

TABLE OF CONTENTS

DIVISION ME

SECTION	PAGE
ME-1 (2100) BRIDGE VENTILATION SYSTEM.....	1
ME-1.1 VENTILATION REQUIREMENTS FOR CONFINED SPACES	1
ME-1.2 VENTILATION DESIGN DESCRIPTION	2
ME-1.3 MATERIALS	2
ME-1.4 CONSTRUCTION REQUIRMENTS	4
ME-1.5 METHOD OF MEASUREMENT AND BASIS OF PAYMENT	4

SPECIAL PROVISIONS
DIVISION "ME"
SPECIAL REQUIREMENTS

ME-1 (2100) BRIDGE VENTILATION SYSTEM

ME-1.1 VENTILATION REQUIREMENTS FOR CONFINED SPACES

Since Minnesota has adopted the Federal OSHA Standard, 29 CFR 1910.146 Permit Required Confined Spaces for General Industry, the recommendations in this report will be following these guidelines.

This OSHA standard allows the use of alternate procedures for entering a confined space under the conditions set forth in this standard.

These alternate procedures require the employer to: demonstrate that the only hazard posed by the permit space is an actual or potential hazardous atmosphere; that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry; that the employer develops monitoring and inspection data that supports these demonstrations. Alternate entry procedures require continuous forced air ventilation shall be used, as follows:

- (1) An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere.
- (2) The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space.
- (3) The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.

The data must demonstrate that there are no non-atmospheric hazards and that the ventilation will keep the air inside the permit space safe for entry. This should include initial data in the form of:

- Volume of the space to be entered.
- Capacity and configuration of the ventilation equipment to be used.
- Identified atmospheric hazards and potential hazards.
- The sampling of results from routine testing of the space from the time ventilating has begun through final determination of acceptable entry conditions.
- Atmospheric hazards created by work in the space.

OSHA classifies this space as a Controlled-Atmosphere Confined Space (CACS). Ventilation alone will control the atmosphere hazards at safe levels. Continuous air monitoring is required unless it is demonstrated that periodic monitoring is sufficient. As inspectors and workers entering the confined space will have portable air monitoring equipment, a permanent air monitoring system will not be installed.

ME-1.2 VENTILATION DESIGN DESCRIPTION

There are eighteen (18) concrete box girders shown in the design of the Lowry Avenue Bridge. They are two sizes: the large is approximately 13,505 cubic feet and the small is approximately 11,635 cubic feet. Because oxygen deficiency is the common cause of death in confined spaces, ventilation is required before and during entry to control potential hazardous atmospheres.

The solution shall be to mechanically force ventilation air into the confined space and exhaust it simultaneously. This solution requires two (2) openings into each box girder one (1) for a fan and one (1) for personnel entry. It is important that this ventilation fan is located in an area where the ventilation air is not contaminated by motor vehicle exhaust, etc.

When forced ventilation of a confined space is required, it is recommended that at least three (3) air changes are provided before entry. The volume of the larger box girder is approximately 13,505 cubic feet. If the ventilation system was sized for one air change every 4 minutes, the fans and openings will need to be sized for 3,400 cubic feet of air per minute (cfm). This system size allowing three (3) air changes shall require a wait time of twelve (12) minutes before entry. The ventilation system shall remain in operation while the space is occupied.

The fan access openings shall be protected by a louver, screen or burglar bars to prevent unauthorized entry. The exhaust air shall enter through the fan opening and leave the box girder through the personnel entry opening at the opposite end of the box girder from the fan. The fan shall be controlled by a lighted pilot switch located just inside the personnel entry point. A sign should be installed at each personnel entry point stating the length of time required to purge the space and that the air should be tested before entry.

ME-1.3 MATERIALS

The materials used in this work shall be new and conform to the requirements for kind and size of material specified herein or as shown on the plans or Proposal.

