

EXPRO National Manual for Projects Management

Volume 6, chapter 7

Civil (Site Works and Roads) 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 Civil 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. This 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 Civil. Users are urged to carefully read the instructions provided in the aforesaid document 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 2 - Civil 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-000001 Civil Design Guideline
- 3. EPM-KEC-GL-000005 Surveying Guideline
- 4. EPM-KEC-PR-000001 Exterior Signage Criteria Procedure

3.0 CIVIL DESIGN AIDS

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

3.1 Civil 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.

Civil Design Guideline and Surveying Guideline references are listed below:

SN	Title	Document No.
1	Civil Design Guideline	EPM- KEC-GL-000001
2	Surveying Guideline	EPM- KEC-GL-000005

3.2 Civil Design Deliverables

Refer to Volume 6, Chapter 7, General Design Guidelines (Document No EPM-KEM-GL-000001) for the purpose and the instructions on the use of List of Design Deliverables issued for use in the design of Entity's projects.

List of Civil Design Deliverables

SN	Title	Document No.
1	List of Civil Design Deliverables	EPM- KEC-RG-000001



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 Civil Checklists issued for use on Entity's Projects

List of Civil Checklists

SN	Check List for	Document No
1	Grading Layout Drawings	EPM-KEC-TP-000001
2	Road Layout and Profile Drawings	EPM-KEC-TP-000002
3	Grading Cross-Section at Interval Drawings	EPM-KEC-TP-000003
4	Setting-out Drawings	EPM-KEC-TP-000004
5	Road Cross-Section at Interval Drawings	EPM-KEC-TP-000005
6	Road Signage and Marking Drawings	EPM-KEC-TP-000006

3.4 Templates

Refer to Volume6, 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 Civil templates issued for use on Entity's Projects

List of Civil Templates

SN	Template for	Document No.
1	Survey Requirement	EPM-KEC-TP-000012
2	Road Pavement Design Criteria	EPM-KEC-TP-000013
3	Earthwork and Grading Design Criteria	EPM-KEC-TP-000017
4	Traffic & Transportation Design Criteria	EPM-KEC-TP-000019
5	Street & Roadways Design Criteria	EPM-KEC-TP-000021

3.5 Typical Construction Detail Drawings (TCDDs)

Refer to Volume 6, Chapter 7, General Design Guidelines (Document No EPM-KE0-GL-000016) for the purpose of issue of Typical Construction Detail Drawings (TCDD) in the design of Entity's projects Table below lists examples of Civil TCDD's issued as sample for use by Entity.

SN	Sample Installation Standard Details	Discipline	Drawing No.
1	Typical Cross-Section - Residential Road	Civil	EPM-KEC-05-000001
2	Typical Barrier Types	Civil	EPM-KEC-05-000002
3	Curb and Gutter Detail	Civil	EPM-KEC-05-000003
4	Pre-cast Unit Paving Blocks	Civil	EPM-KEC-05-000004
5	Sewer Line Pipeline Section	Civil	EPM-KEC-05-000005

3.6 Procedure

Civil procedure of Exterior Signage Criteria (Document No. EPM-KEC-PR-000001) issued for use on Entity's Projects. The purpose of this procedure is to establish the criteria and define the signage category applicable to infrastructure projects.



4.0 ATTACHMENTS

- 1. EPM-KEC-TP-000001 Checklist Grading Layout Drawings
- 2. EPM-KEC-TP-000002 Checklist Road Layout & Profile Drawings
- 3. EPM-KEC-TP-000003 Checklist Grading Cross-Section at Interval Drawings
- 4. EPM-KEC-TP-000004 Checklist Setting-out Layout Drawings
- 5. EPM-KEC-TP-000005 Checklist Road Cross-Section at Interval Drawings
- 6. EPM-KEC-TP-000006 Checklist Road Signage & Marking Drawings
- 7. EPM-KEC-TP-000012 Survey Requirement Template
- 8. EPM-KEC-TP-000013 Road Pavement Design Criteria Template
- 9. EPM-KEC-TP-000017 Earthwork and Grading Design Criteria Template
- 10. EPM-KEC-TP-000019 Traffic & Transportation Design Criteria Template
- 11. EPM-KEC-TP-000021 Streets & Roadways Design Criteria Template
- 12. EPM-KEC-RG-000002 List of Civil Deliverables
- 13. EPM-KEC-05-000001 Typical Cross-Section-Residential Road
- 14. EPM-KEC-05-000002 Typical Barrier Types
- 15. EPM-KEC-05-000003 Curb and Gutter Detail
- 16. EPM-KEC-05-000004 Pre-cast Unit Paving Blocks
- 17. EPM-KEC-05-000005 Sewer Line Pipeline Section



