

# Fire Protection Analysis of a Fresno Elementary School



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## Executive Summary

This report details the fire and life safety analysis of a Fresno Elementary School. Both prescriptive and performance based analysis were used to determine compliance with the building codes and fire codes which the building was constructed under.

The prescriptive analyses included evaluation of the egress system, structural fire protection requirements, fire detection and alarm system and fire suppression systems. The prescriptive analyses were done to show the code requirements and how the building complies with them.

The performance analyses were done to analyze the performance of the building in the event of a fire scenario. Three fire scenarios were modeled using guidelines from NFPA 101. The available safe egress time (ASET) and the required safe egress time (RSET) were both reviewed to determine the safety and ability to exit the building of occupants in a fire scenario. Fire Dynamics Simulator (FDS) was used for this analysis.

Recommendations based on the performance and prescriptive analyses are presented.

# FIRE PROTECTION ANALYSIS OF A FRESNO ELEMENTARY SCHOOL

## Project Scope

The scope of this project was to perform a prescriptive analysis and a performance based analysis to evaluate the fire life safety requirements and goals of the building. The governing codes that were in place at the time of the building design and construction along with additional National Fire Protection Agency (NFPA) standards were used for this analysis. Fire selection scenarios for the performance based design were selected based on NFPA 101 Life Safety Code.

## Project Overview Information

### Building Background Information

This new elementary school is located in Fresno, CA. The elementary school consists of a 2-story classroom and administration building. The building is a Type II-B construction, sprinklered building with an E occupancy totaling 50,358 SF. The building has a maximum height of 39'-3" from the top of slab to the top of the parapets. The building consists of mainly classrooms, an administrative office area, library and support corridors and rest rooms. The first floor spaces have 9'-6" ceilings consisting of T-bar or hard gyp board surfaces. The second floor spaces have 10'-0" ceilings consisting of T-bar or hard gyp board surfaces. The entry corridor (Corridor 101) is open to the second floor ceiling and has a ceiling height of 29'-0".

#### Key Building Information

- 2 story elementary school
- Type II-B construction
- Sprinklered
- E occupancy
- 50,358 SF
- 39'-3" maximum height
- 1<sup>st</sup> floor rooms have 9'-6" ceilings
- 2<sup>nd</sup> floor rooms have 10'-0" ceilings
- Entry corridor has a 29'-0" ceiling

The building is situated on a new campus in an existing neighborhood. The campus consists of the main primary building which is the subject of this analysis, a multi-purpose building and in the future will have portable classroom and restroom buildings. The main public entry of the building is from the north with access from a gated parking lot with drive thru. At the rear of the building are sports courts which have access gates to allow fire truck drive thru access in a fire event. The 2-story primary classroom building consists of administration offices on the ground floor, a library area on the ground floor and classrooms on the ground floor and second floor. Pre-kindergarten and kindergarten classrooms are located on the ground floor only. Storage and restrooms spaces are located on both floors. Classrooms exit into a common interior corridor. The corridor is open to the entry area and connected to open stairs at both the east and west ends of the building along with a double set of stairs that is located in the center of the building's main entry area.

