall examine alternative options and ensure that the existing installations are unaffected. Where this is not possible, MV/HV/EHV cable installation shall be diverted and re-routed. The funds for such additional works shall be met from the concerned Service Authority.

The following requirements are complementary to those already stipulated as above and shall be satisfied as a minimum for any activity within the vicinity of MV/HV/EHV installations.

- 6.2.6.1 After the preliminary investigations, detailed drawings shall be submitted showing the precise location of other services and the proposed development works with respect to existing MV/HV/EHV installations superimposed on single sheets.
- 6.2.6.2 KM shall have the right to excavate within the cable reservation, be it new roadways, pavements, walkways, roundabout, center reservation etc., and remove any obstruction whatsoever at any time should it be necessary to attend to cable repair and maintenance.
- 6.2.6.3 Where the line of the proposed carriageway/hard shoulder infringes on existing cable installation which has hitherto remained as an off-road installation, and where the depth from final surface level to the top of the cable cover is not more than 0.7m over a length not exceeding 200 m of cable route, suitable RCC raft protection may be installed with the consent of KM. The proposed raft protection shall incorporate the following requirements and the proposed installation details, and methodology shall be submitted to the Electricity Transmission Department for review.
 - 250 mm wide with suitable lifting facility
 - Capability of withstanding 10 Ton wheel load

- The length of the raft extending 0.5 m beyond each outside edge of cable tile.
 - 200 mm dune sand bedding between the top of cable tile and bottom of raft protection.
- 6.2.6.4 In the event of widening of the road (or part thereof), the spare type H cable ducts of the existing road crossings shall be extended to cover the increased area falling under the new road including a length of 0.5 m beyond the furthest edge of the proposed curb line on each side of the extended carriageway/or Type H Duct bank to be provided parallel to existing cable circuit either by Open trench or HDD . For the portion of cable falling under carriage way additional protection slab to be provided for the shallow cables only if Cable tile top is less than 70cm from final ground level. All the ducts shall be sealed with caps to prevent the migration of contaminants inside the ducts. The work should be co-coordinated and carried out with the approval of the Electricity Transmission Department.
- 6.2.6.5 One Spare type “H-HDPE” ducts shall be constructed parallel to the circuits (Two Feeders) at road crossings.
- 6.2.6.6 Constructions such as water gullies, soak pits, chambers, water mains, high mast foundations, Traffic signal control equipment, Traffic Radar Cabinets shall be located 1.5 METER away from the nearest edge of cable protective cover, Tank pit or cable joint bay.
- 6.2.6.7 Use of heavy mechanical excavators (other than hand operated pneumatic jack hammers) or driving sheet piles within 3m reach of the nearest edge of cable cover, cable joint and tank pits are not permitted.
- 6.2.6.8 Heavy machinery engaged in the civil construction or road works shall be located in such a manner that the operating load/thrust/weight will not be applied directly on the cable installation.
- 6.2.6.9 Trench excavations parallel to the cable installations shall have a minimum separation of 1.0 m to the nearest edge of cable tile. The trench shall NOT remain open at any time unless suitable shoring, timbering and shuttering are provided acceptable to KM, to protect the MV, HV and EHV installations and the cable from collapsing.
- 6.2.6.10 Laying metal pipes over a long distance parallel to cable in close proximity is not permitted unless the concerned authority satisfies that the Step and Touch Potentials at any point of the pipeline do not exceed 65 Volts.
- 6.2.6.11 Temporary access or approach roads so required for diversion of vehicular traffic during the progressive stages of construction works, which falls over the cable installations shall be subject to limitations noted under (4) above.
- 6.2.6.12 The hard surface, if any, falling above the cable installation shall be loosened by pneumatic jack hammers or similar machinery prior to scooping out the debris to prevent the transmission of vibration to the cable installation below.