Attachment 1 - EPM-KEC-TP-000001 - Checklist - Grading Layout Drawings

PROJECT NAME:			DRAWING NO. RE							
No.	QUESTIONS	ORI	GINA:	TOR		IECK	ER			
	QUESTIONS			MO	N/A	YES	NO			
1	Does this drawing show physical features such as boundary walls,		0		0	0	0			
	fences, drainage/hydrological features, etc.? Does this drawing show gridlines of coordinates if a coordinate									
2	Does this drawing show gridlines of coordinates of a coordinate system is used?									
3	Does this drawing show legends for all the entities given on drawing?									
	Does this drawing show North Arrow that also includes Makkah	_		_	_	_	_			
4	direction?									
5	Does this drawing show key map of project area?									
6	Does this drawing show sheet key?					0				
7	Does this drawing show references of all typical applicable				0		0			
•	drawings?				_	_	_			
8	Does this drawing show reference to specifications? Does this drawing specify units of dimensions?		00			0				
9		ш	3	2		ш				
10	Does this drawing specify coordinate or baseline reference system and vertical datum?									
	Does this drawing show match line and drawing reference of other									
11	drawings?									
12	Does this drawing show major and minor grading contours?						0			
13	Does this drawing show major and minor contours of existing				0	0	0			
13	surface?	-	-	ш	3	ш	u			
14	Does this drawing show stations at intervals that maken with the			п	0	0	0			
17	cross-sections?									
15	Does this drawing show the coordinates by other survey data of						0			
4.00	grading area limits? Does this drawing show grading levels at appropriate distances?				0		0			
16	Does this drawing show the flew arrows that show direction of slope	-	1	-	1	ш	ш			
17	of grading?									
18	Does this drawing show the Daylight slope of grading?						0			
19	Does this drawing clearly show the grading cut and fill?									
20	Are specified cut and fill slopes used for grading of site and road?						0			
21	Is the minimum vertical clearance and slope between Finished Floor				0	0	0			
201	Level and Finished Pavement Level appropriate?	-	1	-	1	3	3			
22	Is the grading developed to minimize impact to natural drainage		0	0	0		0			
	pattern?									
23	Are stabilization measures shown on graded slopes that are subject to erosion?									
24	Are heights of cut and fill within the specified limits?				0		0			
	Are minimum transverse and minimum longitudinal gradients of						_			
25	graded surfaces in accordance with standards?									
	Are maximum transverse and maximum longitudinal gradients of	-		-	-					
26	graded surfaces in accordance with standards?									
27	Are the limits of grading clearly marked on this drawing?					0				
	Charles de Commonte									
NO.	checker's Comments Ri			esolution						
Origina	Originator's Name / Signature and Date: Checker's Name / Signature									
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Attachment 2 - EPM-KEC-TP-000002 - Checklist - Road Layout & Profile Drawings

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	31	Does the profile on this drawing show existing ground levels,		0		0	0	_	



Attachment 3- EPM-KEC-TP-000003 - Checklist - Grading Cross-Section at Interval Drawings

