

# Schirmer

SCHIRMER ENGINEERING CORPORATION  
707 LAKE COOK ROAD  
DEERFIELD, ILLINOIS 60015  
(312) 272-8340

FIRE PROTECTION ENGINEERS  
SAFETY ENGINEERS  
CODE CONSULTANTS

ANALYSIS OF FIRE DETECTOR LOCATIONS  
AT  
LASALLE COUNTY STATION  
FOR  
SARGENT & LUNDY ENGINEERS  
AND  
COMMONWEALTH EDISON COMPANY

## INTRODUCTION

Schirmer Engineering Corporation reviewed several fire zones to determine if the fire protection systems currently installed are acceptable for the hazard. This review encompassed heat detection systems and several sprinkler systems. The purpose of the sprinkler system review was to determine if any field conditions exist that may adversely affect the sprinkler system coverage and to verify that the installation is in accordance with NFPA 13, Installation of Automatic Sprinklers. This review consisted of an analysis of installation only and did not include such items as analysis of hydraulic calculations, density requirements, etc.

The review is presented on the following pages and it encompasses the following zones:

Zone No.	Description
7B1	Unit 1, HPCS Diesel Generator Room
7B2	Unit 1, Division 2, Standby Diesel Generator Room
7B3	Unit 1, Division 1, Standby Diesel Generator Room
7B4	Unit 1, HPCS Diesel Day Tank Room
7B5	Unit 1, Division 2, Diesel Day Tank Room
7B6	Unit 1, Division 1, Diesel Day Tank Room
7C1	Unit 1, HPCS Diesel Fuel Tank Room
7C2	Unit 1, Division 2, Diesel Fuel Tank Room

May 14, 1984

-1-

SEC Project No. 83118

8406050197 840601  
PDR ADOCK 05000373  
F PDR

Zone No.	Description
7C3	Unit 1, Division 1, Diesel Fuel Tank Room
8B1	Unit 2, HPCS Diesel Generator Room
8B2	Unit 2, Division 2, Standby Diesel Generator Room
8B3	Unit 2, HPCS Diesel Day Tank Room
8B4	Unit 2, Division 2, Diesel Day Tank Room
8C1	Unit 2, HPCS Diesel Fuel Tank Room
8C2	Unit 2, Division 2, Diesel Fuel Tank Room

## FIRE ZONE 7B1 - UNIT 1, HPCS DIESEL GENERATOR ROOM

Fire Zone 7B1 is the Unit 1, HPCS Diesel Generator Room. An automatic total flooding CO<sub>2</sub> system is provided for the zone. Actuation of the CO<sub>2</sub> system via a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at  $190^{\circ}\text{F} \pm 10^{\circ}\text{F}$  and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 22 feet, 6 inches above the floor (2 feet, 6 inches below the ceiling).

The sensitivity of a detector will be lessened in a high ceiling area. NFPA 72E has recognized this and recommends a listed spacing of 46 percent when ceiling heights are between 24 and 26 feet. With this reduction, the installed detector spacing exceeds the adjusted listed spacing. Also, detectors have been located over the generator. The generator occupies one-half of the room and, as such, detectors are spaced too far from the opposite wall.

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. According to NFPA 72E, detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, because of the height of the ceiling (see above discussion) and the possibility of heat rising and filling the bays when the generator is running (e.g., a normal operation or maintenance run), it is recommended that detectors be located at the bottom of alternate W27 beams on the east side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip. On the west side of the north/south beam, the ceiling height is lower. Due to the reduced ceiling height, two detectors should be installed in this area.

This design would require a total of 5 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of three new  $190^{\circ}\text{F} \pm 10^{\circ}\text{F}$  heat detectors. These detectors should be installed as indicated on Drawing 7B1-3. All heat detectors should serve to actuate the CO<sub>2</sub> system. By doing this, the average area per detector will be 374 square feet, which is within the NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.

