حكومة دبي
GOVERNMENT OF DUBAI

هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority

POWER SUPPLY GUIDELINES FOR MAJOR PROJECTS

POWER & WATER PLANNING / POWER TRANSMISSION PLANNING

SYSTEM PLANNING DEPARTMENT

(Update – July 2025)

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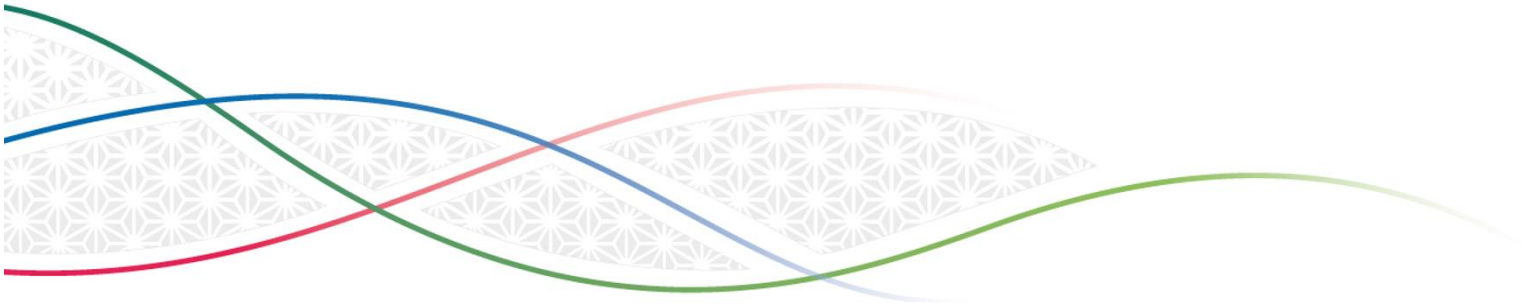

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1. Introduction

To ensure the timely availability of power, it is essential that the technical details of the Major project including the power phasing, locations of 400/132kV substations (if any), 132/11kV substations and associated 132kV and 11kV corridors, plot-wise load details and other requirements from all the potential developers or their appointed consultants are available with DEWA well in advance.

The purpose of this document is as follows:

- To provide guidelines to all the major developers and the consultants regarding DEWA's power supply requirements rules and guidelines.
- To assist the developers and the consultants in understanding the requirements for submissions of project / development Master Plan documents and to facilitate the project / development power supply on time.

In order to ensure timely, optimal and reliable power supply network to major project development projects across Dubai, it is essential that the developers and their consultants prepare and submit their complete development project(s) master plans to DEWA.

The purpose of these guidelines is to provide developers/consultants with adequate information to help with the preparation and submission of their development master plans. The Guidelines include all requirements related to project's power demands, power phasing, population, land use, 132kV and 11kV corridors, 132/11kV substation locations, plot-wise load details, network information and models, etc. to be submitted as part of the master plan submission for DEWA's review and approval. This project information once approved will be used by DEWA for Power Infrastructure planning activities.

It is therefore essential for developers and their consultant to ensure that development master plans are prepared in line with DEWA's Guidelines for a timely and efficient approval process. This document includes itemized requirements for each of the development master plan components, as shown in Annexure-7.1.

2. MA'LEM DUBAI

MA'LEM DUBAI is an online service enables the enrolled / registered Developers and Consultants to apply Power Supply Master Plan for Major Project Developments for DEWA review.

3. Power Supply Master Plan Requirements

In order to avail the power supply for any major project / development on time, it is necessary to submit and get approved the technical pre-requisites on time as DEWA require lead-time.

3.1 Technical Requirements

The technical requirements that are necessary to be submitted to DEWA for planning any 400/132kV and 132/11kV substations, designing the 11kV Distribution Network and allocating necessary 11kV cables from the 132/11kV substations are listed below:

3.1.1 Location and Layout of the Development Project

Location (with DLTM coordinates) shall be shown on Dubai Map. Further, a detailed project layout reflecting roads, buildings, parks, parking areas, open spaces, water ponds / canals, bridges etc. also to be submitted.

3.1.2 Nature of the Project

Description of the project along with type of land use (Residential, Industrial, Commercial, Labour Accommodation, Data Centre, etc.) to be mentioned.

3.1.3 Total Connected Load (TCL) and Expected Maximum Demand (MD)

- Total connected load (along with split up of General, Cooling load, Data Centre Load etc.) of the project, type of cooling system, and expected peak demand.
- Realistic power requirement date / phasing.
- Split up details of the load like, Residential, Commercial, Industrial, Data Centre, Labour Accommodation, Cooling, etc.
- Plot-wise load details in the standard format (refer to Annexure-7.2). The plot-wise load details should be organized in an Excel file with four sheets or tabs. The first sheet should display the project layout, while the subsequent sheets should include plot-wise load details, a substation-wise load summary and a cross-section checklist.
- In case ultimate load details are not available, the load requirement up to next 5 years should be submitted.
- Details of the District Cooling Plant loads (size, location and the expected phasing of its commissioning).

3.1.4 Distribution Renewable Resources Generation (DRRG)

For the projects with DRRG, the submittal shall include DRRG plan (PV Rooftop Solar) which consists of;

- Planned DRRG capacity (kW) per plot and for entire project.
- Expected commissioning dates of PV solar in the project.

3.1.5 Power Factor

Power Factor is to be maintained at not less than 0.95 and any capacitor bank installation required at customer end (at 11kV level) shall be by the customer at his own cost.

3.1.6 Load Characteristics (quality of voltage, harmonics, flickering, dents, etc.)

- The main characteristics of the supply voltage expected at customer load supply terminals shall be in line with DEWA regulations. Customers shall ensure that their equipment can adequately operate in accordance with the supply technical characteristics as per DEWA rules.
- Voltage drop calculation, harmonic study, fault level calculation, etc., to be submitted by the consumer for any dirty load/ private switchgear.
- Installation of special equipment and devices, if required, to maintain the same as per the standards shall be by the consumer at his own cost.

3.1.7 Power Supply Voltage

- Dedicated / shared 132/11kV substation is required for meeting the power supply requirement of any Major Development. Large loads requiring the allocation of several 132/11kV substation plots might require 400/132kV source. The project developer should allocate plots for the required number of substations and associated 132kV and 11kV corridors.
- 11kV shall be the general distribution voltage.

3.1.8 Substation Plot Sizes and Layouts

- 400/132kV substation: 200m x 200m.
- 132/11kV substation: 60m x 50m (Standard shape without any chamfer).
- Sikka of 7m width for 132/11kV substation.
- 11/0.4kV substation: Refer to Distribution Substation Guidelines.
- The standard setting out plan of 400/132kV substation is shown in Annexure-7.3.
- The standard setting out plan of 132/11kV substation is shown in Annexure-7.4.

3.1.9 Location of Substation Plot

3.1.9.1 400/132kV Substation Location

- The 400/132kV substation plot should have access to heavy vehicles.
- Enough space/corridors for taking 400kV overhead lines IN/OUT.
- Enough space/corridors for taking 132kV cables IN/OUT.

3.1.9.2 132/11kV Substation Location

- The 132/11kV substation plot shall have access from two major roads or one major road and Sikka (min 7m wide). The longer side (60m) shall face the main road.
- The 132/11kV substation shall have one main gate, two sliding gates and a personal gate from main road to access the plot along the 60 meters side.
- The access road to the substation plot shall be adequate for smooth maneuvering of heavy vehicles (low bed trailer, crane, etc.).
- Enough space/corridors for taking 132kV cables IN/OUT.
- Enough space/corridor for taking out 80 numbers of 11kV outgoing cables with proper duct arrangement with minimum 150mm space between the cables.
- Location of 132/11kV substations should be provided at the load center and close to District Cooling Plants (DCP) if available.
- When a project requires more than one 132/11kV substation, the feeding zone of each substation shall be specified.

3.1.10 The 400/132kV and 132/11kV Substation Plot Verification Requirements

- In order to review the proposed 400/132kV substation plot, the developer / consultant to comply and submit standard substation plot verification checklist (refer to Annexure-7.5) for each 400/132kV substation plot, along with respective drawings / layouts.
- In order to review the proposed 132/11kV substation plot, the developer / consultant to comply and submit standard substation plot verification checklist (refer to Annexure-7.6) for each 132/11kV substation plot, along with respective drawings / layouts.

- The 132/11kV substation layout drawing to indicate the plot-size, coordinates of all corners of the plot, access roads and sikka (reflecting width), gate locations, functions of surrounding plots / area (building, DCP, gas farm, water bodies, bridge, metro line, metro station, etc.).

3.1.11 Affection plans for 400/132kV and 132/11kV Substations

Approved affection plans (in the ownership of DEWA) of the substation plot are required from the concerned Zoning Authority. The developer shall confirm, whether the building permit for the substation building will be issued by Dubai Municipality or other Zoning Authorities.

3.1.12 Undertakings for Transmission Substations and Corridors

The project developer is required to submit a letter for the 400kV / 132kV substation plots and corridors allocated within their Major Project boundary, undertaking the following:

a. To divert all services (if any) within the plot allocated for 400/132kV or 132/11kV substation, well in advance of any construction works at site and bear all the associated costs.

b. DEWA will have 24x7 unconditional access to 400kV and 132kV corridors for daily patrolling and maintenance crew including heavy machineries.

c. The 400kV and 132kV corridors will be levelled and kept free from any kind of obstacles (trees / structures).

d. To divert all existing infrastructure services (if any) within the allocated 400kV and 132kV corridors inside the project boundary and bear all the associated costs.

e. To install all the 132kV ducts at site well in advance of any 132kV cable laying works and bear all the associated costs.

f. To ensure that the access road to the 400/132kV and 132/11kV substations is available to facilitate movement of machinery and vehicles during construction works.

g. To carryout all reinstatement works (tiles, footpath, landscaping, shrubs and any other special type of pavements) after laying of 400kV / 132kV cable, maintenance or emergency works and bear all the associated costs.

h. The width of the access road to the 400/132kV and 132/11kV substation plots will be in line with DEWA standards and will be sufficient for maneuvering of heavy vehicles (lowbed trailer and crane).

i. To ensure that water network connection is available well before commissioning of each 132/11kV substation within the project.

3.1.13 Corridors

3.1.13.1 400kV Overhead Lines (OHL)

- 50m wide corridor (double circuit tower line).

3.1.13.2 132kV Underground Cables

- 2.5m wide corridor for each 132kV cable circuit.
- Minimum horizontal clearance between 132kV corridor and nearby pressure pipeline (100mm to 450mm Ø) shall be 1m (edge of the pipe to edge of the trough).
- Minimum horizontal clearance between 132kV corridor and nearby pressure pipeline (500mm to 1200mm Ø) shall be 3m (edge of the pipe to edge of the trough).
- Minimum gap of 2m shall be ensured between 132kV corridors and nearest foundation / permanent structure / plot boundary.
- The 132kV cable under the dual carriageway is not acceptable. The surface above 132kV corridors shall be either soft landscaped or interlock tiled only.
- The developer to divert all the existing infrastructure services (if any) within the allocated 132kV corridors inside the project boundary and bear all the associated costs. Further, the project developer to level and free the allocated 132kV corridors from any obstacles (trees / structures).
- The 132kV duct bank arrangement for road crossing shall comply with DEWA standard (refer to Annexure-7.7).
- The developer to install all the 132kV ducts at site well in advance of any 132kV cable laying works at site and bear all the associated costs.
- The project developer / consultant to update the approved 132kV corridors allocated within the project in Dubai Municipality GIS System.

3.1.13.3 11kV Underground Cable

- Exclusively 11kV corridor of 7m (2x2.5m + 2m gap) width to be provided at two adjacent sides of 132/11kV substations up to the roads.

- Exclusive 11kV corridors of 2.5m width to be provided on both sides of the road around the 132/11kV substations.
- A single stretch of 11kV corridor width should not exceed 2.5m.
- A minimum clearance of 2m to be maintained between adjacent 11kV corridors / between adjacent 132kV and 11kV corridors. Further, the space between the adjacent 11kV corridors / adjacent 132kV and 11kV corridors can be used for any non-heat generating services.
- Dedicated 11kV corridors to be provided from the source 132/11kV substation to the District Cooling Plant (DCP).
- The 11kV corridors under carriageway, median, curbstone and service road are not acceptable. The surface above 11kV corridors shall be either soft landscaped or interlock tiled only.
- Cross-section to be provided for each road section, dedicated 11kV corridors should be available on both sides of road.
- Duct arrangement for each road crossing is to be provided.
- In case of 132/11kV substation away from the road Right–of–Way (ROW), the party shall provide sufficient corridor from the substation boundary to the road.
- The protection barriers to be between 11kV corridors and big trees / street lighting poles, wherever they are adjacent.
- In case street light pole is adjacent to DEWA 11kV corridors, a minimum clearance of 50cm to be maintained or foundation of the street light pole to be extended 150cm from the bottom of the cable.

