

SCHEDULE 6 SEWAGE COLLECTION AND DISPOSAL

6.0 SEWAGE COLLECTION AND DISPOSAL

6.1 General

- 6.1.1 No new subdivision that creates new parcels less than 1 hectare in area or development will be permitted in the City of Langford unless serviced by a municipal sanitary sewer system.
- 6.1.2 Wherever, in the opinion of the City Engineer, future development or subdivision shown in the Official Community Plan for the City is probable for the lands adjacent to the development or subdivision, sanitary sewers must be extended to the property boundary and terminated with a capped stub or a manhole. Size and location shall be suitable for the future extension to the satisfaction of the City Engineer.
- 6.1.3 Each parcel in a subdivision which is not connected to the municipal sewer system shall have an area for sewage disposal approved by the Capital Health Region Environmental Health Officer or shall have secure access to such an approved area for sewage disposal on another parcel.
- 6.1.4 Any existing in-ground disposal system in a development or new subdivision shall be decommissioned and removed to the satisfaction of the City Engineer if it is the intent of the developer to provide a new in ground disposal system or to connect to the Municipal Sewer System. Any existing sewage disposal systems shall be shown on the construction drawings.

6.2 Design Criteria

6.2.1 TABLE 6-1: Sewage Flow Design Criteria

Residential Flow	250 L/capita/day
Stormwater inflow/infiltration	14,500 L/ha/day for 10 year
Storm water Inflow/infiltration	20,000 L/ha/day for 100 year
Commercial Flow	20,000 L/ha/day
Industrial Flow	20,000 L/ha/day
Institutional Flow	20,000 L/ha/day

6.2.2 TABLE 6-2: Population Equivalent Table

Housing Unit Type	Persons per unit
Single Family	3.7
Multi Family – Low Rise	2.7
Multi Family- High Rise	2.5
Modular Homes	2.0
Non-Residential	80 per ha

6.2.3 TABLE 6-3: Main Pipe Parameters

Minimum Ø	200mm
Terminus piping (last 300m)	150mm at 2% grade
Minimum velocity:	0.61m/sec. at full pipe
Minimum gradient:	1.00% for terminal sections
Maximum velocity:	6.10m/sec
Roughness coefficients	0.013
Acceptance of existing systems	In accordance with the Official Community Plan and the Sewer Master Plan as directed by the City Engineer

6.2.4 Pipes may be laid to the minimum vertical and/or horizontal radius of 60 metres or as recommended by the manufacturer, providing the design velocity (full pipe) is increased to 0.914 m/s for the curved section.

6.2.5 Mains shall have at least 1m cover and be deep enough to provide drainage at 2% minimum gradient from 600mm below basement floor elevation to obvert of pipe crown for new parcels. Cover shall be 0.6m at ditch inverts.

6.2.6 When a sanitary sewer pipe is installed such that it crosses below an existing asbestos cement (alc) watermain, the existing watermain material shall be replaced with ductile iron pipe for a distance of at least two (2) metres beyond each edge of the trench of the service crossing the watermain.

6.3 Manholes

6.3.1 Manhole structures shall be in accordance with MMCD S1 and S2.

6.3.2 Manholes shall be provided at all changes in grade, pipe size, horizontal alignment (for non-curvilinear sewers) and at the upper end of mains not to be extended in the future. Only one curve, horizontal or vertical, is permitted between manholes. In addition to the foregoing, additional manholes shall be constructed so that the maximum distance between manholes is as shown in TABLE 6-4.