## **FIRE ZONE 7B2 - UNIT 1, DIVISION 2, STANDBY DIESEL GENERATOR ROOM**

Fire Zone 7B2 is the Unit 1, Division 2, Standby Diesel Generator Room. An automatic total flooding CO<sub>2</sub> system is provided for the zone. Actuation of the CO<sub>2</sub> via from a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F  $\pm$  10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 21 feet, 10 inches above the floor (3 feet, 1 inches below the ceiling).

The sensitivity of a detector will be lessened in a high ceiling area. NFPA 72E has recognized this and recommends a listed spacing of 46 percent when ceiling heights are between 24 and 26 feet. With this reduction, the installed detector spacing exceeds the adjusted listed spacing. Also, detectors have been located over the generator. The generator occupies one-half of the room and, as such, detectors are spaced too far from the opposite wall.

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. According to NFPA 72E, detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, because of the height of the ceiling (see above discussion) and the possibility of heat rising and filling the bays when the generator is running (e.g., a normal operation or maintenance run), it is recommended that detectors, for the most part, be located at the bottom of alternate deep beams on each side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip.

This design would require a total of 6 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of four new 190°F  $\pm$  10°F heat detectors. These detectors should be installed as indicated on Drawing 7B1-3. All heat detectors should serve to actuate the CO<sub>2</sub> system. By doing this, the average area per detector will be 277 square feet, which is within the NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.



## **FIRE ZONE 7B3 - UNIT 1, DIVISION 1, STANDBY DIESEL GENERATOR ROOM**

Fire Zone 7B3 is the Unit 1, Division 1, Standby Diesel Generator Room. An automatic total flooding CO<sub>2</sub> system is provided for the zone. Actuation of the CO<sub>2</sub> via from a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F  $\pm$  10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 19 feet, 7 inches above the floor (5 feet, 5 inches below the ceiling).

The sensitivity of a detector will be lessened in a high ceiling area. NFPA 72E has recognized this and recommends a listed spacing of 46 percent when ceiling heights are between 24 and 26 feet. With this reduction, the installed detector spacing exceeds the adjusted listed spacing. Also, detectors have been located over the generator. The generator occupies one-half of the room and, as such, detectors are spaced too far from the opposite wall.

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. According to NFPA 72E, detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, because of the height of the ceiling (see above discussion) and the possibility of heat rising and filling the bays when the generator is running (e.g., a normal operation or maintenance run), it is recommended that detectors, for the most part, be located at the bottom of alternate deep beams on each side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip.

This design would require a total of 6 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of four new 190°F  $\pm$  10°F heat detectors. These detectors should be installed as indicated on Drawing 7B1-3. All heat detectors should serve to actuate the CO<sub>2</sub> system. By doing this, the average area per detector will be 289 square feet, which is within the NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.



#### **FIRE ZONE 7B4 - UNIT 1, HPCS DIESEL DAY TANK ROOM**

Fire Zone 7B4 is the Unit 1, HPCS Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard pendent sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 83 square feet with the deflector located 7 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

#### **FIRE ZONE 7B5- UNIT 1, DIVISION 2, DIESEL DAY TANK ROOM**

Fire Zone 7B5 is the Unit 1, Division 2, Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 63 square feet with the deflector located 8 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

#### **FIRE ZONE 7B6- UNIT 1, DIVISION 1, DIESEL DAY TANK ROOM**

Fire Zone 7B6 is the Unit 1, Division 1, Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 67 square feet with the deflector located 6 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system.

The south sprinkler over the tank is located in a pocket between two beams and as such will have its discharge obstructed. It should be relocated so that the water will effectively reach the tank. It is recommended that the existing upright sprinkler be replaced with a standard pendent sprinkler.