3.1.14 LV Network.

The LV distribution network will not be reviewed in power supply Master Plan finalization stage. Therefore, The relevant drawings, load schedules, single line diagrams and road cross-sections for LV distribution network approvals such as 11kV substation locations, capacity, LV cable routes, feeder pillar locations, MDB / MCCB capacity connected load / maximum demand / demand factor of each plot / substation wise, voltage drop etc. shall be uploaded during online 'Getting Electricity' application system.

3.1.15 Policy on Construction of 400kV and 132kV Substations.

3.1.15.1 400/132kV Substation

DEWA requires sufficient lead time to construct a 400/132kV substation.

3.1.15.2 132/11kV Substation

Any 132/11kV substation for development projects shall be constructed by the project developer matching their power requirement phasing of the project, through a DEWA approved consultant and contractor. However, DEWA requires adequate lead time for arranging 132kV cables to any new 132kV substations after finalization of load requirements, substation locations, cable corridors and receiving the original affection plan of the plot for the substation in the ownership of DEWA.

If the project developer wishes to finance and have DEWA manage the construction of the dedicated 132/11kV substation for their project, the developer should liaise directly with DEWA's Transmission Projects Department to finalize the Project Management Consultancy Services (PMCS) and the Asset Transfer Agreement (ATA). Accordingly, the construction schedule of the substation, clearly indicating the construction start date and commissioning date (month/year), should be submitted in coordination with DEWA's Transmission Projects Department.

3.1.16 Project Parameter Report for 132kV Substations.

In order to issue the Project Parameter Report (PPR) for the construction of 132/11kV substation, the project consultant / develop to finalize the power supply Master Plan of the Major Project development and the plot for the 132/11kV substation complying with DEWA standards / requirements. Subsequently, the developer should request to issue the PPR for the 132/11kV substation and to ensure the submission of the following:

1. The justification report for the requirement of 132/11 kV substation.
2. The power phasing of the project.
3. The updated plot-wise load details.
4. The developer's letter confirming the requirement of the 132/11 kV substation along with the commissioning date in line with realistic timeline of the project development.
5. The project developer's undertaking letter to construct the 132/11kV substation.

6. The original affection plan of the 132/11kV substation plot (in the ownership name of DEWA) issued by concerned Authority reflecting the access arrangements as per DEWA standards.

7. The developer's undertaking to divert all services within the plots allocated for the 132/11kV substations (if any), well in advance before the construction works and also to bear all the associated costs.

8. The construction schedule of the 132/11kV substations clearly indicating the construction start date and commissioning date (month / year), while considering the tendering, awarding and construction lead time and taking into account of realistic timeline of your project development.

9. A layout drawing clearly indicating the Entry / Exit arrangement of 132kV and 11kV cables around the proposed 132/11 kV substation plot. Further, developer/consultant shall indicate the access road to the substation plot and the same has to be approved by concerned Authority.

10. The project developer / consultant to submit drawings (AutoCAD + PDF) of all existing Infrastructure services laid in the vicinity of allocated 132/11kV Substation plots and 132kV corridors within the project boundary.

11. The project developer's confirming they will ensure that water network connection is available well before commissioning of the 132/11kV substations.

12. The developer's undertaking to submit copy of RTA approved cross-sections before issuance of Project Parameter Report (PPR) for the substation.

13. The list of plots/developments to be fed from the proposed 132/11kV substation in line with the following Table:

Developments / Land Use	No. of Plots	TCL (MW)
Total		

14. The power phasing of the loads planned to be fed from the proposed 132/11kV substation matching with the following Table:

PRD	TCL (MW)			Cumulative TCL (MW)
	General	DCP (If any)	Total	
Substation Commissioning (Year)				
2nd Year				
3rd Year				
4th Year				

Note: Please note that the power requirement date shall be in line with the realistic commissioning date of the proposed 132/11kV substation.

Prior to issue the Project Parameter Report (PPR) for the construction of 132/11kV substation, the project developer to submit the followings;

1. Clear the site of the 132/11kV substation of all obstacles, services, utility infrastructures etc.
2. Finalize the access road and gate level of the 132/11kV substation plot. Please note that the gate level to be minimum +50cm higher than the nearest road.
3. Submit information confirming the above.

3.1.17 Requirement for 11kV Network/Design Approval

- Latest planning of the development (soft copy).
- 11kV Substation location, refer to Distribution Substation Guideline for approval of 11kV substations.
- Total connected load, maximum demand and capacity for individual 11kV substation.
- Realistic power requirement date.
- Zone-wise/phase-wise load details with respective 132/11kV substations to be provided if the number of 132/11kV substations is more than one.
- In case the number of 132/11kV substations are more than one, project loads should be allocated to respective 132/11kV substations for effective network design (Phase wise). In addition, the 132/11kV substations need to be planned for commissioning to match the power requirement date of projects.

- District cooling loads (if any) should be located adjacent to the related 132/11kV substation.
- No source metering is allowed (metering equipment to be arranged in the 11kV switchgear room).
- 11kV corridors details for all the roads within the project boundary.
- Approved cross section of all the roads (with 11kV corridor indicated) to be submitted at the time of 11kV network design request.
- Generally, in case of private switchgear, approval for single line diagram should be obtained prior to purchase.
- All the distribution network design requirements and guidelines for 11kV supply shall be strictly followed in line with the latest design guidelines of Distribution Power Division.

4. Backup Power Generators for Major Projects

4.1 As per the order of His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of UAE and Ruler of Dubai, all real estate developers, companies and other relevant stakeholders must install backup generators at major projects in Dubai.

The attached DEWA circular (refer to Annexure-7.8) requires the installation of backup power generators in major buildings and landmarks such as tourist, commercial and cultural buildings in Dubai. This is to ensure that they will have necessary power in emergencies for public security and safety reasons, while also ensuring the comfort and well-being of society and the public at large.

The backup power generators should be sufficient to cover lighting, elevators, escalators, automatic doors, surveillance cameras, alarm systems and fire and safety equipment's.

These generators must be properly maintained to ensure that they will work when needed in an effective and timely manner, according to best safety practices.

4.2 The real estate developers, companies and other relevant stakeholders shall ensure and provide free access to DEWA mobile generators as appropriate.

4.3 The approval process for the implementation of backup generators for Major Projects, shall be coordinated directly with DEWA Distribution Power Division/ Connection Services Department.

5. Coordination and General Requirements

5.1 The main developer shall appoint a reputed consultant to prepare the infrastructure including power supply Master Plan of their Major Project development, in order to avail DEWA approval.

5.2 The main documents required within power supply Master Plan submission for Major Projects are indicated in Annexure-7.1.

5.3 The developers or their consultants shall submit the Major Project Master Plan or Master Plan related documents for DEWA review thorough online portal called 'MA'LEM DUBAI' (https://www.dewa.gov.ae/en/builder/noc-services/malem-dubai). The user Manuel of 'MA'LEM DUBAI' is available at (https://www.dewa.gov.ae/en/builder/noc-services/malem-dubai-electricity).

5.4 The covering letter for any submission through online portal shall be addressed to:

Dr. Nasser Tleis
Vice President – Power Transmission Planning Department.
Dubai Electricity and Water Authority

5.5 The drawings in the submission shall be in AutoCAD/Microstation and PDF format. Further, the plot-wise load details shall be in MS Excel format. Any other documents (such as covering letter, reports, response sheet, etc.) shall be in PDF format only.

5.6 The drawings (pdf and CAD) file names shall be clear enough to identify the drawing no. and subject.

5.7 The cross-section drawings shall match with RTA standard format (one cross-section per sheet, reflecting 'Typical', 'Existing' and 'proposed' cross-sections) as shown in Annexure-7.9. Further, the cross-sections shall be named alphabetically such as 'Cross-section A, A-A, AA-AA', etc.

5.8 The drawing files in the submission should be geo reference and projection to be DLTM, and the file naming format shall be as per Annexure-7.10.

5.9 The file names and file formats for the documents submitted through 'MA'LEM DUBAI' shall comply with standard requirements explained in the user Manuel of 'MA'LEM DUBAI' (https://www.dewa.gov.ae/en/builder/noc-services/malem-dubai-electricity).

5.10 The major project power supply master plan submissions shall be addressed by e-mail to the below e-mail addresses. Further, in order to schedule meetings / discussions in regard to power supply Master Plans for Major Projects, the followings may be contacted:

- **Mr. Mohamed Naceur Marzouki** (Senior Manager-System Planning)
  Tel: 04 322 2900 Email: Mohamed.Naceur@dewa.gov.ae)
- **Mr. Vijayan Ayappan** (Manager–Planning Coordination)
  Tel: 04 322 2909 Email: Vijayan.Ayappan@dewa.gov.ae)

- **Mr. Ahammed Sadique** (Sr. Engineer – Planning Coordination)
  Tel: 04 322 2904 Email: Ahammed.kuttiadi@dewa.gov.ae)

5.11 The power supply Master Plan for Major Projects shall be submitted well in advance to DEWA and got approved to avoid any delay in starting the project.

5.12 Once approved, DEWA expects that the developer will adhere to the plan and any changes in the project plan, changes in phasing, etc. shall be informed to DEWA in time and got approved. Changes on works during the execution stage shall not be entertained.

5.13 Any power supply requirement for the project shall be from the 132/11kV substation built for the project. The developer shall phase the developments and accordingly the power requirements matching the commissioning schedule of the source 132/11kV substation for the project.

5.14 During the progress of the Project, bi-annual updated information shall be submitted by the party which shall include:

a. Energized load details till date.

b. The developer shall issue confirmation on the individual party's loads (who had applied for power supply NOC) as a part of their Master Plan in terms of magnitude and time. Load under design/approval but not approved for power supply NOC including the load of project shall be as per the agreement already signed between party and developer.

c. The updated information shall be submitted by the party in area maps indicating plot numbers, power requirement dates and comparison with the original information received as per the approved Master Plan of the project / development.

5.15 DEWA will not be responsible for any delay in commissioning due to any change/ revision of loads, which might result in re-design of 11kV cable circuits.

5.16 After approval of the power supply Master Plan, the developer / consultant to submit final / approved power supply Master Plan (soft copy) of the project thorough online portal 'MA'LEM DUBAI', to upload on DEWA GIS system, complying with Digital Drawing Submission Requirements (refer to Annexure-7.11).

However, the developer / consultant to ensure that the final submission are as approved by DEWA and the offset from the building line of ROW in the soft copy (AutoCAD and GIS Drawings) are in line with DEWA approval as well as matching with pdf drawings.

5.17 The relevant drawings, load schedules, single line diagrams and road cross-sections for LV distribution network approvals such as 11kV substation locations, capacity, LV cable routes, feeder pillar locations, MDB/MCCB capacity connected load / maximum demand / demand factor of each plot / substation wise,

voltage drop etc. shall be uploaded during on-line power supply NOC application for the project through 'Getting Electricity' application system (www.dewa.gov.ae).