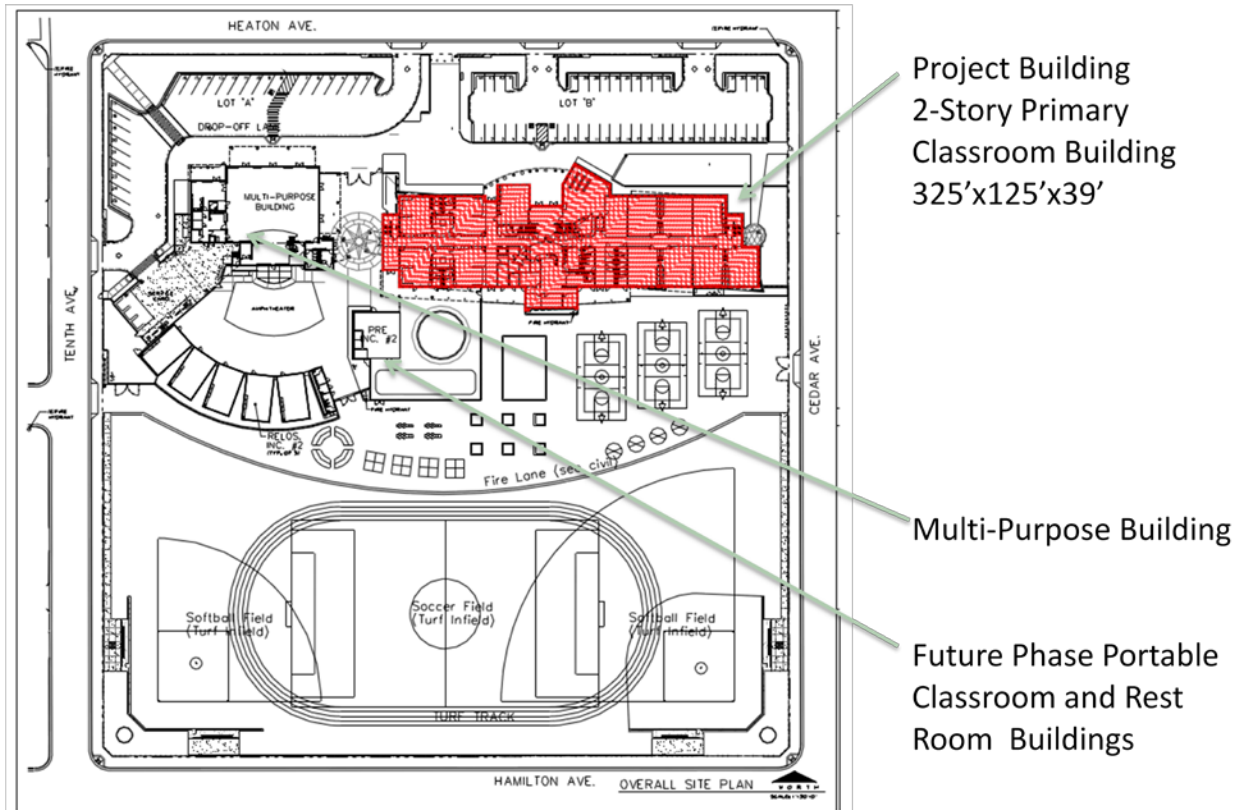


Figure 1 - Campus Site Diagram

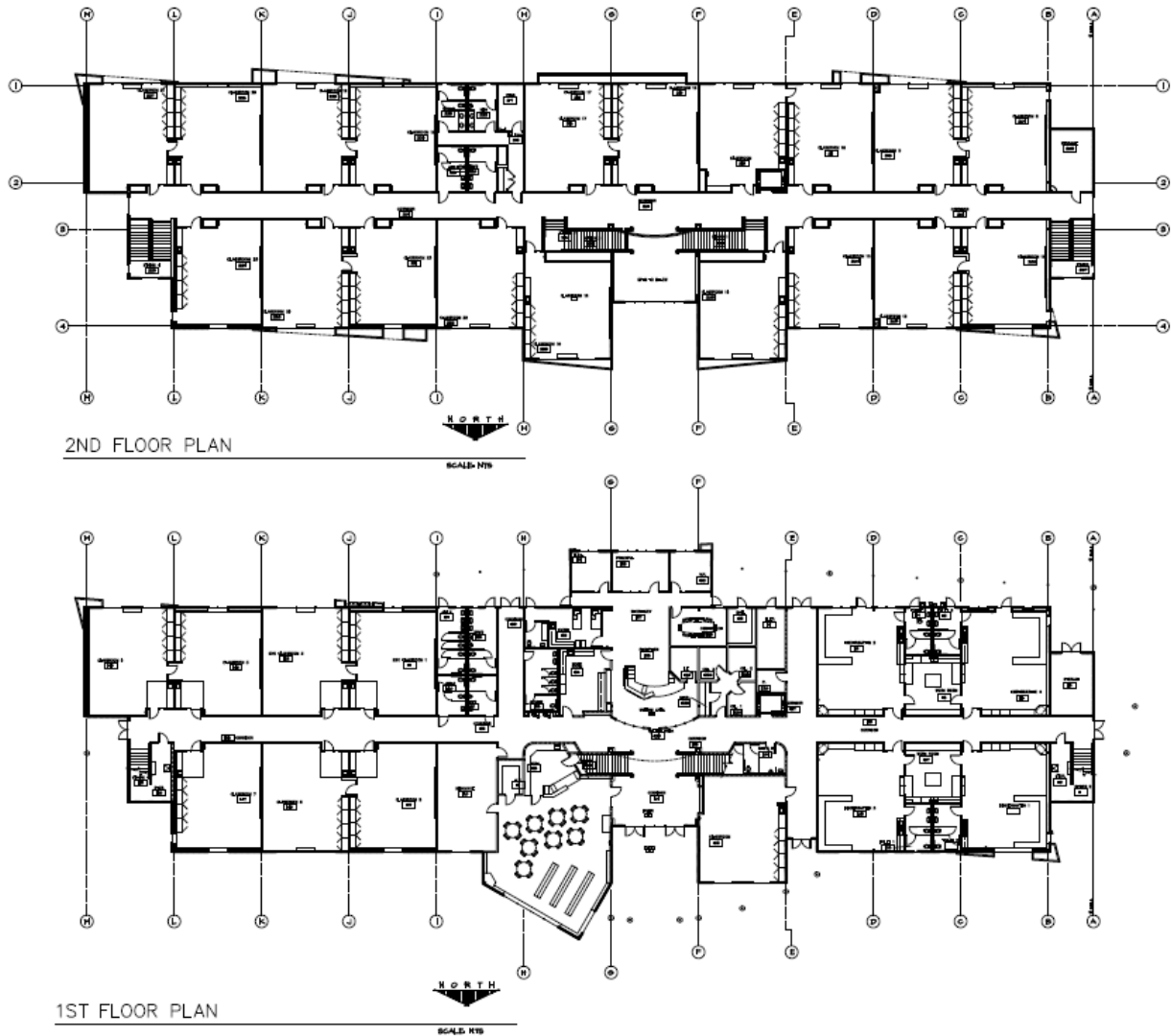


Figure 2 – 1st and 2nd Overall Floor Plans

### **Building Reviewing Agencies**

Project plan review was done by the Division of State Architect (DSA) which has three main areas of review.

- Fire Life Safety
- Access and Compliance
- Structural



The project was also reviewed and approved by the local Fire Agency who has local authority for fire life safety.

During construction a full time independent inspector employed by the owner was on sight to verify monitor the installation of systems with the design documents and code on a day to day basis.

The design team consisting of the architectural design firm and the various engineers including civil, structural, electrical and mechanical all provided construction management services during the construction and provided site observation inspections and reports.

### **Applicable Codes, Laws, Regulations and Standards**

This new elementary school was designed under the following codes, laws, regulations and standards:

- 2007 CBC (Part2 Title 24), UBC with CA Amendments
- 2007 CEC (Part2 Title 24), NEC with CA Amendments
- 2007 CMC (Part2 Title 24), UMC with CA Amendments
- 2007 CFC (Part2 Title 24), UFC with CA Amendments
- 2007 CA Referenced Standards, Part 12, Title 24,
- NFPA 13, 2002
- NFPA 14, 2003
- NFPA 72 Fire Alarm Code with CA Amendments, 2002 Edition.

# Site Fire Protection Requirements

## Site Access

Per the CFC section 503.a.a an approved fire apparatus access road is required. Access is provided from a gate on the east side of the campus which allows a clear drive south of the building on the sports courts that conforms to the requirements of CFC chapter 5.

## Site Fire Hydrants

Per the CFC appendix B table B105.1 a Type IIB construction building of 50,358 SF requires a fire flow of 4,750 gpm for 4 hours. This requirement can be reduced up to 75% or a minimum of 1500 gpm per CFC appendix B section B105.2 if the building is sprinklered. This reduction reduces the building hydrant requirement to the minimum 1500 gpm. A hydrant is located at the center of the south side of the building and per civil plans meets the 1500 gpm requirement.

## Site Fire Plan

The site is served by a 10 inch diameter water fire loop. This loop serves the project building with a single 6 inch line to the fire hydrant and a single 4 inch line to the fire sprinkler riser at the south east corner of the building. Site fire information is detailed in the figure below.

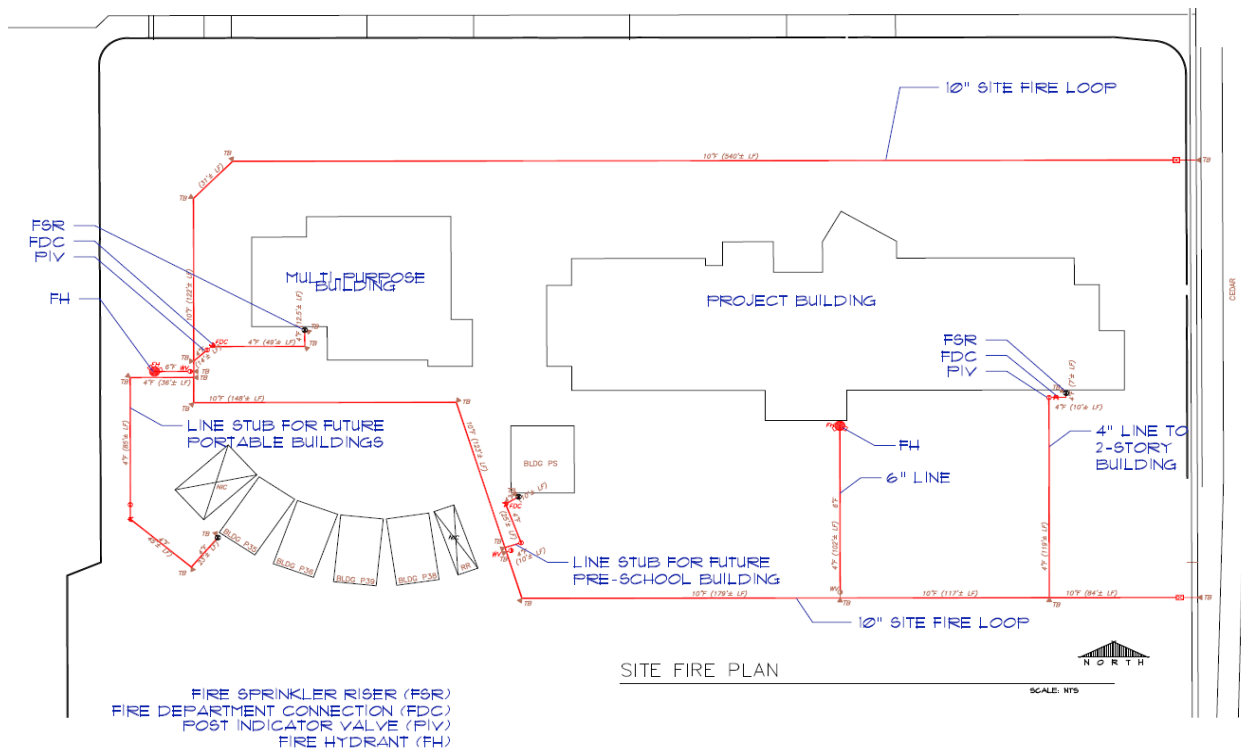


Figure 3 – Site Fire Plan

## Building Egress Requirements

### General Building Layout

The building is designed to provide a fire rated interior corridor system to serve as the means of egress for the occupants. Classrooms on both the first and second floor exit to the corridor. From the corridor occupants on the second floor are directed to one of three groups of stairs two of which are located at each end of the building and the third is two stairs located in the center of the building. The stairs are open to the corridors on both the second floor and the ground floor. Occupants from the second floor merge with occupants from the second floor at the exterior exit doors. The exterior exit doors are located at the ends of the building and in the center of the building at the main entry.