#### **FIRE ZONE 7C1 - UNIT 1, HPCS DIESEL FUEL TANK ROOM**

Fire Zone 7C1 is the Unit 1, HPCS Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 12 sprinklers installed. This yields an average area per sprinkler of 83 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers, rated at 220°F, and the deflectors are located 9 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

#### **FIRE ZONE 7C2 - UNIT 1, DIVISION 2, DIESEL FUEL TANK ROOM**

Fire Zone 7C2 is the Unit 1, Division 2, Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 13 sprinklers installed. This yields an average area per sprinkler of 78 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers, rated at 220°F, and the deflectors are located 8 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

#### **FIRE ZONE 7C3 - UNIT 1, DIVISION 1, DIESEL FUEL TANK ROOM**

Fire Zone 7C3 is the Unit 1, Division 1, Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 13 sprinklers installed. This yields an average area per sprinkler of 74 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers, rated at 220°F, and the deflectors are located 8 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.



## FIRE ZONE 8B1 - UNIT 2, HPCS DIESEL GENERATOR ROOM

Fire Zone 8B1 is the Unit 2, HPCS Diesel Generator Room. An automatic total flooding CO<sub>2</sub> system is provided for the zone. Actuation of the CO<sub>2</sub> via from a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F  $\pm$  10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 21 feet, 11 inches above the floor (3 feet, 1 inches below the ceiling).

The sensitivity of a detector will be lessened in a high ceiling area. NFPA 72E has recognized this and recommends a listed spacing of 46 percent when ceiling heights are between 24 and 26 feet. With this reduction, the installed detector spacing exceeds the adjusted listed spacing. Also, detectors have been located over the generator. The generator occupies one-half of the room and, as such, detectors are spaced too far from the opposite wall.

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. According to NFPA 72E, detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, because of the height of the ceiling (see above discussion) and the possibility of heat rising and filling the bays when the generator is running (e.g., a normal operation or maintenance run), it is recommended that detectors be located at the bottom of alternate W27 beams on the east side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip. On the west side of the north/south beam, the ceiling height is lower. Due to the reduced ceiling height, two detectors should be installed in this area.

This design would require a total of 5 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of three new 190°F  $\pm$  10°F heat detectors. These detectors should be installed as indicated on Drawing 8B1-2. All heat detectors should serve to actuate the CO<sub>2</sub> system. By doing this, the average area per detector will be 374 square feet, which is within the NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.

## FIRE ZONE 8B2 - UNIT 2, DIVISION 2, STANDBY DIESEL GENERATOR ROOM

Fire Zone 8B2 is the Unit 2, Division 2, Standby Diesel Generator Room. An automatic total flooding CO<sub>2</sub> system is provided for the zone. Actuation of the CO<sub>2</sub> via from a heat detector sounds an alarm locally and in the control room, and shuts the supply fans and dampers. Two Fenwal Model 27121-0 heat detectors are installed. These detectors are rated to operate at 190°F  $\pm$  10°F and have a listed spacing of 50 feet by 50 feet. Detectors are mounted approximately 22 feet, 2 inches above the floor (2 feet, 10 inches below the ceiling).

The room is subdivided by a deep beam running north and south. Five additional 27-inch deep beams further subdivide the ceiling of the zone into bays. Detectors would normally be required in each bay, thereby requiring an additional 12 detectors. However, due to the potential for activation by a heat buildup in the bays while the generator is running (e.g., a maintenance run), it is recommended that detectors, for the most part, be located at the bottom of alternate deep beams on each side of the north/south beam. In this way, the beam flange will serve as the heat collector while mounting detectors some distance below the ceiling will lessen the possibility of a false trip.

This design would require a total of 6 detectors. The two detectors that are already installed may be relocated, thereby requiring the addition of four new detectors. These detectors should be installed as indicated on Drawing 8B1-2. All heat detectors should serve to actuate the CO<sub>2</sub> system. By doing this, the average area per detector will be 334 square feet, which is within NFPA 72E guidelines for a high ceiling area.

The existing detection system serves as a spot-detection system for the diesel generator. The generator is the most likely source of fire and current installation will eventually sense a fire originating in this area. The new system will provide total area detection. No compensatory measures are required.