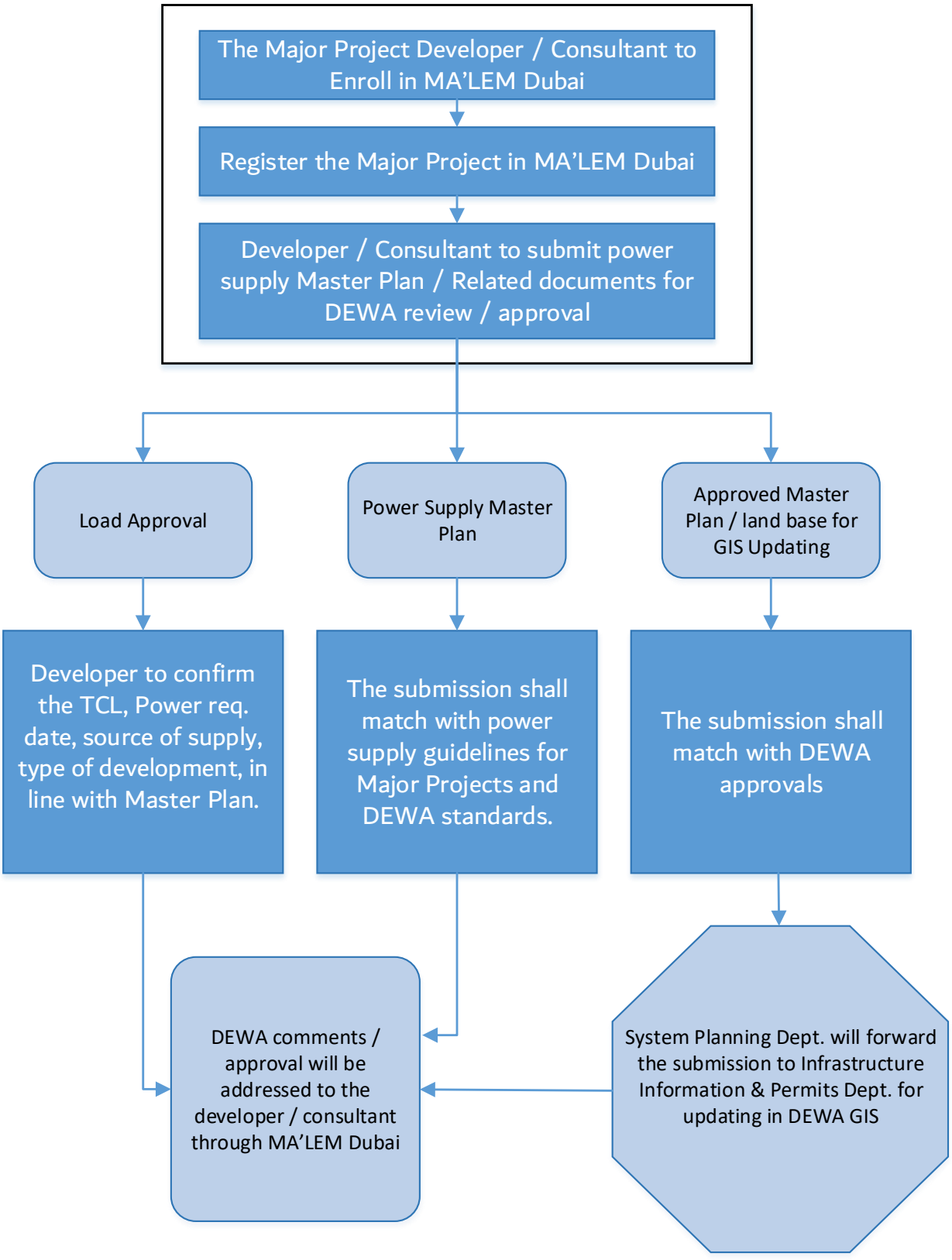
5.18 The approval of the 11kV substation plots / locations to be finalized directly with concerned DEWA Department (Connection Services Department) and the same is not part of the power supply Master Plan approval process.

5.19 On approval of power supply Master Plan, the plot owners / consultant may apply for power supply NOC for their plot, through E-Services for "Getting Electricity" on DEWA Website (as per normal practice), along with the main developer's letter confirming the load figures indicated in NOC application are equal to the loads in the plot-wise load details.

5.20 On finalization of the power supply Master Plan for entire or portion (Phase) of any Major Development, the project developer / consultant to approach concerned Zoning Authority as well as DEWA Infrastructure Information & Permits (II&P) Department (at Al Warsan Office) to upload the project land base in GIS. II&P department's requirements are listed in Annexure-7.11.

5.21 The project developer / consultant to obtain design / construction NOC from DEWA Infrastructure Information & Permits (II&P) Department during infrastructure-design / approval / execution stage.

6. Power Supply Master Plan Process Map



7. Annexures

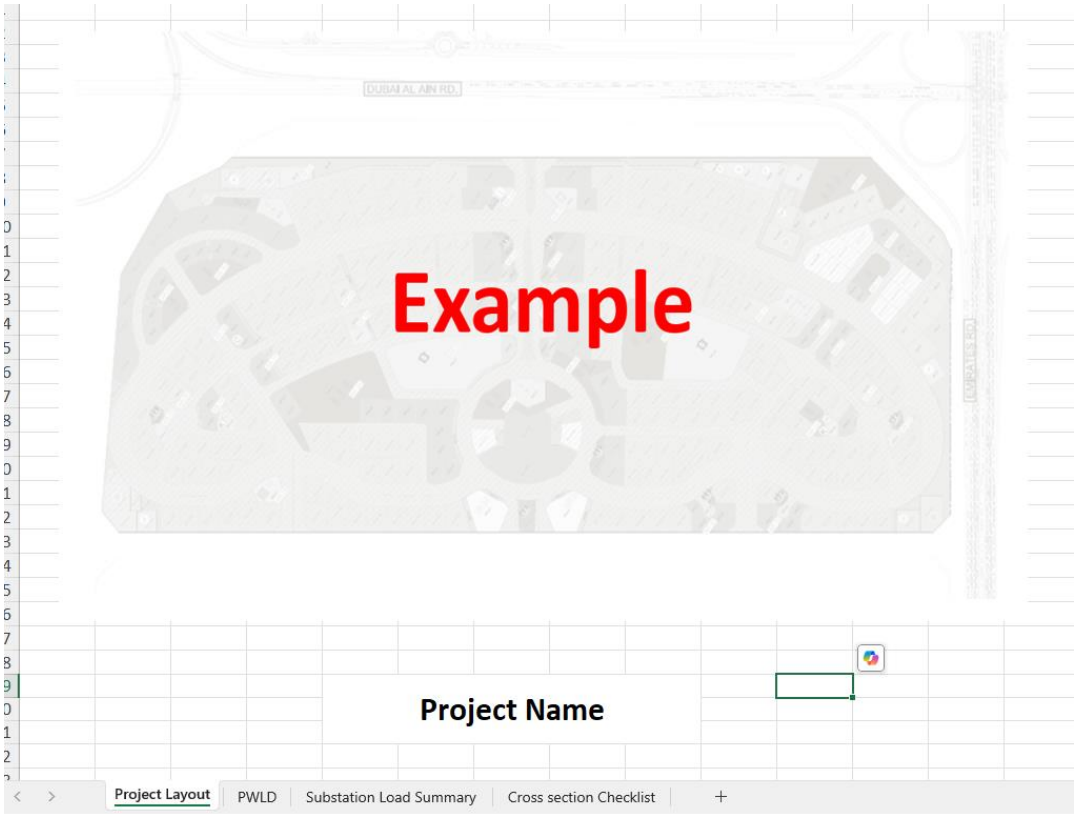
7.1 Annexure-1 : List of Documents to be Submitted

S. No.	Documents	Remarks
1	Key Plan showing the location and layout of the project in Dubai Map with co-ordinates.	
2	Plot-wise load details in the standard format (refer to Annexure-2)	MS Excel format
3	Year-wise Power Phasing	
4	Nature of Load	
5	Details of District Cooling Loads (location / capacity, power requirement date etc.)	
6	Locations of proposed 132/11kV substation(s)	
7	Locations of proposed 400/132kV substation(s)	
8	400kV corridors details within the project area	
9	132kV corridors details with detailed road cross-sections	
10	400kV / 132kV substation plot verification checklist	
11	132kV ducts arrangements	
12	11kV corridors details with detailed road cross-sections	
13	11kV ducts arrangements	
14	Comments Response Sheet (CRS): detailing the responses provided to DEWA's earlier feedback on the subject submission.	
15	PV Solar requirements in terms of capacity per plot	

The above documents shall be submitted in Digital Copy / soft copy only thorough online portal 'MA'LEM DUBAI'.

7.2 Annexure-2 : Standard Format for Plot-wise Load Details

The plot-wise load details should be organized in an Excel file with four sheets or tabs. The first sheet should display the project layout, while the subsequent sheets should include plot-wise load details, a substation-wise load summary and a cross-section checklist. Formats are given below.



Sheet-1: Project Layout

Plot-Wise Load Details

Project Name:	
Developer Name:	
Consultant Name:	

Developer Plot Number	DM Plot number	Plot Owner Name	Plot Project Name	Power Density (Watt/Sq.m)	GFA (Sq.m)	Land Use	Plot Status	Expected Power Requirment date (PRD) Month/Year	Genaral Load (KW)	Localized Cooling Load (If No DCP) (KW)	DCP Load (KW)	Data Center Load (KW)	Industrial Load (KW)	Agritech Load (KW)	EV Charger Load (KW)	Total Connected Load (KW)	Solar Load (KW)	Initial Source (Developer's Substaion Name)	Initial (DEWA Substation Full Name)	Initial (DEWA Substation SCADA Name)	Initial (Developer's 132/11kV substation Commsioning Date)	Ultimate Source (Developers's Substaion Name)	Ultimate (DEWA Substation Full Name)	Ultimate (DEWA Substation SCADA Name)	Ultimate (Developer's 132/11kV substation Commsioning Date)
Total																									

Sheet-2: Plot-wise Load Details

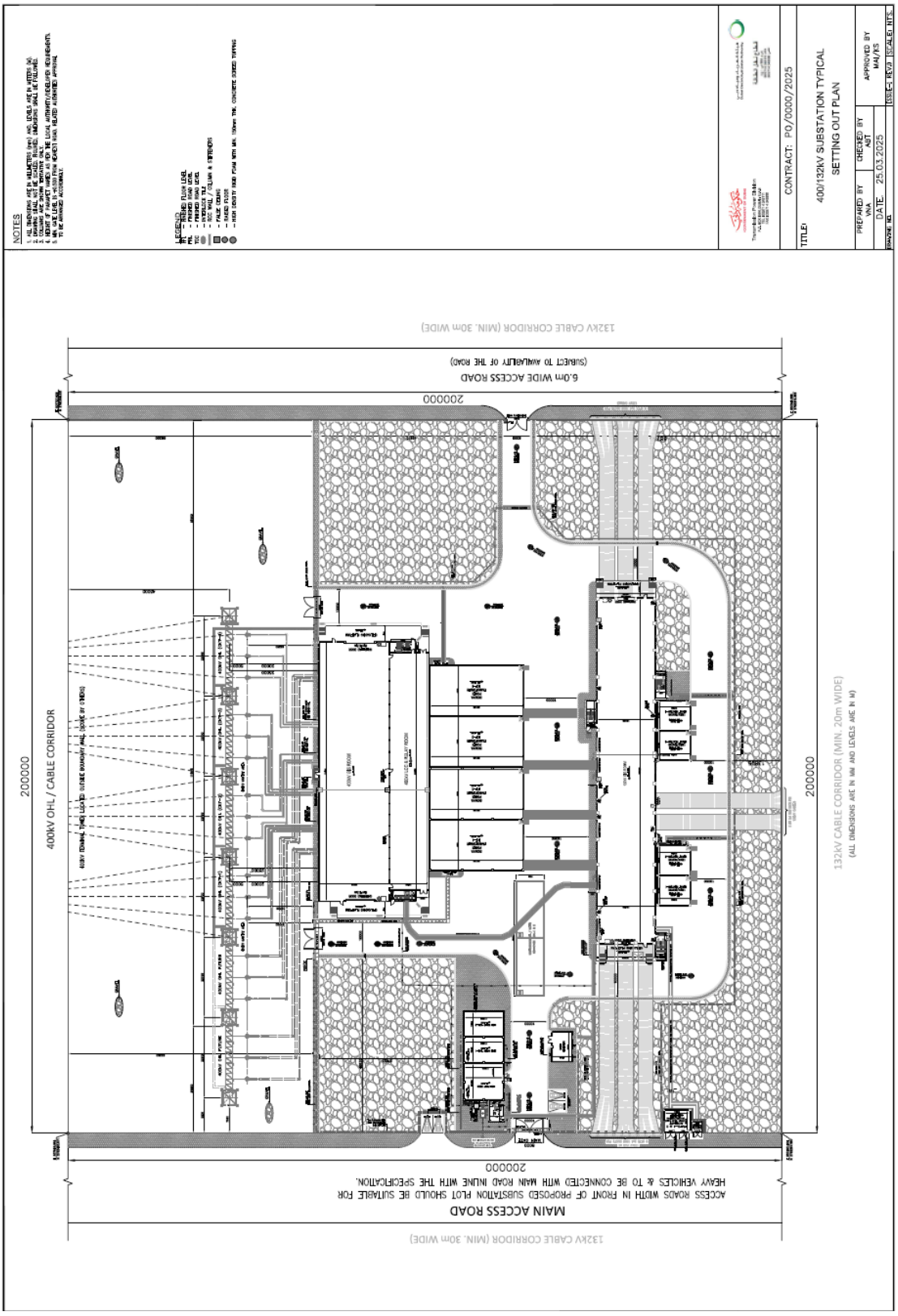
Sr No.	Substation Name	Initial TCL		Initial DCP Load		Ultimate TCL		Ultimate DCP Load		Load Fed From Substation Outside the Project (if any)	132/11kV Substation is Exceeding the Standard Firm Capacity (Yes/No)	Remarks
		Earlier	Updated	Earlier	Updated	Earlier	Updated	Earlier	Updated			
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
Total												

