

SEQUENCE OF OPERATIONS:

THE SERVICE BAY, PAINT BAY, WELDING BAY AND WELDING SHOP SHALL OPERATE INDEPENDENT OF EACH OTHER, ACCORDING TO THE FOLLOWING SEQUENCES. CONTROL OF THE INDIVIDUAL SYSTEMS SHALL BE VIA MAIN GAS DETECTION CONTROLLER LOCATED IN THE LARGE SERVICE BAY, AND SHALL ALSO INCLUDE REMOTE ALARMS IN EACH OF THE INDIVIDUAL AREAS:

SERVICE BAY:

- GAS DETECTION: THE GAS DETECTION SYSTEM SHALL OPERATE AND OVER-RIDE ALL OTHER SEQUENCES.

A. THERE ARE THREE SETS OF CARBON MONOXIDE AND NITROGEN DIOXIDE SENSORS, TO PROVIDE FULL COVERAGE OF THE ENTIRE VEHICLE MAINTENANCE BAYS AREA.

B. IF ANY ONE OF THE CARBON MONOXIDE AND/OR NITROGEN DIOXIDE DETECTORS SENSES GAS CONCENTRATIONS ABOVE LEVEL ONE SET POINTS (20 PPM OF CARBON MONOXIDE AND/OR 3 PPM OF NITROGEN DIOXIDE), THE FOLLOWING SHALL OCCUR.

 - MOTORIZED DAMPERS AT BOTH OF THE TWO OUTSIDE AIR LOUVERS SHALL OPEN.
 - ALL FOUR ROOF MOUNTED EXHAUST FANS SHALL BE ENERGIZED.
 - END SWITCHES SHALL PROVIDE INDICATION THAT DAMPERS ARE WIDE OPEN, BUT SHALL NOT PROCLUDE ANY EXHAUST FANS FROM OPERATING.

C. IF ANY ONE OF THE CARBON MONOXIDE AND/OR NITROGEN DIOXIDE DETECTORS SENSES GAS CONCENTRATIONS CONTINUING TO RISE ABOVE LEVEL TWO SET POINTS (50 PPM OF CARBON MONOXIDE AND/OR 5 PPM OF NITROGEN DIOXIDE), THE GAS DETECTION PANEL SHALL INITIATE AUDIBLE AND VISUAL ALARMS.

D. EXHAUST FAN(S) SHALL CONTINUE TO OPERATE UNTIL GAS CONCENTRATIONS ARE REDUCED TO BELOW SET POINT LEVELS.

E. WHEN CARBON MONOXIDE AND/OR NITROGEN DIOXIDE GAS CONCENTRATIONS FALL BELOW THE LEVEL ONE SET POINTS (NOTED ABOVE), THE EXHAUST FAN(S) SHALL DE-ENERGIZE AND MOTORIZED DAMPER(S) SHALL CLOSE.
- VEHICLE EXHAUST:

A. VEHICLE EXHAUST UTILITY FANS SHALL BE MANUALLY STARTED, WITH TAILPIPE HOSE CONNECTED TO VEHICLE(S) PLANNED TO BE OPERATED.

B. MOTORIZED DAMPERS AT BOTH OF THE TWO OUTSIDE AIR LOUVERS SHALL OPEN.

C. WHEN VEHICLE EXHAUST FAN IS DE-ENERGIZED, AND IF GAS DETECTION SYSTEM IS NOT IN LEVEL ONE OR LEVEL TWO ALARM, THE OUTSIDE AIR MOTORIZED DAMPER SHALL CLOSE.
- SUMMER VENTILATION:

A. THE SPACE TEMPERATURE SENSOR SHALL, UPON A RISE IN ROOM TEMPERATURE ABOVE ITS SET POINT (80°F, ADJUSTABLE), OPEN THE OUTSIDE AIR LOUVERS' MOTORIZED DAMPERS, AND ENERGIZE THE ROOF MOUNTED EXHAUST FANS.

SEQUENCE OF OPERATIONS: (CONT.)

PAINT BAY:

- GAS DETECTION: THE GAS DETECTION SYSTEM SHALL OPERATE AND OVER-RIDE ALL OTHER SEQUENCES.

A. THERE IS A SINGLE SET OF CARBON MONOXIDE AND NITROGEN DIOXIDE SENSORS, CENTRALLY LOCATED, TO PROVIDE FULL COVERAGE OF THE PAINT BAY.

B. IF EITHER ONE OF THE CARBON MONOXIDE AND/OR NITROGEN DIOXIDE DETECTORS SENSES GAS CONCENTRATIONS ABOVE LEVEL ONE SET POINTS (20 PPM OF CARBON MONOXIDE AND/OR 3 PPM OF NITROGEN DIOXIDE), THE FOLLOWING SHALL OCCUR.

