

EXPLO National Manual for Projects Management

Volume 6, chapter 7

Utilities Design Aids



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Utilities Design Aids

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1.0 PURPOSE

The purpose of this section is to provide the Entity-A/E the templates, checklists, design guidelines, etc. (collectively called Design Aids) to comprehensively define the Utility design of a Project and ensure that the design is complete, uses appropriate templates and has undergone the necessary checks to achieve the quality design which can be used to purchase fit for purpose material/ equipment and safely install all facilities under Entity's project. .

Refer to Volume 6, Chapter 7, General Design Guidelines (Document No EPM-KE0-GL-000016) for the definition of terms used and the instructions on the use of every element of Design Aids. The Section 1 also covers non-discipline specific Design Aid such as Calculation Templates, Calculation check list, Design software list, etc. which apply to all engineering disciplines including Utility. Users are urged to carefully read the instructions provided in Volume 6, Chapter 7, Section 1-General Design to fully understand the purpose and use of all documents listed in this section.

The Entity-A/E shall review the documents listed in Volume 6, Chapter 7, Section 1 - General Design & Section 8 – Utilities Design and determine the templates, check lists, etc. applicable to their project. The list of applicable templates/ checklists/ etc. may vary from project to project depending upon the Design Scope of Work of every Project.

2.0 REFERENCE

1. EPM-KE0-GL-000016 - General Design Guideline
2. EPM-KEC-GL-000004 - Utility Design Guideline
3. EPM-KEC-RG-000002 - List of Civil Deliverable

3.0 UTILITY DESIGN AIDS

The Utility Design Aids developed for use on Entity's projects are listed below, each issued as a standalone document.

3.1 Utility Design Guideline

Refer to Volume 6, Chapter 7, General Design Guidelines (Document No EPM-KE0-GL-000016) for the purpose and the instructions on the use of discipline Design Guidelines issued for use in the design of Entity's Projects.

Refer to the document EPM-KEC-RG-000004 for the typical list of design deliverable applicable for Utility Design discipline.

3.2 Utility Design Deliverables

Refer to Volume 6, Chapter 7, General Design Guidelines (Document No EPM-KE0-GL-000016) for the purpose and the instructions on the use of List of Design Deliverables issued for use in the design of Entity's projects.

Refer to the document EPM-KEC-GL-000004 for the details of Utility Design Guideline.

3.3 Design Check Lists

Refer to Volume 6, Chapter 7, General Design Guidelines (Document No EPM-KE0-GL-000016) for the purpose and the instructions on the use of Checklists issued for the use in the design of Entity's projects.

Table below lists Utility check lists issued for use on Entity's Projects.



Utilities Design Aids

List of Utility Checklists

SN	Check List for	Document No
1	Utility Layout Drawings	EPM-KEC-TP-000007
2	Utility Profile Drawings	EPM-KEC-TP-000008
3	Utility Chamber Schedule Drawings	EPM-KEC-TP-000009
4	Utility Typical Chamber Drawings	EPM-KEC-TP-000010
5	Utility Corridor Layout Drawings	EPM-KEC-TP-000011

3.4 Templates

Refer to Volume 6, Chapter 7, General Design Guidelines (Document No EPM-KE0-GL-000016) for the purpose and the instructions on the use of Templates issued for the use in the design of Entity's projects.

Table below lists Utility templates issued for use on Entity's Projects.

List of Utility Templates

SN	Template for	Document No.
1	Storm Water Design Criteria	EPM-KEC-TP-000014
2	Potable & Fire Water Design Criteria	EPM-KEC-TP-000015
3	Sanitary Sewer Design Criteria	EPM-KEC-TP-000016
4	Recycled Water (Irrigation) System Design Criteria	EPM-KEC-TP-000018
5	Utility Corridor Criteria	EPM-KEC-TP-000020