Sheet-3: Substation Load Summary

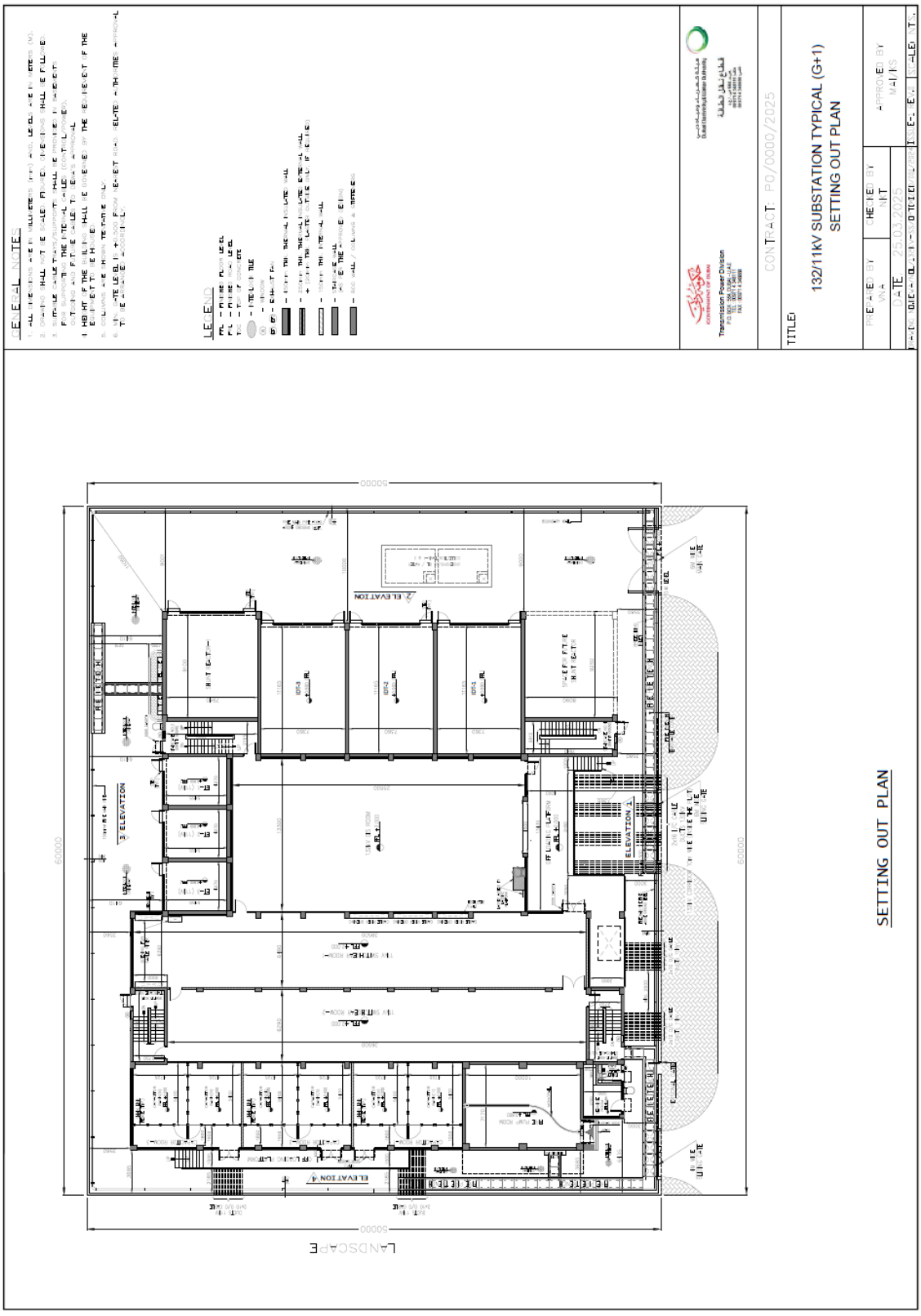
Sr No.	ROW	Section	11kV corridor width on LHS (m)	11kV corridor width on RHS (m)	The distance between adjacent 11kV corridors is 2m minimum. (Yes/No)	The distance between adjacent 11kV and 132kV corridors is 2m minimum. (Yes/No)	The top surface above the 11kV corridor is as per DEWA standards (soft landscape, interlock tiles, etc.) (Yes/No)	The 11kV corridors are matching with (RTA ROW 100) (Yes/No)	Remarks
1									
2									
3									
4									
5									
6									
7									
8									
9									

Sheet-4: Cross-section Checklist

7.3 Annexure-3 : Standard Setting Out Plan of 400/132kV Substation



7.4 Annexure-4 : Standard Setting Out Plan of 132/11kV Substation



7.5 Annexure-5 : The 400/132kV Substation Verification Checklist

GOVERNMENT OF DUBAI
Dubai Electricity & Water Authority

Document Title	Plot Name	Plot No.	Revision No.	Date	Previous revision approval status
Transmission 400/132kV Substation Plot Verification					

SR.	Description	Complied with	Remarks
1	**Pre-requisite Documents (To be attached with submittal)**		
1.1	Provide Plot coordinates.		
1.2	Initial/Draft Developer Master Plan.		
1.3	Substation corridors for 400 & 132kV cables.		
1.4	Duly Filled Plot verification checklist.		
2	**Technical Details**		
2.1	**Proposed Substation's Plot**		
2.1.1	Size of the proposed plot should be 200m (Width) x 200m (Length).		
2.1.2	Affection plan reflecting the height of B + G+ 1 (Max of 23 m) to be confirmed.		
2.1.3	The proposed plot should have a regular shape without any chamfer.		
2.1.4	To confirm that the proposed plot is free from any services.		
2.1.5	To confirm that the proposed plot is not located above a tunnel, under a bridge or a metro line, earlier been used as a damp fill area, an earlier structure has been constructed in the plot..etc .		
2.1.6	To confirm that the proposed plot have minimum clearance as below:		
2.1.6.1	Gas farm/DUSUP Corridor - minimum clearances is inline with the authority regulations (e.g. DCD, etc) .		
2.1.6.2	Water bodies or water structure or revetment - minimum 7m.		
2.1.6.3	To confirm that the proposed plot is not located above or near an existing or future Metro line.		
2.1.6.3.a	In case there is an existing or future nearby (over ground) Metro or Railway line, the below shall be confirmed/provided: a. The distance between the Metro/Railway line to end of DEWA cable corridor shall be minimum of 20m. b. To confirm the submission of study of settlement and vibration for DEWA review prior to starting the construction.		
2.1.6.3.b	In case there is an existing or future nearby (underground) Metro or Railway line, the below shall be confirmed/provided: a. To confirm that the end of influence zone shall be outside of end of DEWA corridor. b. To confirm the submission of study of settlement and vibration for DEWA review prior to starting the construction.		
2.1.7	The availability of permanent water line connection prior to energization to be confirmed.		
2.1.8	Required Leveling shall be highlighted in the submission as per site status.		
2.1.9	To confirm that the required leveling will be under developer responsibility before project awarding.		
2.2	**Proposed Substation's Plot Surroundings**		
2.2.1	The proposed plot should be surrounded with minimum of one main road and one side road.		
2.2.2	Proposed Substation plot should be surrounding with Minimum two 132kV cable corridor.		
2.2.3	The proposed plot should have proper road clear access where substation should be accessed directly from the road.		
2.2.4	Clear width of access roads should be minimum 20 meters to allow smooth maneuvering of large vehicles while accessing the plot.		
2.2.5	Detailed data of surrounding plots to be provided including the land use. Height & Function of the future surroundings (buildings/projects) and type of utility near the proposed substation plot to be provided by the developer.		
2.3	**Proposed Substation's Plot Access Gate**		
2.3.1	Minimum of one main gate (8m) from main road, one emergency gate (6m) from side road and a personal gate shall be provided to access the plot and shall be indicated in the layout drawing for the substation entry.		
2.3.2	To confirm that Gate Location is verified & suitable for the proposed layout in line with authorities' regulation.		
2.3.3	Undertaking letter to obtain RTA approval for the proposed access gate location prior to awarding the project to be submitted.		
2.3.4	Study of vehicle movement/entry to be submitted to proposed plot and for each access gate.		
2.3.5	All gate levels shall be 50cm minimum above the road level.		
2.4	**Proposed Substation's Plot OHL and Corridors**		
2.4.1	Substation entry/exit corridors for 400kV OHL and the connecting corridors to be shown clearly for the proposed plot.		
2.5	**Proposed Substation's Plot Cables and Corridors**		
2.5.1	Substation entry/exit corridors 400kV Cable & 132kV cables and the connecting corridors to be shown clearly for the proposed plot.		
2.5.2	132kV outgoing cables shall be in the arrangement of 2x4 150Θ ducts with a minimum of 2.5 meter width for each set for a total of 22 sets.		
2.5.3.	The cable corridor for six 400kV incoming feeders shall be shown. The corridor width for each feeder shall be a minimum of 3.5 meters.		
2.5.4	Total width of connected 400kV cable corridor should be minimum of 20 meters.		
2.5.5	Width of 400kV cable corridor in substation entry should be 20 meters.		
2.5.6	400kV and 132kV corridor to the substation shall be free from any future construction/development and accessible for heavy machinery for cable installation and maintenance.		

* Note: if 2.3.3 can't complied with, than this comment to be given in Rev. 1 (any delay in obtaining the approval of the gates location (one main gate, two sliding gates and a personal gate) after the project award will be the developer's responsibility)

Architectural Team	Dy Mgr. - Civil Architectural	Sr Mgr. - Trans Engg Civil & Electro Mech	VP-TE
PREPARED BY	**CHECKED BY**	**APPROVED BY**	**DEPARTMENT HEAD**

7.6 Annexure-6 : The 132/11kV Substation Verification Checklist (Version 3)

GOVERNMENT OF DUBAI
هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority

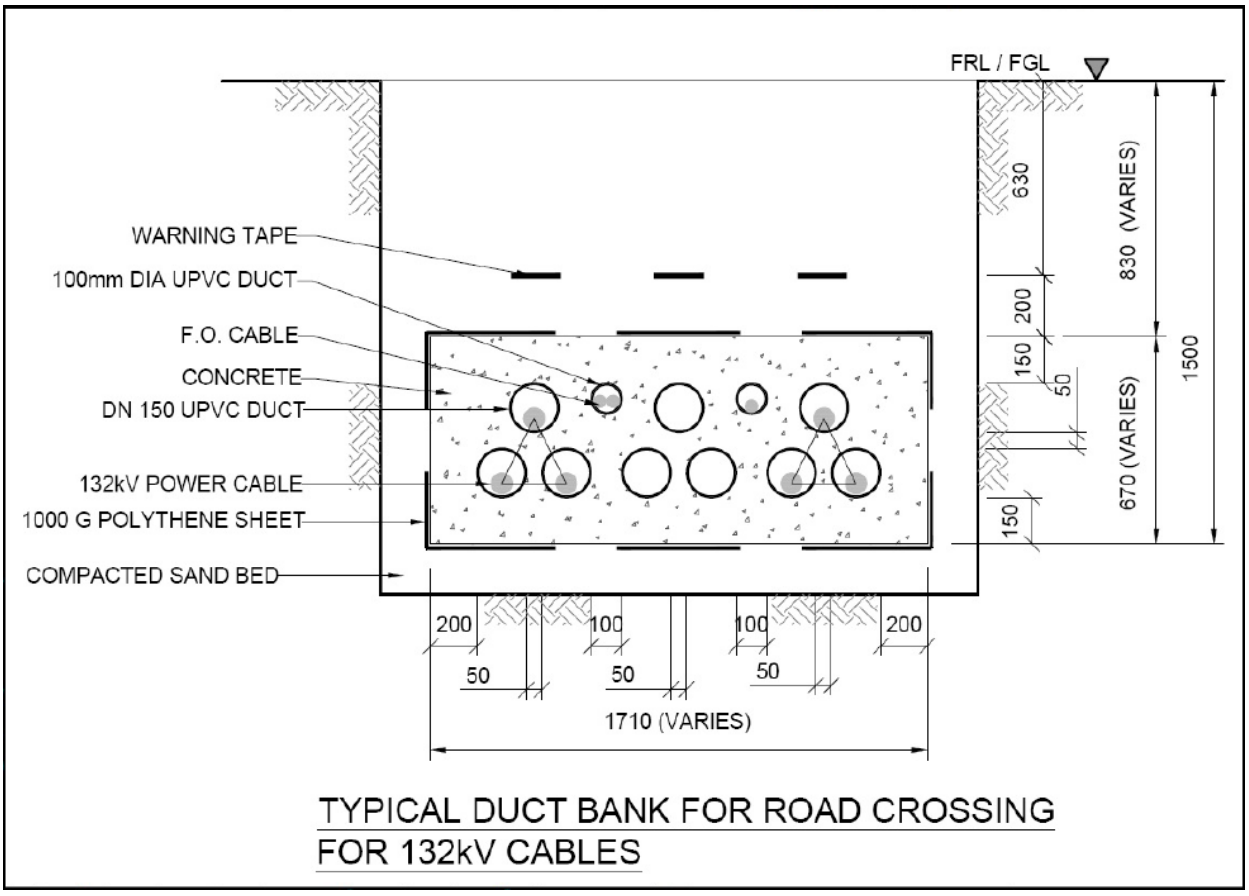
Document Title	Plot Name	Plot No.	Revision No.	Date	Approval status
Transmission 132/11kV Substation Plot Verification					