 - MOTORIZED DAMPER AT OUTSIDE AIR LOUVER SHALL OPEN.
 - ROOF MOUNTED EXHAUST FAN SHALL BE ENERGIZED.
 - AN END SWITCH SHALL PROVIDE INDICATION THAT DAMPER IS WIDE OPEN, BUT SHALL NOT PROCLUDE THE EXHAUST FAN FROM OPERATING.

C. IF EITHER ONE OF THE CARBON MONOXIDE AND/OR NITROGEN DIOXIDE DETECTORS SENSES GAS CONCENTRATIONS CONTINUING TO RISE ABOVE LEVEL TWO SET POINTS (50 PPM OF CARBON MONOXIDE AND/OR 5 PPM OF NITROGEN DIOXIDE), THE GAS DETECTION PANEL SHALL INITIATE AUDIBLE AND VISUAL ALARMS, AND LOCALIZED REMOTE AUDIBLE AND VISUAL ALARMS (WITHIN THE PAINT BAY) SHALL INITIATE.

D. EXHAUST FAN SHALL CONTINUE TO OPERATE UNTIL GAS CONCENTRATIONS ARE REDUCED TO BELOW SET POINT LEVELS.

E. WHEN CARBON MONOXIDE AND/OR NITROGEN DIOXIDE GAS CONCENTRATIONS FALL BELOW THE LEVEL ONE SET POINTS (NOTED ABOVE), THE EXHAUST FAN SHALL DE-ENERGIZE AND MOTORIZED DAMPER SHALL CLOSE.
- SUMMER VENTILATION: SIMILAR SEQUENCE TO NORTHEAST WORKBAYS (SEE ABOVE).

A. THE SPACE TEMPERATURE SENSOR SHALL, UPON A RISE IN ROOM TEMPERATURE ABOVE ITS SET POINT (80°F, ADJUSTABLE), OPEN THE OUTSIDE AIR LOUVERS' MOTORIZED DAMPER, AND ENERGIZE THE ROOF MOUNTED EXHAUST FAN.

WELDING BAY:

- GAS DETECTION: THE GAS DETECTION SYSTEM SHALL OPERATE AND OVER-RIDE ALL OTHER SEQUENCES.

A. THERE IS A SINGLE SET OF CARBON MONOXIDE AND NITROGEN DIOXIDE SENSORS, CENTRALLY LOCATED, TO PROVIDE FULL COVERAGE OF THE WELDING BAY.

B. IF EITHER ONE OF THE CARBON MONOXIDE AND/OR NITROGEN DIOXIDE DETECTORS SENSES GAS CONCENTRATIONS ABOVE LEVEL ONE SET POINTS (20 PPM OF CARBON MONOXIDE AND/OR 3 PPM OF NITROGEN DIOXIDE), THE FOLLOWING SHALL OCCUR.

 - MOTORIZED DAMPER AT OUTSIDE AIR LOUVER SHALL OPEN.
 - ROOF MOUNTED EXHAUST FAN SHALL BE ENERGIZED.
 - AN END SWITCH SHALL PROVIDE INDICATION THAT DAMPER IS WIDE OPEN, BUT SHALL NOT PROCLUDE THE EXHAUST FAN FROM OPERATING.

C. IF EITHER ONE OF THE CARBON MONOXIDE AND/OR NITROGEN DIOXIDE DETECTORS SENSES GAS CONCENTRATIONS CONTINUING TO RISE ABOVE LEVEL TWO SET POINTS (50 PPM OF CARBON MONOXIDE AND/OR 5 PPM OF NITROGEN DIOXIDE), THE GAS DETECTION PANEL SHALL INITIATE AUDIBLE AND VISUAL ALARMS, AND LOCALIZED REMOTE AUDIBLE AND VISUAL ALARMS (WITHIN THE WELDING BAY) SHALL INITIATE.

D. EXHAUST FAN SHALL CONTINUE TO OPERATE UNTIL GAS CONCENTRATIONS ARE REDUCED TO BELOW SET POINT LEVELS.

E. WHEN CARBON MONOXIDE AND/OR NITROGEN DIOXIDE GAS CONCENTRATIONS FALL BELOW THE LEVEL ONE SET POINTS (NOTED ABOVE), THE EXHAUST FAN SHALL DE-ENERGIZE AND MOTORIZED DAMPER SHALL CLOSE.
- SUMMER VENTILATION: SIMILAR SEQUENCE TO NORTHEAST WORKBAYS (SEE ABOVE).