### Occupancy Classification and Loads

The building has four occupancy classifications per the CBC Table 1004.1.1. These occupancy classifications determine the number of occupants to be used for design occupant loads in determining means of egress.

FUNCTION OF SPACE	FLOOR AREA IN SQ. FT. PER OCC.
Accessory storage area, mechanical equipment room.	300 gross
Business areas	100 gross
Educational Classroom area	20 net
Library Reading rooms	50 net

Table 1 – Occupancy Classification per 2007 CBC Table 1004.1.1

The majority of the building areas are educational. The administration area which is a business occupancy is located in the south center of the first floor and is separated from the education area and has egress paths separate from those serving the education portion of the building. Occupant classifications are located in the building per the following figure.

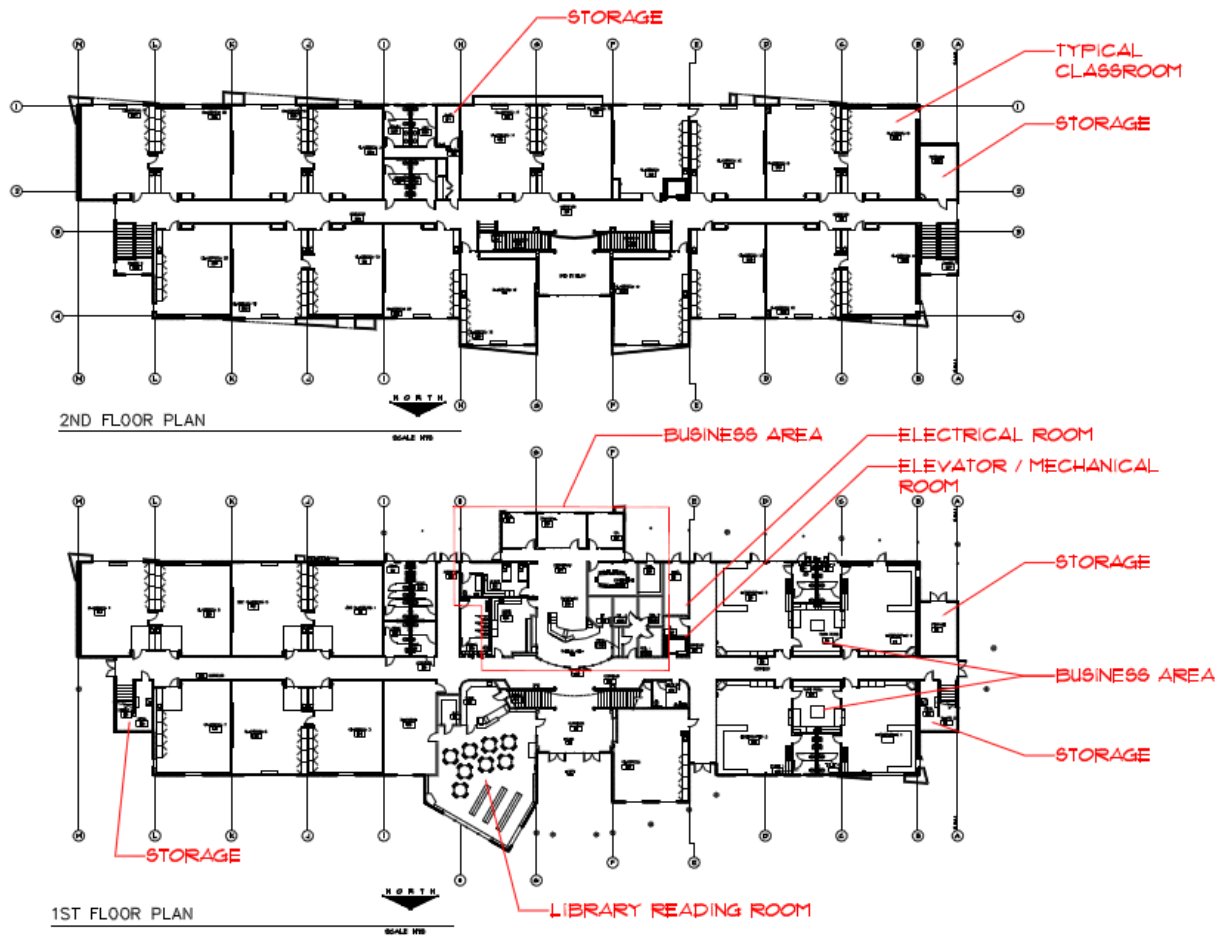


Figure 4 – Occupant Classification Areas

Occupant loads for the building are per the following table.

<b>FUNCTION OF SPACE</b>	<b>OCCUPANT LOAD</b>
<b>First Floor</b>	
Accessory storage area, mechanical equipment room.	8
Business areas	57
Educational Classroom area	539
Library Reading rooms	26
<b>First Floor Total</b>	<b>630 Occupants</b>
<b>Second Floor</b>	
Accessory storage area, mechanical equipment room.	2
Educational Classroom area	842
<b>Second Floor Total</b>	<b>844 Occupants</b>
<b><u>Building Total</u></b>	<b><u>1474 Occupants</u></b>

Table 2 – Building Occupant Loads

### **General Means of Egress Height Requirements**

CBC 1003.2 requires that the ceiling height in the means of egress shall be not less than 7 feet 6 inches. All ceilings in the building are over 8 feet in height.

## **Means of Egress Illumination**

The exit discharge shall be illuminated at all times the building is occupied per CBC 1006.1 The illumination level shall not be less than 1 foot candle measured at the walking path surface level. Per CBC 1006.3 emergency power is required for a duration of 90 minutes by use of batteries or an onsite generator. The building complies with the above.

## **Classroom Exit and Exit Access Doorways**

Typical classrooms are under 1000 SF which yields an occupant load of 49 or less per classroom. Per CBC section 1015 exits in type E or B occupancy with less than 49 occupants require only 1 exit door. The arrangement of the door shall be that the availability is obvious and it shall remain unobstructed at all times.

## **Exit Access Travel Distance**

Travel distance to exits complies with CBC section 1016. Per 1016.1 exists shall be located on each story such that the maximum length of exit travel measured from the most remote point within each story shall not exceed the distances of Table 1016.1. Per Table 1016.1 in an E occupancy with sprinklers the maximum exit travel distance is 250 feet. Per Table 1016.1 in a B occupancy with sprinklers the maximum exit travel distance is 300 feet. The building meets these requirements.

## **Corridor Requirements**

Corridor requirements follow CBC 1017. Per Table 1017.1 a corridor served by 10 or more occupants in a type E occupancy of a fire sprinklered building shall have a fire resistance rating of 1 hour. The corridor system of the building has a one hour rating.

## **Number of Exit Requirements**

Per CBC Table 1019.1 the second floor with an occupant load of 844 occupants will require a minimum of 3 exits. The first floor with an occupant load of 630 requires 3 exits. The total occupant load of 1474 requires 4 exits. The second floor has 3 exits and complies with the requirements and the ground floor has 5 main exits and complies with the requirements.