SR.	Description	Complied with (rev. x)	Remarks (rev. x)
1	**Pre-requisite Documents (To be attached with submittal)**		
1.1	Plot coordinates.		
1.2	Initial/Draft Developer Master Plan.		
1.3	Substation entry/exit corridors for 132kV and 11kV cables.		
1.4	Duly Filled Plot verification checklist.		
2	**Technical Details**		
2.1	**Proposed Substation's Plot**		
2.1.1	Size of the proposed plot should be 60m (Width) x 50m (Length).		
2.1.2	To confirm that the affection plan reflects the height of B + G+ 1 (Max of 16 m).		
2.1.3	To confirm that the affection plan reflects all gate levels shall be 50 cm minimum above the road level.		
2.1.4	The proposed plot should have a regular shape without any chamfer.		
2.1.5	To confirm that the proposed plot is free from any services.		
2.1.6	To confirm that the proposed plot is not located above a tunnel, under a bridge or a metro line, earlier been used as a damp fill area, an earlier structure has been constructed in the plot..etc .		
2.1.7	To confirm that the proposed plot have minimum clearance as below:		
2.1.7.1	OHL - vertical or horizontal clearances of line conductor full swing to any object is 8 m		
2.1.7.2	Gas farm/DUSUP Corridor - minimum clearances is inline with the authority regulations (e.g. DCD, DEWA, etc) .		
2.1.7.3	Water bodies or water structure or revetment - minimum is 7m		
2.1.7.4	To confirm that the proposed plot is not located above or near an exisitng/future Metro or Railway line.		
	In case there is a nearby (over ground) Metro or Railway line, the below shall be confirmed/provided: a. The distance between the Metro/Railway line to end of DEWA cable corridor shall be minimum of 20m. b. To confirm the submission of study of sattelment and vibration for DEWA review prior to starting the construction.		
	In case there is a nearby (underground) Metro or Railway line, the below shall be confirmed/provided: a. To confirm that the end of influence zone shall be outside of end of DEWA corridor. b. To confirm the submission of study of sattelment and vibration for DEWA review prior to starting the construction.		
2.1.8	The availability of permanent water line connection to prior to energization to be confirmed.		
2.1.9	Required Leveling shall be highlighted in the submission as per site status.		
2.1.10	To confirm that required level will be under developer responsibility before project awarding.		
2.2	**Proposed Substation's Plot Surroundings**		
2.2.1	The proposed plot should have proper road clear access where substation should be accessed directly from the road (main road access from 60 m side)		
2.2.2	The proposed plot should be surrounded with a minimum of one main road and one sikka perpendicular to main road.		
2.2.3	Clear width of main access road in front of proposed plot should be minimum 10 meters to allow smooth maneuvering of large vehicles while accessing the plot.		
2.2.4	Width of sikka should be minimum 7 meters.		
2.2.5	Detailed data of surrounding plots to be provided including the land use. Height & Function of the future surroundings (buildings/projects) and type of utility near the proposed substation plot to be provided by the developer.		
2.2.6	Location of laydown area and site office nearby proposed plot to be indicated in the master plan.		
2.3	**Proposed Substation's Plot Access Gate**		
2.3.1	One main gate, two sliding gates and a personal gate shall be provided from main road to access the plot along the 60 meters side and shall be indicated in the layout drawing for the substation entry.		
2.3.2	To comfirm that Gate Location is verified & suitable for the proposed layout in line with authorities' regulation.		
2.3.3*	Undertaking letter to obtain RTA approval for the proposed access gate location prior to awarding the project to be submitted.		
2.3.4	Study of Vehicle manuevering route from main road (project's boundary) through master plan to proposed plot's access gates shall be indicated.		
2.3.5	Minimum distance from plot limit to the nearest turn/roundabout shall be as per authorities requirements (15 meters).		
2.4	**Proposed Substation's Plot Cables and Corridors**		
2.4.1	Substation entry/exit corridors for 132kV and 11kV cables and the connecting corridors to be shown clearly for the proposed plot.		
2.4.2	11kV outgoing cables shall be in the arrangement of 4 sets of (2x10Θ) with a minimum of 2.5 meter width for each set.		
2.4.3	The exit location for 11kV outgoing cables shall be from sikka and road side.		
2.4.4	The 11kV exit corridors' location shall be shown from the 11kV cable basement.		
2.4.5	2 meters gap shall be provided between every 2 sets of 11kV outgoing cables.		
2.4.6	132kV incoming cables should be in the arrangement of 4 sets of (2x4) with a minimum of 2.5 meters width for each set.		
2.4.7	Total width of connected 132kV cable corridor should be minumum of 10 meters.		
2.4.8	Width of 132kV cable corridor in substation entry should be 10 meters.		
2.4.9	Entry location of 132kV cable sets should preferably be from one side (60 meters side) of the proposed plot.		
2.4.10	132kV corridor to the substation shall be free from any future construction/development and accessible for heavy machinery for cable installation and maintenance.		
2.4.11	The 132kV corridor, along with cross-section details, shall be provided.		

* Note: if 2.3.3 can't complied with, than this comment to be given in Rev. 1 (any delay in obtaining the approval of the gates location (one main gate, two sliding gates and a personal gate) after the project award will be the developer's responsibility).

Architectural Team	Dy Mgr - Civil Architectural	Sr Mgr - Trans Engg Civil & Electro Mech	VP-TE
PREPARED BY	**CHECKED BY**	**APPROVED BY**	**DEPARTMENT HEAD**

7.7 Annexure-7 : The 132kV Typical Duct Bank for Road Crossing



TYPICAL DUCT BANK FOR ROAD CROSSING
FOR 132kV CABLES

7.8 Annexure-8 : DEWA Circular Regarding Backup Generators

حكومة دبي
GOVERNMENT OF DUBAI
هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority

المرجع : ع م / 146 /2017

التاريخ: 2017/4/25

تعميم

إلى المطورين العقاريين والاستشاريين والمقاولين
وكافة الجهات المعنية الأخرى

الموضوع: توفير مولدات كهرباء احتياطية في المباني والمرافق والمنشآت الحيوية ذات الطابع الحضاري والسياحي والتجاري في إمارة دبي

بناء على أمر صاحب السمو الشيخ محمد بن راشد آل مكتوم نائب رئيس الدولة رئيس مجلس الوزراء حاكم إمارة دبي رعاه الله، بإلزام المطورين العقاريين والشركات وكافة الجهات المعنية الأخرى التي تعمل على تنفيذ المشاريع العمرانية الكبرى والمباني والمرافق والمنشآت الحيوية ذات الطابع الحضاري والسياحي والتجاري في إمارة دبي بتوفير مولدات كهرباء إحتياطية في هذه المباني والمرافق والمنشآت لضمان تزويدها بالطاقة الكهربائية اللازمة في الحالات الطارئة لاعتبارات الأمان والسلامة العامة، وتأمين الراحة للمجتمع والجمهور اعتباراً من 25 ابريل 2017.

على أن تكون قدرة هذه المولدات الاحتياطية كافية لتغطية المتطلبات الأساسية بما فيها الإنارة الكافية والمصاعد والسلالم المتحركة والأبواب الأوتوماتيكية وكاميرات المراقبة وأجهزة الإنذار والسلامة ومكافحة الحريق وغيرها، مع التأكد من الصيانة الدورية لضمان عمل هذه المولدات الاحتياطية في الحالات التي تستدعي ذلك بشكل فعّال ووقت مناسب مع مراعاة اشتراطات وإجراءات السلامة.

ولتنفيذ هذا الأمر السامي، يرجى التعاون التام مع هيئة كهرباء ومياه دبي كونها الجهة ذات الاختصاص والمسؤولة عن متابعة هذا الأمر والإشراف على تنفيذه مباشرة.

سعيد محمد الطاير
العضو المنتدب والرئيس التنفيذي

هيئة كهرباء ومياه دبي
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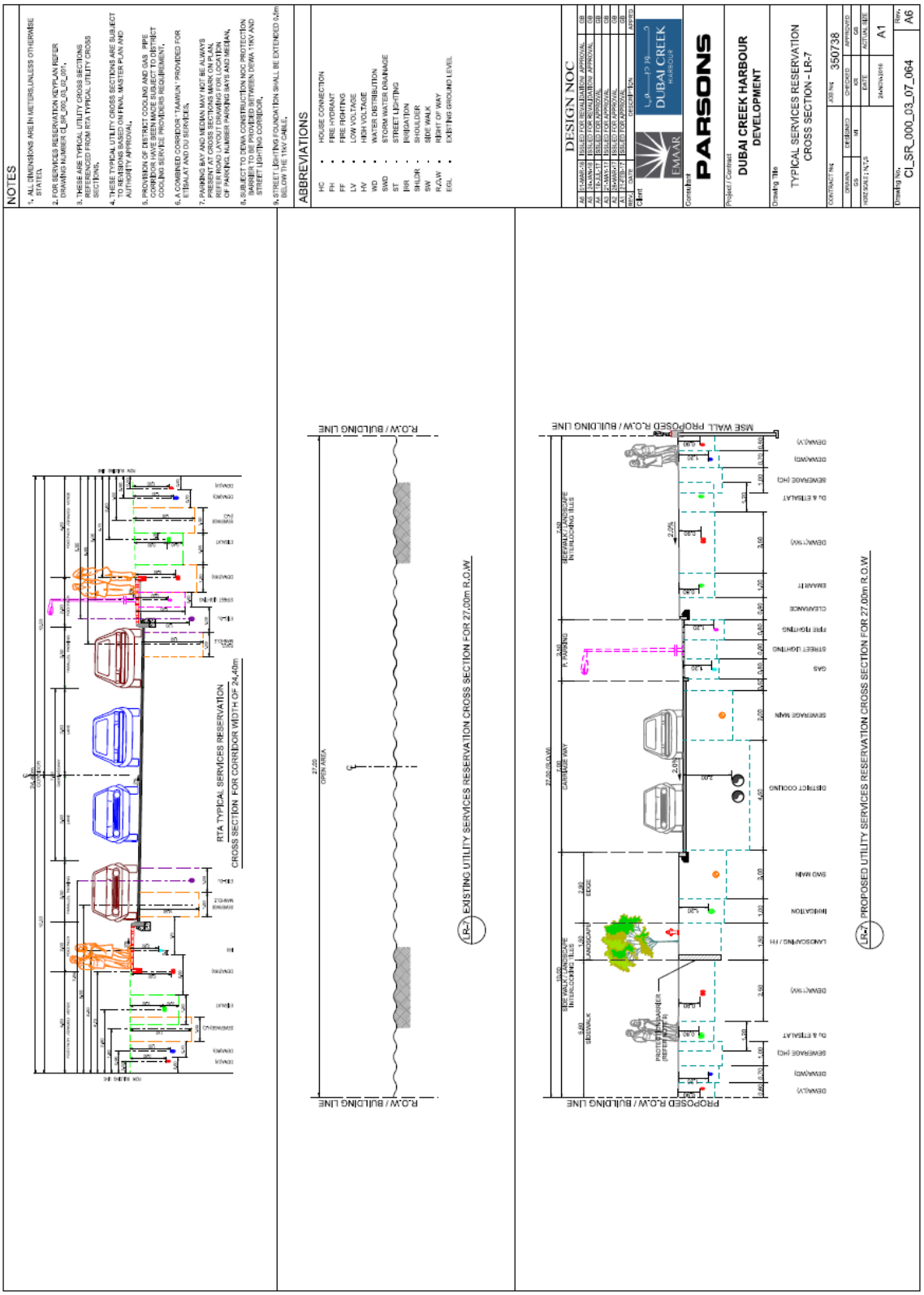
7.9 Annexure-9 : Standard Cross-section Details Format



7.10 Annexure-10 : File Naming Format

Project Code *(as per MA'LEM DUBAI Registration)*	**File Description**	**File Format**
MP00126	Layout Drawing (DLTM)	MP00126-LD
MP00126	132kV Corridors Drawing (DLTM)	MP00126-132CD
MP00126	11kV Corridors Drawing (DLTM)	MP00126-11CD
MP00126	132kV Road Crossing Ducts (DLTM)	MP00126-132RCD
MP00126	11kV Road Crossing Ducts (DLTM)	MP00126-11RCD
MP00126	Cross Section markers drawing (DLTM)	MP00126-CSMD
MP00126	Ultimate Feeding Zone Drawing (DLTM)	MP00126-UFZD-SS1(SS*)
MP00126	Interim Feeding Zone Drawing (DLTM)	MP00126-IFZD-SS1(SS*)
MP00126	Entry/Exit of 132kV and 11kV Corridors (DLTM)	MP00126-EE-132-11-SS1(SS*)
MP00126	Detailed Cross Sections Drawing (Bulk Drawing)	MP00126-XS-AA(AA*)- PDF