PROJECT NAME:		DRA	WING	NO.		REV.	,
P-1-	OUESTIONS	OR	ORIGINATOR			HECK	ER
No.	QUESTIONS	N/A	YES	NO	N/A	YES	NO
01	Does this <u>drawing</u> use latest model and information of existi ground and grading?	ng 🗖			0		
02	Does this drawing show legends for all the entities given on drawin-	17 🔲					
03	Does this drawing show references to all applicable typical		п			0	0
	drawings?		-		_	_	_
04	Does this drawing show reference to specifications?				0		
05	Does this drawing specify unit of dimensions?						
06	Does this drawing show horizontal and vertical scale of cross section?	8-					
07	Is appropriate vertical exaggeration used in this drawing?				0		
08	Is horizontal and vertical scale of cross-section appropriate and per standard?	as D			0		
09	Does this drawing specify correct vertical datum reference?						
10	Does this drawing show match line of other drawings?						
11	Does this drawing show station of the cross-section/sections?						
12	Does the station of the cross-section/sections in this drawing was with grading layout drawings?						
13	Does this drawing show level information of exhaling ground, top s removal, and grading? Does this drawing show offset values of exhaling ground, top s						
14	removal, and grading?	oil				0	0
15	Is level information in data Gens correct with respect to station?						
16	Are specified cut and fill slopes used for grading of site and road?						
17	Are the grading elevations coordinated with building pad elevatio and other nearby facilities?				0		
18	Is minimum vertical clearance and slope between Finished Flo Level and Finished Pavement Level appropriate?	or 🔳				0	
19	Is grading developed based on natural drainage pattern of area?						
20	Are graded slopes, swales and ditches that are subject to erosi- stabilized?	on 🗖					
21	Are heights of cut and fill within the specified limits?						
22	Are minimum transverse and minimum longitudinal gradients graded surfaces in accordance with standards?	of 🗖					
23	Are maximum transverse and maximum longitudinal gradients graded surfaces in accordance with standards?	of 🗖			0	0	
 							
No.	Checker's Comments	Resolu	tion				
Origin	Originator's Name / Signature and Date: Checker's Name / Signature						



Attachment 4 - EPM-KEC-TP-000004 - Checklist - Setting-out Layout Drawings

PROJE	PROJECT NAME:			WING	NO.		REV.	
bl -	OUESTIONS		ORIGINATOR			CI	HECK	ER
No.	QUESTIONS		NAA.	YES	MO	NAA.	YES	NO
1	Does this drawing use the latest building architectural b	ackground?						
2	Does this drawing show a legend for all the entities	s shown on					0	0
2	drawing?		1	-	3	3	3	u
3	Does this drawing show North Arrow that also include	ies Makkah						
	direction? Does this drawing show a key map of project area?							
4 5	Does this drawing show a key map of project area? Does this drawing show sheet key?		3	_	3			
6	Does this drawing show sneet key? Does this drawing show reference to all typical applicable	Commission of						
7	Does this drawing show reference to an typical applicable.	c urawiiiys r	_			0	<u>-</u>	0
8	Does drawing specify unit of dimensions?		_				0	0
9	Does drawing specify coordinate or baseline reference	system?					_	_
_	Does this drawing show continuation drawing referer					_	1	_
10	drawings?	(6)						
11	is drawing based on latest road model?	$a \rightarrow b$	20					
12		ph/head with				п		п
12	station?		-			ш	3	ш
13	Does this drawing show the correct horizontal phones.							
14	Does this drawing show clearly the alignment's langer	t, curve and	0			0	0	0
17	spiral?			-		-		-
15	Does this drawing show docadinates of all requires	1 points on						0
	alignment's tangents, curve and soliday Does this drawing show horizontal curve data such a	a dames of						
16	curvature, radius, length and etc.?	s degree or						
		ch as sniral						
17	length. A value and etc.?	urras spirai						
18	Does this drawing show the tangent length and bearing	angle?						0
	Does this drawing show the horizontal alignment whi					_		
19	with the minimum radius corresponding to the design so	eed?						
	Does this drawing show the horizontal alignment whi	ch complies						
20	with the minimum sight distances corresponding to	the design						
	speed?	W-						
21	Does this drawing show the horizontal alignment whi	ch complies					0	0
2.1	with minimum curve length?						-	-
22	Does this drawing show the horizontal alignment whi	ch complies				0		0
	with minimum and maximum tangent lengths?						1	
23	Does this drawing show the horizontal alignment with o	orrect spiral						
	length if any?							
No.	Checker's Comments	Re	Bolu	tion				
diam'r I	and the second s	Harman I Billion and an		No. of Co.				
Originator's Name / Signature and Date: Checker's Name / Signature and Date:								



Attachment 5 - EPM-KEC-TP-000005 - Checklist - Road Cross-Section at Interval Drawings