TABLE 6-4: Manhole Distance

Pipe size (mm Ø)	Maximum Distance (m)
375 and smaller	125
450 and 750	155
900 and larger	185

6.3.3 Manholes in gravel areas shall have a 1.5m square 50mm thick asphalt or 100mm thick concrete apron.

- 6.3.4 In cases where the sewer will be extended in the near future and the end of the present construction is within 45m of an existing manhole, the City Engineer may allow the use of a cleanout structure in accordance with drawing SS-S6 in place of a manhole.
- 6.3.5 Outside-drop manholes will be permitted, if in the opinion of the City Engineer, the circumstances preclude the use of normal manholes. These shall be constructed wherever the change in invert elevations through the manhole is greater than 600mm. Elevation changes greater than 600mm shall be by way of an outside drop only. Allowance shall be made in the design for the effect of the resulting turbulence on the hydraulic capacity of the system.
- 6.3.6 The relative elevations entering and leaving a manhole must not reduce the hydraulic capacity of the system
- 6.3.7 Allowances for energy losses or changes in velocity are to be determined in accordance with sound hydraulic principals.
- 6.3.8 The City Engineer may approve situations involving a large pipe flowing into a smaller pipe at steeper grade.
- 6.3.9 Stubs shall be placed in manholes to allow for future connections. The length of the stubs shall be 600mm maximum from the outside of the manhole. The end shall be securely capped to the satisfaction of the City Engineer. Grades shall be suitable for future extension of the system.
- 6.3.10 Manhole benching shall be a steel trowel finish with a constant grade from the inlet(s) to the outlet. The benching inside radius shall be no less than three times the branch diameter. Pre-benched manholes are permitted.
- 6.3.11 All channels shall be constructed to permit use of a pan and tilt camera having dimensions of 600mm x 150mm diameter.
- 6.3.12 The obvert of pipes entering a manhole shall not be lower than 50mm above the obvert of the outlet pipe. The internal channel in the manhole shall have an elevation difference of 5% from the inlet to the outlet.
- 6.3.13 Manhole and cleanout lids are to be set to match existing or planned grades both longitudinally and transversely. If the highway grade is greater than 6%, manhole castings shall be encased in a concrete surround poured to 150mm below the rim.
- 6.3.14 All manhole barrel and sections shall be installed with rubber gaskets and mastic and shall be grouted inside with rapid set non-shrink grout. If, in the opinion of the City Engineer the water table may be high enough to affect the manhole, fibreglass bases in a concrete liner may be required.
- 6.3.15 Inlet and outlet pipes shall be grouted inside the manhole with rapid set non-shrink grout.

6.4 Service Connections

- 6.4.1 Sanitary sewer service connections of adequate size, but not less than 100mm Ø shall be provided from a main to the property line of each new or existing parcel, which forms part of the development or which fronts a highway or other right-of-way in which the sewer is to be constructed and shall be constructed in accordance with MMCD S7.
- 6.4.2 All service connections shall be provided with an inspection chamber at the property line or at service the right-of-way boundary in accordance with drawing SS-S9.
- 6.4.3 All service connections shall terminate a distance inside the property line equal to the depth at the property line for new parcels unless otherwise approved by the City Engineer and at property line for existing parcels at a location agreed upon by the owner. All stubs must have a 1% minimum gradient from the inspection chamber into private property in accordance with the Building Code and 2% minimum from the sewer main to the inspection chamber, in accordance with the MMCD Documents.
- 6.4.4 Where deep sewers exist (those installed at greater than 3 meters below finished grade), the service stub shall be terminated within 1.0 vertical meters of the minimum basement floor elevation and marked with a 2x4 stake. The service connection shall have a long radius sweep and be installed at no more than 45 degrees from the vertical.
- 6.4.5 Duplex lots shall have a 100mmØ service connection with two 100mmØ stubs and two inspection chambers or may terminate at a 4 x 4 x 4 duplex inspection chamber. Lots with duplex potential shall have a 100mmØ service connection.
- 6.4.6 Wherever possible, adjoining residential type lots shall be serviced with one 100mmØ service connection with one 100mmØ stub and one inspection chamber for each lot, or may terminate at a 4 x 4 x 4 duplex inspection chamber.
- 6.4.7 Service locations shall be marked with a 40mm x 90mm stake painted red complete with a red insulated wire from a nail on the stake to the service connection cap with the depth marked.

6.5 Inspection Chambers

- 6.5.1 All inspection chamber (IC) lids and collars shall be installed in accordance with drawing SS S9. The lid cams shall be securely tightened to ensure that they are not subject to vandalism or misuse. Cast iron IC lids may be substituted for the plastic covers in existing asphalt or concrete driveways.
- 6.5.2 All inspection chambers shall have a cast iron chamber cover and concrete surround in accordance with drawing SS S9.