7.11 Annexure-11 : Digital Drawing Submission Requirements for Power Supply Master Plan

Digital Drawing Submission Requirements
For Power Supply Master Plan

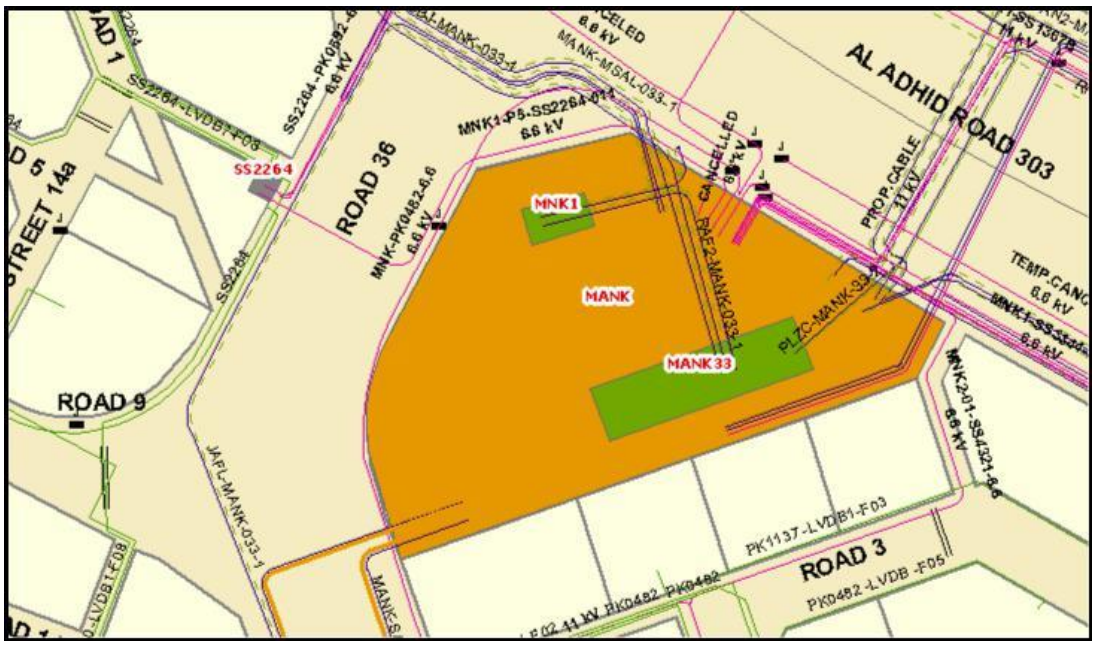


Table of Content

1. Introduction

The purpose of this document is to provide the GeoSpatial Data submission guidelines to all DEWA customers. The Layers/levels in the GDS submission shall be in line with DEWA requirements. Therefore, DEWA customers are requested to submit Power Supply Master Plan projects to DEWA PTP in a predefined format, which will enable us to work in an orderly manner. This guideline is intended to understand and facilitate DEWA II&P requirements to upload the project's landbase on DEWA GIS system.

Any questions concerning these standards or exceptions to these standards due to special circumstances should be referred to DEWA II&P Department for further clarification.

The format and the content of the GDS template file are explained in the following sections.

1.1 GDS File Format

The format of the GDS file can be either ESRI GeoDatabase (GDB), AutoCAD (DWG) or MicroStation (DGN). DEWA will agree all above formats for data exchange from Data Submitter.

The GDS file defines the following;

a. What coordinate system to be used in drawing preparation

b. How map features are organized into layers

c. How those layers are named

d. How existing features and layers in DEWA's GIS are symbolized.

Once the customers started to submit the drawings in the above specified manner then DEWA's II&P Department GIS team can update database in DEWA GIS.

Important note:

Drawing files submitted by the customers should strictly follow this guidelines such as "Level or Layer/Feature Class Name" "Symbology" "Coordinate system" etc..., that are mentioned in the **Layers Data field definition** (Ref 2.1) for example If customer not comply with specified **Layers Data field definition**, the GDS will not be recognized as data.

Most importantly, the drawing file submitted by the customer must not contain the following.

1. Title block
2. Border line

3. Notes in the drawing.

2. GDB/CAD/CSV file Submission Details

The following guidelines should be considered while preparing CAD/GDB for Road Network Layers and CSV for Proposed Duct/utility cross-section marker submissions. The File name should start with Project Name along with file details. For example Projectname_Crosssection.csv, Projectname_Dist_duct.csv, Projectname_roadlayout.dgn, Projectname_roadlayout.dwg, Projectname_Trans_duct.csv. (Ref. Appendix 1)

2.1 Layers, Data Field and Definitions

ROAD NETWORK LAYERS				
S.No.	**Layer_Name**	**Description**	**Geometry Type and Color Code CAD**	**Geometry Type GDB**
1	Road Width	The width allocated to lanes for motorists, buses, trucks, bikes and this is also called carriage way.	Polyline and Point (RGB: 0:0:255)	Polygon
2	Roundabout	Non-pedestrian islands in the road surface that normally contains grass, trees, flowers or other plantations.	Polyline and Point (RGB: 255:102:102)	Polygon
3	Road Divider	The area that separates opposing lanes of traffic on divided roadways. Also called central reservation.	Polyline and Point (RGB: 255:0:255)	Polygon
4	Right-of-way	Right-of-Way is the land on which a roadway and its associated facilities and appurtenances are located. Highway right-of-way accommodates the entire roadway (i.e., travel lanes and shoulders), as well as adjacent sidewalks and the roadside corridors on which utilities are located.	Polyline (RGB: 0:255:0)	Polygon
5	Pavements	A path consisting of a paved area on the side of a road for Pedestrians, also called a sidewalk.	Polyline and Point (RGB: 204:0:0)	Polygon
6	Parking Lots	Should Represent vehicles Parking lot boundaries.	Polyline and Point (RGB: 0:255:0)	Polygon

7	Cross-section	The simple line should be captured across the road which covers all road utilities allocations and road associated features(make sure the cross-section marker should not extend beyond the ROW).The cross-section ID should be provided in Text format, which should match with section id in detailed section view PDF file. Alternatively, CSV file should have both start and end coordinates with DEWA specified attributes. The direction for Cross-section digitization should be Right side (X1,Y1) to Left side (X2,Y2) according to the orientation.	Line, Text and CSV (RGB: 255:255:255)	Line
8	Parcels	The boundary and ID of the parcel should match with Authorities (DM, DSO and so on.) This Parcel ID should match with CSV file Parcel ID Column.	Polyline/Text/CSV (RGB:51:0:0)	Polygon
9	Conduit132kV Planned(CAD) ElectricTransmissionDataSet /T_Conduitline (GDB).	Should represent simple line.	Line and CSV (RGB:255:170:0)	Line
10	Conduit11kV_ 33kV _Planned (CAD) ElectricDistribution DataSet / Conduitline (GDB).	Should represent simple line.	Line and CSV (RGB:76:230:0)	Line
11	ConduitLV Planned (CAD) ElectricDistrib	Should represent simple line.	Line and CSV (RGB:244:179:252)	Line

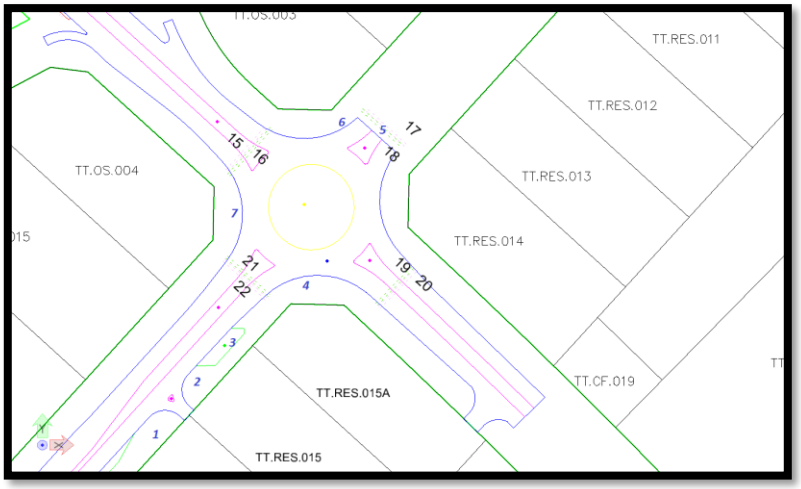
	utionDataSet / Conduitline (GDB).			
12	Duct_No and No. of Ways	This Duct ID should match with DEWA CSV file Ref No Column.	Text (RGB:204:204:0)	NA
13	Corridor	Should represent simple line.	Polyline (RGB:245:255:255)	NA
14	UC_EHV	Transmission Power network Corridor (132kv and 400kV).	Point (RGB:127:127:127)	Polygon
15	UC_HV	Distribution Power network Corridor (33kV, 11kV, and 6.6kV).	Point (RGB:255:0:0)	Polygon

Other than GIS data, DEWA II&P expect customer to submit proposed duct/Utility Cross-section in CSV file and This CSV file should follow as per instruction given in Ref.3.0 Specification of coded values for various fields-CSV, and 4.Specification of coded values for various fields-CSV (Cross-section).

Note: There is no need to provide CSV files when submitting GDS data in ESRI GDB format.

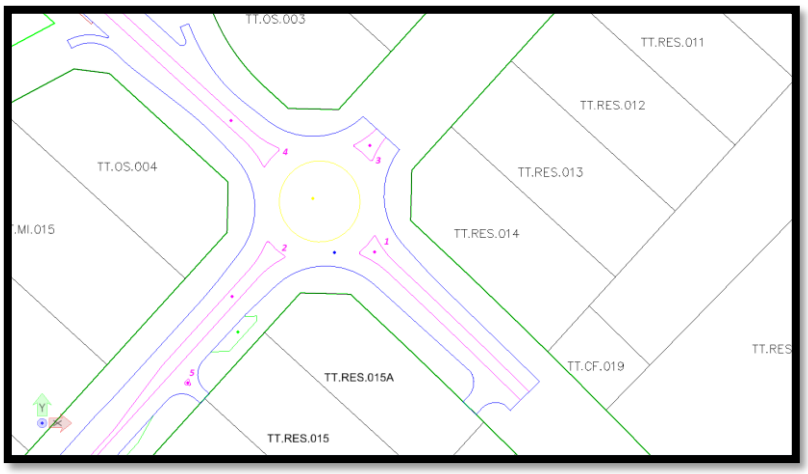
2.1.1 Road Width and Duct

The road width should be captured in Line string as specified in below picture and each segment should be end snapped with adjacent features. The duct should be captured as a single line segment with duct number as a text.



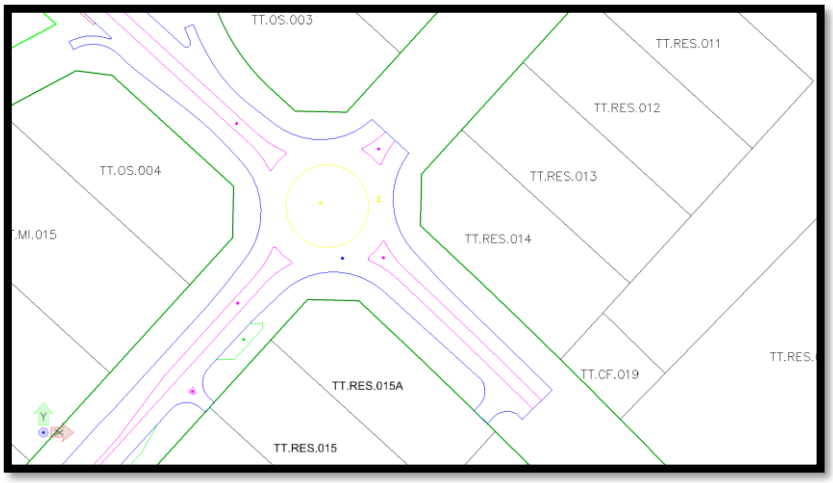
2.1.2 Road Divider

The road divider should be captured in Line string as specified in below picture and each segment should be end snapped with adjacent features.



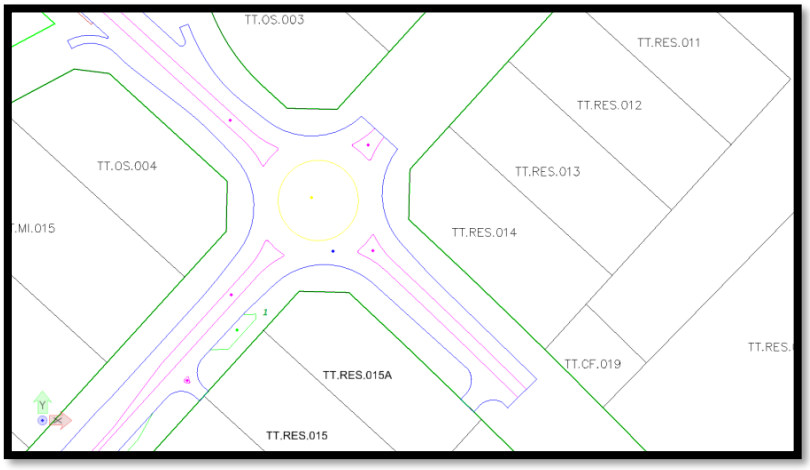
2.1.3 Roundabout

The Roundabout should be captured in Line string as specified in below picture.



