
	<b>CONFINED SPACE HAZARD ASSESSMENT</b>		HA # 1
	<b>CONFINED SPACE NAME:</b> Sanitary & Storm Sewer Manholes	<b>ID #</b> N/A	<b>LOCATION:</b> City Wide (over 1800)

<b>Confined Space?</b>	<b>YES</b>	
YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Enclosed or partially enclosed?		
YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Limited or restricted entry/exit?		
YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> Intended for continuous human occupancy?		
YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Large enough that a worker can enter?		

<b>SPACE INFORMATION/DETAILS (IN OPERATION):</b>			
<b>SPACE DESCRIPTION:</b> Below ground vertical cylindrical shaped storm/sanitary sewer manhole (storm and sanitary sewers exist separately). Access point for maintenance of the sewer system. No combined sewers (sanitary and storm sewers physically together) exist in the city's system.			
<b>CONTENTS:</b> Raw sewage, wastewater, street surface water run-off and debris (e.g., sticks, leaves) <i>Equipment:</i> None			
<b>PROCESS/FUNCTION/USE DESCRIPTION:</b> Distributes water, wastewater and sewage through city's sewer system.			
<b>PHYSICAL CHARACTERISTICS:</b> Cylindrical shaped manholes			
<b>DIMENSIONS:</b> Approximate range (feet - 'ft'): 5 ft to 20 ft (D) x 3.5 ft Ø		<b>VOLUME:</b> Approximate range: 48 ft <sup>3</sup> to 192 ft <sup>3</sup>	
<b>SPACE MATERIAL:</b> Precast or poured concrete (approximately one or two may be constructed of PVC)			
<b>ENTRY CHARACTERISTICS:</b> Sleeve			
<b>LOCATIONS:</b> 1 – at grade		<b>SIZE:</b> 24 inch (") Ø	
<b>SECURING MECHANISM:</b> Gravity			
<b>ADJACENT VESSELS/SPACES/PIPING:</b>			
<u>NAME OF SPACE/PIPE</u>	<u>CONTENTS</u>	<u>TEMPERATURE</u>	<u>PRESSURE</u>
Inlet (8" Ø average)	Raw sewage/wastewater/surface water	No concern	No concern
Outlet (8" Ø average)	Raw sewage/wastewater/surface water	No concern	No concern

<b>SCOPE OF WORK:</b>
This Hazard Assessment (HA) refers to entry for the purpose of inspection (mostly from the outside of the space) and manual removal of objects (such as branches) or removal of objects with a sucker truck from outside the space. Minor rare repairs include removing and replacing damaged fixed ladder rungs (short duration task), which involves cutting steel ladder rungs with an angle grinder, drilling holes (one inch) with an electric powered-drill (e.g., Hilti-type drill) and pressure fitting new ladder rungs into the drilled-holes with an impact device (e.g., impact driver).  <i>Hot work and other atmospheric contaminant generating activities are not included in this Hazard Assessment.</i>

<b>HAZARDOUS ATMOSPHERIC RATING (LOW, MOD. HIGH)</b>	<b>Moderate</b>	<b>JUSTIFICATION:</b> Potential for CO and H <sub>2</sub> S to be greater than 10% of exposure limits.
<b>COMPLETED BY:</b>	<b>Prepared by:</b> Peter Bergholz, BSc, CIH, AMEC, November 2012 <b>Reviewed by:</b> Victor Leung, MSc, CIH, ROH, CRSP, AMEC, November 2012	<b>INFO. SOURCE:</b> Paul Elsoff & Dave Cooper

# **CONFINED SPACE HAZARD ASSESSMENT**

**CONFINED SPACE NAME:**
**ID #**
**LOCATION:**

Sanitary &amp; Storm Sewer Manholes

N/A

City Wide (over 1800)