## **Exit Discharge Requirements**

Exit discharge is per CBC 1024 and requires that exits discharge directly to the exterior of the building and that the capacity is not less than the required discharge capacity of the exits being served. The exits comply with the requirements of the code.

## Exit Paths

The following diagrams show general proposed exit paths for the building. Circled exterior doors represent primary exit doors serving the discharge of the second and first floor occupants. These plans are also in **Appendix A** in a larger scale.

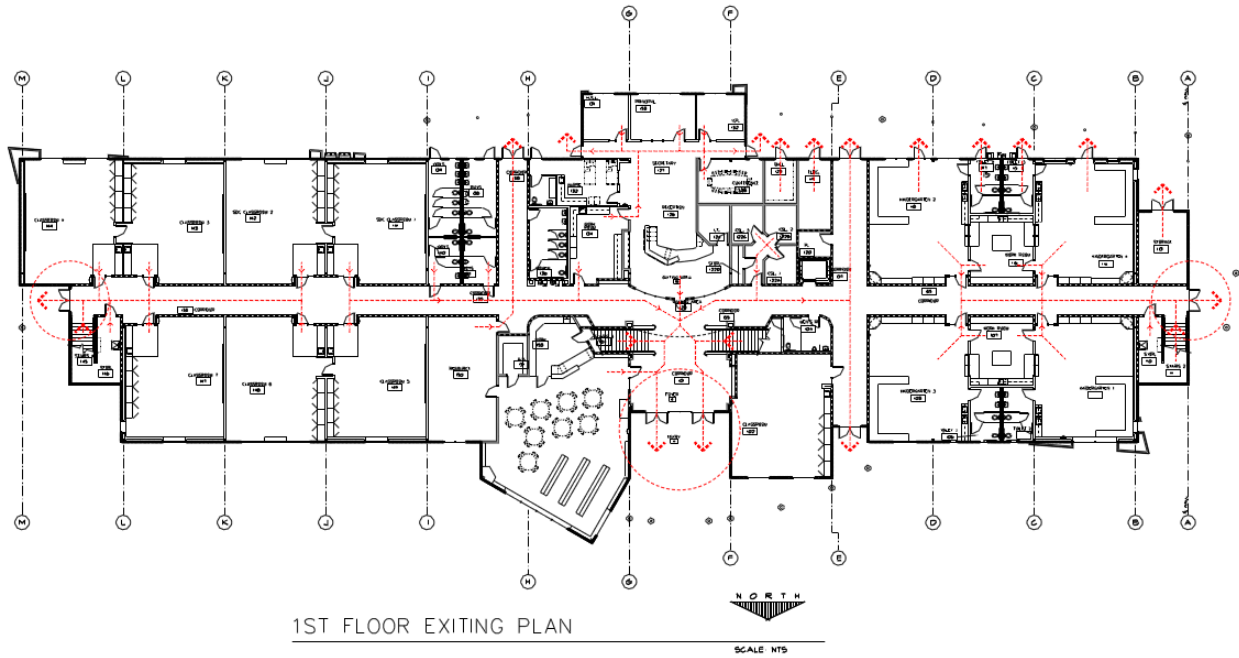


Figure 5 – Exit Path – First Floor

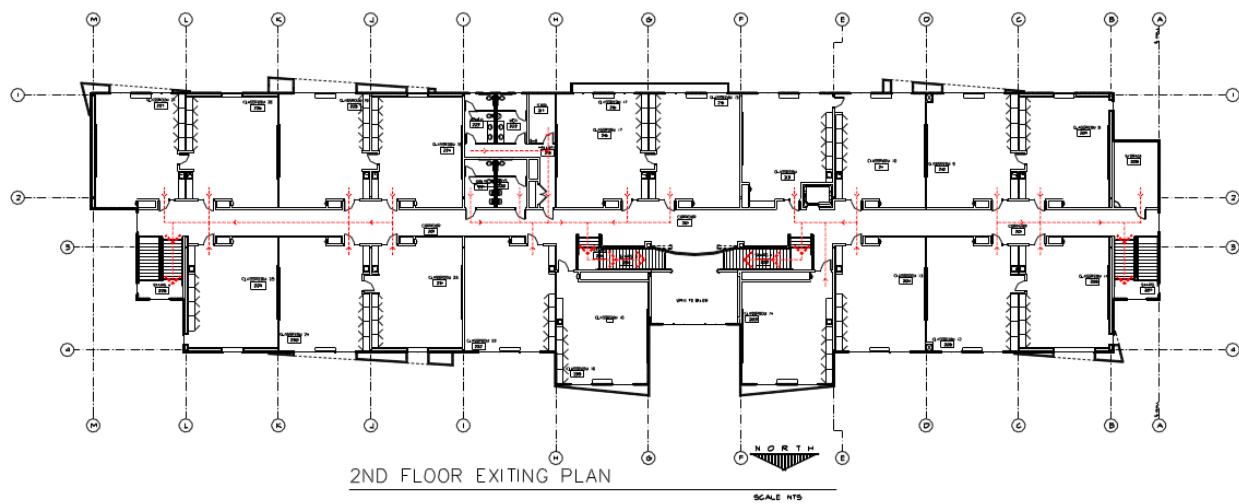


Figure 6 – Exit Path – Second Floor

# Building Structural Fire Protection

## General Information

The structural fire protection evaluation details information on the minimum required and the actual construction classification, materials and fire resistance requirements for the project elementary building.

## General Building Classification Options

Reviewing the requirements for the building in general as an E occupancy building with two stories each with 27,196.5 SF for a total of 54,393 SF of area. From this area we can determine the following:

### **Allowable Building Heights and Areas with no sprinkler or area increases**

(only construction types that meet building area are shown)

Allowable Building Heights and Areas Per CBC Table 503

Construction Type	Base # of Stories	Tabular Floor Area (ft <sup>2</sup> )
IA	UL	UL
IB	5	UL

Table 3 - Allowable Stories

### **Fire-Resistance Rating Requirements for Building Elements with no sprinkler or area increases**

(only construction types that meet building area are shown).

Fire-Resistance Rating Requirements for Building Elements Per CBC Table 601

Building Element	Ratings in Hours	
	Type IA	Type IB
Primary Structural Frame	3	2
Bearing Wall Exterior	3	2
Bearing Wall Interior	3	2
Nonbearing Wall and Partitions		
Inter.	0	0
Floor Const. and Secondary Memb.	2	2
Roof Const. and Secondary Memb.	1-1/2	1

Table 4 - Fire Resistance Ratings



**Allowable Building Heights and Areas if using sprinkler and Area increase allowance**

(only construction types that meet building area are shown)

Construction Type	Percent		Tabular Floor Area (ft <sup>2</sup> )	a	b
	Base # of Stories	Max. # of Stories		Allowable Floor Area (ft <sup>2</sup> )	Maximum Building Area (ft <sup>2</sup> )
Base Area	100				
Frontage Increase	11				
Sprinkler Increase	200				
Area After Increase	311				
IA	UL	UL	UL	UL	UL
IB	5	6	UL	UL	UL
IIA	3	4	26500	82415	329660
IIB	2	3	14500	45095	135285
IIIA	3	4	23500	73085	292340
IIIB	2	3	14500	45095	135285
IV	3	4	25500	79305	317220
VA	1	2	18500	57535	115070
VB	1	2	9500	29545	59090

UL = Unlimited

a = 311 percent times tabular area

b = stories x allowable floor area (max. 3 stories)

Table 5 - Height Increases

## Fire-Resistance Rating Requirements for Building Elements with Sprinkler and Area increases

(only construction types that meet building area are shown).

