

SPECIFICATION FOR
THE SUPPLY AND DELIVERY
OF PRECAST CONCRETE CULVERTS

1290. 1. Scope

These Specifications govern all operations necessary for and pertaining to the supply, fabrication and delivery of precast concrete culverts for the **Department of Transportation and Government Services** of the Province of Manitoba.

2. Supply Requirements

The material and fabrication shall conform to Specification ASTM C76M, except as modified herein.

2.1 Culvert Class

Precast concrete culverts shall conform to the designated Class. Flared end sections shall conform to a minimum Class II standard.

2.2 Cement

Portland cement shall be Type 50 sulphate resistant in accordance with Specification CAN/CSA-A5.

2.3 Flyash

Flyash may be substituted for Portland cement subject to the following restrictions:

- a) Flyash shall conform to Specification ASTM C618, Class C.
- b) Flyash shall be supplied from a source which has been pre-qualified as an acceptable source by the Department.
- c) A copy of the chemical and physical analysis of the flyash used shall be provided prior to fabrication. The analysis shall identify the source from which the flyash was obtained.
- d) Flyash shall be added to concrete mixtures as a separate constituent material.
- e) Flyash shall not exceed 15 per cent by mass of the designed Portland cement.

2.4. Mix Design

Prior to fabrication the Supplier shall provide a mix design statement showing the mass of each aggregate, Portland cement, flyash, admixtures and water for a cubic meter batch. This mix design shall not be altered without the approval of the Department.

Actual batch weights shall be provided upon request.

1290 2.5 Standard Diameters

The nominal inside diameter of concrete culverts shall be in 150 mm increments between 300 mm and 1 800 mm culverts inclusively.

2.6 Rubber Gaskets

Rubber gaskets for concrete culvert joints shall conform to Specification ASTM C443, and shall be supplied with the necessary lubricant.

2.7 Tie Straps

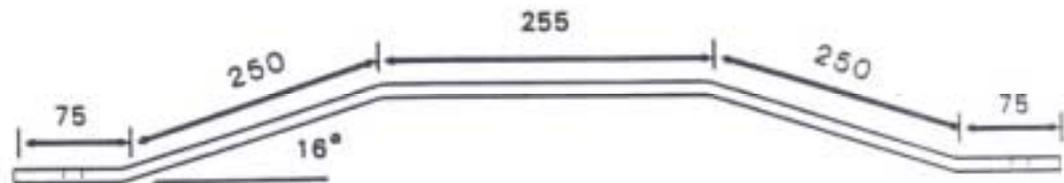
Steel for tie straps shall conform to Specification CAN/CSA G40.21, Grade 38W. Tie straps shall be galvanized in accordance with Specification CAN/CSA-G164, Class 2 or zinc plated in accordance with Specification ASTM B633.

The type and number of tie straps and the size of predrilled holes shall be determined from

Table 1. Holes shall be centered 40 mm from each end of the tie strap.

Type 1 straps shall be 600 mm x 50 mm x 9.5 mm.

Type 2 straps shall be 905 mm x 50 mm x 9.5 mm and shall be shaped as follows:



2.8 Wedge Anchors, Nuts and Washers

The size and number of anchors shall be determined from Table 1.

Wedge anchors shall conform to Specification ASTM E488. Wedge anchors, nuts and washers shall be zinc plated in accordance with Specification ASTM B633 or galvanized in accordance with Specification CAN/CSA G164, Class 5.

2.9 Preliminary Inspection

Precast concrete culverts and fittings will be subject to random inspection and testing.

The Supplier shall contact the Department when an order or part order is ready for inspection prior to delivery. To accommodate this inspection the Supplier shall place the culverts in a separate location in his yard and shall provide the required testing equipment. Records of physical testing shall be provided upon request.

Culverts which have been inspected and meet the Specifications will be stamped by the Department. Culverts shall not be loaded until approval for shipping has been given by the Department.

1290 2.9.1 Joint Roundness

At the point of gasket contact, the mating surfaces of adjacent sections of culvert shall be round and within the tolerances required by the gasket and joint configuration.

2.9.2 Joint Squareness

Culvert ends shall be square in accordance with Specification ASTM C443, Section 8.1.

3. Delivery Requirements

3.1 Station Identification

The Supplier shall identify the station location as designated by the distribution sheets, on the interior of each culvert section. The lettering shall be unwashable, black and at least 100 mm in size.

3.2 Delivery of Culverts

The Supplier shall deliver and unload culverts and fittings to locations designated in the Purchase Order. The delivery schedule will be determined by the Department or its representative. A minimum notice of 48 hours will be provided.

The Supplier shall provide a delivery slip to be signed by the Department or its representative at the time of delivery.

4. Final Acceptance:

Culverts will be subject to inspection upon delivery. Culverts found to be unacceptable due to damage in shipping or handling will be rejected. Unsatisfactory fit of joints due to culvert fabrication will be reason for rejection.

