Caltrans Metric

Dallas J. Forester
REGISTERED CIVIL ENGINEER

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PLANS APPROVAL DATE

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Dallas Forester
No. C37765
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CIVIL
STATE OF CALIFORNIA

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2004 Std PLAN D79

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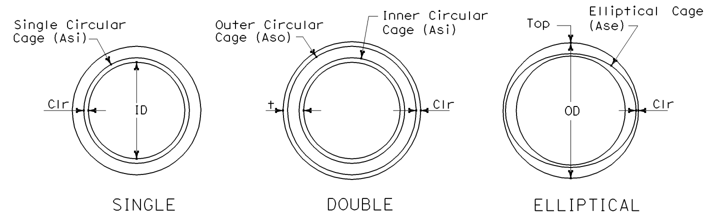
WALL A (f'c = 42 MPa)

ID	t	Min. cover to 3 m max cover, Method 1 Asi	Aso	Ase	Method 2 Asi	Aso	Ase	Method 3A Asi	Aso	Ase	6 m max cover, Method 1 Asi	Aso	Ase	Method 2 Asi	Aso	Ase	Method 3A Asi	Aso	Ase	12 m max cover, Method 3A Asi	Aso
mm																					
600	63	360	–	–	280	–	–	210	–	–	470	–	–	300	–	–	210	–	–	420	–
750	69	400	–	–	380	–	–	320	–	–	660	–	640	420	–	–	300	–	–	570	380
900	75	450	280	490	440	280	440	360	250	360	780	400	800	530	340	550	340	210	340	700	470
1050	88	530	320	590	490	320	490	380	280	380	850	440	950	570	360	590	360	230	380	740	510
1200	100	660	380	680	510	340	530	400	280	400	950	490	1080	640	380	640	400	250	400	800	550
1350	113	680	400	700	530	360	530	400	300	420	1040	530	1230	680	420	700	440	300	440	870	590
1500	125	700	400	720	550	360	550	400	300	420	1140	570	1380	740	470	760	490	320	490	950	640
1650	138	720	420	740	550	360	570	420	300	420	1250	610	1500	800	510	830	530	340	530	1040	680
1800	150	740	420	760	550	360	570	400	300	420	1330	660	1630	870	550	890	550	360	570	1120	720
1950	163	760	420	780	570	380	590	420	300	440	1460	700	1910	930	590	950	590	400	610	1210	780
2100	175	800	440	830	590	380	610	420	300	550	1570	760	–	990	640	1040	660	420	680	1290	830
2250	188	850	470	870	640	400	660	440	300	610	–	–	–	1080	680	1140	700	470	720	1400	890
2400	200	910	490	930	660	420	700	440	300	700	–	–	–	1140	720	1290	740	490	760	1500	950
2550	213	970	530	990	720	470	800	490	320	800	–	–	–	1230	760	1480	800	530	830	1590	990
2700	225	1040	570	1060	760	490	890	530	340	890	–	–	–	1310	830	1690	850	550	890	1690	1060

WALL AA

f'c	ID	t	24 m max cover, Method 3B Asi	Aso
	mm			
f'c = 42 MPa	600	144	280	150
	750	150	400	150
	900	163	510	150
	1050	175	610	210
	1200	188	720	280
	1350	200	850	360
	1500	213	990	440
	1650	225	1100	530
f'c = 49 MPa	1800	238	1210	590
	1950	250	1330	680



CAGE REINFORCEMENT

t = Pipe barral wall thickness, mm

Asi = Inner cage reinforcement, or single circular cage reinforcement, square mm/m

Aso = Outer cage reinforcement, square mm/m

Ase = Elliptical single cage reinforcement, square mm/m

ID = Inside Diameter, mm

OD = Outside Diameter, mm

Clr = Design clearance, mm (see Note 6)

WALL B (f'c = 35 MPa)

ID	t	Min. cover to 3 m max cover, Method 1 Asi	Aso	Ase	Method 2 Asi	Aso	Ase	Method 3A Asi	Aso	Ase	6 m max cover, Method 1 Asi	Aso	Ase	Method 2 Asi	Aso	Ase	Method 3A Asi	Aso	Ase	12 m max cover, Method 3A Asi	Aso
mm																					
600	75	250	–	–	210	–	–	190	–	–	380	–	–	250	–	–	190	–	–	380	–
750	88	400	–	320	300	–	250	250	–	210	530	–	470	340	–	280	230	–	210	510	–
900	100	380	190	380	280	170	300	230	150	230	490	230	590	340	190	340	230	150	230	470	280
1050	113	440	230	440	320	190	340	280	170	280	570	300	740	380	210	400	280	170	280	530	320
1200	125	510	280	510	380	230	380	300	190	320	660	340	910	440	250	470	320	190	320	610	380
1350	138	550	300	550	400	250	400	320	210	320	760	380	1060	510	300	510	360	210	380	700	440
1500	150	570	320	590	420	280	420	340	210	340	850	440	1270	570	340	570	400	230	420	780	490
1650	163	610	320	640	440	300	440	360	230	380	930	490	1550	640	380	640	440	300	440	870	550
1800	175	640	340	660	440	300	470	360	230	400	1100	550	1840	700	420	720	530	320	530	950	610
1950	188	660	360	680	470	320	510	380	250	470	1310	590	2140	760	470	780	550	340	570	1040	680
2100	200	700	380	720	490	320	550	380	250	550	1480	640	–	830	510	870	590	360	610	1120	720
2250	213	760	400	780	530	340	640	400	250	640	–	–	–	890	550	1040	640	380	660	1190	760
2400	225	830	420	850	570	340	720	420	250	720	–	–	–	950	590	1160	680	420	720	1250	800
2550	238	890	470	950	610	380	800	470	300	800	–	–	–	1040	660	1350	740	470	800	1350	870
2700	250	950	510	1140	660	400	910	510	320	910	–	–	–	1100	680	1500	800	510	910	1420	970

