

**TENDER FOR CONSTRUCTION OF RESIDENTIAL HOUSING UNITS  
AT TURKWEL POWER STATION – PHASE II (KGN-TURK-005-2024)**

**TYPICAL CULVERT DETAILS AND SPECIFICATIONS**

## Supply and Installation of Concrete Pipe Culverts

**08-60-031      600 mm surrounds**

**08 – 60-33 `    900 mm surrounds**

The Contractor shall supply, lay and join concrete pipes to form culverts, including the concrete bedding; haunching or surrounds; and backfilling, in accordance with the Drawings for the Type and diameter specified in the Contract or directed by the Engineer.

The pipes shall be of Class 20/20 concrete, at least 28 days cured, and manufactured on site or procured from a supplier approved by the Engineer and preferably ogee jointed. The pipes shall be laid on a bedding of Class 15/20 concrete of dimensions as shown on the Drawings and jointed with cement mortar 1:4.

The culvert gradient including the outlet shall be a minimum 2%.

The pipes shall be surrounded with Class 15/20 concrete to the dimensions shown on the Drawings or as directed by the Engineer.

Backfilling shall be carried with approved material and compacted in layers not exceeding 150 mm loose depth and placed evenly on each side of the pipe. Ramps shall be shaped to achieve a minimum overfill of 75% of the pipe diameter, and shall be tapered back on the carriageway to provide a gradual approach, as directed by the Engineer.

If the Contractor wishes to construct culverts on site, using inflatable or collapsible forms the Engineer's approval shall first be sought for the proposed working method.

On completion the inside of the culvert shall be smooth, without displaced joints or other obstructions and true to line and level.

The Contractor shall use **Labour** and appropriate compaction **Equipment** to carry out this item work

Work Method:                    **LM-MB**

### Quality Control

- Concrete quality shall be checked for cracks, honey combing, and other defects.
- Before the pipes are laid, the gradient of the concrete bedding shall be checked and shall not be less than 2%
- The joints shall be checked to see that they have been properly made.

Measurement Unit: m

The measurement shall be in linear metres of the installed Type and size of culvert specified, measured net according to the Drawings.

### Payment

The unit rate shall be the full compensation for labour, tools, materials, equipment and any other incidentals that may be required in carrying out the work.

### **08-60-030 Excavate in soft material for culverts**

These activities should be done in accordance with Bill 8, sub clauses 8.01 to 8.20 in the Standard Specifications for Roads and Bridges 1986.

The Contractor shall use both **Labour** and appropriate **Equipment** to carry out this item.

Work Method: **LM-MB**

### Quality Control

- The workability and mix of concrete for the classes 15/20 and 20/25 shall be checked using the slump test and shall have a slump limit as directed by the Engineer.
- The laying and joining of the culverts shall be subject to the approval of the engineer.

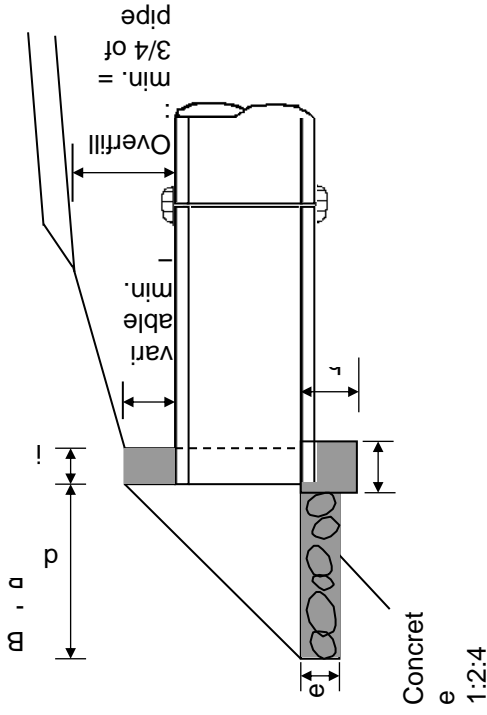
Measurement Unit: m

The measurement shall be the length of culvert laid.