Fire-Resistance Rating Requirements for Building Elements Per Table 601

Building Element	Ratings in Hours							Type VA	Type VB
	Type IA	Type IB	Type IIA	Type IIB	Type IIIA	Type IIIB	Type IV		
Primary Struct. Frame	3	2	1	0	1	0	HT	1	0
Bearing Wall Exterior	3	2	1	0	2	2	2	1	0
Bearing Wall Interior	3	2	1	0	1	0	1/HT	1	0
Nonbear. Wall and Part. Inter.	0	0	0	0	0	0	see 602.4.6	0	0
Flr Const. and Secd. Memb.	2	2	1	0	1	0	HT	1	0
Roof Const. and Secd. Memb.	1-1/2	1	1	0	1	0	HT	1	0

Table 6 - Rating Hours

### Actual Building Evaluation

The actual building has the following construction classification, materials and fire resistance requirements.

Number of Stories = 2

Occupancy = E

Construction Type = II-B

Fire Sprinklers = Yes

Building Perimeter, P = 921 ft

Perimeter fronting public way, F = 333 ft

Access way width, W = 30 ft

Per Table 601 a Type II-B, 0-hour fire resistance rating is required for building elements including – Primary Structural Frame, Bearing Walls (interior and exterior), Non-Bearing Walls and Partitions, Floor Constructions, and Roof Constructions.

**TABLE 601  
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (hours)**

Type II B

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A*	B	A*	B	HT	A*	B
Structural frame <sup>a</sup>	3 <sup>b</sup>	2 <sup>b</sup>	1	0	1	0	HT	1	0
Bearing walls									
Exterior <sup>d</sup>	3	2	1	0	2	2	2	1	0
Interior	3 <sup>b</sup>	2 <sup>b</sup>	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions	See Table 602								
Exterior	See Table 602								
Nonbearing walls and partitions							See Section 602.4.6		
Interior <sup>f</sup>	0	0	0	0	0	0		0	0
Floor construction									
Including supporting beams and joists	2	2	1	0	1	0	HT	1	0
Roof construction									
Including supporting beams and joists	1½ <sup>e</sup>	1 <sup>c,d</sup>	1 <sup>c,d</sup>	0 <sup>d</sup>	1 <sup>c,d</sup>	0 <sup>d</sup>	HT	1 <sup>c,d</sup>	0

For SI: 1 foot = 304.8 mm.

- a. The structural frame shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns and bracing members designed to carry gravity loads. The members of floor or roof panels which have no connection to the columns shall be considered secondary members and not a part of the structural frame.
- b. Roof supports: Fire-resistance ratings of structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
- c. Except in high-rise buildings, Group A, E, F-1, H, I, L, M, R-1, R-2 and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. For high-rise buildings, Group A, E, I, L, R-1 and R-2 occupancies and other applications listed in Section 111 regulated by the Office of the State Fire Marshal, fire protection of members other than the structural frame shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- d. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.
- e. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3 or an allowable height increase in accordance with Section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.
- f. Not less than the fire-resistance rating required by other sections of this code.
- g. Not less than the fire-resistance rating based on fire separation distance (see Table 602).

Table 7 – CBC Table 601

Per Table 602 Exterior Walls for the building have a fire-resistance rating of 0-hours because the fire separation distance is greater than 30 feet.

**TABLE 602** Type E  
**FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE\*\***

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H, L	OCCUPANCY GROUP F-1, M, S-1	OCCUPANCY GROUP A, B, E, F-2, I, R', S-2, U <sup>A, f</sup>
$x < 5^c$	All	3	2	1
$5 \leq x < 10$	IA	3	2	1
	Others	2	1	1
$10 \leq x < 30$	IA, IB	2	1	1 <sup>d</sup>
	IIB, VB	1	0	0
	Others	1	1	1 <sup>d</sup>
$X \geq 30$	All	0	0	0

For SI: 1 foot = 304.8 mm.

a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.

b. For special requirements for Group U occupancies see Section 406.1.2.

c. See Section 705.1.1 for party walls.

d. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.

e. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.

f. Group R-3, and Group U when used as accessory to Group R-3, shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet or more.

Table 8 – CBC Table 602

Per Table 704.8 the allowable area opening is not limited because the Fire Separation Distance is greater than 30 feet and the building is classified as unprotected and sprinklered.

**TABLE 704.8**  
**MAXIMUM AREA OF EXTERIOR WALL OPENINGS<sup>a</sup>**

CLASSIFICATION OF OPENING	FIRE SEPARATION DISTANCE (feet)							
	0 to 3 <sup>d</sup>	Greater than 3 to 5 <sup>a, b</sup>	Greater than 5 to 10 <sup>c, a, b</sup>	Greater than 10 to 15 <sup>a, b</sup>	Greater than 15 to 20 <sup>a, b</sup>	Greater than 20 to 25 <sup>a, b</sup>	Greater than 25 to 30 <sup>a, b</sup>	Greater than 30
Unprotected	Not Permitted	Not Permitted <sup>c</sup>	10% <sup>i</sup>	15% <sup>i</sup>	25% <sup>i</sup>	45% <sup>i</sup>	70% <sup>j</sup>	No Limit <sup>h</sup>
Protected	Not Permitted	15%	25%	45%	75%	No Limit <sup>b</sup>	No Limit <sup>b</sup>	No Limit <sup>h</sup>

For SI: 1 foot = 304.8 mm.

a. Values given are percentage of the area of the exterior wall.

b. Not used.

c. For occupancies in Group R-3, the maximum percentage of unprotected and protected exterior wall openings shall be 25 percent.

d. The area of openings in an open parking structure with a fire separation distance of greater than 10 feet shall not be limited.

e. For occupancies in Group H-2 or H-3, unprotected openings shall not be permitted for openings with a fire separation distance of 15 feet or less.

f. For requirements for fire walls for buildings with differing roof heights, see Section 705.6.1.

g. The area of unprotected and protected openings is not limited for occupancies in Group R-3, with a fire separation distance greater than 5 feet.

h. For special requirements for Group U occupancies, see Section 406.1.2.

i. Buildings whose exterior bearing wall, exterior nonbearing wall and exterior structural frame are not required to be fire-resistance rated by Table 601 or 602 shall be permitted to have unlimited unprotected openings.

j. Includes accessory buildings to Group R-3.

Table 9 – CBC Table 704.8

Per Table 1018.1 for an E occupancy with a corridor serving greater than 10 people and sprinklers the corridor is required to have a 1-hour rating. All penetrations of the rating are required to be protected.

**TABLE 1017.1**  
**CORRIDOR FIRE-RESISTANCE RATING** Type E

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system <sup>a</sup>
H-1, H-2, H-3, L	All	Not Permitted	1
H-4, H-5	Greater than 30	Not Permitted	1
A <sup>d</sup> , B, F, M, S, U	Greater than 30	1	0
R	Greater than 10	Not Permitted	1
I-2 <sup>a</sup> , I-2.1, I-4	Greater than 6	Not Permitted	1
I-1, I-3	Greater than 6	Not Permitted	1 <sup>b</sup>
<b>E</b>	<b>Greater than 10</b>	<b>1</b>	<b>1</b>

a. For requirements for occupancies in Group I-2, see Section 407.3.  
 b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Section 408.7.  
 c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.  
 d. [SFM] See Section 1025.

Table 10 – CBC Table 1017.1

**Actual Building Area Allowances**

Per Table 503 a Group E occupancy Type II-B building is allowed 2 stories and 14,500^2 per floor.