PROJECT NAME:		DRA	DRAWING NO.				REV.		
	OUESTIONS		ORI	GINA1	TOR	CH	HECK	ER	
No.	QUESTIONS		NAA.	YES	MO	N/A	YES	NO	
01	Does this drawing use latest road, existing ground, and finished					0	0	0	
02	grading information? Does this drawing show legends for all the entities of	Persistente de accel							
02	Does this drawing show references to all a		ш			3	_	_	
03	drawings?								
04	Does this drawing show reference to specifications	:?							
0.5	Does this drawing specify unit of dimensions?								
06	Does this drawing show horizontal and vertical section?	scale of cross-					0		
07	Is horizontal and vertical scale of cross-section ap per standard?	propriate and as					0	0	
08	Does this drawing specify correct height datum ref						0		
09	Does this drawing show match line of other drawing								
10	Does this drawing show station of the cross-sec roadway segment to which each applies?	tion/sections and				0			
11	In this drawing, do the stations of the cross-section with layout drawings?	n/sections match					0		
12	Do the cross-sections match with the typical section	of the conscular.				0	0	0	
	road? Does this drawing show details of the road i.e. sid	ewalk, road curb.	_					_	
13	sub-grade, etc.?								
14	Does this drawing show center line of cold. Does this drawing show direction and our photographicage.						0		
15	road cross-section?								
16	Does this drawing show correct subtr elevation applicable?	•				0	0		
17	Does this drawing show byel information for subgrade, advanced grading and existing ground?						0		
18	Does this drawing show offset values of finished advanced grading and existing ground?	grade, subgrade,				0	0		
19	Is level information in data band correct with corresponding station?	respect to the				0	0		
20	Does this drawing show the correct number of lane	s and lane width?						0	
21	Does this drawing show the correct curb type and			_		0	0	0	
2.1	sections? Does this drawing show the correct barrier type	and location on			-	_	_	-	
22	cross-sections?								
23	Does this drawing show the correct guard rail type cross-sections?	e and location on							
24	Does this drawing show the correct fill slope?								
25	Does this drawing show the correct cut slope?								
26	Does this drawing show the correct aggregate base and pavement type for the road, including thicknesses?					0	0	0	
	2 50								
No.	Checker's Comments R		golui	tion					
Origina	etor's Name / Signature and Date: Che	ker's Name / Signature	and D	Series:					



Attachment 6 - EPM-KEC-TP-000006 - Checklist - Road Signage & Marking Drawings

Does this drawing show key map of project area? Does this drawing show well experted the state of the state	PROJECT NAME:				DRAWING NO. REV.					
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The state of the s	36	Is correct type of arrow marking provided as per local standards?								