4.0 ATTACHMENTS

1. EPM-KEC-TP-000007 - Checklist - Utility Layout Drawings
2. EPM-KEC-TP-000008 - Checklist - Utility Profile Drawings
3. EPM-KEC-TP-000009 - Checklist - Utility Chambers Schedule Drawings
4. EPM-KEC-TP-000010 - Checklist - Utility Typical Chamber Drawings
5. EPM-KEC-TP-000011 - Checklist - Utility Corridors Layout Drawings
6. EPM-KEC-TP-000014 - Storm Water Management Design Criteria Template
7. EPM-KEC-TP-000015 - Potable and Fire Water Design Criteria Template
8. EPM-KEC-TP-000016 - Sanitary Sewer Design Criteria Template
9. EPM-KEC-TP-000018 - Recycled Water (Irrigation) System Design Criteria Template
10. EPM-KEC-TP-000020 - Utility Corridor Design Criteria Template



Utilities Design Aids

Attachment 1 - EPM-KEC-TP-000007 - Checklist - Utility Layout Drawings

PROJECT NAME:		DRAWING NO.			REV.		
No.	QUESTIONS	ORIGINATOR			CHECKER		
		N/A	YES	NO	N/A	YES	NO
1	Does this drawing use latest road layout background?	☐	☐	☐	☐	☐	☐
2	Does this drawing specify unit of dimensions?	☐	☐	☐	☐	☐	☐
3	Does this drawing specify coordinate or baseline reference system and vertical datum?	☐	☐	☐	☐	☐	☐
4	Does this drawing show continuation drawing reference of other drawings?	☐	☐	☐	☐	☐	☐
5	Does this drawing show North Arrow that includes direction of Makkah?	☐	☐	☐	☐	☐	☐
6	Does this drawing show key map of project area?	☐	☐	☐	☐	☐	☐
7	Does this drawing show sheet key?	☐	☐	☐	☐	☐	☐
8	Does this drawing show legend for all the entities given on drawing?	☐	☐	☐	☐	☐	☐
9	Does this drawing show existing and proposed lines of utilities?	☐	☐	☐	☐	☐	☐
10	Is this drawing based on latest utility model?	☐	☐	☐	☐	☐	☐
11	Does this drawing indicate locations where concrete encasement required?	☐	☐	☐	☐	☐	☐
12	Does this drawing show references to all typical applicable drawings?	☐	☐	☐	☐	☐	☐
13	Does this drawing show other physical features such as boundary walls, fences, drainage features, etc.?	☐	☐	☐	☐	☐	☐
14	Does this drawing use latest building architectural background?	☐	☐	☐	☐	☐	☐
15	Does this drawing use latest grading layout background?	☐	☐	☐	☐	☐	☐
16	Does this drawing show gridlines of coordinates, if a coordinate system is being used on the project?	☐	☐	☐	☐	☐	☐
17	Does this drawing show survey information?	☐	☐	☐	☐	☐	☐
18	Does this drawing list reference specifications?	☐	☐	☐	☐	☐	☐
19	Are interferences with other utilities resolved?	☐	☐	☐	☐	☐	☐
20	Are setting-out coordinates of utility chambers listed on drawing?	☐	☐	☐	☐	☐	☐
21	Are proposed cover level, proposed invert levels and existing ground levels of each component of utilities given on drawing?	☐	☐	☐	☐	☐	☐
22	Is the numbering or coding of each component according to standards?	☐	☐	☐	☐	☐	☐
23	Does the numbering or coding of each component match with other reference drawings?	☐	☐	☐	☐	☐	☐
24	Is sizing information such as diameter, thickness and length noted on drawing?	☐	☐	☐	☐	☐	☐
25	Is pipeline or other utility material noted on drawing?	☐	☐	☐	☐	☐	☐
26	Is material of utility pipeline as per design and contract requirements?	☐	☐	☐	☐	☐	☐
27	Is minimum cover requirement followed for pipeline?	☐	☐	☐	☐	☐	☐
28	Is maximum depth of pipeline and chamber according to requirements?	☐	☐	☐	☐	☐	☐
29	Is ducting requirement noted on drawing?	☐	☐	☐	☐	☐	☐
30	Are utilities placed in the designated corridor?	☐	☐	☐	☐	☐	☐
31	Are pipeline bends, tees etc. specified on drawing?	☐	☐	☐	☐	☐	☐
32	Is this drawing prepared in accordance with utility components schedule drawings?	☐	☐	☐	☐	☐	☐
33	Is this drawing prepared in accordance with the latest calculations?	☐	☐	☐	☐	☐	☐
34	Does this drawing show actual size of components/chambers of utilities?	☐	☐	☐	☐	☐	☐
35	Does this drawing show bedding requirement for utilities?	☐	☐	☐	☐	☐	☐
36	Is bedding requirement correct for the depth, type and location of pipeline?	☐	☐	☐	☐	☐	☐
37	Are crossings of all other utilities shown on profile?	☐	☐	☐	☐	☐	☐
38	Are distances between any crossings less than the specified criteria?	☐	☐	☐	☐	☐	☐



