

STEP 1: DETERMINE LOT CONTROL LEVEL AND OPTIMUM LOCATION FOR EACH PROPERTY CONNECTION.
REFER SECTION 5.2.4 OF THE CODE.

STEP 2: DETERMINE OPTIMUM ALIGNMENT BY ASSESSING EVERY OPTION

TABLE 105-A: FACTORS SUPPORTING ALIGNMENT OPTIONS (Generally locate with the following order of preference)

SERVICING ALIGNMENT OPTION	FACTORS SUPPORTING THE ALIGNMENT OPTION	REFERENCE
PUBLIC OPEN SPACE	USUALLY THE BEST OPTION WHERE THE LAND IS AVAILABLE AND ENVIRONMENTAL AND LANDOWNER CONSTRAINTS CAN BE MET	MRWA-S-108
ROAD RESERVE DUAL RETICULATION SEWERS	<ul style="list-style-type: none"> NARROW ALLOTMENTS & WIDE ROADS (ie: WHEN AVERAGE ALLOTMENT WIDTH IS < 1/2 OF THE ROAD RESERVE WIDTH). THERE IS SIGNIFICANT OBSTRUCTION IN THE ROAD RESERVE (ie: DRAIN(S) IN THE ROAD RESERVE WHICH WOULD INCREASE THE DEPTH OF ROAD CROSSINGS). 	MRWA-S-109
ROAD RESERVE SEWER WITH ROAD CROSSINGS	<ul style="list-style-type: none"> WIDER ALLOTMENTS & NARROWER ROADS (ie: WHEN AVERAGE ALLOTMENT WIDTH IS > 1/2 OF THE ROAD RESERVE WIDTH). THERE IS LITTLE OBSTRUCTION IN THE ROAD RESERVE AFFECTING THE DEPTH OF CROSSINGS. 	MRWA-S-110
PRIVATE PROPERTY	<ul style="list-style-type: none"> ADEQUATE ACCESS FOR MAINTENANCE CAN BE PROVIDED. ONLY LOCATE ALONG SIDE BOUNDARY WHEN IMPRACTICAL TO DO OTHERWISE 	MRWA-S-108

STEP 3: ENSURE THAT THE PREFERRED OPTION BEST MEETS THE PRIORITIES DESCRIBED IN TABLE 105-B.

TABLE 105-B: KEY PRINCIPLES AFFECTING SEWER DESIGN DECISIONS

PRIORITY	PRINCIPLE	PREFERENCE / LIMITATIONS
1	PROVIDE LOT CONTROL AND SUITABLE GRADE & DIAMETER	CODE SECTION 5.6.4 REFER TABLE 5.6 FROM THE CODE
2	STRUCTURALLY SOUND	REFER MRWA-S-200 SERIES DRAWINGS
3	REASONABLE ACCESS FOR MAINTENANCE	REFER MRWA-S-108
4	MAINTAIN CLEARANCES FROM OTHER SERVICES & STRUCTURES	REFER SECTION 5.4 OF THE CODE TEXT
5	MINIMISE DEPTH OF SEWERS AND CONNECTION POINTS	ESPECIALLY IN PRIVATE PROPERTY. WHERE PRACTICABLE, RETICULATIONS SEWERS SHALL BE <4m DEEP, AND CONNECTION POINTS SHALL BE < 2.5m DEEP
	MINIMISE LENGTH OF SEWERS, ESPECIALLY UNDER PAVEMENT	

STEP 4: DETERMINE SEWER LINE TYPES AND WHERE STRUCTURES ARE REQUIRED

TABLE 105-C: SEWER LINE REQUIREMENTS & LIMITATIONS

NO. PROPERTY CONNECTIONS	SEWER LINE NAME	MINIMUM UPSTREAM REQUIREMENT	MINIMUM DOWNSTREAM REQUIREMENT	SEWER LINE LIMITATIONS	DESIGN DRAFTING REQUIREMENTS
1	PROPERTY CONNECTION	NO STRUCTURE REQUIRED	OBLIQUE JUNCTION	<ul style="list-style-type: none"> ≤25m Long. Size as per Table 104A-A. Single jump up only. Type S or B jump ups shall be on the far side of an obstruction. Locate within easements in private property as per MRWA-S-108. 	<ul style="list-style-type: none"> Nominate Type (1A, 1B, 2, 4A, 4B, B, S), IL of connection point and Tie. If Type S with jump up, specify IL where it connects to shaft. Black in colour. If Type S or B with jump up, specify location of jump up (black open circle).
2	SPUR BRANCH ³	NO STRUCTURE REQUIRED	OBLIQUE JUNCTION	<ul style="list-style-type: none"> DN100 pipe (1 in 60) servicing 2 property connections. Single jump up only. Spur branch + longest property connection shall be ≤ 25m long. Spur services ≤4 units (2 per connection) or ≤2000m² (1000m² per connection). Type S or B spur branch jump ups shall only occur on the far side of obstructions. Locate within easements in private property. Provide reasonable access to both spur branch property connections. 	<ul style="list-style-type: none"> As above for both property connections. Nominate both connection types on the spur branch as if the other connection did not exist. If Type S spur branch with jump up, specify IL where it connects to shaft. If Type S or B with jump up, specify location of jump up (black open circle). Black in colour. Long sections required only for Road pavement crossings.
≥3	RETICULATION ⁵ SEWER	INSPECTION SHAFT	MAINTENANCE STRUCTURE	DN150 or DN225. Intermediate maintenance structures required where sewer line is longer than the maximum spacing specified in Table 300-B.	Nominate the ILs of all straight pipes >2m long. Long section required. Sewers red in colour.