The following allowances allow the floor area to increase as follows:

**Frontage Increase:**

$$If = 100 * \left[ \frac{F}{P} - 0.25 \right] * [W/30]$$

Where

If = Area increase due to frontage (percent)

F = Building perimeter which fronts public way or open space having 20 ft minimum width.

P = Perimeter of the building.

W = Minimum width of public way or open space.

$$If = 100 * \left[ \frac{333}{921} - 0.25 \right] * [30/30]$$

If = 11 percent

### **Sprinkler Increase:**

Section 506.3 of the IBC allows buildings protected with an approved automatic sprinkler system to have an area increase of:

200 percent ( $I_s = 200$  percent) for multi-storied buildings.

$I_s = 200$  percent

Area Modification per (IBC Section 506)

$$A_a = A_t + [A_t * I_f / 100] + [A_t * I_s / 100]$$

$$A_a = 14,500^2 + [14,500^2 * 11 / 100] + [14,500^2 * 200 / 100]$$

$$A_a = 45,095^2 \text{ per floor}$$

Where

$A_a$  = Allowable area per floor ( $\text{ft}^2$ )

$A_t$  = Tabular area per floor in accordance with Table 503 ( $\text{ft}^2$ )

$I_f$  = Area increase due to frontage (percent) as calculated in accordance with Section 506.2 and shown below.

$I_s$  = Area increase due to sprinkler protection (percent) as calculated in accordance with Section 506.3.

### **Summary of allowed building area:**

Building with 11 percent increase from frontage and 200 percent increase from the  $14,500^2$  allowed by table 503. With these increases the building is allowed  $45,095^2$  per floor. The actual building is  $27,196.5^2$  per floor, thus the building meets the allowed code floor areas.

### **Actual Building Construction:**

The only required area of the building requiring a rating is the interior corridor which requires a 1-hour rating. The corridor extends from the floor to the bottom of the floor above or the bottom of the roof deck. All opening including doors, glass and any penetrations for pipe or ductwork must maintain the rating.

## Vertical Exit Requirements

Per the requirements of CBC section 1020 the exit stairs serving the second floor corridors are not required to be enclosed from the exit corridors. The current configuration has the stairs open to both the second floor corridors and the first floor corridors. The code and exceptions for this are as follows:

### **SECTION 1020 VERTICAL EXIT ENCLOSURES [B]**

#### **1020.1 Enclosures required.**

Interior exit stairways and interior exit ramps shall be enclosed with fire barriers constructed in accordance with Section 706 of the *California Building Code* or horizontal assemblies constructed in accordance with Section 711 of the *California Building Code*, or both. Exit enclosures shall have a fire-resistance rating of not less than 2 hours where connecting four stories or more and not less than 1 hour where connecting less than four stories. The number of stories connected by the exit enclosure shall include any basements but not any mezzanines. An exit enclosure shall not be used for any purpose other than means of egress.

#### **Exceptions:**

9. In other than Group H and I occupancies, interior egress stairways serving only the first and second stories of a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 are not required to be enclosed, provided at least two means of egress are provided from both floors served by the unenclosed stairways. Such interconnected stories shall not be open to other stories. Unenclosed exit stairways shall be remotely located as required in Section 1015.2.

Diagrams below show the fire rated corridors. These diagrams are also in **Appendix B** in a larger scale.