Utilities Design Aids

Attachment 2 - EPM-KEC-TP-000008 - Checklist - Utility Profile Drawings

PROJECT NAME:		DRAWING NO.			REV.		
No.	QUESTIONS	ORIGINATOR			CHECKER		
		N/A	YES	NO	N/A	YES	NO
01	Does this drawing use latest road layout information?	☐	☐	☐	☐	☐	☐
02	Does this drawing specify unit of dimensions?	☐	☐	☐	☐	☐	☐
03	Does this drawing specify coordinate or baseline reference system and vertical datum?	☐	☐	☐	☐	☐	☐
04	Does this drawing show match line and reference to other drawings?	☐	☐	☐	☐	☐	☐
05	Does this drawing show location plan of project area?	☐	☐	☐	☐	☐	☐
06	Does this drawing show legend for all the entities given on drawing?	☐	☐	☐	☐	☐	☐
07	Does this drawing show all other existing and proposed utilities?	☐	☐	☐	☐	☐	☐
08	Is this drawing based on the latest utility model?	☐	☐	☐	☐	☐	☐
09	Does this drawing indicate locations where concrete encasement is required?	☐	☐	☐	☐	☐	☐
10	Does this drawing show references of all applicable typical drawings?	☐	☐	☐	☐	☐	☐
11	Does this drawing use latest grading layout information?	☐	☐	☐	☐	☐	☐
12	Does this drawing show all crossings of other utilities with levels and details?	☐	☐	☐	☐	☐	☐
13	Does this drawing list reference specifications?	☐	☐	☐	☐	☐	☐
14	Are interferences with other utilities resolved?	☐	☐	☐	☐	☐	☐
15	Does this drawing show all under track (if any), road crossings and drainage/water crossings?	☐	☐	☐	☐	☐	☐
16	Is the numbering or coding of each component according to standards?	☐	☐	☐	☐	☐	☐
17	Does this drawing show depths of utility structures/chambers?	☐	☐	☐	☐	☐	☐
18	Is utility structure/chamber depth safe for construction?	☐	☐	☐	☐	☐	☐
19	Is utility structure/chamber checked for space profiling?	☐	☐	☐	☐	☐	☐
20	Is utility structure/chamber hindered space obstructed by any architectural or structural component?	☐	☐	☐	☐	☐	☐
21	Does this drawing show gradient of utility pipeline?	☐	☐	☐	☐	☐	☐
22	Is gradient of utility pipeline according to the specified limit?	☐	☐	☐	☐	☐	☐
23	Does this drawing show station of utility pipeline?	☐	☐	☐	☐	☐	☐
24	Does this drawing show segment length of utility pipeline?	☐	☐	☐	☐	☐	☐
25	Does this drawing show material and size of utility pipeline?	☐	☐	☐	☐	☐	☐
26	Are all types of chambers provided that are required for maintenance and monitoring purposes?	☐	☐	☐	☐	☐	☐
27	Is material of utility pipeline or other utility as per design and contract requirements?	☐	☐	☐	☐	☐	☐
28	Does this drawing show invert levels, cover levels and ground levels of utility pipeline?	☐	☐	☐	☐	☐	☐
29	Do invert levels match hydraulic calculations?	☐	☐	☐	☐	☐	☐
30	Does the numbering or coding of each component match with other reference drawings?	☐	☐	☐	☐	☐	☐
31	Are ducting requirements noted on drawing?	☐	☐	☐	☐	☐	☐
32	Are pipeline bends, tees, thrust blocks etc. specified on drawing?	☐	☐	☐	☐	☐	☐
33	Is selected pipeline profile optimized with respect to cost?	☐	☐	☐	☐	☐	☐
34	Is this drawing prepared in accordance with information on components schedule drawings?	☐	☐	☐	☐	☐	☐
35	Is this drawing prepared in accordance with the latest calculations?	☐	☐	☐	☐	☐	☐
36	Does this drawing show actual size of utility components?	☐	☐	☐	☐	☐	☐
37	Does this drawing show bedding requirement of utilities?	☐	☐	☐	☐	☐	☐
38	Is bedding requirement correct for the depth, type and location of pipeline?	☐	☐	☐	☐	☐	☐
39	Does this drawing show connection point, or source point, or discharge point of utility?	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐

Attachment 3 - EPM-KEC-TP-000009 - Checklist - Utility Chambers Schedule Drawings

[illegible]



Utilities Design Aids

Attachment 4 - EPM-KEC-TP-000010 - Checklist - Utility Typical Chamber Drawings

PROJECT NAME:		DRAWING NO.			REV.		
No.	QUESTIONS	ORIGINATOR			CHECKER		
		N/A	YES	NO	N/A	YES	NO
01	Does this drawing specify unit of dimensions?	☐	☐	☐	☐	☐	☐
02	Does this drawing show references to all other applicable drawings?	☐	☐	☐	☐	☐	☐
03	Does this drawing show reference to applicable specifications?	☐	☐	☐	☐	☐	☐
04	Does this drawing show legend for all the entities given on drawing?	☐	☐	☐	☐	☐	☐
05	Does this drawing show internal plan of chamber?	☐	☐	☐	☐	☐	☐
06	Does this drawing show detail of chamber cover?	☐	☐	☐	☐	☐	☐
07	Does this drawing show cross sections/sections of chambers?	☐	☐	☐	☐	☐	☐
08	Does this drawing show finished ground level and existing level?	☐	☐	☐	☐	☐	☐
09	Are internal and external dimensions of chamber listed or tabulated on drawing?	☐	☐	☐	☐	☐	☐
10	Does this drawing present or tabulate depth of chambers?	☐	☐	☐	☐	☐	☐
11	Are all mechanical fittings in the chamber illustrated?	☐	☐	☐	☐	☐	☐
12	Are mechanical fittings shown as per scale?	☐	☐	☐	☐	☐	☐
13	Are distances of mechanical fittings from internal walls of chamber shown?	☐	☐	☐	☐	☐	☐
14	Can mechanical components fit in chamber due to their height?	☐	☐	☐	☐	☐	☐
15	Is setting out point of chamber indicated?	☐	☐	☐	☐	☐	☐
16	Does this drawing show thickness of wall, foundation and cover slab?	☐	☐	☐	☐	☐	☐
17	Does this drawing show structural details of chamber, or provide reference to structural details?	☐	☐	☐	☐	☐	☐
18	Does this drawing show sleeve requirement of pipe or other utility entry?	☐	☐	☐	☐	☐	☐
19	Does this drawing provide details of all material used in drawing?	☐	☐	☐	☐	☐	☐
20	Is chamber constructible with respect to size and depth?	☐	☐	☐	☐	☐	☐
21	Is chamber size safe for maintenance activity?	☐	☐	☐	☐	☐	☐
22	Can chamber be safely constructed?	☐	☐	☐	☐	☐	☐
23	Is chamber cover provided for entry during maintenance activity?	☐	☐	☐	☐	☐	☐
24	Is chamber cover designed as per the applicable traffic load?	☐	☐	☐	☐	☐	☐
25	Is ventilation arrangement of chamber proposed in drawing?	☐	☐	☐	☐	☐	☐
26	Is specification of concrete provided in drawing?	☐	☐	☐	☐	☐	☐
27	Is ladder detail provided for chamber?	☐	☐	☐	☐	☐	☐
28	Is chamber checked for buoyancy condition?	☐	☐	☐	☐	☐	☐
29	Are external and internal protections of chamber wall noted?	☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐	☐
No.	Checker's Comments	Resolution					
Originator's Name / Signature and Date:		Checker's Name / Signature and Date:					