**HA #** 1

**DATE:** November 2012

HAZARDS		UNDISTURBED SPACE POTENTIAL HAZARDS	WORK TASKS POTENTIAL HAZARDS	CONTROL MEASURES
ATMOSPHERE	Oxygen (O <sub>2</sub> ) Deficiency	<b>Yes</b> Possible for closed up space prior to entry.	No	Monitoring for O <sub>2</sub> . Continuous ventilation during entry.
	O <sub>2</sub> Enrichment	No	No	
	Chemical	<b>Yes</b> Potential for hydrogen sulphide (H <sub>2</sub> S) and methane to be present in spaces and carbon monoxide (CO) from adjacent vehicular traffic.	<b>Yes</b> <u><b>Drilling - silica dust:</b></u> If required (rare), short duration drilling tasks (drilling 1 inch holes) for ladder repair will potentially present minor exposures to silica and dust.  <u><b>Grinding - metallic dust:</b></u> If required (rare), short duration grinding tasks of grinding carbon steel ladder rungs with angle grinders will potentially present minor exposures to metallic dusts. MSDSs for grinding wheels typically contain metals.	Monitoring for H <sub>2</sub> S, methane and CO. Continuous ventilation during entry.  <b>General PPE:</b> Coveralls, safety boots, work gloves, hard hat and safety glasses with side shields.  For sanitary sewers, disposable Tyvek coveralls and disposable nitrile gloves are recommended.  <b>Drilling &amp; Grinding PPE:</b> General PPE, full face shield (grinding only), hearing protection and disposable dust mask (e.g., N95 type). If multiple ladder rungs are required to be repaired, a half face respirator with P100 cartridges is required. <b>Note:</b> respirator requirements are recommended in the absence of space-specific exposure monitoring data.
	Biological	<b>Yes</b> Vermin (rats, mice or their excrement) may be present. For storm sewers, bacteria/fungi/sludge is possible in spaces that are wet or are not opened for prolonged periods.  For sanitary sewers, the presence of pathogenic bacteria and sludge are possible in spaces at all times.  Needles/sharps (potentially containing bodily fluids) may be present.  Raw sewage passes through the sanitary manholes.	No	For storm sewer entry, rinse space prior to entry if space contains large amounts of bacteria/fungi/sludge and wear <b>General PPE</b> .  For sanitary sewer entry, rinse space prior to entry and wear <b>General PPE</b> (disposable Tyvek coveralls and disposable nitrile gloves are recommended).  Remove objects from outside the space at all times with sucker truck, if feasible.
	Fire/Explosion	<b>Yes</b> Potential for combustion gases (methane) or volatile chemical substances to be present emitted from wastewater or from accidental/illicit dumping.	No	Monitoring for LEL. Continuous ventilation during entry.

**HAZARDOUS  
ATMOSPHERIC RATING  
(LOW, MOD. HIGH)**

## **Moderate**

**JUSTIFICATION:** Potential for CO and H<sub>2</sub>S to be greater than 10% of exposure limits.

**COMPLETED  
BY:**
**Prepared by:** Peter Bergholz, BSc, CIH, AMEC, November 2012  
**Reviewed by:** Victor Leung, MSc, CIH, ROH, CRSP, AMEC, November 2012

**INFO.  
SOURCE:**

Paul Elsoff &amp; Dave Cooper

# **CONFINED SPACE HAZARD ASSESSMENT**

**CONFINED SPACE NAME:**
**ID #**
**LOCATION:**

Sanitary &amp; Storm Sewer Manholes

N/A

City Wide (over 1800)

