***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

SECTION 697 – STYRENE ENVIRONMENTAL CONTROL

 **DESCRIPTION**

**697.01.01 GENERAL**

1. The Contractor shall provide and maintain methods, equipment, and temporary construction, as necessary to provide monitoring and controls for styrene emissions at the construction site and adjacent areas.
2. Reference:

OSHA Standard Subpart H (1910.106) Flammable Liquid Storage and Dispensing Operations of Polyester Resin

OSHA Standard 1910 Subpart Z (1910.1000) Air contaminants

OSHA Standard 1926 Subpart D Gases, Vapors, Fumes, Dusts and Mists

1. A minimum of 72 hours prior to the work on any manhole, cleanout, service lateral, or line segment, Contractor to distribute a door-to-door Owner approved Homeowner Notification door hanger describing the work to be performed, if the property is potentially tied to the section of line where work is being performed, based upon information provided by the Owner and site pre-inspection.
2. The Contractor shall include information regarding the potential for styrene odors from the work in the notifications as specified above. The notification should list the potential causes of odors such as sewer gases (hydrogen sulfide), and chemical emissions (styrene).

**CONSTRUCTION**

**697.03.01 STYRENE ODOR CONTROL**

A. The Contractor shall employ methods and procedures that mitigate the generation and discharge of objectionable odors from styrene emissions to the atmosphere at all times.

1. All manufacturer recommended procedures and safety equipment necessary for successful completion of the work and safety of personnel shall be provided by the Contractor.

B. The Contractor shall employ methods and procedures to monitor and mitigate releases of styrene emissions to the atmosphere. The current published exposure standard for styrene monomer is a Time Weighted Average (TWA) of 50 Parts Per Million (ppm) with a Short-Term Exposure Limit (STEL) of 100 ppm.

C. Photoionization detectors (PID), colorimetric gas detection tubes or approved equal can be utilized to assess styrene atmospheric levels, applied in accordance with manufacturer recommendations. All equipment used shall be classified for styrene detection. If required, all equipment shall be calibrated as indicated and as often as required by the manufacturer. For monitoring variations in exposure, equipment that records and stores the styrene concentration is required. Contractor shall reference current published exposure limit and recommendations at time of work being performed. Reference OSHA Standards listed in 700.01.01 General A.

1. The CIPP process shall follow manufacturer’s recommendations to minimize release of styrene odors.
2. The Contractor can submit for approval the use of styrene free vinyl ester resin in place of the polyester resin for the project. The use of this resin would not require monitoring specified in this Section.
3. The Contractor shall manage the site with good housekeeping practices, including prevention measures and clean-up procedures from spills, drips or other incidents during the CIPP process.
4. The ambient air at the liner truck or storage unit and each manhole or access point shall be monitored throughout the installation, curing and cool down processes to confirm levels are less than the current published voluntary occupational limit of 50 ppm for TWA and time of exposure. Onsite mitigation methods (in accordance with OSHA Standard 1926, Subpart D) and personal protective equipment to protect against inhalation (in accordance with OSHA Standard 1910) shall be implemented should levels reach or exceed this limit.
5. Prior to the installation of the liner the Contractor shall contact property owners to request that water is run in all drain systems to ensure p-traps are not dry and vents are not blocked to prevent migration of odors into the property. Contractor is not obligated to confirm property owners comply with this request.
6. In addition to notification of property owners with connections to the segment being rehabilitated, the Contractor shall provide notification of property owners upstream and downstream for 250 feet to inform them of the potential for odors.
7. Notification of property owners regarding the work shall include information on the potential smell from styrene odors. Contractor to provide monitoring if requested by property owner to confirm the atmospheric reading for styrene is less than currently published exposure limit of 50 ppm TWA and time of exposure.
	1. Work around childcare facilities and schools requires coordination of construction schedules to limit installation to after school hours or provide air monitoring inside the school or facility.
	2. Work around hospitals, nursing homes and emergency care facilities requires coordination with facility staff to take precautions to ensure odors do not migrate up lateral connections. This can include verifying water has been run through drains prior to installation of the liner.
8. The Contractor shall not release water until the curing water temperature has cooled to a specified temperature (typically 100o F, or as required by treatment operations) prior to discharge of cooled water.
9. For small diameter sewers, 8-inch diameter and less, the discharge of cure water shall be regulated to provide adequate dilution of the process cure water to minimize impact on the Treatment Plant.
10. For water cured liners, the Contractor shall monitor the downstream manholes for styrene odors during the discharge of the process cure water.
11. Methodologies to mitigate styrene odors during the CIPP process may include:
	1. An extended cool down period to achieve cooler process water discharge temperatures of 100o F or less.
	2. The approved venting measures with the use of fans/blowers at the access points to disperse emissions and mitigate resulting odors.
12. Results of monitoring shall be recorded in a log electronically that includes information such as but not limited to: concentration, location of sample, date and time.