- 6.5.3 Any inspection chamber set in a slope greater than 3% shall have a cast iron chamber cover and concrete surround in accordance with SS S9.
 - 6.5.4 Wherever a inspection chamber is covered by a cast iron chamber cover, the clearance between the cast iron lid and the plastic lid shall be a minimum of 75mm.
 - 6.5.5 Inspection chambers shall be supplied and installed without plugs.
 - 6.5.6 The inspection chamber lid shall be fastened to the riser pipe with a stainless steel machine bolt as provided by the manufacturer.
 - 6.5.7 Where property line is within 1 meter of the backside of a sidewalk or curb the inspection chamber shall be installed using cast iron inspection chamber cover specified in drawing SS S9, in a cast in place concrete apron protruding from the sidewalk or curb toward the property. This apron shall be constructed to the same engineering specifications as the sidewalk and shall provide a minimum of 200mm of concrete from the edge of the cast iron lid to the edge of the apron. An expansion joint at the sidewalk or curb to apron interface shall be provided.
 - 6.5.8 Inspection chambers shall be a minimum of one meter apart from centre to centre when installed, unless, in the opinion of the City Engineer the clustering of services would be beneficial to site servicing and layout in which case the sewer and drain connections may be installed on one adjoining property line.
- 6.6 Force Mains
- 6.6.1 At the lowest pump delivery rate anticipated to occur at least once per day, a cleansing velocity of at least 0.9m/s shall be maintained. The maximum velocity should not exceed 3.5m/s.
 - 6.6.2 An automatic air/ vacuum relief valve shall be placed at high points in the force main to prevent air locking, in accordance with good engineering practice.
 - 6.6.3 Force mains should enter the gravity sewer system at a point not more than 600mm above the flow line.
 - 6.6.4 The minimum size for mains discharging raw sewage shall be determined for each specific project by a Professional Engineer.
 - 6.6.5 Force main service connections shall be a minimum 50mm Ø, and shall have a check valve and a ball valve at the property line.
 - 6.6.6 Force main service connections shall be within 1 metre of the property line on the municipal right-of-way.

- 6.6.7 A tracer wire shall be installed for the purpose of locating the force main and a warning tape clearly marked "CAUTION BURIED SEWER LINE" shall be placed a minimum of 300mm and a maximum of 600mm above the obvert of the force main and service connections. The tracer wire shall be installed along the obvert of the force main and service connection.
 - 6.6.8 All force mains shall be designed to prevent damage from imposed loads, or from water hammer or column separation phenomena.
 - 6.6.9 Pipe bedding shall be a minimum depth of 150mm of sand under and 300mm above the pipe.
 - 6.6.10 The minimum depth of a force main shall be 1.0 from finished grade.
 - 6.6.11 Cleanouts shall be provided at all low points in the system and at the system terminus.
 - 6.6.12 All force main ties to gravity feeds shall be designed to avoid confluence turbulence.
 - 6.6.13 All force main gate valves shall be right hand closing and suitable for raw sewage application. Spacing shall be a minimum of 300m.
 - 6.6.14 Check valves shall be provided where required for maintenance.
 - 6.6.15 A gate valve on the force main from the pump station is required.
 - 6.6.16 Force mains shall be hydrostatically tested to a minimum 150 psi for a minimum of 1 hour with zero allowable leakage.
- 6.7 Testing
- 6.7.1 All sewer systems must be tested to MMCD standards prior to final acceptance by the City Engineer. The contractor must provide the City Engineer with 24 hours notice of the test.
 - 6.7.2 All sanitary sewers must be video inspected and the Professional Engineer must certify that all the videos have been viewed and that the sewer and connections are clean and free of defects prior to submission to the City Engineer for review.
 - 6.7.3 CCTV videos and reports are to be accompanied with half size drawings. Air tests and videotaping are required prior to hot-mix asphalt concrete paving.
 - 6.7.4 The system must be flushed and re-videoed prior to 1 year warranty inspection.