Attachment 7 - EPM-KEC-TP-000012 - Survey Requirement Template



Survey Requirement Template

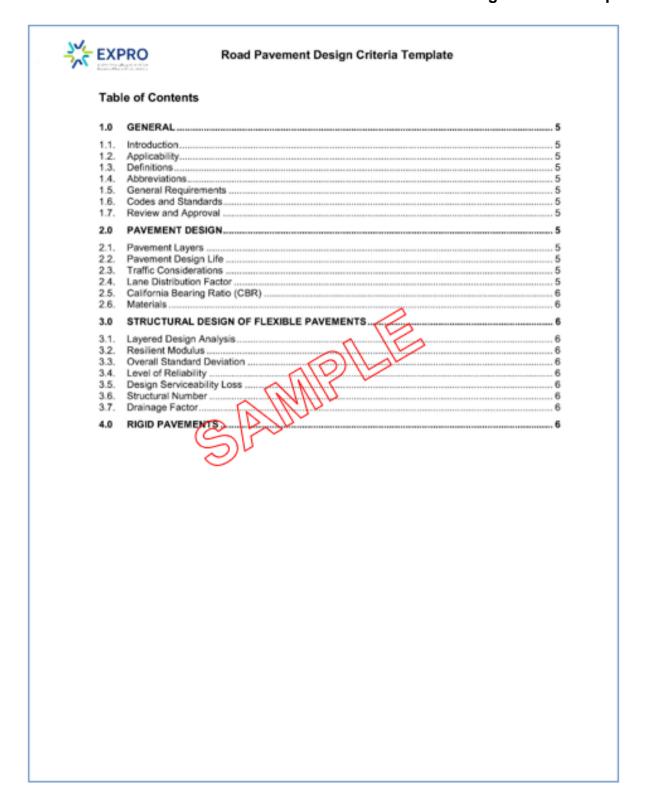
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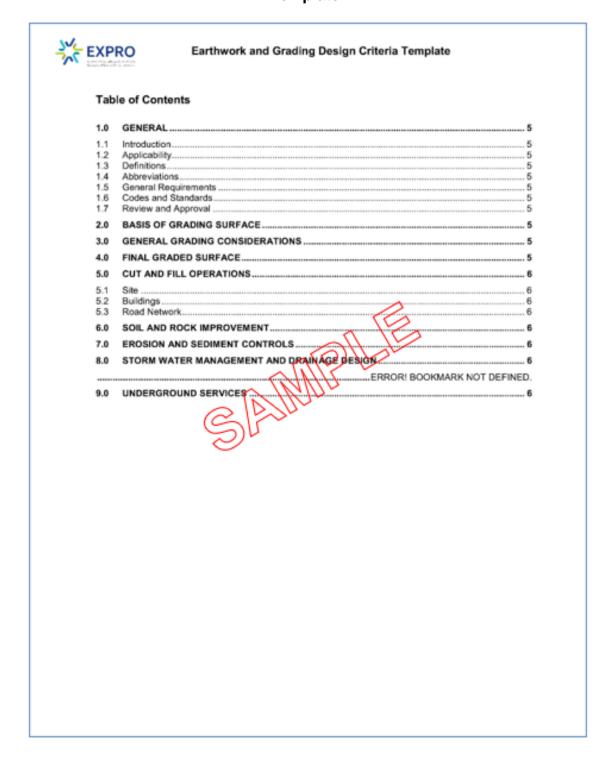


Attachment 8 - EPM-KEC-TP-000013 - Road Pavement Design Criteria Template





Attachment 9 – EPM-KEC-TP-000017 - Earthwork and Grading Design Criteria Template





Attachment 10 - EPM-KEC-TP-000019 - Traffic & Transportation Design Criteria **Template**



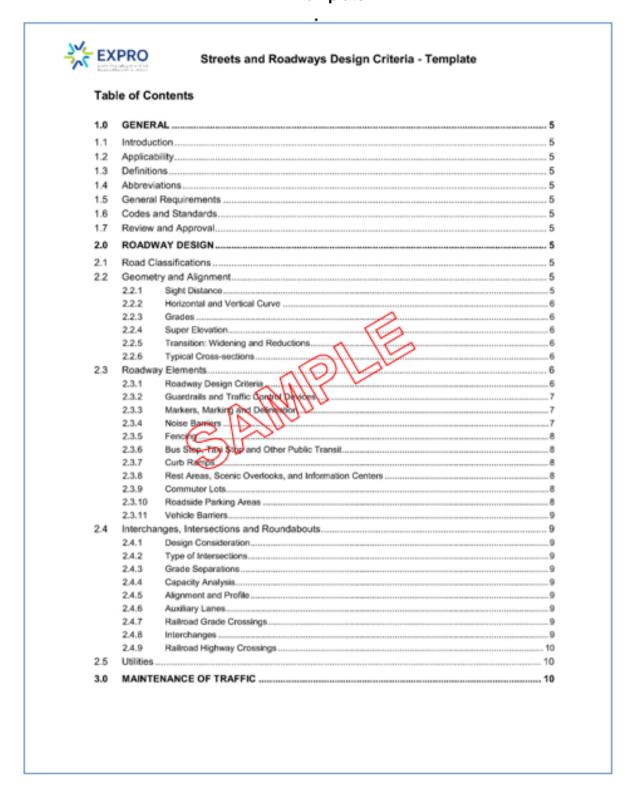
Traffic and Transportation Design Criteria Template

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Attachment 11 - EPM-KEC-TP-000021 - Streets & Roadways Design Criteria Template