**HA #** 1

**DATE:** November 2012

HAZARDS		UNDISTURBED SPACE POTENTIAL HAZARDS	WORK TASKS POTENTIAL HAZARDS	CONTROL MEASURES
SAFETY	Structural Hazard	No	No	
	Engulfment	<b>Yes</b> Potential if the outlet were to become plugged during entry (sanitary and storm) or during/following high rain fall (storm).	No	Entry Supervisor to evaluate liquid level prior to entry. Entry prohibited if the flow level is surcharging and when significant precipitation is forecasted in the catchment area during entry.  Harness and lifeline must remain connected during entry.
	Entrapment	No	No	
	Electrical	No	<b>Yes</b> Electrical powered tools required (drills, impact drivers, grinders).	GFCI for power cords and electrical equipment (drills, impact drivers, grinders) is required.
	Access/Egress	No	No	
	Fall	<b>Yes</b> Fixed ladders present.	<b>Yes</b> May require working on fixed or portable ladder at heights (i.e., ladder rung repair).	Fixed ladder or portable ladder required. Maintain 3 points of contact on the ladder at all times.  Use caution upon initial entry (inspect fixed ladder condition). Portable ladders may substitute fixed ladders where manhole opening permits usage.  Fall protection required when climbing up and down ladders. Lifeline attached at all times.
	Slip/Trip	<b>Yes</b> Interior of space, ladder rungs and floor surface may be wet and slippery.	<b>Yes</b> Work tasks may involve manually removing large branches which may pose a tripping hazard.	Wear <b>General PPE</b> (safety boots) and work with care.
	Visibility/Light Level	<b>Yes</b> Insufficient lighting	No	Portable lighting (flashlight or portable light with GFCI) required.
	Baffles/Internal Arrangement	No	No	
	Floor Openings in Space	No	No	
PHYSICAL	Noise/Vibration	No	<b>Yes</b> Grinding/impact driver tasks may be required	Hearing protection required (wear <b>Drilling &amp; Grinding PPE</b> ).
	Temperature	<b>Yes</b> Entry into space may occur during hot/cold weather conditions (spaces are located outside).	<b>Yes</b> Surfaces are immediately hot after cutting ladder rungs with grinder.	Wear <b>General PPE</b> and dress appropriate for outside weather conditions.  Provide heat stress awareness sessions to work crews if working

**HAZARDOUS ATMOSPHERIC RATING (LOW, MOD. HIGH)**

## Moderate


**JUSTIFICATION:** Potential for CO and H<sub>2</sub>S to be greater than 10% of exposure limits.

**COMPLETED BY:**

**Prepared by:** Peter Bergholz, BSc, CIH, AMEC, November 2012  
**Reviewed by:** Victor Leung, MSc, CIH, ROH, CRSP, AMEC, November 2012

**INFO. SOURCE:**

Paul Elsoff &amp; Dave Cooper


	<b>CONFINED SPACE HAZARD ASSESSMENT</b>		<b>HA #</b> 1
	<b>CONFINED SPACE NAME:</b> Sanitary & Storm Sewer Manholes	<b>ID #</b> N/A	<b>LOCATION:</b> City Wide (over 1800)
			<b>DATE:</b> November 2012

HAZARDS		UNDISTURBED SPACE POTENTIAL HAZARDS	WORK TASKS POTENTIAL HAZARDS	CONTROL MEASURES
OTHERS				during hot summer days.  Wear work gloves ( <b>General PPE</b> ) and work with care.
	Non/Ionizing Radiation	No	No	
	Laser	No	No	
	Ingestion/Skin Contact Hazard	Yes Contact with raw sewage/wastewater may occur in spaces.	No	Work with care and wear <b>General PPE</b> . Rinse space prior to entry if space contains large amounts of bacteria/fungi/sludge material. Practice good personal hygiene and wash hands thoroughly prior to break and at end of work shift.
	Mechanical Hazard	No	No	
	Traffic Hazard	Yes Manholes exist at street locations	No	Entrance to space must be physically isolated from vehicular and pedestrian traffic. Standby person or designated road-traffic crew must monitor traffic in the area.
	Hydraulic/Pneumatic Hazard	Yes Potential for water pressure to build up inside manhole piping.	No	Entry Supervisor to evaluate liquid level prior to entry. Entry prohibited if the flow level is surcharging and when significant precipitation is forecasted in the catchment area during entry.

CONTROL MEASURES REQUIRED:	
<b>Confined Space Permit:</b>	Yes
<b>Atmospheric Testing:</b>	Gas monitor with sensors for O <sub>2</sub> , LEL, CO & H <sub>2</sub> S. Monitor for methane (CH <sub>4</sub> ) with LEL sensor.
<b>Ventilation Requirements:</b>	Provide mechanical ventilation (minimum 64 CFM) through the opening. Minimum ventilation requirements are based on achieving 20 air changes per hour. The atmosphere inside the space will be controlled through air pressurization achieved by providing increased mechanical ventilation (over-ventilating the space).
<b>PPE Requirements:</b>	<b>General PPE:</b> Coveralls, safety boots, work gloves, hard hat and safety glasses with side shields. For sanitary sewers, disposable Tyvek coveralls and disposable nitrile gloves are recommended.  <b>Drilling &amp; Grinding PPE:</b> General PPE, full face shield (grinding only), hearing protection and disposable dust mask (e.g., N95 type). If multiple ladder rungs are required to be repaired, a half face respirator with P100 cartridges is required. <b>Note:</b> respirator requirements are recommended in the absence of space-specific exposure monitoring data.
<b>Lockout/Isolation:</b>	Isolation is not possible. Entry Supervisor to evaluate liquid level prior to entry. Entry prohibited if the flow level is surcharging and when significant precipitation is forecasted in the catchment area during entry.
<b>Standby Person:</b>	Yes, at or near entrance.
<b>Communication Procedures:</b>	Radio, voice

