

1.0 **GENERAL**

1.1 Related UBC Guidelines

- .1 33 82 01s CCTV Pipeline Inspection (*see <https://energy.ubc.ca/community-services/contractors-developers/>*)
- .2 33 01 30.41s Cleaning of Sewers (*link as above*)

1.2 System Description

- .1 The campus has a dedicated sanitary sewer system which discharges to the *Metro Vancouver* trunk system; both to the north and to the south. *Each discharge to the Metro Vancouver* system is equipped with a flow meter. There are currently **3** communal pump stations and *approximately* 30 individual building pump stations within the campus wide system.

2.0 **MATERIAL AND DESIGN REQUIREMENTS**

2.1 Responsibilities

- .1 UBC Energy & Water Services (*EWS*) is primarily responsible for operation, maintenance, and overall stewardship of the sanitary sewers in cooperation with the following departments/organizations:
 - .1 UBC Health, Safety, & Environment.
 - .2 UBC Sustainability.
 - .3 UBC Properties Trust.
 - .4 UBC Campus Planning & Development.
 - .5 UBC Building Operations.
- .2 The demarcation of UBC Energy & Water Services point of service is defined in the standard drawing found under Division 33 section listings here:
http://www.technicalguidelines.ubc.ca/technical/standard_drawings.html#div33
- .3 The project Designer must incorporate all specific requirements for design and materials and execution of this section into the contract drawings in the form of job-specific notes. Only making reference to UBC Technical Guidelines in the drawings is not sufficient.

2.2 Sanitary Sewer Standards

- .1 The latest revisions of the following standards shall apply to sanitary sewers at UBC:
 - .1 BC Master Municipal Construction Documents (MMCD).
 - .2 GVRD Sewer Use Bylaw No. 299 latest edition.
 - .3 UBC Environmental Protection Policy # 6
(<http://universitycounsel.ubc.ca/policies/index/>).
 - .4 UBC Sustainability Development Policy #5
(<http://universitycounsel.ubc.ca/policies/index/>).
 - .5 BC Provincial Health Act.

2.3 Sanitary Sewer Connections

- .1 The first step to install any new or substantially modified connections to the sanitary sewer system at UBC is to complete a Utility Service Connection Application. This and other forms can be found at <https://energy.ubc.ca/community-services/contractors-developers/>.
- .2 Campus Planning and Development's Regulatory Services also require a Plumbing Permit to meet provisions of the B.C. Building Code Plumbing Provisions.
- .3 Any new connections to the sanitary sewer system will be reviewed for consistency with the Sanitary Sewer Master Servicing Plan.
- .4 The Designer shall obtain the sanitary service records by contacting the Records Clerk at the Infrastructure Development, Records (Phone: 604-822-9570) and develop proposed service connection location(s). Service connections may be possible to more than one sanitary sewer main fronting the site.

2.4 Sanitary Sewer Discharge

- .1 As part of the development design submission, the Designer shall provide the following:
 - .1 Estimates on the number and types of plumbing fixtures proposed in the buildings (i.e. low-flow vs. conventional).
 - .2 The waste stream must be fully characterized by type and quantity.
 - .3 The design flows must be identified for all pipe reaches.
 - .4 Any chemical or biological materials must be fully disclosed and addressed in the design.
 - .5 All waste being discharged shall be in compliance with the GVRD Sewer Use Bylaw No.164. A materials handling and disposal management strategy report must also be submitted for all waste which is not in compliance.
 - .6 The sanitary discharge characterization may be included in the drawing notes of the mechanical or civil design drawings for the development.