5. Submission of Tenders:

The Supplier shall indicate on the quotation the "Length to be Supplied" for each installation, as determined from Tables 2 and 3.

7. Method of Measurement:

The length of culvert supplied, to the nearest hundredth of a metre, will be determined from Tables 2 and 3.

9. Basis of Payment:

The unit price per metre for "Precast Concrete Culvert" will be payment in full for supplying materials, fabricating and delivering the culverts and for performing all operations necessary or incidental thereto as herein described.

A copy of the delivery slip shall accompany the invoices.

TABLE 1
TIE STRAP AND FASTENER REQUIREMENTS

TYPE OF JOINT	CULVERT DIAMETER (mm)	TIE STRAPS			WEDGE ANCHOR FASTENERS				
		TYPE	DIAMETER OF PREDRILLED HOLE (mm)	NO. REQUIRED PER INSTALLATION	DIAM (mm)	LENGTH (mm)	MINIMUM DRILL HOLE DEPTH (mm)	SIZE OF DRILL HOLE (mm)	NO. REQUIRED PER INSTALLATION
TONGUE AND GROOVE	300-600	1	13	8	9.5	69	38	9.5	16
	750-1 050	1	19	8	13	95	57	13	16
	1 200-1 800	1	19	12	13	95	57	13	24
BELL AND SPIGOT	300-600	2	13	8	9.5	69	38	9.5	16
	750-1 050	2	19	8	13	95	57	13	16

TABLE 2

**PRECAST CONCRETE CULVERT TABLE TO DETERMINE
THE LENGTH TO BE SUPPLIED FOR EACH INSTALLATION**

INSTRUCTIONS FOR USE OF TABLE:

1. Locate the row for appropriate culvert section length.
2. Scan the row to find the Ordered Length for each installation from the distribution sheet.
3. Scan the column to locate the Number of Culvert Sections to be Supplied.
4. Quote the Length to be Supplied in metres.

NOTES

1. The Ordered Length will be to the nearest 0.1 m.
2. This table assures that the total Length to be Supplied will not be less than 1.0 m of the Ordered Length.

DEFINITIONS

1. O.L. = Ordered Length in metres.
2. L.S. = Length to be Supplied in metres.

CULVERT SECTION LENGTH	NUMBER OF CULVERT SECTIONS TO BE SUPPLIED							
	4		5		6		7	
	O.L	L.S	O.L	L.S	O.L	L.S	O.L	L.S
1.83	6.6-8.3	7.32	8.4-10.1	9.15	10.2-11.9	10.98	12.0-13.8	12.81
1.88	6.7-8.5	7.52	8.6-10.4	9.40	10.5-12.2	11.28	12.3-14.1	13.16
1.91	6.8-8.6	7.64	8.7-10.5	9.55	10.6-12.4	11.46	12.5-14.3	13.37
1.93	6.9-8.7	7.72	8.8-10.6	9.65	10.7-12.5	11.58	12.6-14.5	13.51
2.44	8.4-10.7	9.76	10.8-13.2	12.20	13.3-15.6	14.64	15.7-18.0	17.08
2.50	8.6-11.0	10.00	11.1-13.5	12.50	13.6-16.0	15.00	16.1-18.5	17.50

	8		9		10		11	
1.83	13.9-15.6	14.64	15.7-17.4	16.47	17.5-19.3	18.30	19.4-21.1	20.13
1.88	14.2-16.0	15.04	16.1-17.9	16.92	18.0-19.8	18.80	19.9-21.6	20.68
1.91	14.4-16.2	15.28	16.3-18.1	17.19	18.2-20.1	19.10	20.2-22.0	21.01
1.93	14.6-16.4	15.44	16.5-18.3	17.37	18.4-20.3	19.30	20.4-22.2	21.23
2.44	18.1-20.5	19.52	20.6-22.9	21.96	23.0-25.4	24.40	25.5-27.8	26.84
2.50	18.6-21.0	20.00	21.1 -23.5	22.50	23.6-26.0	25.00	26.1-28.5	27.50

TABLE 2 (Continued)

**PRECAST CONCRETE CULVERT TABLE TO DETERMINE
THE LENGTH TO BE SUPPLIED FOR EACH INSTALLATION**

CULVERT SECTION LENGTH	NUMBER OF CULVERT SECTIONS TO BESUPPLIED							
	12		13		14		15	
	O.L	L.S.	O.L	L.S.	O.L	L.S.	O.L	L.S.
1.83	21.2-22.9	21.96	23.0-24.7	23.79	24.8-26.6	25.62	26.7-28.4	27.45
1.88	21.7-23.5	22.56	23.6-25.4	24.44	25.5-27.3	26.32	27.4-29.2	28.20
1.91	22.1-23.9	22.92	24.0-25.8	24.83	25.9-27.7	26.74	27.8-29.6	28.65
1.93	22.3-24.1	23.16	24.2-26.0	25.09	26.1-28.0	27.02	28.1-29.9	28.95
2.44	27.9-30.2	29.28	30.3-32.7	31.72	32.8-35.1	34.16	35.2-37.6	36.60
2.50	28.6-31.0	30.00	31.1-33.5	32.50	33.6-36.0	35.00	36.1-38.5	37.50

