

# MINISTRY OF MUNICIPALITY AND ENVIRONMENT

INFRASTRUCTURE PLANNING DEPARTMENT

## **Guidelines for Location of Electrical Distribution Substation**

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## **1.0 BACKGROUND**

The Ministry of Municipality and Environment (MME) is the authority who is charged with the allocation of lands in the State of Qatar. The Infrastructure Planning Department (IPD) is tasked with ensuring that any land required for infrastructure development is provided, and in particular allocate substation plots based on IPD planning considerations as well as requests from Qatar General Electricity and Water Corporation (KAHRAMAA) to service new and proposed new subdivisions develop by the Urban Planning Department.

In addition, IPD is the authority to review, audit, reject and approve requested substations that maybe required for the servicing of the road network, be it local roads or Expressways being developed by the Public Works Authority (Ashghal).

## **2.0 INTRODUCTION:**

The Infrastructure Planning Department has generated these guidelines to facilitate the design and subsequent approval of new substations required in projects being implemented by the Public Works Authority, such as Expressway Projects or Local Road and Drainage Projects (LRDP). Such projects will generate additional electrical loading thus necessitating new substations as Kahramaa would probably not be able to provide feeders from their existing substations, if available. *Clause 8.0 "Proposed New Substations"* of this guideline will guide the consultant through the design requirement such as preferred location, plot parameter, architectural finishes and other important aspect of the design required for approval.

This guideline will also provide the procedures for relocating existing substations that could be affected by a new proposed Right of Way and would thus require to be relocated. *Clause 8.1 "Relocation of Existing Substation"* of the guidelines provide the necessary guidance for such relocation, including identifying the ownership of the affected existing substation.

All proposed substations or utility buildings located within the Right of Way that have been identified in this guideline to be Special Cases would be subject to the requirements specified in *Clause 8.2.2 "Special Cases"* and *Clause 9.0 "Utility Building"* of this guideline. In these cases, the Infrastructure Planning Department will adjudicate on a case-by-case basis, taking into consideration the justifications, locations & architectural treatment (subject to Urban Planning Department (UPD) requirements).

## **3.0 REFERENCE**

All substation plots specified in Guidelines for Standard Parameters, Types & Orientations of Substations (refer to document number IPD-MME-EE-SS-01-R0) were the result of the final agreed parameters for each type of substation including the required setbacks. Reference is made to KAHRAMAA letter to Infrastructure Planning Department reference number (684-302/2014) dated 13/05/2015.



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## 4.0 GOVERNMENT ORGANIZATIONS:

- a. Infrastructure Planning Department (IPD)
- b. Urban Planning Department (UPD)
- c. State Property Department (SPD)
- d. Qatar Armed Forces (QAF)
- e. Ministry of Endowments and Islamic Affairs (AWQAF)
- f. Ministry of Transportation and Communication (MOTC)
- g. Communication Regulatory Authority (CRA)

## **5.0 UTILITY AGENCIES:**

- a. Qatar General Electricity and Water Corporation (KM)
- b. Public Works Authority Roads & Drainage (PWA)
- c. Ooredoo
- d. Vodafone
- e. Qatar National Broadband Network (QNBN)
- f. Qatar Petroleum (QP)

## 6.0 **PROCEDURES**

All proposals either for the approval of a new electrical substation, or the relocation of an existing substation or any special case have to be reviewed and approved by the Infrastructure Planning Department. The applications will only be considered either from government entities (Public Works Authority and/or from Kahramaa Electricity).

In order to ensure smooth and speedy approval, the consultant is encouraged to submit his design for review and comments only from IPD at an early stage. Thus permitting IPD to provide feedback that would include the land availability, substation orientation, space requirement, and would highlight any additional required information and so on.

In some instances, the Infrastructure Planning Department would consider requests from private entities to allow for the installation of private substations provided that the land owner confirms his intention to build and maintain this private substation, and that such request is appropriate, in the view of IPD. These substations will have to be constructed to KAHRAMAA's standards, in particular with respect to network protection. The coordinates and justification for the proposed substation including the landowner's certificate and undertaking shall be attached in the request letter.

