



WORK PRACTICE

City of Kalamazoo
Public Services Department
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WP Number:	Computer Path:	
Title: Manhole Safe Work Practices	Written By: ^	Date: ^
	Reviewed By: ^	Date: ^
	Approved By: ^	Date: ^

Purpose:

The purpose of this safe work practice is to provide a procedure to be used when working around an 'open' manhole or preparing to enter a manhole for routine maintenance or inspection.

A manhole structure is a confined space that presents possible fall hazards where there is a potential for toxic gases to be present. Therefore ALL PUBLIC SERVICES PERSONNEL assigned to enter sanitary and storm manholes shall follow the procedures in this work practice.

Required Safety Equipment

The following safety equipment shall be used by all personnel working around open manholes and preparing to enter the manhole:

- a. approved gas detector (properly calibrated);
- b. fresh air blower;
- c. safety harness, rope, and tripod safety system; and
- d. an approved hard hat.

Confined Space Entry Procedures

All sanitary and storm sewer manholes, which have been designed to be entered for inspection and maintenance on a regular basis, shall follow the following procedures **BEFORE ENTERING THE CONFINED SPACE:**

1. **Atmospheric Testing:** Before allowing any personnel inside the confined space, test the space for all three atmospheric conditions, oxygen content, flammable or explosive gases and hydrogen sulfide.
 - a. **Oxygen content** must be at least 19.5% in the confined space, measured at all levels (bottom, middle, and top). The safe oxygen level is between 19.5% and 21%. **Do not enter the confined space if the oxygen level is below 19.5% or above 21%.** Due to the extreme danger of suffocation in confined spaces, constant and continuous oxygen monitoring is required throughout each work period. Oxygen content above 23% can cause explosions or vigorous burning of flammable materials, including hair or clothing.
 - b. After you have determined oxygen content, **use the detector to measure flammability at all levels of the confined space (bottom, middle, and top).** Flammability is measured in terms of the Lower Flammable Limit (LFL) or Lower Explosive Limit (LEL). This is the smallest concentration of a combustible gas in air that will explode when it contacts a spark or open flame,
 - c. Finally, test the atmosphere for any toxic concentrations of vapors. Toxicity is measured in terms of the Threshold Limit Value (TLV). **Use the detector to measure toxicity at all levels of the confined space (bottom, middle, and top).** Since toxic concentrations may be lighter or heavier than air, they can be present at the top or the bottom of the confined space.

Note: The confined space must be tested at three levels for each atmospheric condition. Each level must be tested for a minimum of 60 seconds. The gas detector itself can be lowered into the confined space atmosphere with a safety line or the detector can be used with an aspirator pump

so the detector is not lowered into the confined space. **Consult the detector operating procedures manual if you have any operating questions.**

2. **Ventilation:** A fresh air blower ventilation system shall be set up and in operation **before and during** all inspection and maintenance procedures.
3. After the air blower ventilation system has been in operation and the confined space has been tested and determined to be safe for entry, the operator shall be equipped with:
 - a. A safety harness and lifeline which is attached to the tripod safety retrieval system.
 - b. An approved, properly calibrated gas detector that is in operation the entire time the employee is in the confined space. This is necessary due to the possibility of a rapid change in the confined space atmosphere.
 - c. An approved hard hat.
4. If permanent ladder steps are not provided in the confined space, an aluminum ladder in good operating condition shall be used to enter the confined space. Any employee who descends into a man hole/sewer will have safety harness, rope, and tripod safety system attached to the employee.
5. At least one person shall be stationed above ground for support purposes whenever a confined space is entered.
6. Entering sanitary and storm sewer lift stations that are designed to be entered regularly, shall have the power apparatus **locked out (off)** while the employees are working on the lift station system. Locking out the power apparatus prevents an accidental pump start while employees are working on the system.
7. **Emergency Action Plan** -- No person shall enter a confined space (manhole, wet well, dry well, or underground vault) to retrieve someone who is unconscious without having **additional trained** personnel above ground to assist. The person entering the confined space for rescue purposes must be equipped with the required rescue equipment and follow the specific rescue procedure.
8. A qualified person shall inspect all safety devices and instruct all involved employees on proper confined space safety procedures. All defective safety devices shall be reported to the foreman immediately. It shall be the **supervisor's responsibility** to insure that crews assigned to enter confined spaces have the required safety devices in their possession. The supervisor must assure the assigned employee has the required safety devices in their possession. The supervisor must assure the assigned employee is trained to operate all safety equipment and understands all safety procedures.

General Manhole Safe Work Practices:

1. Use caution when working around manholes.
2. Do not smoke, light open flames, or produce sparks in the immediate vicinity of open manholes.
3. **Before removing manhole or entrance covers**, test the atmosphere inside the manhole by using remote sampling probe or aspirators. If the lower explosive limit is above 10% inside the manhole, do not remove the cover.
4. Use picks, hooks to open manhole covers.
5. Lift manhole covers and heavy hatches with the legs. Never lift with the back muscles.
6. Lay removed manhole and heavy hatch covers flat on the ground several feet away from the opening.
7. When manhole or entrance covers are removed, the opening must be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and protect each employee working in the space from foreign objects entering the space.
8. Use barricades and/or warning devices to direct traffic around open manholes.
9. Follow Public Services Department's **Confined Space Entry Program** and all safety procedures before entering and during entry into any manhole.
10. Have at least two persons present before entering a manhole: One person to enter the manhole and one person in the clear to observe in the event of an emergency. One of the persons must be a "qualified person" as defined by the Public Services Department's Confined Space Entry Program.

This person bears the responsibility of completing the Confined Space Entry Permit. Never enter a manhole unattended.

11. Wear protective clothing and nonslip, non-sparking shoes in a manhole.
12. Test each individual manhole step carefully. Be sure to check ladder for overall structural soundness and ability to support weight before using.
13. Use ladders to access manholes whenever the structural soundness and support ability of the manhole steps/stairs are in question.
14. Take proper safety precautions when using ladders in a manhole.
15. Use a safety harness and life line when entering a vertical entry manhole, unless the life line creates an entanglement hazard.
16. Watch out for slippery footing in a manhole.
17. Do not hand-carry tools and/or equipment while climbing up or down steps or a ladder into a manhole.
18. Raise or lower tools and/or equipment into a manhole using a rope, sling, or bucket.
19. Use only explosion-proof portable lighting and non-sparking tools in a manhole.
20. Avoid using electrical tools in or near water. Never stand in water when using electrical tools.
21. Constant ventilation is required when performing "hot-work" within a manhole.

Point of Contact for :

If the above safe works practices can not be accomplished, or if there is a positive reading on the gas detection equipment you must contact the following appropriate location of your work assignment:

STOCKBRIDGE LOCATION

Dispatch (Stockbridge)-269-337-8148 or 269-337-8729
Bob McClenney(Stockbridge)- 269-998-6430

HARRISON LOCATION

TCA (Harrison)
Jim Cook – 269-998-0497-Cell Phone

Marion (Mac) McLemore – Safety Specialist
269-207-6668 – Cell Phone

Under no circumstances will any employee proceed with the job unless all safe work practices can be met.

Failure to adhere to the above sanitary and storm sewer safety work practices for manholes and lift stations by City of Kalamazoo personnel will result in progressive disciplinary actions up to and including discharge.