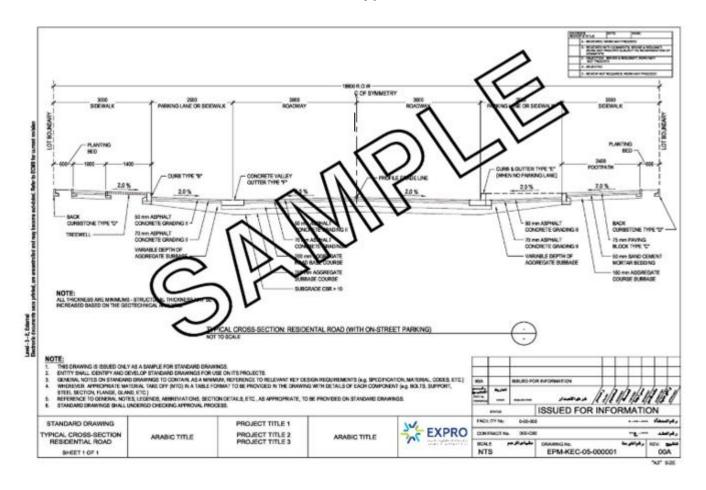


Attachment 12 - EPM-KEC-RG-000002 - List of Civil Deliverables

	Deliverable Tool		Deliverable Contents	ģ	Deliverable/ Data required for				
SN		Tool		Developed During*	рициприна	Construction	Start-Up & Commissioning	Project Controls	Comments
1.0 (GENERAL								
1	BIM / 3D Model	S&Cent (oBeads, (otpa)Vorke/ Civil3D, NavistVorke Bentley Navigator	The 3D model shall show realistic depictions and contain relevant design data for all physical disciplines in sufficient detail to produce the design deliverables. Model reviews shall be conducted for functional checks and collision checks. The BIM / 3D model shall be setup to support 4D and 5D delivery. Model collaboration methods will be compensate all stakeholders are referencing the latest BIM / 3D model and collaborating most effectively. Interference checking is porter to an amodels; interference management processes are used as part of the design and quality control process and the stracting IFC deliverables.	BAD		Υ		Υ	
2	Specifications	e≅pes/MS Word	Engineering scheduled and define the technical and Quality Management System require pents, including applicable codes. Refer to EPM-KEC- RG-0000-young contents of SOW and Specification	BAD	×	×	Y		
3	Bulk Quantity Takeoff / BOQ	MS Excel / MS Access	Provide Ed. Quantity Takeoffs (QTOs) for tracking engineering-released quantities at 30%, 60%, & 90% Milestones to support construction installation including method of measurement and/or standard code or measurement principles.	BAD	≻	Y	Y	Υ	
4	Tagged Material Tracking / BOQ	MS Excel / MS Access	Equipment and Specialty Items (EA): Includes tags, sizes, description, quantity, physical dimensions, weight, capacity, datasheet (fit / function) type information.	D		×	Y	Υ	
5	Permitting submittals	PDF	Include documents and drawings required for applicable construction and environmental permitting activities for the project. Specific documents vary by scope and permit type as well as responsible discipline.	BAD	×	Y			
6	Interface Management Plan	MS Office	Establish the Interface Management Plan per discipline to ensure all stakeholders receive the information they require in a timely manner.	BAD	Y	Y			
7	Standard Details and Notes	2D	Select details needed and show them on a set of standard project drawings. These details include those items that do not need to be uniquely designed for a specific set of loads or job conditions. They include but are not limited to: «Survey monuments «Supporting road details (guardrails, curbs, etc.) «Chain link fence detail	BāD	Υ	Y			