- 6.2.6.13 Where the requirement of other services, such as water mains, telephone, sewerage mains etc. necessitate the crossing of MV, HV or EHV installations, prior approval of KM shall be obtained for the precise location and the method of crossing. Where the proposed services shall cross under, the MV/HV/EHV cables shall be temporarily protected in a manner acceptable to KM. Such protective measures should be implemented with the cables switched off (applicable for FTB & CBS protected cables). IF REQUIRED, for which purpose 14 days' notice will be required. In the event KM is unable to arrange the outages as requested, such reworks shall be programmed during the period spanning from 01st October to 30th March of the following year when the plant can be conveniently taken out of service.
- 6.2.6.14 Work within the MV, HV & EHV reservation shall be continuously supervised by the authority, or the Consultant engaged in the proposed development work. However, if it becomes necessary to disturb the cable installation or expose the cables such works shall be carried out only after obtaining necessary safety documents.
- 6.2.6.15 Continuous interaction shall be maintained by the authority or the consultant with KM as the work progresses in order to ensure the highest safety and security to the integrity of MV/HV/EHV installations.

6.2.7 Existing EHV Cable Crossing by Other Service Providers

The service facilities for portable water, sewerage, drainage, water, gas, telephone etc. are not permitted to be laid within the cable reservations. The following minimum clearances shall be observed for respective service lines at crossing points. Such crossings may not be permitted if the cable's rating / integrity will be affected in any way by the services to cross the cable reserve. Crossing under or above cable joints is strictly prohibited.

Service/Utility	Vertical clearance (Minimum)
Potable Water, TSE /Sewerage/Storm water Mains (to cross below EHV cable level) – <i>Manual crossing</i>	600 mm below cable FTB bedding
Potable Water, TSE /Sewerage/Storm water Mains (to cross below EHV cable level) - <i>Machine crossing</i>	1500 mm below cable FTB bedding
Water distribution lines	200 mm above cable protective tile
Drainage distribution lines	200 mm above cable protective tile
Gas pipes Mains – <i>Manual crossing</i>	600 mm below cable FTB bedding
Gas pipes Mains – <i>Machine crossing</i>	1500 mm below cable FTB bedding
Gas distribution lines	200 mm above cable protective tile
Telephone lines	200 mm above the cable protective tile
LV / 11kV cables	200 mm above the cable protective tile

6.3 TELECOM

General Notes on Diversion or Replacement of FO/Pilot Cable

- 6.3.1 Joint manholes are required on diversion location / points.
- 6.3.2 Two (02) manholes from both sides of tunnel are required for FO/Pilot cable that needs to pass through the tunnel.
- 6.3.3 Concrete manhole specification shall be taken from KM Civil Unit.
- 6.3.4 On FO/Pilot joint manholes, FO/Pilot Cable spare shall have 5 meters spare length.
- 6.3.5 For FO/Pilot cable that needs to pass through the tunnel, two FO/Pilot cables are required for each feeder which makes (e.g. if two Feeders are diverted in a Tunnel, we require 4 nos. of FO/Pilot Cable) to be laid from the point of entry. Two will be jointed for diversion and other two for spare purpose.
- 6.3.6 Power budget calculation should be considered at each time FO/Pilot Cable will be diverted.
- 6.3.7 FO/Pilot cable used for diversion shall be identical or shall have the same specification as existing FO/Pilot Cable.
- 6.3.8 Any FO/Pilot Cable diversion shall be coordinated first with KM Telecom section (EST-ES dept.) before commencement, enabling us to shift any affected signal traffic (Telecom & Protection).
- 6.3.9 No Protection FO/Pilot Traffic shifting will be allowed if Sub-Station is on Single Feed (SFC).
- 6.3.10 The Contractor will be responsible for providing all the accessories required to complete Telecom & Protection traffic shifting process.
- 6.3.11 E2E Testing shall be done in presence of KM / Consultant and by KM LOA authorized person.
- 6.3.12 All Material used for diversion processes like FO/Pilot Cable, FO/Pilot junction box, accessories, etc., shall be as per KM specifications and required to be submitted to KM Telecom section (EST-ES Dept.) for review and approval.
- 6.3.13 All FO/Pilot Test Procedures shall be submitted to KM Telecom section (EST-ES Dept.) for review and approval.
- 6.3.14 FO/Pilot Cable Details, Single Line / Schematic Diagram for existing FO/Pilot Cables and proposed Diversion Plan to be submitted by ASHGHAL/Contractor to KM Telecom section (EST-ES Dept.) for review and approval.
- 6.3.15 As-built to be submitted after completing diversion works including Key-plan Map.
- 6.3.16 Any diversion which involves Water FO/Pilot Cable shall be coordinated with KM Water Network Affairs.