Within fifteen (15) days after award of the Contract and before any installation, the Contractor shall submit to the Engineer for approval three (3) copies of a complete schedule with dimensional drawings and product data on each fan proposed for

installation. This schedule shall be complete with catalogs, drawings, diagrams, provide fan curves for each fan at the specified operation point, with the flow, static pressure and horsepower clearly plotted or any other descriptive data that may be required to establish specification compliance. Should the Contractor fail to submit this schedule as required, the Engineer shall reserve the right to select any or all items omitted from the required schedule. Any items selected by the Engineer shall be furnished and installed by the Contractor without any changes in Contract prices.

Fans:

Reference three manufactures (or approved equal): Greenheck Mixed Flow Fans QEID-15-A10 the motor HP shall be 1 at 0.5" water column static pressure with electrical requirements of 230 volt single phase and 60 hertz; Cook Tubular Centrifugal Inline Fan 150-TCN-17D the motor HP shall be 1.5 at 0.5" water column static pressure with electrical requirements of 230 volt single phase and 60 hertz; Twin City Fan 150-QSL the motor HP shall be 1.5 at 0.5" water column static pressure with electrical requirements of 230 volt single phase and 60 hertz or equal shall be a good selection for this application. These fans are to be manufactured as direct drive fans.

Coatings:

Housing and all support frame work to be coated with a minimum of 3 mils of electrostatically applied and baked polyester urethane. Finish color shall be gray. Coating must exceed 1,000-hour salt spray under ASTM B117 test method.

Screens:

The bat proof fan inlet screens and all fasteners shall be galvanized steel with the openings a mesh 1/4". The fan inlet screens will be removable via bolts from inside the box girder. The opening into the box girder for the fan inlet should be 30"x 30" square. (See structural drawings for details) The fan will need an outlet safety screen to protect personnel and prevent debris from entering the fan from inside the box girder. The outlet safety screen will be ordered with the fan from the fan supplier and be constructed of expanded metal and are factory installed.

The access openings/entry points through the box girder and the exhaust air should be 24"x24". The access openings design includes a double hatch; the lower hatch is flush to the soffit and a solid cover. The solid cover shall remain open while fans are operating and people are inside the box girders. The second hatch is a grated safety hatch to prevent "fall thru" protection. (See structural drawings for details)

Fan Supports:

The structural steel fan support and all fasteners shall be stainless steel. The

structural steel fan supports must to be designed to carry the fan weight / load while spanning the 30"x 30" opening in the box girder for the fan inlet. When the final fan selection has been made and the fan shop drawings approved, the structural steel fan support design and bolt hole locations will need to be finalized by the Contractor. The Contractor shall then submit the structural steel fan support design to the Engineer for approval, see attached fan support detail for design information.

ME-1.4 CONSTRUCTION REQUIRMENTS

Inspection:

During the process of unloading, all fans and accessories shall be inspected by the Contractor for loss or damage in transit. All material found during the progress of the work to have cracks, flaws or other defects will be rejected by the Engineer and the Contractor shall promptly remove from the site of the work such defective material. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, products included, and location of installation.

Contractor's Responsibility for Material - The Contractor shall be responsible for all material furnished and shall replace at no cost to the Owner all such material that is found to be defective in manufacture or that has become damaged in handling after delivery by the manufacturer. This shall include the furnishing of all installed material required for the replacement of installed material discovered defective prior to the final acceptance of the work. The Contractor shall be responsible for the safe storage of material furnished by or to the Contractor and accepted by the Contractor and intended for the work, until it has been incorporated and accepted in the completed project. Store fans and materials in a dry area indoors, protected from damage, and in accordance with manufacturer's instructions.

Handling and lift fans in accordance with the manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer. Fans and other accessories shall, unless otherwise directed by the Engineer, be unloaded at the point of delivery, hauled to and distributed at the site of the project by the Contractor.

ME-1.5 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Payment for Bridge Ventilation System under Item 2100.601 by the lump sum shall be as specified on the proposal, which shall include the cost of furnishing all the ventilation fans, furnished and installed as specified, electrical connections, structural steel supports, testing, labor, materials and signs necessary for constructing the bridge ventilation system as shown in the plans.