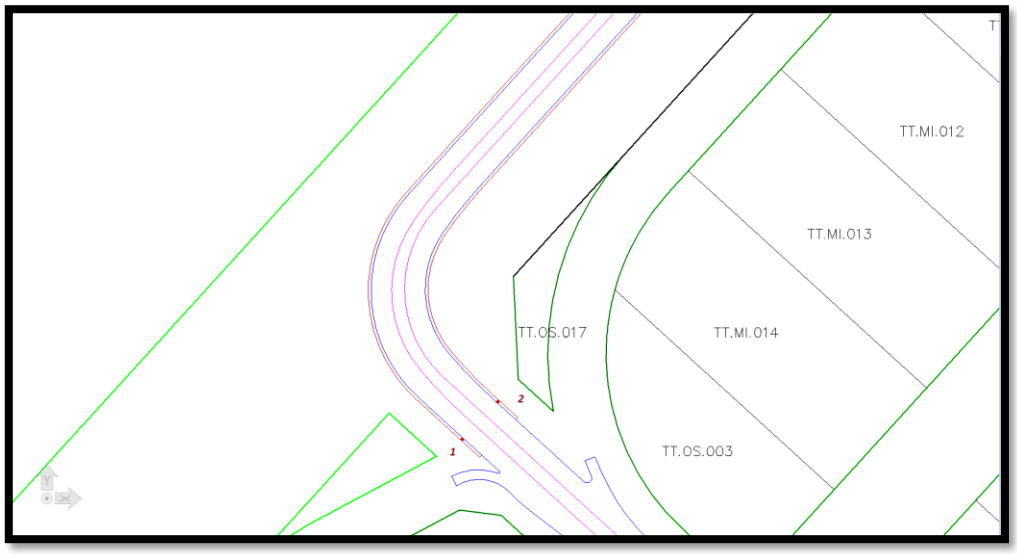
2.1.4 Parking

The Parking should be captured in Line string as specified in below picture and each segment should be end snapped with adjacent features.



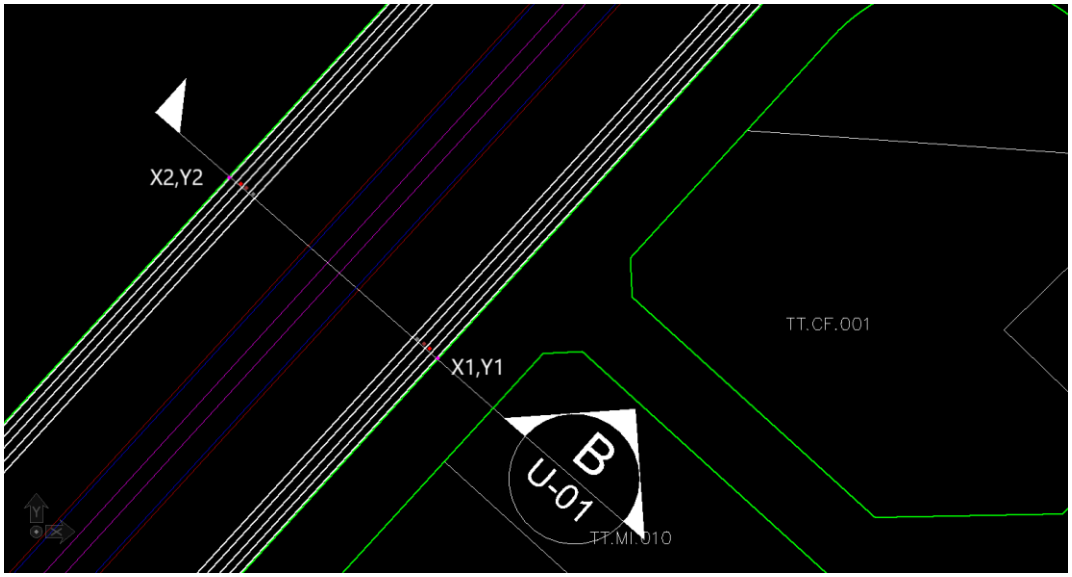
2.1.5 Pavement

The Pavement should be captured in Line string as specified in below picture and each segment should be end snapped with adjacent features.



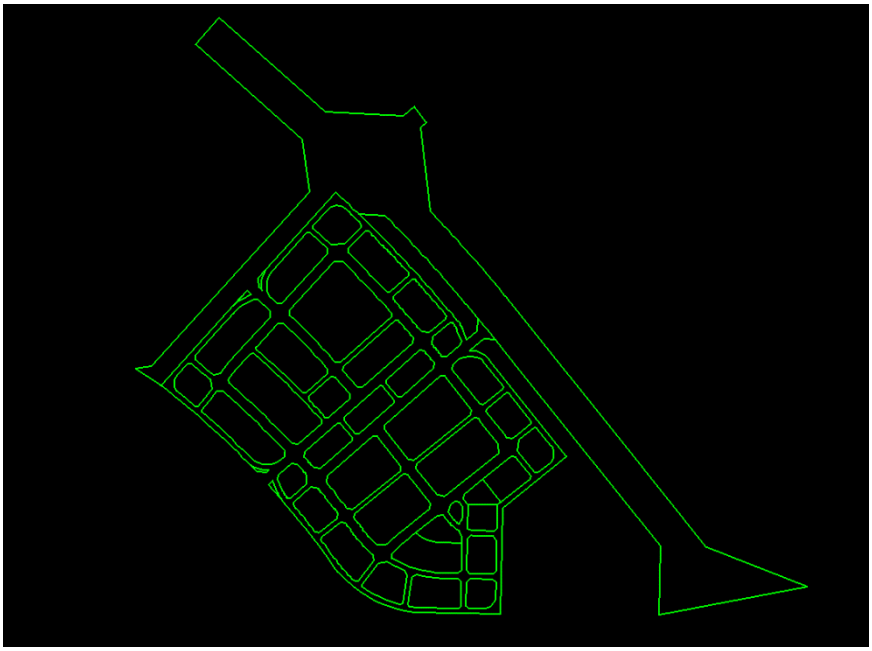
2.1.6 Cross-section

The cross-section should be captured single line segment with section number as a text. The orientation for cross section digitization should be right side (X1,Y1) to left side (X2,Y2) according to the direction.



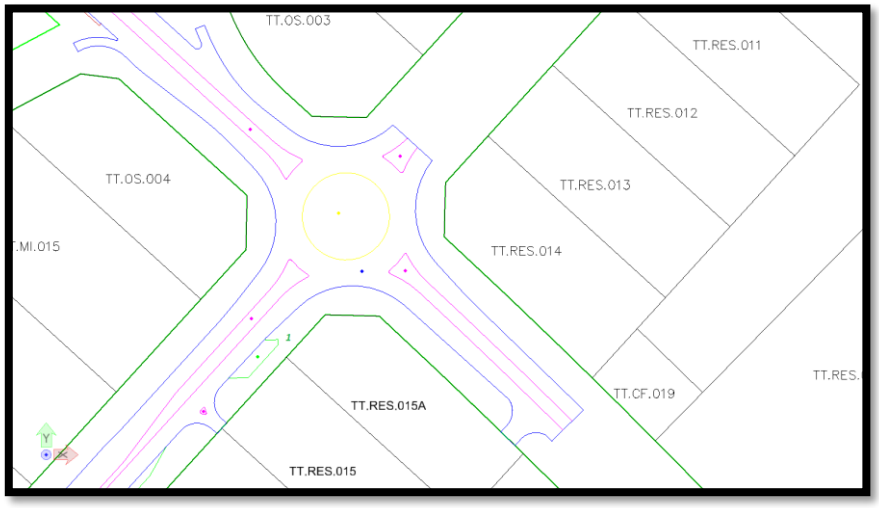
2.1.7 Right of Way

The Right of Way should be captured in Line string as specified in below picture and each segment should be end snapped with adjacent features.



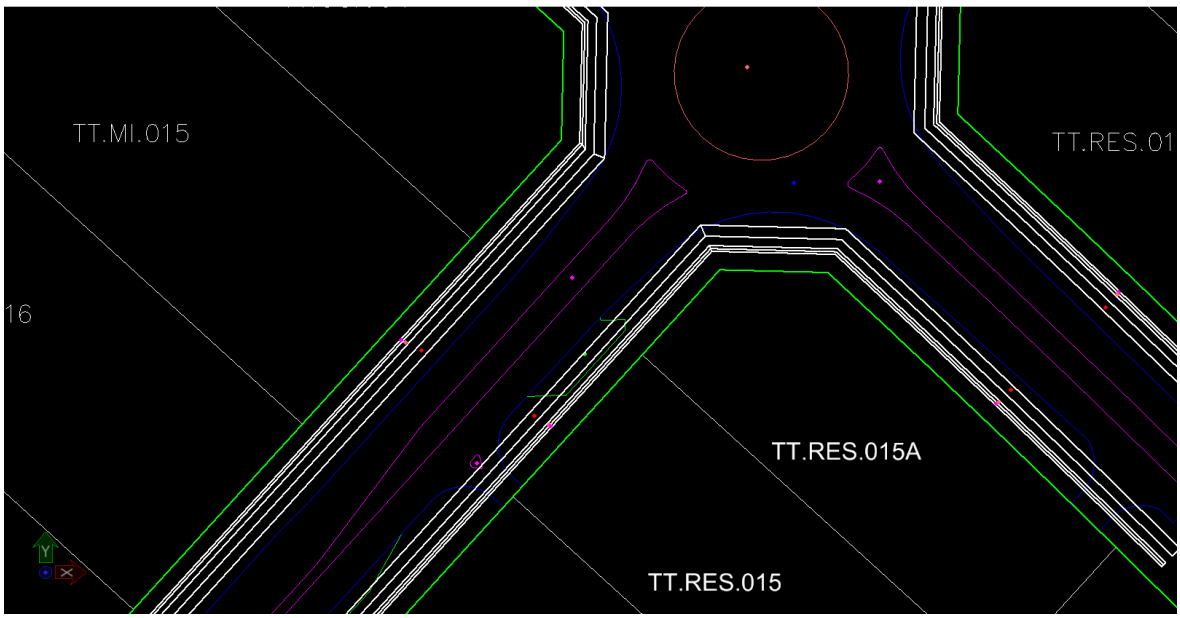
2.1.8 Parcel

The boundary and ID of the parcel should match with Authorities (DM, DSO and so on.) and Parcel boundary polyline should not share with adjacent polyline and text should be fit into inside the parcel.



2.1.9 DEWA Utility Corridor

DEWA utility corridors should be captured in Line string and point features as specified in below picture and each segment should be snapped with adjacent features. The corridor boundary should be captured based on detailed cross-section submitted with Master plan. The different type of utility corridors in DEWA GIS such as UC_EHV (Transmission Power 132kV and 400kV), and UC_HV (Distribution Power 33kV, 11kV, and 6.6kV).



2.2 Coordinate System

Features in DEWA GDS compliant files must be represented in real world locations as referenced by Dubai Local Transverse Mercator projection (DLTM) parameters as given below.

Projection:
Dubai Local Transverse Mercator
Parameters:
Longitude of Origin 55:20:00:00 d:m:s
Latitude of Origin 0:00:00.000 d:m:s
False Easting 500,000.000 m
False Northing 0.000 m
Scale Factor along Longitude of Origin 1.0000
Geodetic Datum: WGS84
Ellipsoid WGS84 (Standard parameters)
Equatorial Radius: 6378137.000 m
Polar Radius: 6356752.314 m
Eccentricity: 0.0818191908426215
Flattening: 0.00335281066474746
Flattening Inverse: 298.257223563002
Units and Formats:
Geographic Units: d: m: s
Format: Long/lat. Precision: 4, Positive N,E
Projection Units: m
Format: Easting/Northing Precision: 3
Height Units: m Precision: 3
Geocentric Units: m Precision: 3
Distance Units: m Precision: 3
Angular Units: deg Precision: 6

2.3 CAD / GDB data submission guidelines

If the Data Submitter is unable to provide the required spatial information in accordance with the DEWA's GDS, the following guidelines should be followed when preparing CAD data for submission to the DEWA that will be used by the GIS Section:

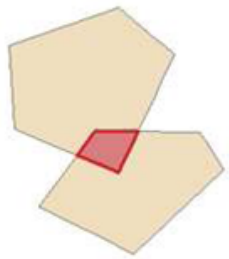
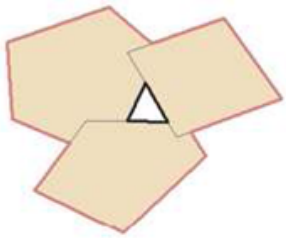
- Layer/feature class names need to follow the DEWA's GDS naming format
- Each Feature Class and/or its sub-types need to be in a separate layer in the CAD file.
- Ellipse and Spline shall not be used at all.
- Overlapping, Self-intersecting and Zero Length are not allowed.