[Note: Please see Appendix A showing the flowchart in land allocation for substation procedure]



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## 7.0 **DOCUMENTATIONS**

The documentation to be provided to Infrastructure Planning Department (IPD) for the proposed electrical substation or utility building shall fulfill the following requirements:

## 7.1 Hardcopy Requirements

- 1. Proposed location with dimensions and coordinates
- 2. TCL & MD (Total Connected Load & Maximum Demand)
- 3. Proposed type of substation to be installed
- 4. Existing substation location and type of substation (i.e. Package substation, Indoor or Outdoor substation)

[Note: Hardcopies must be provided in A3 size paper (Two (2) sets) showing all requirements specified above and reflected on the approved new road layout with areal image including the MME Specified Policy ROW and/or Proposed New ROW.]

## 7.2 Softcopy Requirements:

All specified in Clause 7.1 shall be provided both in PDF and CAD file.

[Note: Softcopies to be provided in CD Two (2) sets.]

## 7.3 CAD Requirements:

- 1. Road layout latest design
- 2. MME Specified Policy ROW and/or Proposed New ROW (if any)
- 3. Proposed substation locations shall be in one layer
- 4. Dimensions and coordinates shall be in one layer

### **8.0 PROPOSED NEW SUBSTATIONS**

New Electrical Substations shall be located where possible outside the roads ROW, and outside the buffer zone adjacent to the road ROW (if exist) i.e. substations are to be located in their designated plots within the Subdivision with their own PIN number. Property documents with PIN numbers can be obtained from MME when the requirements are fulfilled as per procedure. The Electrical Substations shall be constructed above the ground and have a traditional Qatari architecture in general and camouflaged to match as much as possible the surrounding environment. Consideration should be given to lighting and landscaping of the above ground substation. This shall be applicable to both rural and urban areas.

Electrical requirements exclusively for road & infrastructure such as street lighting, irrigation controller, ITS power supply, telecommunication cabinet and others. The substation size to be proposed shall be of the following types, orientations and plot sizes depending on the design total connected load (TCL) and detailed as below:



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## 8.1 Types of Substations

## 8.1.1 Package Substation

| Details : | Size        | : 6 Meter X 5 Meter       |
|-----------|-------------|---------------------------|
|           | Orientation | : 6 Meter facing the road |
|           | Capacity    | : One (1) Transformer     |

#### 8.1.2 Outdoor Substation

| Details : | Size        | : 10.5 Meter X 11.9 Meter    |
|-----------|-------------|------------------------------|
|           | Orientation | : 10.5 Meter facing the road |
|           | Capacity    | : Two (2) Transformers       |

### 8.1.3 Indoor Substation

| Details : | Size        | : 11.4 Meter X 14.2 Meter    |
|-----------|-------------|------------------------------|
|           | Orientation | : 11.4 Meter facing the road |
|           | Capacity    | : Two (2) Transformers       |

#### 8.1.4 **Double Indoor Substation**

| Details : | Size        | : 17.8 Meter X 14.2 Meter    |
|-----------|-------------|------------------------------|
|           | Orientation | : 17.8 Meter facing the road |
|           | Capacity    | : Four (4) Transformers      |

The proposed new substation, which will cater the road & infrastructure electrical requirements as well as the local costumers, shall conform to the above types and sizes of substations.

[Note: The above substations types shall come in different plot size based on the proposed location considering the neighbors, roads and sikka. Refer to IPD document number: IPD-MME-EE-PLC-SS-01-R0 - 2018 Guidelines for Types of substation plots and Orientations]

[Note: In case the space available is not sufficient enough to accommodate a standard substation, a special design should be considered subject to the equipment spacing approved by Kahramaa]



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## 8.2 Relocation of Existing Substation

When a road is proposed to be modified, existing Substations that, due to road rehabilitation, redesign or expansion, fall within a new ROW shall be relocated outside the new ROW. Relocation shall be considered on a case-by-case basis. The priority is for the relocation of these Substations outside the new ROW to a suitable location, possibly, within a radius of approximately 250m measured from the center of the existing Substation. Property document with PIN number and access roads (if applicable) must be approved by MME and issued. The relocated Substation shall be constructed above the ground and have a traditional Qatari architecture and camouflaged to match as much as possible the surrounding environment. Consideration should be given to lighting and landscaping of the above ground substations. This shall be applicable to rural and urban areas.