Keeping FO cables under carriageway for short lengths (maximum 200meter) and road crossings

- 6.3.17 FO Cables shall be protected by additional concrete slabs.
- 6.3.18 Accessible HDPE type H spare ducts (for typical drawing see Addendum-D) to be provided parallel with FO cables for the route length which will be under the carriageway or road crossings (50% of circuits numbers with minimum one spare type H duct)
- 6.3.19 FO Cables shall not be exposed, and all the works shall be carried out as per KM procedures.
- 6.3.20 Ashghal shall give the commitment that for maintenance and emergency repairs, KM will reinstate only the cut asphalt area, not all street width.

General Notes on Diversion or Section Replacement of OPGW

- 6.3.21 Joint Boxes are required for diversion location / points.
- 6.3.22 Diversion of both Feeders at the same time is not permitted.
- 6.3.23 Power budget calculation shall be considered in any OPGW Cable diversion.
- 6.3.24 OPGW Cable used for diversion shall be identical or have the same specification with existing OPGW Cable.
- 6.3.25 Any OPGW Diversion shall be coordinated first with KM Telecom section (EST-ES dept.) before commencement, enabling us to shift any affected traffic (Telecom & Protection). The Contractor will be responsible for providing all the accessories required to complete Telecom & Protection traffic shifting process.
- 6.3.26 Testing shall be done in the presence of KM / Consultant and by KM LOA authorized person.
- 6.3.27 All Material used for diversion processes like OPGW Cable, OPGW junction box, accessories, etc., shall be as per KM specifications and required to be submitted to Telecom section (EST-ES Dept.) for review and approval.
- 6.3.28 All OPGW Test Procedures shall be submitted to KM Telecom section (EST-ES Dept.) for review and approval.
- 6.3.29 OPGW Cable Details, Single Line / Schematic Diagram for existing OPGW Cables and proposed Diversion Plan to be submitted by ASHGHAL / Contractor to KM Telecom section (EST-ES Dept.) for review and approval.
- 6.3.30 As-built to be submitted after completing diversion works including Key-plan Map.