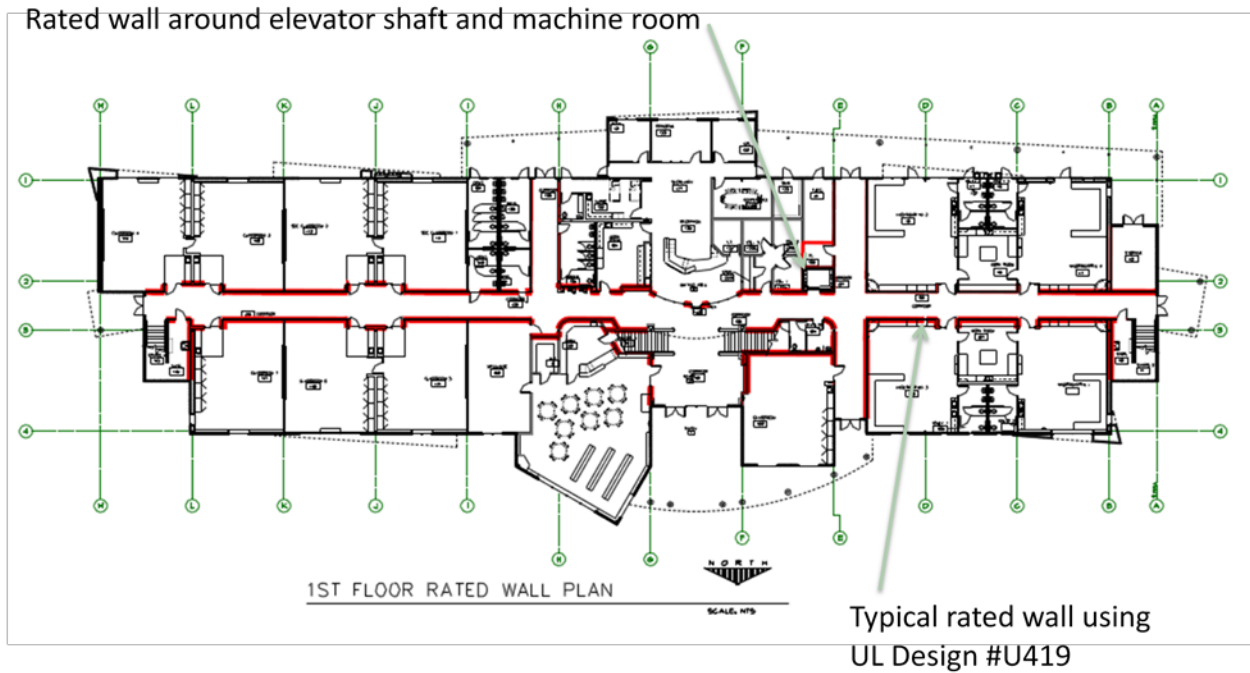


Figure 7 – First Floor Plan – Fire Rating

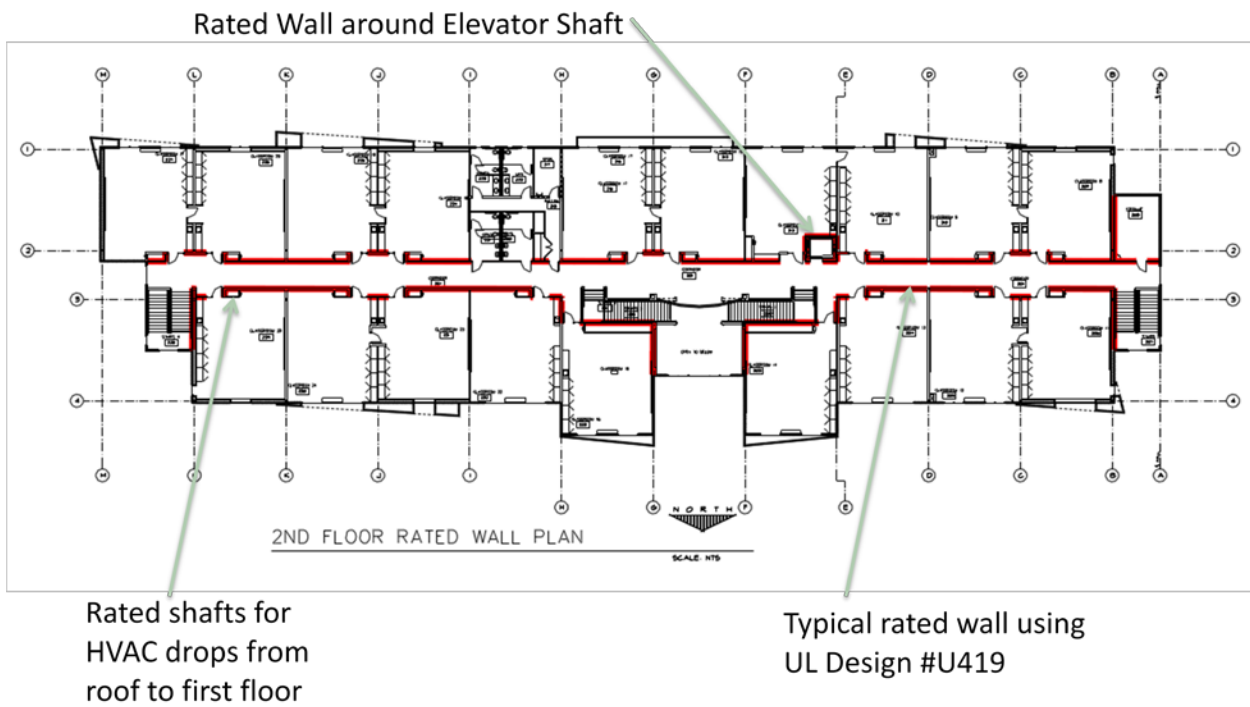


Figure 8 –Second Floor Plan – Fire Rating



**Actual Building Construction Materials:**

**Roof Construction:**

Metal deck with insulation and built-up roofing above. Metal beams and framing.

**Structure:**

Metal construction consisting of various columns, beams, girders and joists of metal construction.

Walls (Interior and Exterior):

**Exterior Walls:**

6" metal studs at 16" O.C. with R-19 insulation. Exterior cement with plaster lath. Interior varies per room finish schedule.

Interior Walls (non-rated):

6" metal studs at 16" O.C. with sound batt insulation. Finish varies per room finish schedule.

**Rated Constructions:**

Interior Walls (1-hour rated):

6" metal studs at 16" O.C. with sound batt insulation. 5/8" type "x" gyp. Bd. On each side. (UL #419).

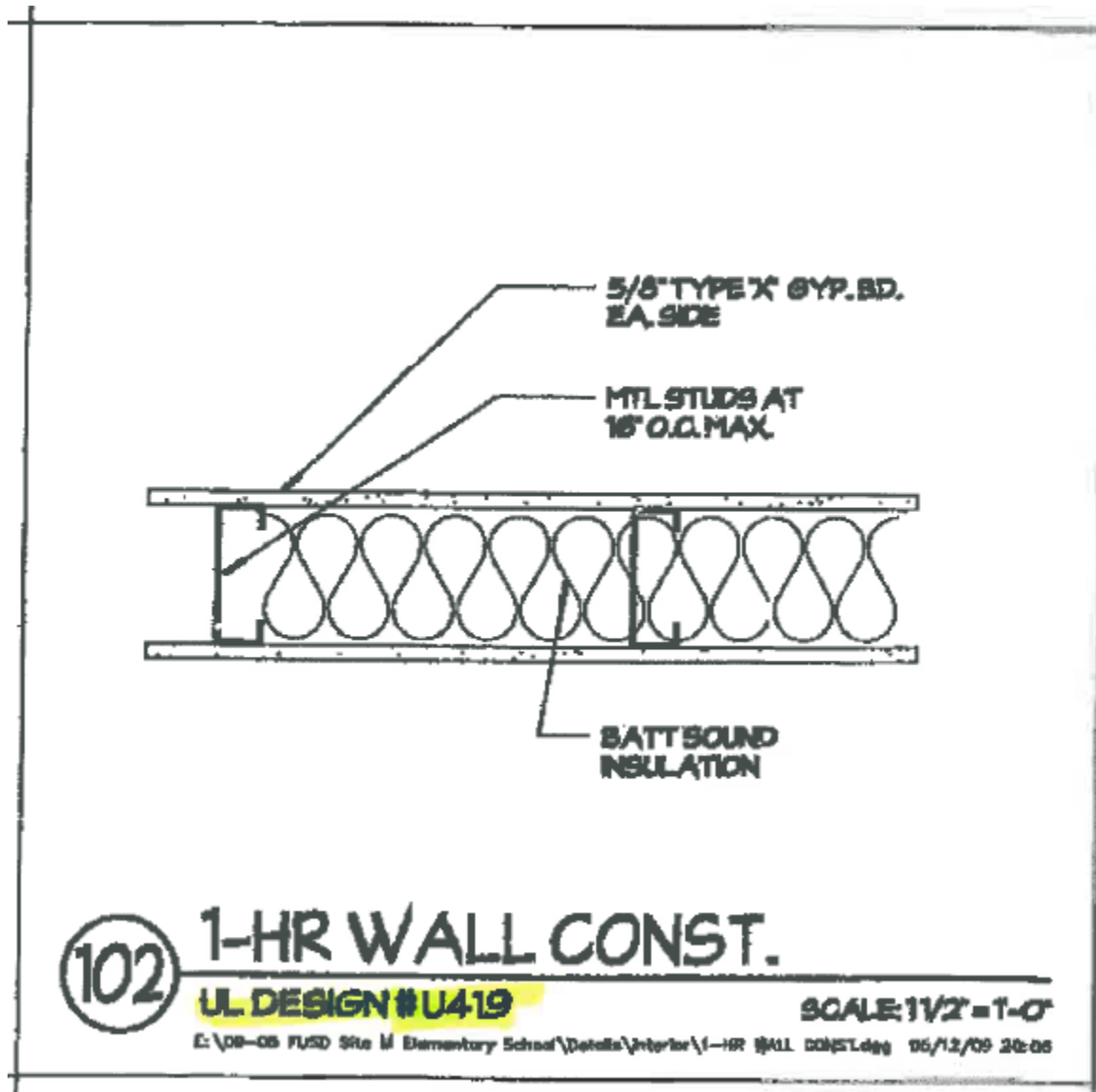


Figure 9 – UL 419 Corridor Interior Wall Rating Detail

Interior Rated Corridor – wall and ceiling tunnel (1-hour rated):

6" metal studs at 16" O.C. with sound batt insulation. 5/8" type "x" gyp. Bd. On each side. (UL #419).

