11.10 Manholes

11.10.1 Location

Manholes are utilized to provide entry to continuous underground storm drains for inspection and cleanout. When possible, utilize grate inlets in lieu of manholes so that the benefit of extra stormwater interception can be achieved with minimal additional cost. Typical locations where manholes should be specified are:

- where two or more storm drains converge
- at intermediate points along tangent sections
- where pipe size changes
- where an abrupt change in alignment occurs
- where an abrupt change of the grade occurs

Manholes should not be located in traffic lanes; however, when it is impossible to avoid locating a manhole in a traffic lane, care should be taken to insure it is not in the normal vehicle wheel path.

11.10.2 Spacing

The spacing of manholes should be in accordance with the following criteria:

Size of Pipe (mm)		Maximum Distance (m)
300-600	(12-24 in)	100 (350 ft)
675-900	(27-36 in)	125 (400 ft)
1050-1350	(42-54 in)	150 (500 ft)
1500-up	(60-up)	300 (1000 ft)

11.10.3 Standard ConnDOT Manholes (Standard Sheet M507-A)

The following guidelines should be followed when specifying a manhole.

- When the storm drain pipe diameter is 750 mm (30 in) or less, a 1200-mm (48 in) diameter manhole should be provided.
- When the storm drain pipe diameter is > 750mm to 1050 mm (30 in to 42 in) inclusive, a 1500-mm (60 in) diameter manhole should be provided.
- When the storm drain pipe diameter is 1050 mm to 1350 mm (42 in to 54 in), a 1800-mm (72 in) diameter manhole should be provided.
- When the storm drain pipe diameter is larger than 1350mm (54 in), a reinforced concrete pipe tee; ConnDOT standard type “C” or “C-L” catch basin double grate type I or II; or if necessary a special design junction box should be provided.

11.10.4 Sizing

When determining the minimum manhole size required for various pipe sizes and locations, two general criteria must be met.

- Manhole or inlet structure must be large enough to accept the maximum pipe as shown in Table 11-6.
- Knowing the relative locations of any two pipes, compute K as follows:

$$K = \frac{R_1 + T_1 + R_2 + T_2 + 355mm}{\Delta} \qquad \left(\quad K = \frac{R_1 + T_1 + R_2 + T_2 + 14in}{\Delta} \right) \qquad \textbf{(11.13)}$$

Where: R_1 and T_1 are interior radius and wall thickness of Pipe #1, mm (in)
R_2 and T_2 are interior radius and wall thickness of Pipe #2, mm (in)
Δ = angle between the pipes, degrees
K = relative manhole coefficient, mm/degree (in/degree)

Table 11-6 Manhole Sizing

MH Dia. mm (in)	K * mm (in)/degree	Max Pipe Size mm (in)
1200 (48)	10.67 (.42)	750 (30)
1500 (60)	13.21 (.52)	1050 (42)
1800 (72)	16.00 (.63)	1350 (54)

* When the computed K value exceeds 16 (.63), a junction chamber or double catch basin will be required.

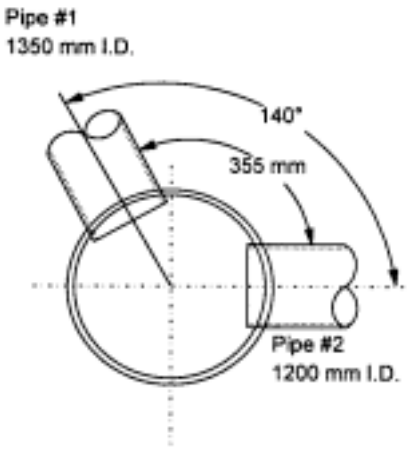

Figure 11-8

Example Problem

Given: Pipe # 1 = 1350 mm Pipe # 2 = 1200 mm
$\Delta = 140^{o}$

Solution:

$$K = \frac{675 \text{ mm} + 140 \text{ mm} + 600 \text{ mm} + 127 \text{ mm} + 355 \text{ mm}}{140^{o}}$$
$$= 13.55 \text{ mm/degrees}$$

The table 11-6 indicates the minimum manhole barrel to be 1800 mm (72 in). For the 1500-mm (60 in) MH barrel, the table indicates a maximum pipe size of 1050 mm (42 in). As the maximum pipe size in the example is 1350 mm (54 in), an 1800-mm (72 in) MH must be used.

For this example, spacing is not critical and the pipe size governs. Had the Δ angle been 115^{o} or less, the spacing would be critical and a larger manhole barrel would have been required. If pipes are located at substantially different elevations, pipes may not conflict and the above analysis is unnecessary.