### Payment

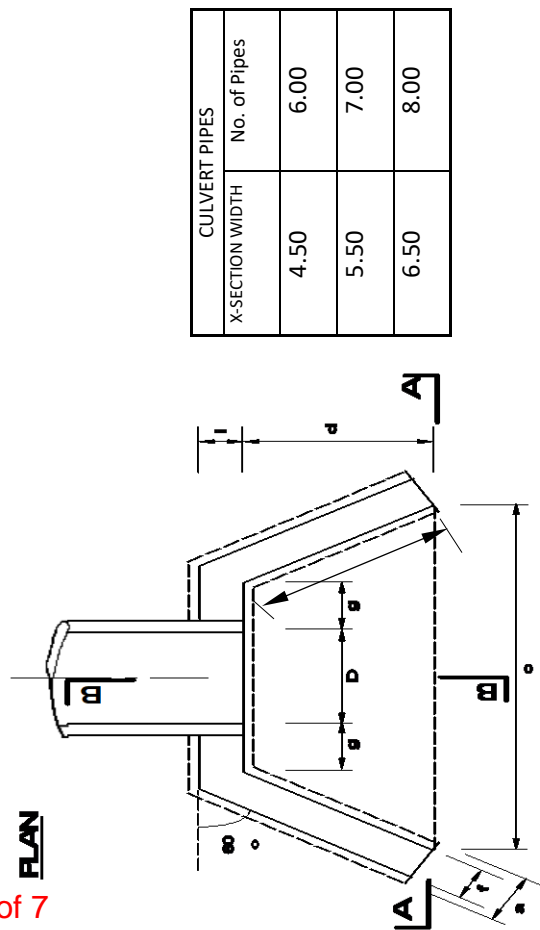
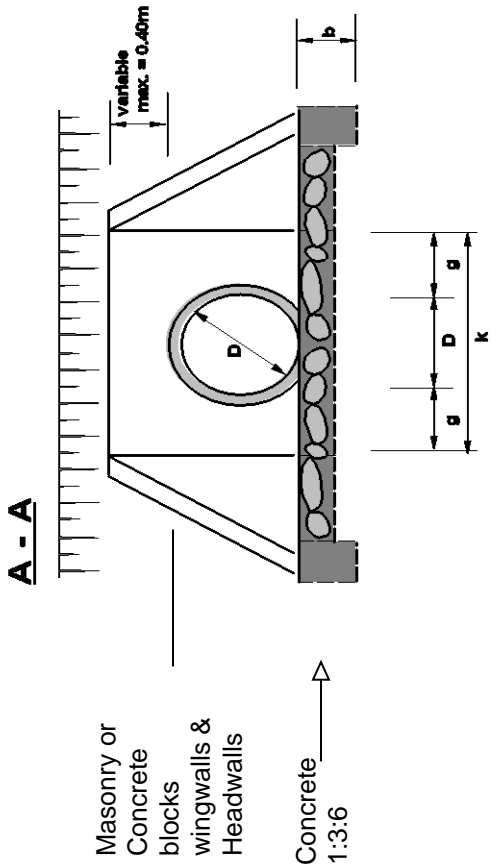
The unit rate shall be the full compensation for labour, tools, materials, formwork, equipment and other incidentals that may be required in carrying out the work.