### **FIRE ZONE 8B3 - UNIT 2, HPCS DIESEL DAY TANK ROOM**

Fire Zone 8B3 is the Unit 2 HPCS Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 83 square feet with the deflector located 4 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

#### **FIRE ZONE 8B4 - UNIT 2, DIVISION 2, DIESEL DAY TANK ROOM**

Fire Zone 8B4 is the Unit 2, Division 2, Diesel Day Tank Room. An automatic sprinkler system is provided for this zone with a total of three sprinklers installed. Two are located over the tank and one is provided to cover the area under the tank. The sprinklers are Viking Fire Protection Company standard pendent sprinklers rated at 220°F. The sprinklers located over the tank cover an area of approximately 78 square feet with the deflector located 14 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

#### **FIRE ZONE 8C1 - UNIT 2, HPCS DIESEL FUEL TANK ROOM**

Fire Zone 8C1 is the Unit 2, HPCS Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 13 sprinklers installed. This yields an average area per sprinkler of 77 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F and the deflectors are located 8 inches below the ceiling.

An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.



## **FIRE ZONE 8C2 - UNIT 2, DIVISION 2, DIESEL FUEL TANK ROOM**

Fire Zone 8C2 is the Unit 2, Division 2, Diesel Fuel Tank Room. An automatic sprinkler system is provided for this zone with a total of 15 sprinklers installed. This yields an average area per sprinkler of 77 square feet. The sprinklers are Viking Fire Protection Company standard upright sprinklers rated at 220°F and the deflectors are located 8 inches below the ceiling.

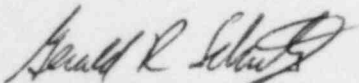
An alarm valve is provided for the room to sound an alarm on water flow in the Control Room. In this manner, the sprinkler system also serves as a detection system. The existing installation is acceptable.

## SUMMARY

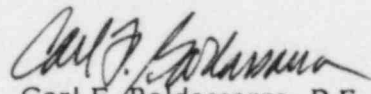
Fire Zones 7B1, 7B2, 7B3, 8B1 and 8B2 are currently provided with a spot detection system for the diesel generator. The detection system will sense a fire in the vicinity of the diesel generator, which is the most likely source of fire. Although the response time will not be as rapid as that contemplated by NFPA 72E, the detectors will eventually detect a fire and, as such, no compensatory measures are required. The new system will be a total area detection system and will provide faster response time.

With the exception of the one sprinkler in Fire Zone 7B6, the existing sprinkler installation in Fire Zones 7B5, 7B6, 7C1, 7C2, 7C3, 8B3, 8B4, 8C1 and 8C2 meets the requirements of NFPA 13, Installation of Automatic Sprinklers. Other than the changing of the sprinkler, no corrective action is required.