6.4 SUBSTATIONS

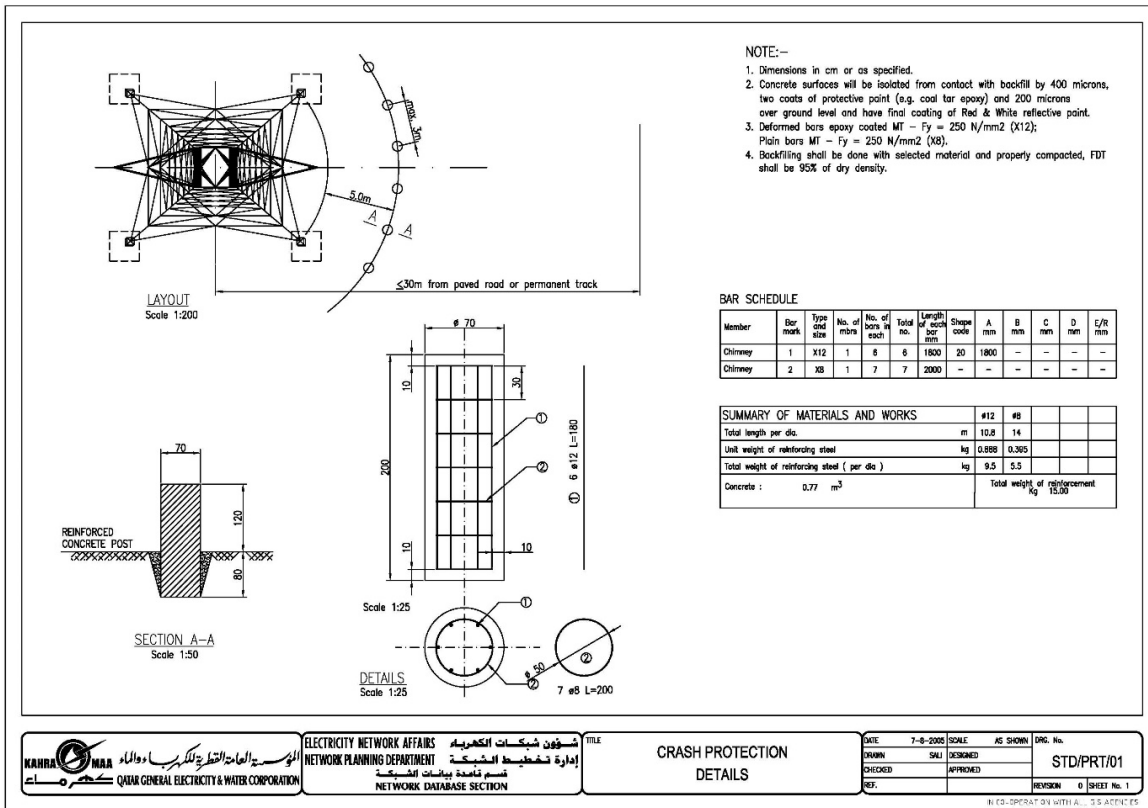
- 6.4.1 The current building permits regulations regarding minimum set-back distances from neighbor's boundaries shall be complied with for adjacent premises. At present a 5.0-meter setback is required from the substation boundary lines fixed at the approved site co-ordinates lines.
- 6.4.2 The design of dwellings and commercial buildings shall take into consideration that harmful objects are not thrown into the substation or exhaust from dust extractors etc. discharged in a manner which may cause serious damage or pollution to the EHV installations.
- 6.4.3 Prior to commencement of construction work in proximity to the outdoor high voltage installations, necessary safety measures shall be observed.
- 6.4.4 KM substation entrance shall be kept clear all the time where no car parking is allowed in front of the Entrance door or near to substation or around the substation. In neighborhood of KM installation, dumping of scrap/rubbish or storage of dangerous materials (gas/explosives) or Building of High-Rise Multi-story building overlooking the substation or utilization of open space for sports activity are strictly prohibited.

6.5 GENERAL LIABILITIES

- 6.5.1 It is the responsibility of the authorities installing other services to ensure that no detrimental effects are encountered due to proximity of MV/HV/EHV installations (e.g. effects of induced voltages, cathodic protection, interference with T.V. & Radio reception etc.).
- 6.5.2 No work which may cause pollution or other detrimental effects on KM installations is permitted in proximity to MV/HV/EHV services.
- 6.5.3 The contractor shall indemnify the KM against accidental injury or death to their personnel working in the proximity of live installations. It is the responsibility of the contractor to ensure that proper safety measures are taken by their personnel working in proximity to MV/HV/EHV installations.
- 6.5.4 The above guidelines do not negate the need to carry out the Road Opening Procedures or any other procedure requested by other sections of KM or any other departments for the same other reason.
- 6.5.5 Neither these guidelines nor any information gathered from any other official source will absolve liability for damage.
- 6.5.6 As-Built Drawings would require to be submitted to KM for location of Road crossing ducts, Diversion or Relocation of MV/HV/EHV installations to update KM records.