WALL BB

f'c	ID	t	24 m max cover, Method 3B Asi	Aso
	mm			
f'c = 35 MPa	600	163	230	150
	750	175	340	150
	900	188	440	150
	1050	200	530	150
	1200	213	660	190
	1350	225	780	280
	1500	238	870	340
	1650	250	1140	420
f'c = 42 MPa	1800	265	1230	510
	1950	280	1310	570
f'c = 49 MPa	2100	290	1330	610
	2250	305	1440	700

DESIGN NOTES

Design: Bridge Design Specifications (1983 AASHTO with interims and revisions by Caltrans)

A. Earth Loading:
Earth Pressures - Vertical: 22.0 kPa/m
Horizontal: Varies, see design lateral pressure chart (Circular Pipe only)

B. Unit Stresses: (Used in Design Tables)
fy = 450 MPa
f'c = See Tables

C. The RCP as shown on this sheet is not intended to be used in a corrosive environment. A special design may be required.

WALL X (f'c = 42 MPa)

ID	t	Min cover to 3 m max cover, Method 3A Asi	Aso	Ase	Method 3B Asi	Aso	Ase	3.1 m to 6 m max cover, Method 3A Asi	Aso	Ase	Method 3B Asi	Aso	Ase	6.1 m to 9 m max cover, Method 3A Asi	Aso	Method 3B Asi	Aso
mm																	
600	47	280	–	–	250	–	–	250	–	–	210	–	–	380	–	320	–
750	53	380	–	–	360	–	–	320	–	–	250	–	–	490	–	400	–
900	59	400	320	400	380	280	380	360	–	300	300	–	250	440	320	450	–
1050	63	610	490	610	570	440	570	420	–	420	340	–	340	660	490	510	380
1200	69	660	510	660	590	470	610	530	–	490	420	–	380	740	550	590	440
1350	75	660	530	660	610	490	610	590	–	510	490	–	400	760	550	590	440
1500	88	610	490	640	570	440	590	680	–	530	550	–	420	780	570	610	470
1650	94	610	490	610	570	440	590	590	420	590	490	360	490	890	640	700	530
1800	105	570	440	570	530	400	550	590	420	590	490	340	490	870	610	700	510
1950	119	530	400	550	510	380	510	590	420	610	490	360	510	870	610	700	510
2100	132	530	400	570	490	360	530	610	440	640	510	360	530	890	640	720	510
2250	144	510	380	590	470	340	590	700	490	720	590	400	590	990	720	830	590
2400	150	510	380	680	490	340	680	720	510	740	590	420	680	990	720	830	590
2550	163	510	380	760	530	340	760	780	550	800	660	470	760	1120	780	910	660
2700	175	550	380	870	490	340	870	850	590	890	720	510	870	1250	850	990	720

CONSTRUCTION NOTES

1. For details of the method of excavation, backfill and bedding (Method 1, Method 2, etc.), see Standard Plan A62D.
2. The tables for minimum allowable classes and D-loads of RCP on Standard Plan A62D shall not apply to direct design RCP.
3. Notes 3, 9 and 10 on Standard Plan A62D shall apply to direct design RCP.
4. Throughout the length of any given culvert, the direct design selected by the Contractor shall be the same, including the method of excavation, backfill and bedding.
5. The embankment height prior to excavation specified in note 5 of the Standard Plan A62D shall apply to the direct design RCP instal lation when Method 2, 3A or 3B are used.
6. For single circular cage reinforcement, minimum clearance shall be 40% of the wall thickness (t). For el liptical and double circular cage reinforcement where the wall thickness (t) is less than 65 mm, the minimum clearance (Clr) for reinforcement shall be 20 mm, and where the wall thickness (t) is 65 mm or more the minimum clearance (Clr) for reinforcement shall be 25 mm.
7. Minimum cover measured at the edge of pavement shall be 600 mm to top of AC pavement and 300 mm to top of rigid pavement.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PRECAST REINFORCED CONCRETE PIPE DIRECT DESIGN METHOD

NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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