A. THE SPACE TEMPERATURE SENSOR SHALL, UPON A RISE IN ROOM TEMPERATURE ABOVE ITS SET POINT (80°F, ADJUSTABLE), OPEN THE OUTSIDE AIR LOUVERS' MOTORIZED DAMPER, AND ENERGIZE THE ROOF MOUNTED EXHAUST FAN.

SEQUENCE OF OPERATIONS: (CONT.)

WELDING SHOP:

- GAS DETECTION: THE GAS DETECTION SYSTEM SHALL OPERATE AND OVER-RIDE ALL OTHER SEQUENCES.

A. THERE IS A SINGLE SET OF CARBON MONOXIDE AND NITROGEN DIOXIDE SENSORS, CENTRALLY LOCATED, TO PROVIDE FULL COVERAGE OF THE WELDING SHOP.

B. IF EITHER ONE OF THE CARBON MONOXIDE AND/OR NITROGEN DIOXIDE DETECTORS SENSES GAS CONCENTRATIONS ABOVE LEVEL ONE SET POINTS (20 PPM OF CARBON MONOXIDE AND/OR 3 PPM OF NITROGEN DIOXIDE), THE FOLLOWING SHALL OCCUR.

 - MOTORIZED DAMPER AT OUTSIDE AIR LOUVER SHALL OPEN.
 - ROOF MOUNTED EXHAUST FAN SHALL BE ENERGIZED.
 - AN END SWITCH SHALL PROVIDE INDICATION THAT DAMPER IS WIDE OPEN, BUT SHALL NOT PROCLUDE THE EXHAUST FAN FROM OPERATING.

C. IF EITHER ONE OF THE CARBON MONOXIDE AND/OR NITROGEN DIOXIDE DETECTORS SENSES GAS CONCENTRATIONS CONTINUING TO RISE ABOVE LEVEL TWO SET POINTS (50 PPM OF CARBON MONOXIDE AND/OR 5 PPM OF NITROGEN DIOXIDE), THE GAS DETECTION PANEL SHALL INITIATE AUDIBLE AND VISUAL ALARMS, AND LOCALIZED REMOTE AUDIBLE AND VISUAL ALARMS (WITHIN THE WELDING SHOP) SHALL INITIATE.

D. EXHAUST FAN SHALL CONTINUE TO OPERATE UNTIL GAS CONCENTRATIONS ARE REDUCED TO BELOW SET POINT LEVELS.

E. WHEN CARBON MONOXIDE AND/OR NITROGEN DIOXIDE GAS CONCENTRATIONS FALL BELOW THE LEVEL ONE SET POINTS (NOTED ABOVE), THE EXHAUST FAN SHALL DE-ENERGIZE AND MOTORIZED DAMPER SHALL CLOSE.
- SUMMER VENTILATION: SIMILAR SEQUENCE TO NORTHEAST WORKBAYS (SEE ABOVE).

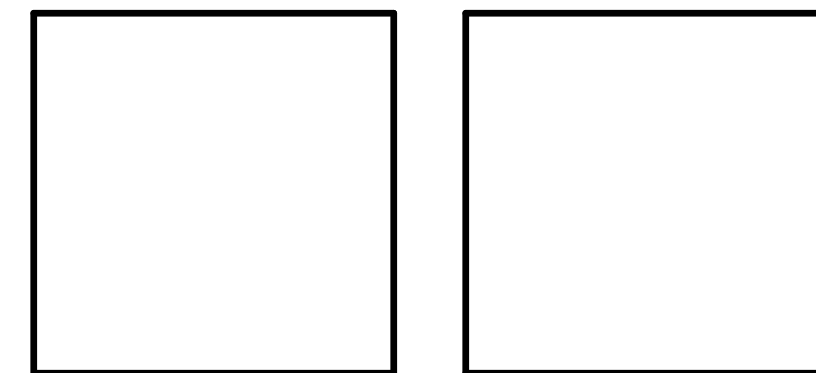
A. THE SPACE TEMPERATURE SENSOR SHALL, UPON A RISE IN ROOM TEMPERATURE ABOVE ITS SET POINT (80°F, ADJUSTABLE), OPEN THE OUTSIDE AIR LOUVERS' MOTORIZED DAMPER, AND ENERGIZE THE ROOF MOUNTED EXHAUST FAN.

General Notes:

NOT FOR BIDDING
PURPOSES

Consultant:

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Revision

Project:

**DELAWARE ARMY
NATIONAL GUARD**

**VEHICLE MAINTENANCE BLDGS - CO/NO2
DETECTION DESIGN**

**COMBINED SUPPORT MAINTENANCE
SHOP DETAILS (CSMS)
1197 RIVER ROAD
NEW CASTLE, DE 19720**

Set No.: DESIGN Sheet Title: MECHANICAL AND ELECTRICAL DETAILS & NOTES

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