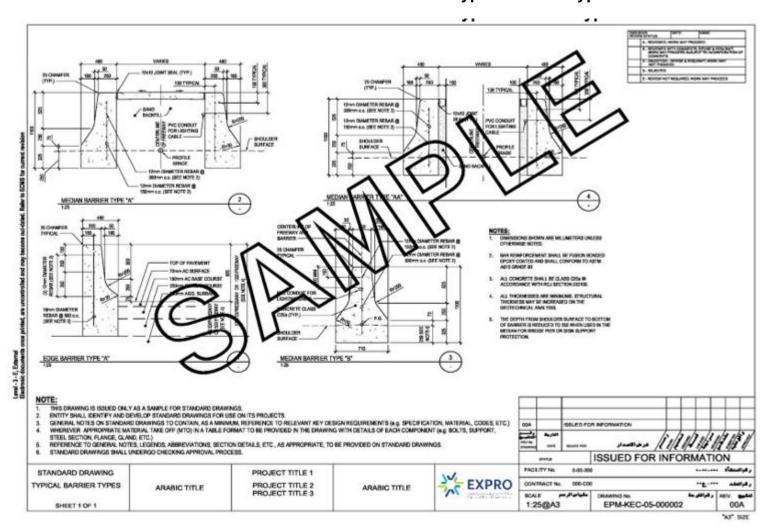


Attachment 13 - EPM-KEC-05-000001 - Typical Cross-Section-Residential Road



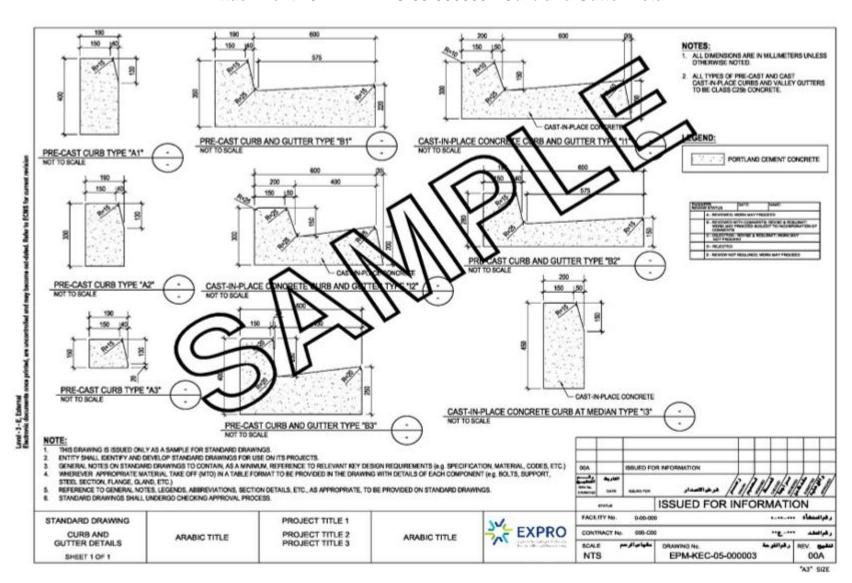


Attachment 14 - EPM-KEC-05-000002 - Typical Barrier Types



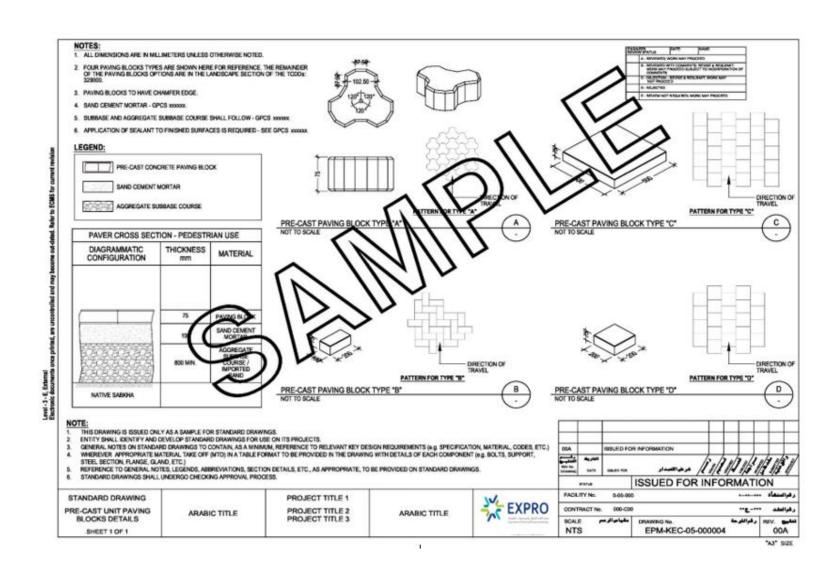


Attachment 15 - EPM-KEC-05-000003 - Curb and Gutter Detail





Attachment 16 - EPM-KEC-05-000004 - Pre-cast Unit Paving Blocks





Attachment 17 - EPM-KEC-05-000005 - Sewer Line Pipeline Section