<b>HAZARDOUS ATMOSPHERIC RATING (LOW, MOD. HIGH)</b>	<b>Moderate</b>	<b>JUSTIFICATION:</b> Potential for CO and H <sub>2</sub> S to be greater than 10% of exposure limits.
<b>COMPLETED BY:</b>	<b>Prepared by:</b> Peter Bergholz, BSc, CIH, AMEC, November 2012 <b>Reviewed by:</b> Victor Leung, MSc, CIH, ROH, CRSP, AMEC, November 2012	<b>INFO. SOURCE:</b> Paul Elsoff & Dave Cooper

This Hazard Assessment (HA) pertains to the activity and confined space listed above. This hazard assessment is required to be reviewed within 3 years of preparation; any change in activity requires a review of this HA and a completion of a HA for the specific activity (especially when contaminants will be generated by an activity such as welding, radiation or chemical usage).

	<b>CONFINED SPACE HAZARD ASSESSMENT</b>		<b>HA #</b> 1
	<b>CONFINED SPACE NAME:</b> Sanitary & Storm Sewer Manholes	<b>ID #</b> N/A	<b>LOCATION:</b> City Wide (over 1800)

CONTROL MEASURES REQUIRED:	
<b>Rescue Procedures:</b>	Standby person calls 911 and calls Entry Supervisor. Entry Supervisor will respond to scene. Self rescue (if possible) or removal by Standby Person (from outside space) using winch.
<b>Required Rescue and Safety Equipment</b>	Two-way radio, cellular telephone, harness (must be worn), tripod, winch, lifeline (attached at all times).
<b>Other:</b>	<p>For storm sewer entry, rinse space prior to entry if space contains large amounts of bacteria/fungi/sludge and wear <b>General PPE</b>.</p> <p>For sanitary sewer entry, rinse space prior to entry and wear <b>General PPE</b> (disposable Tyvek coveralls and disposable nitrile gloves are recommended).</p> <p>Remove objects from outside the space at all times with sucker truck, if feasible.</p> <p>Harness and lifeline must remain connected during entry.</p> <p>GFCI for power cords and electrical equipment (drills, impact drivers, grinders) is required.</p> <p>Fixed ladder or portable ladder required. Maintain 3 points of contact on the ladder at all times. Use caution upon initial entry (inspect fixed ladder condition). Portable ladders may substitute fixed ladders where manhole opening permits usage. Fall protection required when climbing up and down ladders. Lifeline attached at all times.</p> <p>Portable lighting (flashlight or portable light with GFCI) required.</p> <p>Wear <b>General PPE</b> and dress appropriate for outside weather conditions.</p> <p>Provide heat stress awareness sessions to work crews if working during hot summer days.</p> <p>Practice good personal hygiene and wash hands thoroughly prior to break and at end of work shift.</p> <p>Entrance to space must be physically isolated from vehicular and pedestrian traffic. Standby person or designated road-traffic crew must monitor traffic in the area.</p>

<b>HAZARDOUS ATMOSPHERIC RATING (LOW, MOD. HIGH)</b>	<b>Moderate</b>	<b>JUSTIFICATION:</b> Potential for CO and H <sub>2</sub> S to be greater than 10% of exposure limits.
<b>COMPLETED BY:</b>	<b>Prepared by:</b> Peter Bergholz, BSc, CIH, AMEC, November 2012 <b>Reviewed by:</b> Victor Leung, MSc, CIH, ROH, CRSP, AMEC, November 2012	<b>INFO. SOURCE:</b> Paul Elsoff & Dave Cooper