**FIGURE C.8 - HEADWALL TYPE 1  
(HEAD AND WINGWALLS)**



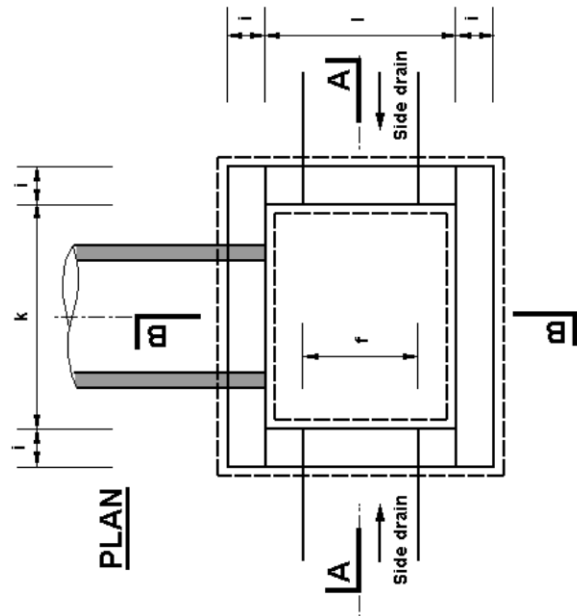
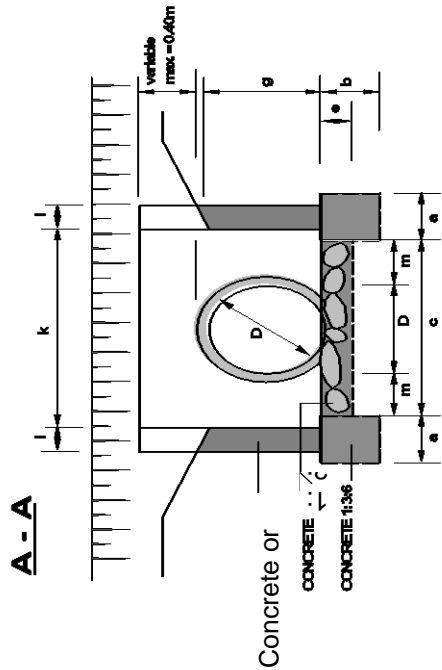
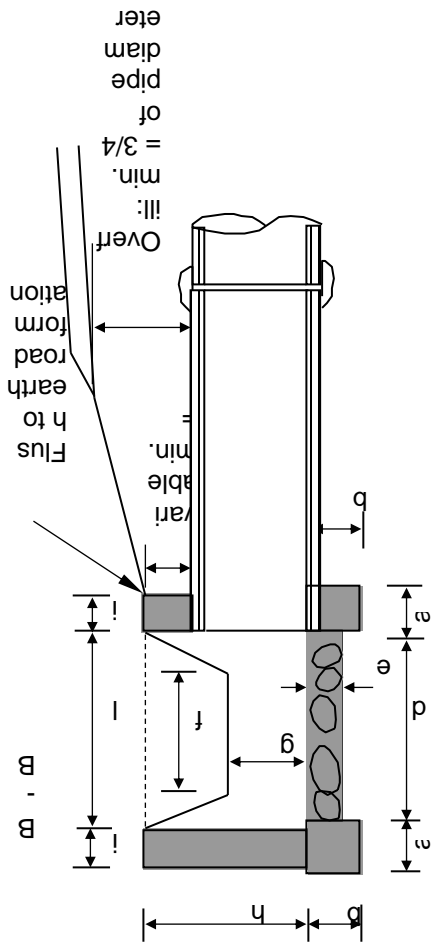
**DIMENSIONS AND MATERIAL REQUIREMENTS**

PIPE DIAMETER IN (M)	TYPE A (CONCRETE BLOCKS)			TYPE B (STONE MASONRY)		
	450	600	900	450	600	900
<b>DIMENSION</b>	<b>UNIT</b>					
a	0.30	0.30	0.30	0.40	0.40	0.60
b	0.30	0.30	0.40	0.30	0.30	0.40
c	2.20	2.35	2.89	2.20	2.35	2.89
d	1.00	1.00	1.20	1.00	1.00	1.20
e	0.20	0.20	0.20	0.20	0.20	0.20
f	0.20	0.20	0.20	0.40	0.40	0.40
g	0.30	0.30	0.30	0.30	0.30	0.30
h	1.15	1.15	1.39	1.15	1.15	1.39
i	0.20	0.20	0.20	0.40	0.40	0.40
k	1.05	1.20	1.50	1.05	1.20	1.50
<b>MATERIAL REQUIREMENT</b>						
FOUNDATION	0.3			0.4		
(Concrete)	m <sup>3</sup>			m <sup>3</sup>		
HEAD/WINGWALLS	0.4			0.8		
(Concrete/Masonry)	m <sup>3</sup>			m <sup>3</sup>		
APRON	0.33			0.33		
(Concrete)	m <sup>3</sup>			m <sup>3</sup>		