- Where two Polylines logically join, intersecting features within the same layer these shall be snapped at the point of intersection.
- Each text/point representing information about an area should fit well inside it.
- Digitization of lines (for example where these are roads) should be undertaken in their direction of travel where the road links are 'one-way' links. Two-way links represented as one link can be digitized in either direction.
- All new Conduits (Line features) must be clearly distinguishable from existing features by symbology and labels (Existing/New/Proposed).
- For each feature the following spatial data is required: StartPoint, EndPoint and TurningPoints if applicable). Features must have x,y co-ordinates as label text near the respective location on the drawing. These co-ordinates shall be on level 10.
- All drawings delivered to DEWA shall have an attached CSV file containing all features, their X,Y location (StartPoint, EndPoint and TurningPoints) and shall include attributes (ref 3.Specification of coded values for various fields-CSV(Duct) and 4.Specification of coded values for various fields-CSV(Crosssection)) specified in a tabular form. Sample CSV template available in Appendix 1 Sample CSV/CAD file template.
- An additional reference number in duct/section_id in Crosssection (refno-Ref Appendix 1 Sample CSV/CAD file template) can be added (if required) to enable relationships between the graphics in CAD and attributes in CSV.

2.4 Topology Rules

It is important that some basic topological rules are enforced whilst creating and maintaining existing data. These rules should be followed in CAD format files to ensure ease of translating from CAD to GIS formats should DEWA need to undertake such translation exercise. Some of the examples are shown below:

1	Must Not Overlap	Requires that lines not overlap with lines in the same feature class. This rule is used where line segments should not be duplicated.	
2	Must Not Intersect	Requires that line features from the same feature class not cross or overlap each other. Lines can share endpoints. This rule is used in cases where the intersection of lines should only occur at endpoints, such as street segments and intersections.	
3	Must not have Dangles	Requires that a line feature must touch lines from the same feature class at both endpoints. An endpoint that is not connected to another line is called a dangle. This rule is used when line features must form closed loops, such as when they are defining the boundaries of polygon features. It may also be used in cases where lines typically connect to other lines, as with networks, such as road links. In this case, exceptions can be used where the rule is occasionally violated, as with cul-de-sac or dead end street segments.	
5	Must not intersect or Touch Interior	Requires that a line in one feature class must only touch other lines of the same feature class at endpoints. Any line segment in which features overlap or any intersection not at an endpoint is an error. This rule is useful where lines must only be connected at endpoints, such as in the case of plot lines, which must split.	
6	Must not Overlap with	Requires that a line from one feature class not overlap with line features in another feature class. This rule is used when line features cannot share the same space. For example,roads must not exactly follow a railway line.	 Where the purple lines overlap is an error.
7	Must not Self Overlap	Requires that line features not overlap themselves. They can cross or touch themselves, but must not have coincident segments. This rule is useful for features such as streets,where segments might touch in a loop, but where the same street should not follow the same course twice.	 The individual line feature overlaps itself, with the error indicated by the coral line.
8	Must not self Intersect	Requires that line features not cross or overlap themselves. This rule is useful for lines, such as contour lines, that cannot cross themselves.	
9	Must be a Single Part	Requires that lines have only one part. This rule is useful where line features, such as highways, may not have multiple parts.	 Multipart lines are created from a single sketch.

S.no	Topology Rule	Rule Description	Example
1	Must Not Overlap	Requires that the interior of polygons in the feature class not overlap. The polygons can share edges or vertices. This rule is used when an area cannot belong to two or more polygons.It is useful for modelling administrative boundaries, such as building plots, districts, and mutually exclusive area classifications, such as land cover or landform type.	
2	Must Not Have Gaps	This rule requires that there are no voids within a single polygon or between adjacent polygons. All polygons must form a continuous surface. An error will always exist on the perimeter of the surface. You can either ignore this error or mark it as an exception. Use this rule on data that must completely cover an area. For example, Land Uses polygons cannot have gaps.	

The following definitions clarify the subject of the DEWA's GDS:

Polyline: A polyline is a sequence of joined vertices. Each vertex has an X and Y. Attributes further describe the polyline. A polyline must be uniquely identified and duplicates are not permitted, unless the justification for a duplicate is provided by the Data Submitter.

Polygon: A polygon, like a polyline, is a sequence of vertices. However, in a polygon, the first and last vertices are always at the same position. Overlapping polygons are not permitted, unless the justification for any overlap is provided by the Data Submitter.

Dangle: Dangles are topological errors where an arc or a line does not end at the point where it should. These are created due to improper digitization. Dangles are of two types- overshoots and undershoot. Dangles can be avoided if proper Snapping tolerance is defined before starting digitization. Dangles are not permitted, unless justification for any dangles is provided by the Data Submitter.

Undershoots: When an arc or a line finishes before connecting to another arc at a required location it is called as undershoot. Undershoots can occur when a line feature (e.g. a road) does not exactly meet another feature to which it should be connected. Undershoots are not permitted, unless justification for any undershoot is provided by the Data Submitter.

Overshoots: When an arc or a line does not end at its termination point on another arc and goes beyond it is called as overshoot. Overshoots can occur when a line feature such as a road does not meet another road exactly at an intersection. Overshoots are not permitted, unless justification for any overshoot is provided by the Data Submitter.

Spurious Polygons: Spurious polygons or slivers are often created during overlay of two or more polygon layers. Slivers are small polygons which results due to overlay operations of polygons whose edges do not match. Slivers can occur when the edges of two polygon areas do not meet properly. Slivers are not permitted, unless justification for any sliver is provided by the Data Submitter.

Compliance: The Data Submitter must comply with the requirements for DEWA's GDS in the coordinate system; layer names must meet the requirements of the DEWA's GDS. These layers will be populated by those submitting the GDS file with the appropriate survey / engineering data and by providing supporting documentation to allow DEWA full discovery of the information provided and any issues that DEWA should be aware if they use the data.

Naming Convention: Layers must be submitted in accordance with a naming convention that is consistent with the DEWA's own naming convention.

3. Specification of coded values for various fields-CSV (Duct)

Subtype

Code	State
1	Duct Bank
2	Trench
3	Turf
4	HDD
5	Unknown

Status indicator

Code	State
Proposed	Proposed
Cancelled	Cancelled
In service	In service
Approved for Construction	Approved for Construction
Constructed As laid	Constructed As laid

Operating Voltage

Code	Conduit Nominal Voltage
400	400 kV
132	132 kV

11	11 kV
33	33 kV
LV	LV

Encasement Type

Code	Encasement Type
Backfil	Back Fill
Concrete	Concrete
NDRC	NDRC
Smart Sand	Smart Sand
0	Unknown

Material

Code	Material Type
HDPE	HDPE
UPVC	UPVC
UNK	Unknown

Duct Size

Code	Duct Size
2	2"
4	4"
6	6"
12	12"
18	18"
24	24"
30	30"
36	36"
42	42"
48	48"

Number of Ducts

Code	No of Ducts	Code	No of Ducts	Code	No of Ducts	Code	No of Ducts	Code	No of Ducts
4	1	48	27	32	2x30	55	4x(2x5)	62	2x2
5	2	49	28	33	2x35	1	IV(1)		
6	3	50	29	34	2x40	3	IV(3)		

7	4	51	30	35	2x45	399	IV(39)		
24	5	12	1x6	36	2x50	2	UNKNOWN		
17	6	56	1x8	10	3x4	100	9		
25	7	58	1x11	39	3x5	8	2X4		
15	10	57	1x12	14	3x6	12	1x6		
37	11	8	2x4	22	3x8	14	3x6		
38	13	26	2x5	60	3x11	15	10		
16	16	13	2x6	23	3x12	17	6		
9	18	19	2x8	21	3x16	101	8		
41	19	29	2x10	40	4x4	102	12		
42	20	59	2x11	99	4x6	103	14		
43	21	20	2x12	61	4x11	104	15		
44	22	27	2x15	11	6x4	105	17		
45	23	30	2x20	52	1x(2x5)	106	8x11		
46	25	28	2x24	53	2x(2x5)	107	2x3		
47	26	31	2x25	54	3x(2x5)	108	2x7		

4. Specification of coded values for various fields-CSV (Cross-section)

Status

Domain Type:	CodedValue
Code	**Value**
AB	As-Built
C	Construction
FD	Final Design
PD	Preliminary Design

Undertaking Letter Indicator

Domain Type:	CodedValue
Code	**Value**
N	No
NA	Not Applicable
UNK	Unknown
Y	Yes

5. Specification of coded values for various fields (Parcel Planning)

ENTITLEMENT_E	
Domain Type:	CodedValue
Code	**Value**
1	Private
2	Granted
3	Lease
4	Null
5	Rented
6	Reserved
7	Utilities
8	Government

PARCEL_TYPE	
Domain Type:	CodedValue
Code	**Value**
1	DM Code
2	Developer/Contractor Code
4	JAFZA
5	DWC
6	TRAKHEES
7	Meydan
8	DCCA
11	Jumeirah Golf Estate
12	Nakheel
13	TECOM
14	Dubai Silicon Oasis
15	DAFZA
16	DMCC
17	Jumeirah Lake Towers
18	EO
19	EMAAR
20	DUBAI PROPERTIES

21	DUBAI PORT AUTHORITY
22	DIP
24	MERAAS
25	MBRHE
26	BUSET
27	SOBHA
28	DIRE
29	MAF
30	DFC
31	DHCC
32	HABTOOR
33	DAMAC
34	DUBAI SPORTS CITY
35	UNION PROPERTIES
36	MUSTAFA GALADARI
37	AL BARARI
38	TANMIYAT GROUP
39	DIAMOND
40	FCW
41	TIGERWOOD
42	PCFC
43	LIMITLESS
44	DCA
45	DWTC
46	DIC
48	Deira WaterFront Development
49	NSHAMA
50	DIB
51	DGC
52	Al Wasl
53	DREC
54	Dubai Holding
55	Dubai Maritime City
56	Gulf Developers
57	Nobility

58	GFH
61	Al Ahli Group
62	DHE

ZONINGAUTHORITY	
Domain Type:	CodedValue
Code	**Value**
1	DM
2	DCCA
3	TRAKHEES
4	DWC
5	DSOA
6	JAFZA
7	DAFZA
8	EO
9	DPA

LANDUSE_DESC(LanduseDescription)	
Domain Type:	CodedValue
Code	**Value**
1	Residential
2	Mixed Use(Residential-Office-Retail)
3	Commercial
4	Public Facilities
5	Hotels and Apartments
6	Parks
7	OpenSpace and Recreation
8	Utilities
9	Landscaping
10	Sikka
11	BufferZone
12	Hospital/Clinic
13	Schools
14	Transportation

SUBTYPECD	
Domain Type:	CodedValue
Code	**Value**
1	FreeZone
2	DM

Status

Domain Type:	CodedValue
Code	**Value**
1	Preliminary Design

6. General Requirements

All digital drawings submitted to DEWA must confirm to the following requirements.

6.1 Documentation

The following documentation is required when submitting digital drawings to DEWA

- Document describing the content of digital data, including project details. Example:
  Project Name: Palm Island
  File Name(s): 132kV_ThePalm.shp, 33kV_ThePalm.shp, etc
  Date: July 1, 2004
  Company Name: Contractor LLC
  Contact Person: John Doe
  Contact Phone: +971 50 555 5555
  Contact E-mail: John.Doe@contractor.co.ae
  Format: DWG2000/DXF/GDB/DGNv8
  Layers submitted: As specified in the Table 1.0
  Thumbnail images of drawings
- Digital drawing files (DGN/DWG/DXF/GDB files)
- Comma Delimited File (CSV) sheet describing attributes of features included in the CAD drawings. *This document is not required if digital drawing is submitted in ESRI GDB file format.*

All documentation, including drawings, shall be submitted on CD-ROM/DVD media only.

6.2 Accuracy of co-ordinates in digital drawings

The accuracy of the co-ordinates submitted to DEWA shall be clearly mentioned on the submitted drawings or in attached documentation.

6.3 Digital drawing format standards

All drawing submitted to DEWA must be delivered in one of the following standardized drawing formats.

MicroStation design files (.dgn) up to Version 8i AutoCAD drawing files .dwg)
up to AutoCAD 2016

ESRI GDB V10

ASCII, binary and partial drawing interchange files (.dxf) that comply with DXF standards.

6.4 Map Orientation

All drawings shall be delivered in a non-rotated orientation (North facing up).

6.5 2D versus 3D drawings

All drawings are to be submitted as two dimensional (2D) graphic files. Three-dimensional Drawings are not acceptable except if specified by DEWA.

Appendix 1 : Sample CSV/CAD file template