**697.03.03 ODOR CONCENTRATION AIR MONITORING**

1. It shall be the responsibility of the Contractor to continuously measure wastewater streams headspace odorant concentrations and atmospheric conditions to provide sufficient equipment, chemicals and labor to control styrene odors generated by the sewer rehabilitation work and ensure a safe working environment in accordance with OSHA standards listed in 700.01.01 General A. The initial styrene concentration measurements, to establish baseline atmospheric conditions, taken by the Contractor prior to beginning the CIPP work shall be recorded and results provided to the Engineer.
2. Monitoring of exposure limits (parts per million and time) for VOC (volatile organic compound) emissions shall be in accordance with published regulatory guidelines from the Environmental Protection Agency (EPA), the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA).
3. For styrene, air monitoring should be performed at the initial opening of the liner truck or storage unit door, and at both liner installation and finish access points, to ensure a safe work environment for those entering the liner truck or storage unit and working around the installation and exit points, with monitoring continuously performed throughout the rehabilitation process.
4. To limit exposure to styrene emissions for workers, at the initial opening of the liner transport truck or storage unit door, suitable Personal Protection Equipment (PPE) in accordance with OSHA Standard – 1910 should be worn by persons immediately entering the truck or storage unit throughout the liner rehabilitation process. Barriers should be placed around the liner truck or storage unit as a precaution to indicate that these areas are typical for higher concentrations of styrene.
5. In addition to initial monitoring and during the first day of each new flow bypass setup the Contractor shall monitor styrene levels a minimum of four (4) times daily (minimum of 4 hours required between monitoring).
6. The Engineer reserves the right to request monitoring data at any time. Engineer shall be notified immediately of any property owner odor complaints and provided copies of monitoring of the property. Styrene Odor control and air monitoring logs shall be submitted to the Engineer on a weekly basis and prior to completion of the segment.
7. Contractor shall notify the City immediately when monitored levels exceed the published exposure limit of 50 ppm (TWA) and/or 100 ppm (SEL). Once a level exceeding published exposure limits is logged, Contractor shall implement onsite mitigation methods (in accordance with OSHA Standard 1926, Subpart D) and personal protective equipment to protect against inhalation (in accordance with OSHA Standard 1910) shall be implemented for all onsite employees.
8. In the event that styrene related odors become an issue as it relates to the public, masking agents employed by the contractor and approved by the City and/or Engineer shall be implemented, only after confirming the logged exposure limit has not been reached and/or exceeded at any monitoring location throughout the CIPP process.

**METHOD OF MEASUREMENT**

**697.04.01 MEASUREMENT**

No measurement will be made for Styrene Environmental Control Sanitary Sewer Rehabilitation. Compliance with this specification shall be considered subsidiary to the project work.

**BASIS OF PAYMENT**

**697.05.01 PAYMENT**

Unless otherwise provided in the Special Provisions, no payment will be made for Styrene Environmental Control Sanitary Sewer Rehabilitation as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which such Styrene Environmental Control Sanitary Sewer Rehabilitation is required.

**END OF SECTION 697**