CULVERT PIPES	
X-SECTION WIDTH	No. of Pipes
4.50	6.00
5.50	7.00
6.50	8.00

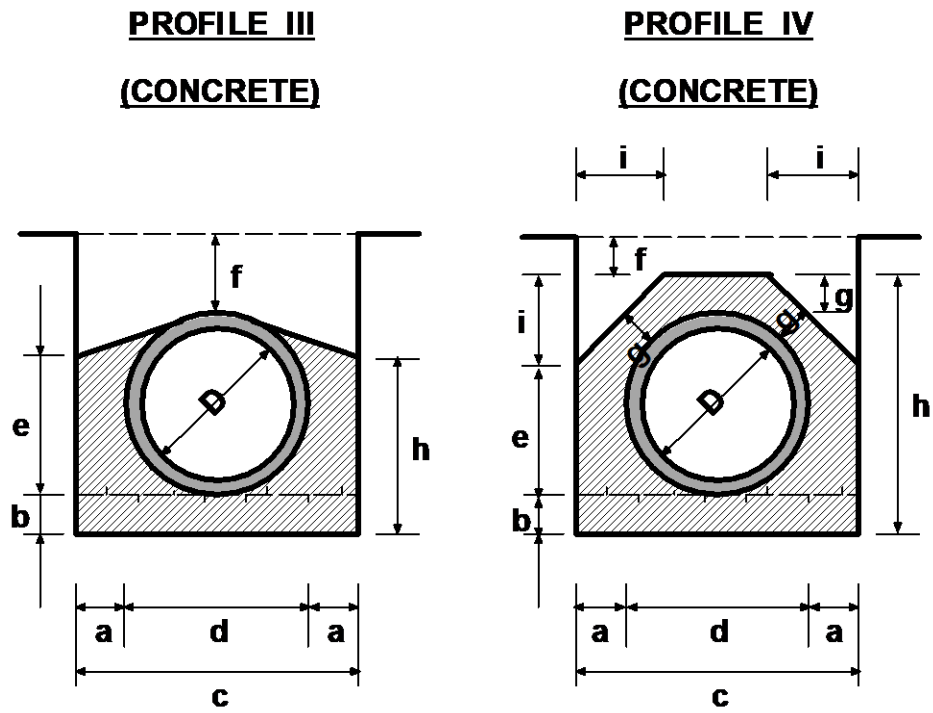
**FIGURE C.9 - HEADWALL TYPE 2 (DROP INLET)**



**DIMENSIONS AND MATERIAL REQUIREMENTS**

PIPE DIAMETER IN (M)	TYPE A (CONCRETE BLOCKS)			TYPE B (STONE MASONRY)		
	450	600	900	450	600	900
a	0.30	0.30	0.30	0.40	0.40	0.40
B	0.30	0.30	0.30	0.30	0.30	0.30
c	1.10	1.10	1.40	1.20	1.20	1.50
d	0.90	0.90	0.90	1.00	1.00	1.00
e	0.20	0.20	0.20	0.20	0.20	0.20
f	0.60	0.60	0.60	0.60	0.60	0.60
g	0.30	0.40	0.60	0.30	0.40	0.60
h	0.60	0.80	1.20	0.60	0.80	1.20
i	0.20	0.20	0.20	0.40	0.40	0.40
k	1.20	1.20	1.50	1.20	1.20	1.50
l	1.00	1.00	1.00	1.00	1.00	1.00
m	0.38	0.30	0.30	0.38	0.30	0.30
<b>MATERIAL REQUIREMENT</b>						
FOUNDATION (Concrete)	0.47	0.47	0.52	0.72	0.72	0.79
HEAD/WINGWALLS (Concrete/Masonry)	0.53	0.69	1.11	1.24	1.63	2.61
APRON (Concrete)	0.24	0.24	0.30	0.24	0.24	0.30

FIGURE C.14 - BEDDING AND HAUNCH PROFILES TYPES III & IV



Diameter (D)	450 (mm)	600 (mm)	900 (mm)
	Dimensions in (m)		
a	0.15	0.2	0.2
b	0.1	0.15	0.15
c	0.86	1.12	1.48
d	0.56	0.72	1.08
e	0.42	0.54	0.81
f (min.)	0.23	0.3	0.45
g	-	-	-
h	0.52	0.69	0.96
i	-	-	-
Concrete	Volume in (m <sup>3</sup> /m)		
	0.26	0.47	0.71
Application	<ul style="list-style-type: none"> <li>- Fair subgrade condition;</li> <li>- Overfill &gt; ¾ Diameter;</li> <li>- Seasonal waterflow only.</li> </ul>		
Remarks	<ul style="list-style-type: none"> <li>- Use gravel material for back/overfill.</li> </ul>		

450 (mm)	600 (mm)	900 (mm)
Dimensions in (m)		
0.15	0.2	0.2
0.1	0.15	0.15
0.86	1.12	1.48
0.56	0.72	1.08
0.46	0.52	0.78
0.15	0.15	0.15
0.15	0.15	0.15
0.81	1.02	1.38
0.28	0.35	0.45
Volume in (m <sup>3</sup> /m)		
0.37	0.61	0.92
<ul style="list-style-type: none"> <li>- Fair to poor subgrade Condition;</li> <li>- Overfill &gt; ¾ Diameter;</li> <li>- Seasonal waterflow only.</li> </ul>		
<ul style="list-style-type: none"> <li>- Use gravel material for back/overfill.</li> </ul>		