NOTES Regarding Table 105-C:

- Add maintenance structures as stipulated in Table 105-C and in compliance with maximum spacing requirements (refer Table 300-B), ensuring that the number of structures is minimised.
- Sewer line: "any sewer between two junctions or between the end of a pipe and a junction. It may be straight or contain bends".
- A spur branch is a sewer which collects two property connections. It commences from the junction of the 2 connections and ends at the junction with the reticulation sewer.
- If the longest property connection plus spur branch is longer than 25m, the spur branch shall transition to become a Reticulation Sewer.
- DN150 and DN225 sewers are defined as reticulation sewers. Branch sewers are those ≥DN300 in diameter. Branch sewers require maintenance structures at both ends. Connection of properties directly to sewers ≥DN500 in diameter requires water agency approval.

STEP 5:

- Determine inverts of sewers and complete long sections.
- Minimise depth and clashes with obstructions.
- Confirm alignment remains optimum if depth is excessive.

STEP 6: DETERMINE LOCATIONS OF ALL DROPS. SELECT THE TYPE OF DROP IN EACH CASE.

TABLE 105-D: DROP OPTIONS, LIMITATIONS AND PREFERENCES

PREFERENCE	DROP OPTION	LIMITATIONS	REFERENCE
1	CONNECT TO SHAFT OF AN IS, MS OR MC REQUIRED FOR OTHER REASONS (ie: IT IS NEEDED FOR JUNCTION OF SEWERS OR MAX SPACING REQ'S)	DN100 property connections only into ISs. DN100 property and spur branch connections into MSs & MCs. MSs & MCs require a base level inflow ≥ 3 equivalent lots.	MRWA-S-300, 305 & 306
	ELEVATED CONNECTION TO MH REQUIRED FOR OTHER REASONS		MRWA-S-308, 311 & 312
2	TYPE 2 or TYPE 4 CONNECTION	Property and spur branch connections only.	MRWA-S-303 & 304 FIGURE 107-C
3	GRADE SEWER LINE TO REQUIRED LEVEL	Maximum grade limits	
4	VERTICAL BEND(S) IN THE SEWER LINE	≤DN225 sewer lines only	MRWA-S-104B & FIGURE 107-A, B, & D
5	ELEVATED CONNECTION TO AN MS OR MC REQUIRED SPECIFICALLY FOR THE DROP	Property and spur branch connections only. Require a base level inflow ≥ 3 equivalent lots.	MRWA-S-305 & 306
6	ELEVATED CONNECTION TO A MH REQUIRED SPECIFICALLY FOR THE DROP		MRWA-S-308, 311 & 312

NOTES Regarding Table 105-D:

- Optimum means of achieving a drop depends on:
- Location, type and cost of a suitable maintenance structure. where a maintenance structure is required for another reason, it often provides the optimum means of achieving a drop in invert. To construct one especially for the drop (particularly if it is a M.H) may be more expensive than using bends or grading the sewer more steeply.
 - Turbulence Risks. Turbulence through Maintenance Structure drops into smaller sewers (≤DN375) provides beneficial oxygenation. Turbulence through maintenance structure drops into larger sewers (≥DN450) increases the level of H₂S gas release.
 - Ground conditions. Hard rock, unstable or water charged ground will increase construction cost at depth, reducing the preference for grading out the drop.
 - Location of an obstruction(s). Vertical deflections (using 2 bends) can be constructed:
 - With a deflection in the downstream line (refer Figures 107-B). This is the preferred option where it is feasible.
 - With deflections in all lines upstream of a junction (refer Figure 107-D). This may be required where an obstruction is close by.

STEP 7: DEFINE EACH MAINTENANCE STRUCTURE TYPE, ENSURING COMPLIANCE WITH LIMITATIONS (REFER MRWA-S-300).

ALL DIMENSIONS IN mm UNLESS STATED OTHERWISE				DESIGNED: R. JAGGER DATE: 1 JULY 2015			MELBOURNE RETAIL WATER AGENCIES			MRWA SEWERAGE STANDARDS			NOT TO SCALE																										
				DRAWN: R. JAGGER DATE: 1 JULY 2015						RETICULATION DESIGN			MRWA-S-105																										
				<table border="1"> <thead> <tr> <th>CHECKED:</th> <th>NAME</th> <th>DATE</th> <th>APPROVED:</th> <th>NAME</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/></td> <td>CWW</td> <td>D. MOORE</td> <td><input checked="" type="checkbox"/></td> <td>CWW</td> <td>R. CARRUTHERS</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>SEW</td> <td>C. PAXMAN</td> <td><input checked="" type="checkbox"/></td> <td>SEW</td> <td>D. O'DONOVAN</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>YVW</td> <td>K. DAWSON</td> <td><input checked="" type="checkbox"/></td> <td>YVW</td> <td>J. TOMASI</td> </tr> </tbody> </table>			CHECKED:	NAME	DATE							APPROVED:	NAME	DATE	<input checked="" type="checkbox"/>	CWW	D. MOORE	<input checked="" type="checkbox"/>	CWW	R. CARRUTHERS	<input checked="" type="checkbox"/>	SEW	C. PAXMAN	<input checked="" type="checkbox"/>	SEW	D. O'DONOVAN	<input checked="" type="checkbox"/>	YVW	K. DAWSON	<input checked="" type="checkbox"/>	YVW	J. TOMASI	 		
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3	UPDATED TABLE 105-C & D	1/06/16	RJ / CP / JT	ISSUED 2015			VERSION 1																																
2	PUBLISHED FIRST ISSUE	01/10/15	CP / JT / KD / RJ																																				
1.1	PRE-PUBLISHED DRAFT	01/03/15	CP / JT / KD / RJ																																				
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