#### 8.2.1 **Potential Locations For Substations**

- 1. Potential locations for substations are the following:
  - a. Open spaces, parks, car park, mosque backyards and similar land use areas could be considered, as potential locations for Substations and a specific plot shall be allocated for that use.
  - b. Plot is already affected by the proposed road design and subsequently subject for land expropriation.
  - c. Substation partially affected by the new road ROW to remain in its current location by extending the substation plot size wherever possible.
- 2. The existing substation should be identified as either public or private substation. Design consultant to coordinate with KAHRAMAA and obtain the confirmation of the existing substation whether it is public or private substation. Proposed substation drawings to be submitted along with KAHRAMAA confirmation for review and approval of IPD.
- 3. Consultant to coordinate with the owner of the private substation and agree on the location and size within the same plot prior to submission to IPD. The submission should comply to the following notes:
  - a. The new cable route for these new locations should be laid within the approved designated corridor and within the Right of Way.
  - b. An investigation on the private substation if it serves or shares some feeders to other plot.
  - c. The new feeders had been considered and secured as part of utility assessments/diversions approval from KAHRAMAA.
  - d. The final location of the private substation shall be agreed with the owner and approved by KAHRAMAA.
  - e. A confirmation letter from the private owner to be provided along with the drawings for review and approval of IPD.



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#### 8.2.2 Special Cases

In very special cases, where the substation could not be constructed outside the road ROW, the substation, preferably, shall be constructed under the ground in urban areas and could be constructed above the ground in rural areas within the ROW. IPD will consider this issue on a case-by-case basis; the applicant is requested to provide MME-IPD with the following:

- 1. Justification for the proposed location (within the road ROW).
  - a. Justification as to the reasons either Substation or utility building should be inside the Right of Way and above ground
  - b. State the purpose of the substation or utility building and/or consequences
  - c. In case the substation is below ground, the technical issues related to the substation locations shall be discussed with the relevant departments of KAHRAMAA to determine the technical constraint and the area required.
  - d. Demonstrate the safety measures that have been taken to minimize traffic accidents possibly related by the presence of such building within the right of way and in the interchange.
  - e. Health and Safety use of substation or utility building near Electricity Overhead Lines.
- 2. Utility Impact Analyses at the vicinity of the proposed substation location, which includes all utilities (existing and proposed) alignments and road cross-sections before and after the substation.
  - a. Road Layouts with the proposed utility corridors reflecting the substation or utility buildings
  - b. Superimposed utility corridors and existing/proposed utilities
  - c. Provide a drainage concept of the road interchange (if that has not been already made) and possible flood mitigation measures to protect the substation or utility Building.
  - d. Assessment on the existing utilities below or the substation or utility building.
- 3. Final approval for the architectural treatment and aesthetics of the structure will be granted by the respective municipality.
  - a. The substation or utility building shall be camouflaged in a way that will minimize any possible distraction to road users. Non Objection Certificate (NOC) from the Ministry of Transport and Communication (MOTC) should be provided related to the road safety.
  - b. The camouflaged could be in the form of soft or hard landscaping or combination of both and shall be approved by the Urban Planning Department. (3D renderings or video to demonstrate the camouflage treatment is to be provided along with the submittals)
- 4. The initial approval of KAHRAMAA on the technical issue and space requirements is required and is to be submitted with the application.
- 5. In the event that the technical requirements dictates that the substation is to be partially above ground, the same requirements as listed above for the special cases above ground



substations shall be used. The above ground portion of the substation shall have appropriate architectural detailing and camouflaged to match as much as possible the surrounding environment.