Addendum-A

Tower Crash Protection



KAHRA MIA
الهيئة العامة للتخطيط والكهرباء والمياه
QATAR GENERAL ELECTRICITY & WATER CORPORATION

ELECTRICITY NETWORK AFFAIRS
شؤون شبكات الكهرباء
NETWORK PLANNING DEPARTMENT
إدارة تخطيط الشبكة
قسم قاعدة بيانات الشبكة
NETWORK DATABASE SECTION

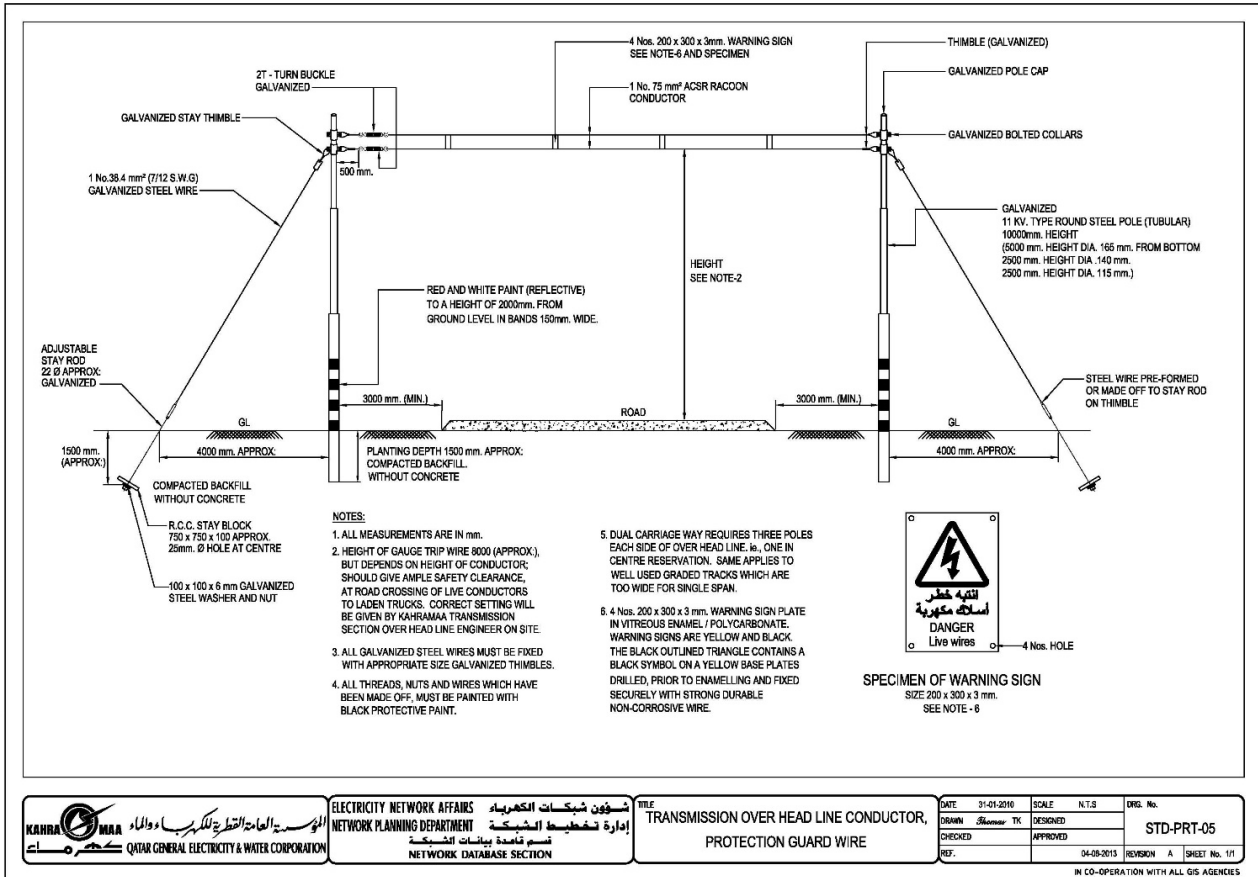
CRASH PROTECTION
DETAILS

DATE 7-8-2005 SCALE AS SHOWN DRG. No.
DRAWN SAJ DESIGNED
CHECKED APPROVED
REF. REVISION 0 SHEET No. 1
STD/PRT/01

IN CONSULTATION WITH ALL 35 AFFILIATES