2.5 Sanitary Sewer Design

- .1 Sanitary sewer systems shall be designed using the Peak Wet Weather Flow (PWWF). The PWWF flow shall be the sum of the Peak Dry Weather Flow (PDWF), infiltration flow, and pumped flow.
- .2 The PDWF shall be the product of the Average Daily Flow (ADF) and the peaking factor. The minimum ADF rates shown in Table 2.5.2 shall be used:

**Table 2.5.2
 Summary of Minimum Average Daily Flows (ADF)**

Flow Category	Description	Category Code	Average Daily Flow
Family Residential	Housing for families, post graduate couples, professional, faculty and staff.	RES-F	325 Lpcd
Student Residential	Housing for students – apartments, dormitories, shared units.	RES-S	230 Lpcd
Office	Administrative and academic offices.	OFF	90 Lpcd
Classrooms	Classrooms, lectures, teaching labs, student and community activities.	CL	90 Lpcd
Research Facilities	Research and processing.	RSH	90 Lpcd
Mixed Building Use	Mixed use of classrooms, lecture halls, labs, research, administration and academic.	M-RCO	90 Lpcd
Library	Libraries.	LIBRY	90 Lpcd
Medical/ Clinical	Clinics, medical sciences research and teaching.	MEDIC	4 L/m ²
Animal Sciences	Livestock holding for research purposes.	ANIMAL	7.5 L/m ²
Assembly	Visitor oriented buildings for conferences, events, and cultural shows.	ASSM	16 L/m ²
Food Services	Dominant floor area designed for preparing and serving food services.	FOOD	100 L/m ² dining area
Hospital	Hospital.	HOSP	680 L/bed or 7 L/m ²
Other Uses	No distinct common use or other than described above.	OTHER	Specifically determined for use.

- .3 The ADF values listed above shall be considered minimum values. The varied building uses and activities at UBC may produce unique sewage flow rates. The Developer is responsible to ensure that flow rates are computed in accordance with the specific size and activities of the proposed facility. All pertinent information shall be provided on the design drawings as described above.
- .4 The PDWF shall be computed using the Harmon Peaking Formula.
- .5 An infiltration rate of 250 litres per pipe diameter (m) per Length (m) per day shall be added to the PDWF to determine the PWWF.
- .6 Sanitary sewer shall flow only by gravity into UBC sanitary system. Only under unique circumstances will pumped sewage be considered, but a request for a permission to do so shall be submitted to UBC Energy & Water Services with an explanation why the sanitary sewer cannot run by gravity, the proposed pump capacity (L/s) at operating head (kPa), a diagram showing pump curve with the superimposed piping system curve at operating flow and head and sump dimensions with elevations at which pump starts and stops. Sump volume between pump start and stop elevations shall be sized so that the maximum number of On/Off cycles does not exceed six per hour.
- .7 Gravity sewers shall be sized using the Manning's Formula using an "n" value of 0.011 for PVC or 0.013 for concrete. New gravity sewers shall be sized such that the PWWF depth will

- not exceed 50% of the full depth of the pipe, with a resulting minimum flow velocity of 0.6 m/s.
- .8 Forcemains shall be sized using the Hazen-Williams formula using a “C” value of 100. Forcemains shall have a minimum pipe size of 100 mm and designed for a minimum velocity of 0.9 m/s.
 - .9 *Forcemains grades should be straight lines between defined deflection points and elevations should be recorded. Where possible, the minimum grade of forcemains should be 0.1% and grading should be designed to minimize the number of highpoints. Air release valves are required at high points.*
 - .10 When extending the existing trunk lines, sufficient size, depth and slope of the sewer shall be maintained to facilitate the future extension of service in accordance with the Sanitary Sewer Master Servicing Plan.
 - .11 A minimum pipe size of 200 mm shall be used for gravity service mains in residential areas and 250 mm in research / industrial areas. A minimum pipe size of 150 mm shall be used for service connections.
 - .12 Regardless of pipe slope and capacity, the downstream pipe shall be of equal or larger diameter. No downsizing is permitted.
 - .13 Manholes at maximum 100 m spacing shall be installed at each branch connection and each change of direction. Top of manholes shall be 150 mm above the ground in all landscaped areas, otherwise flush with surface. Pipe shall be straight between manholes.
 - .14 Service connections *exceeding 20m in length* shall connect to *sanitary mains* with a manhole. *Service connections less than 20m length shall connect to sanitary mains as per MMCD Section 33 03 01 or as approved by UBC EWS.*
 - .15 *The maximum length of any service, from building face to the first manhole or main line connection, shall be 75 m.*
 - .16 *All services should connect to the mainline distribution system at locations within roadways or utility corridors approved by UBC EWS.*
 - .17 MMCD Inspection Chambers are not allowed on the sanitary sewer system under UBC Energy & Water Services jurisdiction.
 - .18 *Minimum grades for sanitary services shall meet the requirements of MMCD and BC Building Code.*
 - .19 A minimum 750 mm horizontal clearance is required where the sanitary sewer is installed within a common trench with the storm sewer. If the invert of the sanitary sewer varies significantly from the storm sewer, the Designer shall give special consideration to the horizontal spacing. *Clearance from building footings shall be approved by EWS and be a minimum of 3 m per MMCD General Design guideline clause 1.3.*
 - .20 When crossing electric duct bank, run pipe below electrical duct bank with minimum 150 mm vertical clearance from the bottom of electric duct bank. Crossing angle shall be between 45° degree and 90° degree.
 - .21 Where drop manholes are required, drops shall be outside, with clean-outs.