	16		17		18		19	
1.83	28.5-30.2	29.28	30.3-32.1	31.11	32.2-33.9	32.94	34.0-35.7	34.77
1.88	29.3-31.0	30.08	31.1-32.9	31.96	33.0-34.8	33.84	34.9-36.7	35.72
1.91	29.7-31.5	30.56	31.6-33.4	32.47	33.5-35.3	34.38	35.4-37.2	36.29
1.93	30.0-31.8	30.88	31.9-33.8	32.81	33.9-35.7	34.74	35.8-37.6	36.67
2.44	37.7-40.0	39.04	40.1-42.4	41.48	42.5-44.9	43.92	45.0-47.3	46.36
2.50	38.6-41.0	40.00	41.1-43.5	42.50	43.6-46.0	45.00	46.1-48.5	47.50

	20		21		22		23	
1.83	35.8-37.6	36.60	37.7-39.4	38.43	39.5-41.2	40.26	41.3-43.0	42.09
1.88	36.8-38.6	37.60	38.7-40.4	39.48	40.5-42.3	41.36	42.4-44.2	43.24
1.91	37.3-39.2	38.20	39.3-41.1	40.11	41.2-43.0	42.02	43.1-44.9	43.93
1.93	37.7-39.6	38.60	39.7-41.5	40.53	41.6-43.4	42.46	43.5-45.3	44.39
2.44	47.4-49.8	48.80	49.9-52.2	51.24	52.3-54.6	53.68	54.7-57.1	56.12
2.50	48.6-51.0	50.00	51.1-53.5	52.50	53.6-56.0	55.00	56.1-58.5	57.50

TABLE 2 (Continued)

**PRECAST CONCRETE CULVERT TABLE TO DETERMINE
THE LENGTH TO BE SUPPLIED FOR EACH INSTALLATION**

CULVERT SECTION LENGTH	NUMBER OF CULVERT SECTIONS TO BE SUPPLIED							
	24		25		26		27	
	O.L.	L.S.	O.L.	L.S.	O.L.	L.S.	O.L.	L.S.
1.83	43.1-44.9	43.92	45.0-46.7	45.75	46.8-48.5	47.58	48.6-50.4	49.41
1.88	44.3-46.1	45.12	46.2-48.0	47.00	48.1-49.8	48.88	49.9-51.7	50.76
1.91	45.0-46.8	45.84	46.9-48.7	47.75	48.8-50.6	49.66	50.7-52.5	51.57
1.93	45.4-47.3	46.32	47.4-49.2	48.25	49.3-51.1	50.18	51.2-53.1	52.11
2.44	57.2-59.5	58.56	59.6-62.0	61.00	62.1-64.4	63.44	64.5-66.8	65.88
2.50	58.6-61.0	60.00	61.1-63.5	62.50	63.6-66.0	65.00	66.1-68.5	67.50

	28		29		30		31	
1.83	50.5-52.2	51.24	52.3-54.0	53.07	54.1-55.9	54.90	56.0-57.7	56.73
1.88	51.8-53.6	52.64	53.7-55.5	54.52	55.6-57.4	56.40	57.5-59.2	58.28
1.91	52.6-54.4	53.48	54.5-56.3	55.39	56.4-58.3	57.30	58.4-60.2	59.21
1.93	53.2-55.0	54.04	55.1-56.9	55.97	57.0-58.9	57.90	59.0-60.8	59.83
2.44	66.9-69.3	68.32	69.4-71.7	70.76	71.8-74.2	73.20	74.3-76.6	75.64
2.50	68.6-71.0	70.00	71.1-73.5	72.50	73.6-76.0	75.00	76.1-78.5	77.50

TABLE 3
LENGTH OF FLARED END SECTIONS

CULVERT DIAMETER (mm)	450	600	750	900	1 050	1 200	1 350	1 500
LENGTH OF FLARED END SECTIONS (m)	1.25	1.85	1.85	2.45	2.45	2.45	2.45	2.45

INSTRUCTIONS TO DETERMINE LENGTH TO BE SUPPLIED WHEN FLARED END SECTIONS ARE ORDERED:

1. Locate the appropriate length of flared end section.		<input type="text"/>	A
2. Ordered Length for each installation.		<input type="text"/>	O.L.
3. Ordered Length minus length of flared end sections, (O.L.-2A)		<input type="text"/>	B
4. Enter Length (B) in Table 2 to determine the Length to be Supplied in metres.		<input type="text"/>	L.S.
5. Quote Total Length to be Supplied including flared end sections in metres (L.S.+2A)		<input type="text"/>	T.L.

NOTE:

The Ordered Length will include the required flared end sections and will be to the nearest 0.1 m.