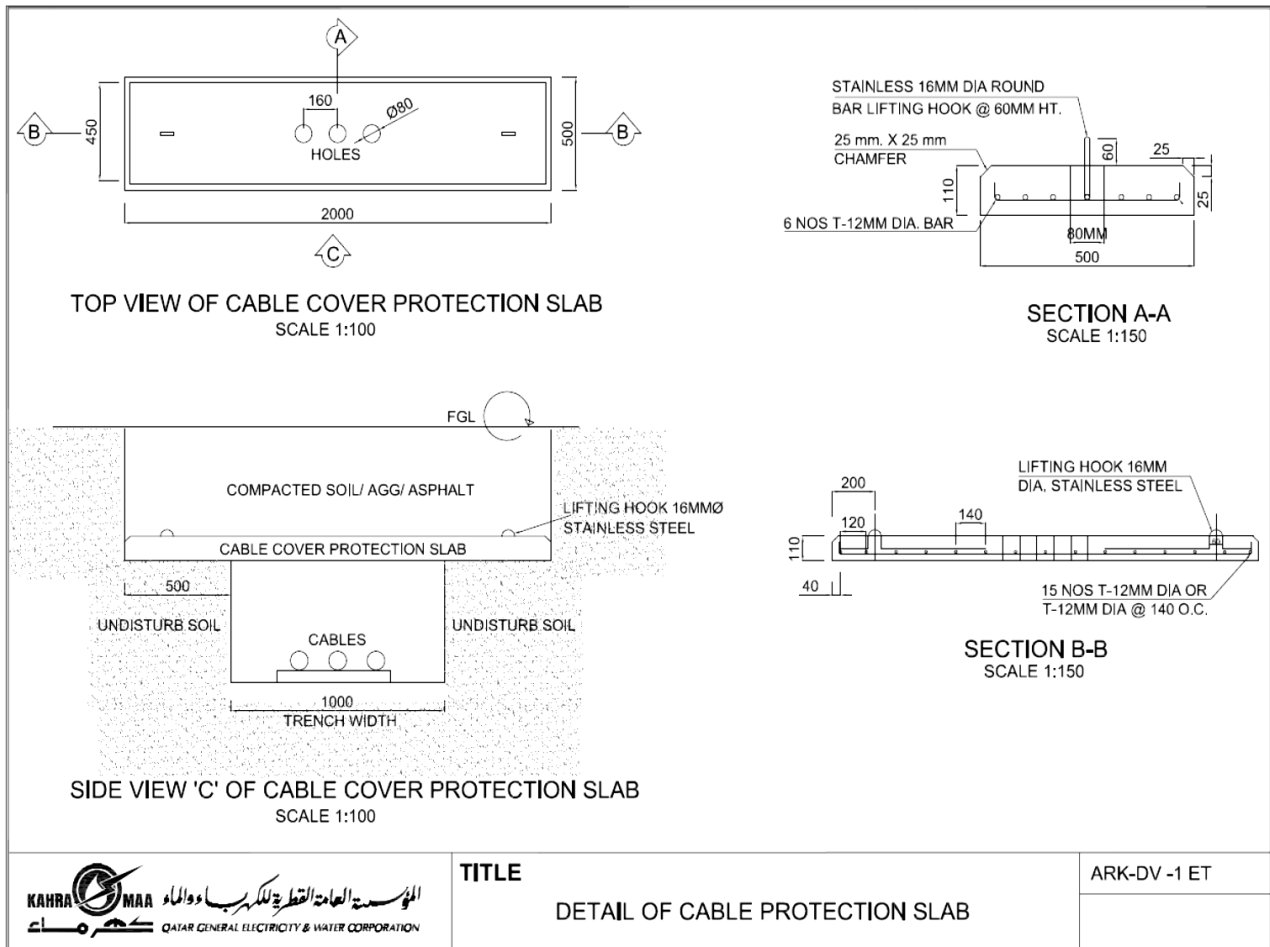
Addendum-B

Transmission Overhead line Protection Guardwire



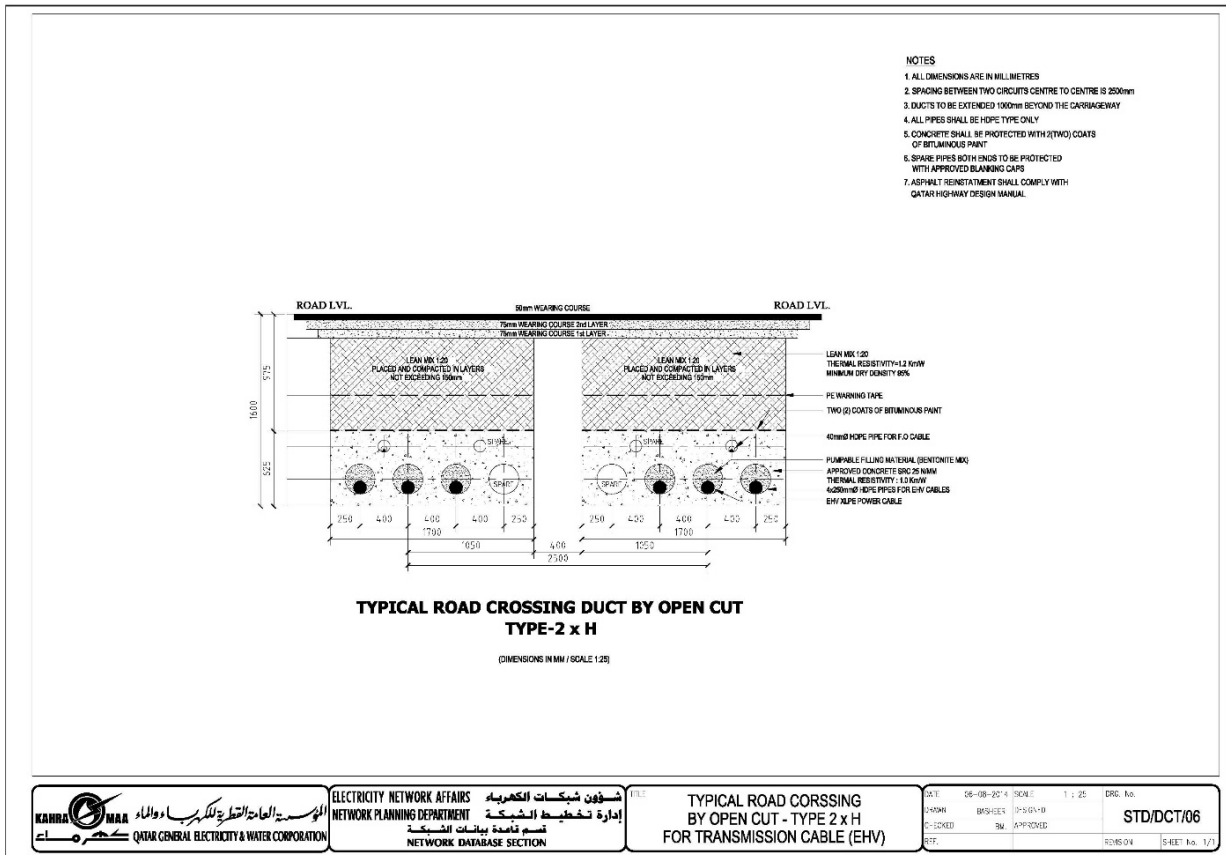
Addendum-C

Cable Concrete Protection Slabs



Addendum-D

HDPE Type-H Duct



-END-