- .22 All manholes shall be benched and have a minimum drop of 30 mm. The drop shall be increased to 50 mm for deflection angles exceeding 45° degree.

2.6 Materials

- .1 Unless otherwise approved in writing by UBC Energy & Water Services, only the following pipe material shall be used for the gravity sanitary sewer system:
 - .1 PVC *pipng is preferred for all piping 450 mm in diameter or smaller*, SDR 28 for 150 mm diameter and smaller and SDR 35 *for larger than 200 mm*.
 - .2 Concrete *for 450 mm diameter and larger* (reinforced C76 required for all pipes 600 mm in diameter and larger).
- .2 Unless otherwise approved in writing by UBC Energy & Water Services, only the following pipe material shall be used for sanitary sewer forcemains:
 - .1 *High-Density Polyethylene (HDPE), designer to specify appropriate dimension ratio*
 - .2 PVC, class C900 (300 mm diameter and smaller) and C905.
 - .3 Ductile Iron (DI), class *C51*.

3.0 EXECUTION REQUIREMENTS

- .1 Sanitary sewer works and appurtenances shall be installed in accordance with the current MMCD standards and specification, unless otherwise noted.
- .2 If temporary bypass pumping is required, the following items are required:
 - .1 Contractor to provide notice of work to residents minimum 1 week prior to commencing (date on letter).
 - .2 Contractor shall install temporary bypass pumping system around the designated sewer sections in accordance with pre-submitted arrangement.
 - .3 Pumps and bypass lines shall be of adequate capacity to accommodate pre-determined flows as specified in the contract documents. A “duplex” pump system is to be used to provide 100% redundancy.
 - .4 Contractor to take all necessary precautions to prevent spills to the environment or backup of sewerage onto private property. In the event of a spill the Contractor shall be responsible for immediate clean-up operation and remediation of damaged property.
 - .5 Contractor shall report any spills and back-ups to UBC Energy & Water Services Mechanical Utilities Engineer immediately.
- .3 Minimum cover on all sanitary sewers shall be 1.0 meters in accordance with the MMCD standards. Where no future main line extension or connection of services is required, and where no traffic road exists or in future will exist, minimum cover may be reduced to 600 mm with special approval.
- .4 All pipe surround material shall consist of clean granular MMCD Type 1 bedding.
- .5 *Trench backfill is to be as per MMCD specifications or as approved by UBC EWS.*
- .6 For purposes of cleaning and flushing, water may be supplied from UBC fire hydrants upon application for a Hydrant Use Permit. Refer to: <https://planning.ubc.ca/planning-development/permits-and-business-licenses/building-and-trades-permits/trades-permits>

- .7 *Completed sanitary sewers shall be video inspected as per UBC supplemental specifications and MMCD prior to final approval by UBC.*
- .8 *Prior to covering the pipe, Contractor shall notify for inspection UBC Energy & Water Services Head Plumber (604-816-9364). Notification for inspection shall be provided minimum 48 hours in advance.*
- .9 Records of pipe sizes and inverts shall be provided to Infrastructure Development, Records; and to UBC Energy & Water Services; in accordance with Sections 01 78 39 Project Record Documents and 33 00 10 Underground Utilities Services of these guidelines.
- .10 Where notification requirements are not met, services may need to be re-excavated, *at the cost of the project*, for inspection and/or testing upon request of UBC Energy & Water Services.

*****END OF SECTION*****