

City of Kelowna
Application for Alternative Measures of Control
for Confined Space Entry (9.22)

The City of Kelowna requires workers to enter various types of confined spaces for inspection, maintenance and repair of equipment. Due to piping configuration of some of these confined spaces, it is not practicable to control or isolate using the measures outline in Section 9.18 (1)(2) of the BC Occupational Health and Safety Regulation.

Please note the scope of the submission *does not* include pressurized piping or manhole-to-manhole travel.

Please consider this application for alternative measures for the following group of like confined spaces for a period of five years:

Description of spaces
<p>Open channel sewer: depth up to 7.5 m</p> <ul style="list-style-type: none">• Concrete all sides, rectangular or cylindrical in shape:<ul style="list-style-type: none">○ Depth range: up to 7.5 m○ Pipe diameter:○ Barrel diameter:○ Volume:• Non-pressurized piping system:<ul style="list-style-type: none">○ Cement cast chambers, precast concrete pipe, reinforced concrete pipe, steel pipe, HDP (high-density polyethylene) pipe, PVC (polyvinyl chloride)○ With or without concrete benching at bottom of barrel• Access through standard manhole lid:<ul style="list-style-type: none">○ 0.6 m (24") to 0.5 m (20"), clear opening○ 0.6 m (24"), clear opening• Fixed ladder at majority of sites• No fixed ladder access at 7% of total sites• No fixed lighting• No fixed ventilation• Temporary flow metering sensor:<ul style="list-style-type: none">○ Limited to max. of 50 sites throughout the collection system○ Low voltage (<12 V) battery pack
System and locations
<ul style="list-style-type: none">• Locations throughout the City of Kelowna's wastewater collection system.

Risk Assessment

The following is a summary of the risk assessment that has been completed for this series of confined spaces.

Entry into the wastewater collection system via manholes is for the purposes of conducting routine inspections, modifications, repairs and installation of flow monitoring equipment. In these cases, entry will not exceed 7.5 meters in depth and horizontal travel within the pipe at the bottom of the manhole will not exceed 2 meters from the chamber. Flow depths must be below 1 meter; although it would be very rare, workers are to cease entry if flow is observed to exceed 1 meter.

As per confined space records, the historical worst case atmospheric monitor readings inside a chamber:

Oxygen: 19.5% H₂S: 5 ppm LEL: 4% CO: 7 ppm

Full detail about hazard control methodologies can be found in the attached group-specific documentation (risk assessment, safe work procedure and rescue plan).

Group-specific atmospheric hazard rating: Moderate	
Critical (high) hazards and harmful substances identified	<ol style="list-style-type: none"> 1. Hydrogen Sulfide (H₂S) 2. Oxygen (O₂) deficiency 3. Combustible gases 4. Biological hazards 5. Restricted access/egress 6. Electrocution/electric shock 7. Falling hazard 8. Limited visibility (low light) 9. Traffic (vehicular, pedestrian)
Atmospheric controls and ventilation requirements	<ol style="list-style-type: none"> 1. Continuous mechanical ventilation: <ul style="list-style-type: none"> • Minimum 1100 cfm • Minimum 500 cfm delivered to worker • Minimum 0.20 m diameter duct • Maximum of two 90-degree bends 2. Pre-entry atmospheric testing to confirm air quality and level of potential contaminants 3. Continuous atmospheric monitoring – must be 4-gas detectors calibrated to detect H₂S, O₂, LEL and CO
Communication and rescue considerations	<p>As per the attached CSE procedure and rescue plan, the following is required/must be confirmed:</p> <ul style="list-style-type: none"> • Review risk assessment and procedure prior to entry to ensure all controls are in place. • Equipment set-up (tripod and winch with Type 3 SRL). • Effective communication between entrants and entry supervisor. This is achieved by maintaining visual (when

	<p>possible), and verbally communicating as established before the entry.</p> <ul style="list-style-type: none"> • Understand roles and responsibilities. • Understand how the rescue plan will be initiated and conducted. • Understand which conditions/situations require entrant(s) to exit the space.
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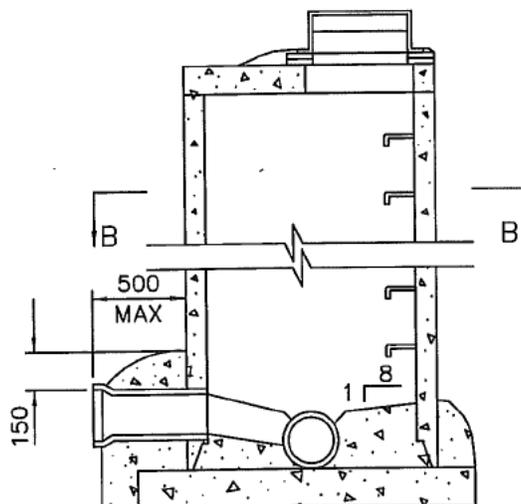
Isolation considerations/hazard control for this category of spaces

To enter into municipal sewage systems that are designed to handle sanitary, storm or combined flows, the level of control that is required by the regulation to isolate the space from the hazards substances is not practicable. The City of Kelowna is unable to isolate the piping configuration due to the lack of mechanism to blank, blind, disconnect or double block and bleed the sanitary sewer system, as per Section 9.18 (1) or (2) of the BC Occupational Health and Safety Regulation. Isolation to the level expected in the regulation is not practicable because of the following outcomes:

- It would involve shutting off services to critical infrastructure
- It would cause discharge of untreated sewerage into the environment

Entry into the chamber or piping system will be planned and conducted during the lowest possible flow conditions. Weather, time of day and effects of smaller lateral pipes, upstream or downstream, connected to the space are discussed prior to and monitored throughout the duration of entry. Visual monitoring for change in sheen, coloration and volume will be assessed and communicated by the entrants to the on-site entry supervisor. Communication between the entrant and entry supervisor will be verbal.

Below is drawing to illustrate the spaces our utilities network maintenance personnel enter:



The hierarchy of hazard control will be considered during all entries by City of Kelowna personnel. As such, the following alternate measures have been selected and will be implemented to control the hazards and harmful substances identified:

Engineering controls	1. Continuous ventilation
Administrative controls	<ol style="list-style-type: none"> 1. Visual inspection of manhole chamber / system 2. Weather forecast – check prior to and same day 3. Working in low flows 4. 4-gas atmospheric monitor for continuous monitoring for H₂S, O₂, LEL and CO
Personal Protective Equipment (PPE)	<ol style="list-style-type: none"> 1. Full face air purifying respirator with acid gas/organic vapour P100 combination cartridges 2. Protective clothing (as specified in entry procedures)

Package preparation and consultation

The following City of Kelowna representatives prepared this application in consultation with knowledgeable workers and the Joint Occupational Health and Safety Committee.

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