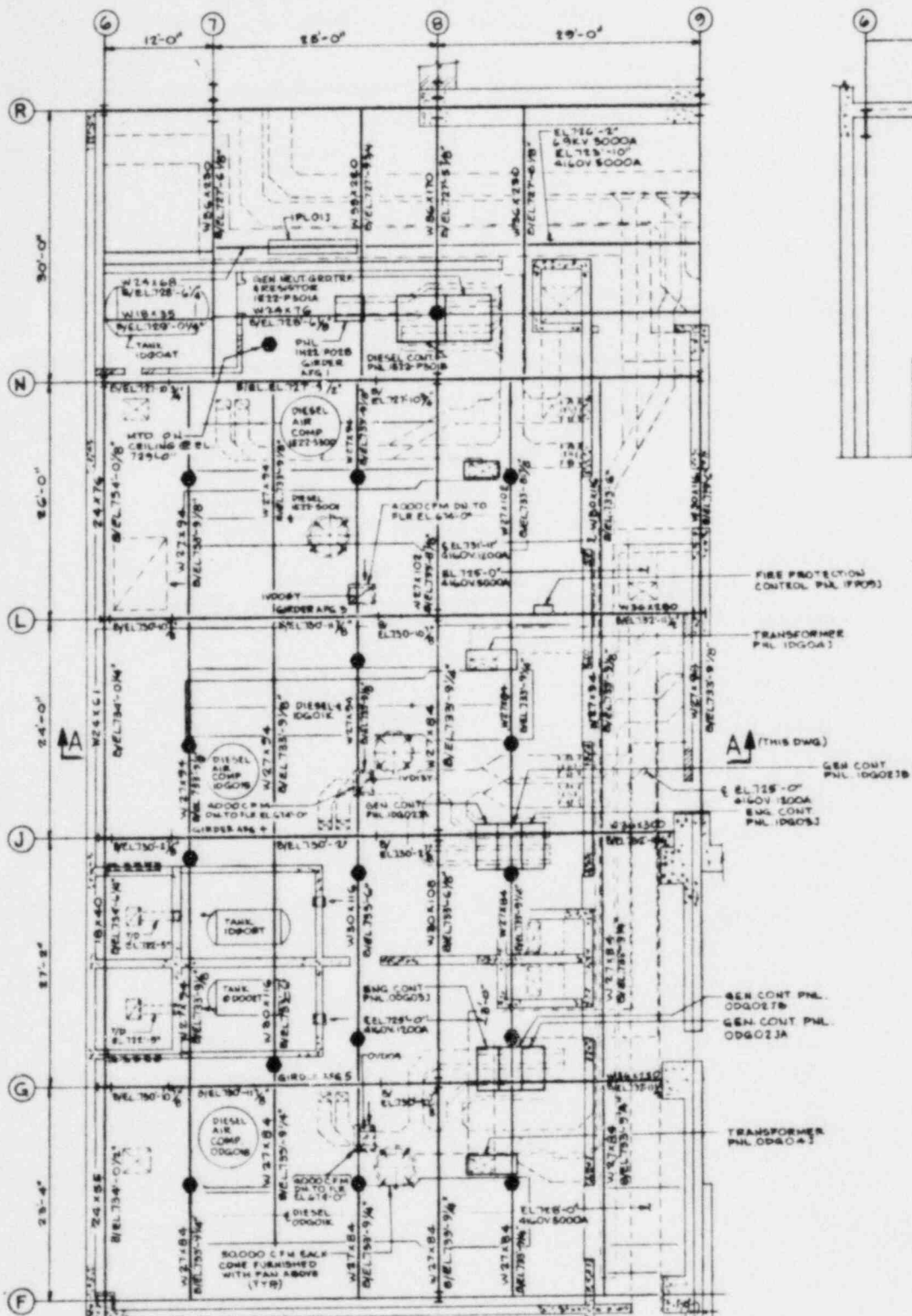
PREPARED BY:

  
Gerald R. Schultz, P.E.

REVIEWED BY:

  
Carl F. Baldassarra, P.E.  
Engineering Manager

7B1-3





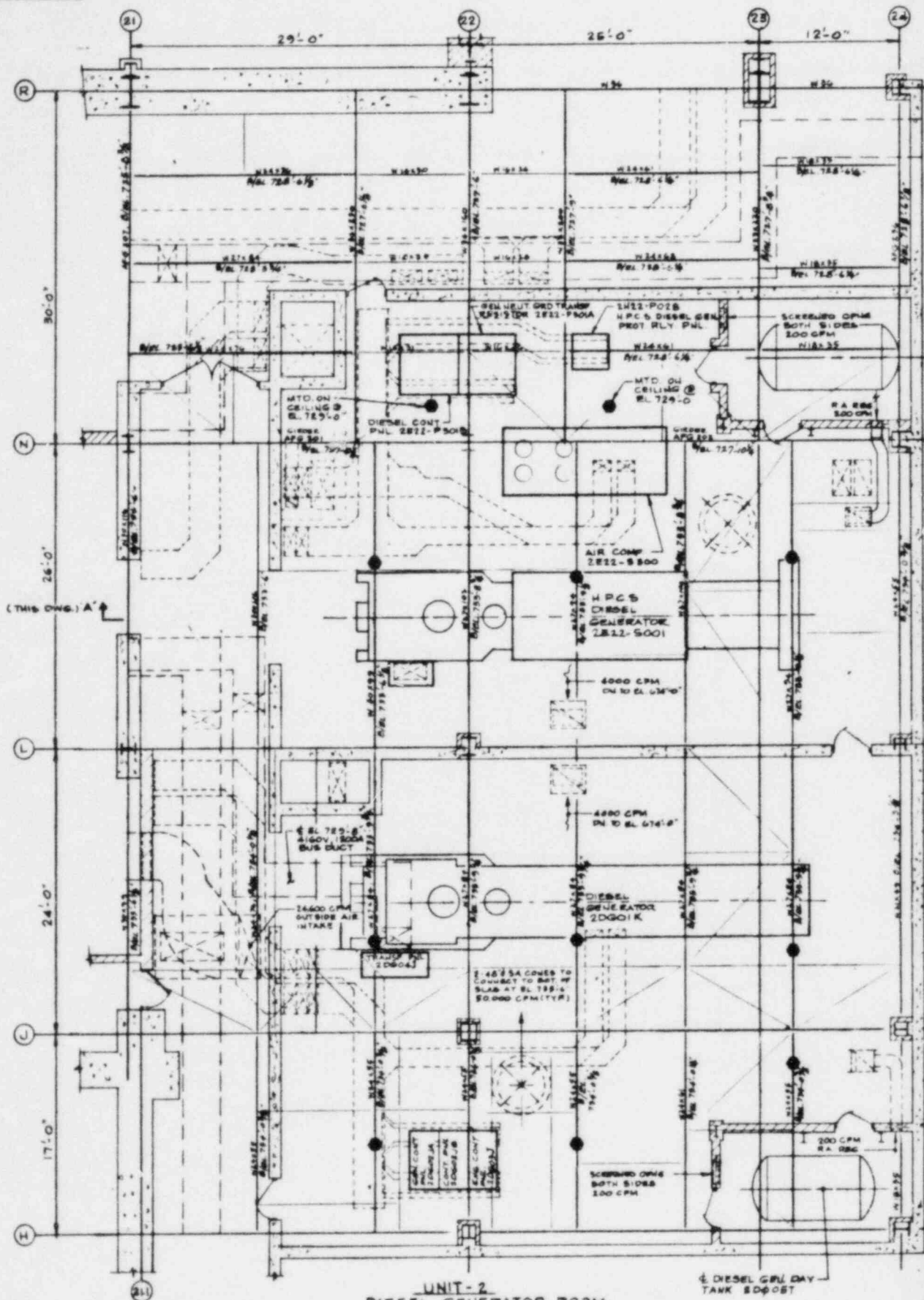
SYMBOL

NOTE: UNLESS INDICATED OTHERWISE ALL  
HEAT DETECTORS MOUNTED ON THE  
BOTTOM OF THE BEAM.

1E-1-3150 & 1E-1-3153 CABLE TRAYS AUX BLDG EL7104-G  
1E-1-3433 & 1E-1-3430 ELECT INSTALL. AUX BLDG EL7104-G  
M-1397 & 394 AUX. BLDG. EL7101-G  
A-276 & 275 AUX. BLDG. GROUND FLOOR PLAN EL7101-G  
S-570 & 572 AUX. BLDG. FRMG. PLAN EL7340 & 736-G

Also Available On  
Aperture Card

8406050197-01



UNIT-2  
DIESEL GENERATOR ROOM  
PLAN EL. 710'-6"  
FIRE ZONE 8B1-2

4 DIESEL GIRL DAY--  
TANK BOOST







# Schirmer

---

SCHIRMER ENGINEERING CORPORATION

HEADQUARTERS  
DEERFIELD, IL  
312-272-8340

EASTERN REGIONAL OFFICE  
WASHINGTON, D.C.  
703-237-8211

WESTERN REGIONAL OFFICE  
SAN FRANCISCO, CA  
415-827-5858

SOUTHWESTERN REGIONAL OFFICE  
DALLAS, TX  
214-495-0726