Utilities Design Aids

Attachment 5 - EPM-KEC-TP-000011 - Checklist - Utility Corridors Layout Drawings

PROJECT NAME:		DRAWINGS NO.			REV.		
No.	QUESTIONS	ORIGINATOR			CHECKER		
		N/A	YES	NO	N/A	YES	NO
1	Does this drawing use the latest building architectural background?	☐	☐	☐	☐	☐	☐
2	Does this drawing use the latest road layout background?	☐	☐	☐	☐	☐	☐
3	Does this drawing show other physical features such as boundary walls, fences, drainage features, etc.?	☐	☐	☐	☐	☐	☐
4	Does this drawing show gridlines of coordinates, if a coordinate system is being used?	☐	☐	☐	☐	☐	☐
5	Does this drawing show North Arrow that includes direction of Makkah?	☐	☐	☐	☐	☐	☐
6	Does this drawing show legend for all the entities given on drawing?	☐	☐	☐	☐	☐	☐
7	Does this drawing show key map of project area?	☐	☐	☐	☐	☐	☐
8	Does this drawing show sheet key?	☐	☐	☐	☐	☐	☐
9	Does this drawing show references to all applicable drawings?	☐	☐	☐	☐	☐	☐
10	Does this drawing specify units of dimensions?	☐	☐	☐	☐	☐	☐
11	Does this drawing specify coordinate or baseline reference system and vertical datum?	☐	☐	☐	☐	☐	☐
12	Does this drawing show match-line and references to other drawings?	☐	☐	☐	☐	☐	☐
13	Does this drawing show corridors of all applicable utilities such as electrical, gas, irrigation, water, sewer, storm water, telecom, street lighting, etc.?	☐	☐	☐	☐	☐	☐
14	Is this drawing coordinated with all utility layout drawings?	☐	☐	☐	☐	☐	☐
15	Is this drawing based on all the latest utility 3D models?	☐	☐	☐	☐	☐	☐
16	Is the dimension or width of each utility corridor clearly marked on drawing?	☐	☐	☐	☐	☐	☐
17	Are interferences of utilities resolved?	☐	☐	☐	☐	☐	☐
18	Is any utility encroaching on or placed in another utility corridor?	☐	☐	☐	☐	☐	☐
19	Is utility corridor of each utility as per the utility corridor requirement and cross section?	☐	☐	☐	☐	☐	☐
20	Are utility chambers accommodated within utility corridor of that particular utility?	☐	☐	☐	☐	☐	☐
21	Are all utility corridors shown with separate colors or legends for identification?	☐	☐	☐	☐	☐	☐
22	Does this drawing clearly show curb line of road?	☐	☐	☐	☐	☐	☐
23	Does this drawing show ducts for utilities?	☐	☐	☐	☐	☐	☐
24	Is the duct extended as per the requirement into road curb?	☐	☐	☐	☐	☐	☐
25	Is any utility duct (wrongly) discontinuing into road?	☐	☐	☐	☐	☐	☐
26	Are utility corridors chamfered on junctions?	☐	☐	☐	☐	☐	☐
27	Are utility corridors (wrongly) encroaching on the plot boundary?	☐	☐	☐	☐	☐	☐
28	Are utility corridors provided for any future connection or utility?	☐	☐	☐	☐	☐	☐
29	Does any proposed duct interfere with other ducts or utilities at road junctions?	☐	☐	☐	☐	☐	☐
30	Is special consideration given to maintaining safe distance separation of gas and electrical lines, especially at utility crossings?	☐	☐	☐	☐	☐	☐
31	Is special consideration given to maintaining safe distance separation of water and sewer lines, especially at utility crossings?	☐	☐	☐	☐	☐	☐
No.	Checker's Comments	Revision					
Originator's Name / Signature and Date:		Checker's Name / Signature and Date:					



Attachment 6 - EPM-KEC-TP-000014 - Storm Water Management Design Criteria Template

	Storm Water Management Design Criteria Template
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Attachment 7 - EPM-KEC-TP-000015 - Potable and Fire Water Design Criteria Template



Potable and Fire Water Design Criteria Template

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Attachment 8 - EPM-KEC-TP-000016 - Sanitary Sewer Design Criteria Template



Sanitary Sewer Design Criteria Template

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Attachment 9 – EPM-KEC-TP-000018 - Recycled Water (Irrigation) System
Design Criteria Template

 **Recycled Water (Irrigation) System Design Criteria Template**

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SAMPLE



Attachment 10 - EPM-KEC-TP-000020 - Utility Corridor Design Criteria Template

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