- 6. In general the design of any substation should:
  - Minimize disruption to bicycle and pedestrian trails
  - Minimize visual and aesthetic impact
  - Maximize compatibility with the surrounding structures
- 7. After IPD approval, IPD will send a request to the Urban Planning Department of MME to fix the location of the substation on the General Policy Plan of MME. It is important to note that if the substation lies within the road ROW or in the buffer, then no PIN number will be issued. However, IPD confirms the approved coordinates to the concerned municipality as required for the Building Permit (DC1) Application.

[Note: The above listed items can be considered as a guideline for substation location and as an enhancement for the note No. 9 on page 7 of MME "Land Acquisition Procedure".]

[Note: The Buffer is considered to be future right of way. Hence, IPD recommendation whenever the electrical substation is propose within the right of way or at the buffer; the location shall be at the inner edge of the buffer strip.]

## 9.0 UTILITY BUILDING

The utility building is a structure that composed of electrical and mechanical equipment. The Infrastructure Planning Department does not recommend the use of Utility Building as this will be a large structure within the Right of Way. However, if a utility building needs to be provided due to the nature of the design, this shall be considered as a Special Case. Thus, the conditions and requirements sets in Clause 8.3 Special Cases needs be used.

This utility building will need to be submitted to the Infrastructure Planning Department for review and approval. The following documentations should be provided as part of the justifications in a report format.

- Electrical power distribution systems to present a set of documents including Calculations, Single Line Diagrams, Power Mapping and Locations of the Substation.
- Equipment layout plans and details.
- Location of the Bulk Fuel Tank for the back-up generator (if present). The location and design of such a facility is subjected to Woqood and Civil Defense approval.
- The risk assessment related to the stand by generator including its fuel tank and its location outside of the utility building and relatively close to the road speed lane.
- The building is to be, as much as possible, hidden from public view. Thus, the landscaping of the proposed utility building must consider this requirement. Therefore, the proposed landscaping will need to be submitted.
- The Ministry of Transport and Communication (MOTC) no objection, as it relates to road safety, is to be secured.



• The security measures; risk assessments are to be produced for an utility building located within the Right of Way.

In addition to the above documentation, the design consultant and the engineers that executed the design must be approved as Grade A by the MME Engineer Committee.

## 9.1 Design Considerations for Utility Building:

- Latest applicable design codes and standards are to be used.
- The electrical system of the utility building should be designed to account for the local environment and conditions.
- Critical Loads should be listed and the redundancy facilities, in case of power failure demonstrated.
- The mode of operation of the utility building, either manned or unmanned, is to be clearly stated.
- The restriction to be define as where there will generally be no public access and only key personnel access (Operators, Civil Defense in case of fire and Police personnel to block the access and secure the area in case VIP or VVIP passage).

Fire Scenario in case the utility building is unmanned and an auto-dialing alarm to the Civil Defense Department is to be provided. The Fire Alarm cause and effect matrix and all other items related to the fire alarm system must be approved by Civil Defense Department.

## **10.0 UTILITY COORDINATION / SERVICES INQUIRY**

Once the requested substation is approved in principle by IPD, the proposed location is then coordinated with all the various utility providers, in order to ensure that the location does not affect their present or future network or facilities.

This utility coordination will be applied in both proposed substation outside and inside the Right of Way. Furthermore, the no objection from the various service providers is required in order to request Urban Planning Department's allocation and demarcation of the proposed substation.

The timetable response for services inquiry has been limited to 14 working days. However, this could be shortened in case the applicant undertake direct follow up with the utility providers. The Infrastructure Planning Department can advise the generated services inquiry reference number to the applicant upon request.

[Note: Any response marked as affected and/or conditional that will impede the substation allocation process will be forwarded to the applicant through official letter. Accordingly, the applicant will be requested to coordinate directly with any affected utility provider and obtain their NOC's. These NOCs are to be submitted to the Infrastructure Planning Department in order to permit them to proceed with the land allocation.]

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## APPENDIX A: LAND ALLOCATION FOR DISTRIBUTION SUBSTATION PROCEDURE





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