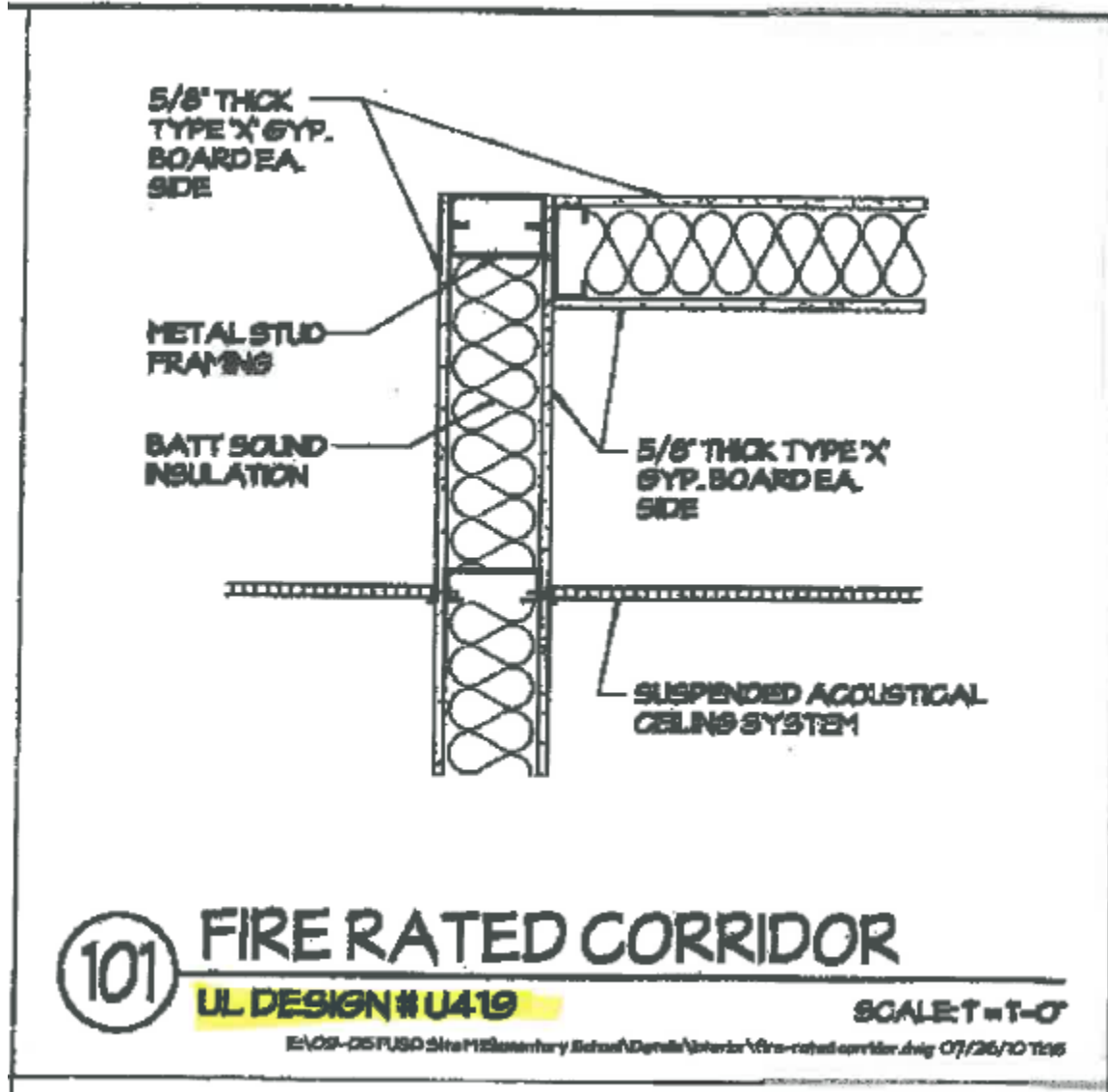


Figure 10 – UL 419 Corridor Tunnel Rating Detail

Rated Shaft at Elevator (1-hour rated):

USG Steel Studs at 24" O.C. 5/8" type "x" gyp. Bd. On each side. (UL #469).

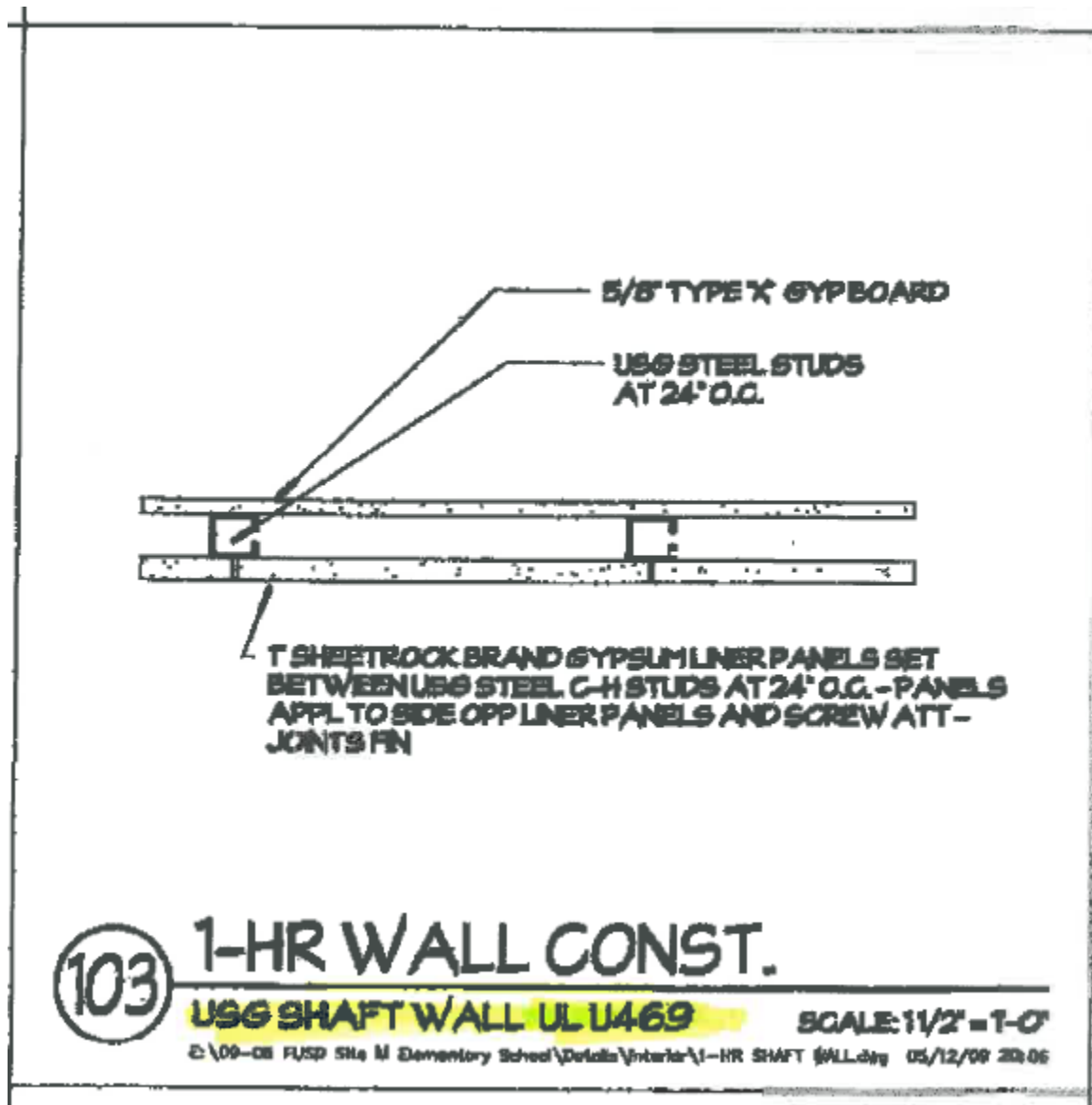


Figure 11 – UL 469 Rated Shaft Detail

# Fire Detection, Alarm and Communications Systems

## Fire Alarm Type and Component Information

This new elementary schools alarm system is a Central Station type which is monitored by an independent central station. This central station conforms to the requirements of NFPA 72 as amended by Article 91. The fire alarm system consists of the key fire alarm components as listed below and all other components as required to provide a complete functioning system to monitor the building. Refer to **Appendix C** for fire alarm drawings (FAx.x) referenced in this section.

Key Fire Alarm Components (refer to Fire Alarm Symbols List on attached sheet FA0.1 and attached product cut sheets in **Appendix E** for additional information)

- Fire Alarm Control Panel – Gamewell-FCI – Model E3
- Fire Alarm Expander Panel – Gamewell-FCI – Model FF8
- Manual Pull Station – Gamewell-FCI – Model MS-7AF
- Heat Detector – Gamewell-FCI – Model ATD-L2F
- Attic Heat Detector – Gamewell-FCI – Model ATD-HL2F
- Smoke Detector – Gamewell-FCI – Model ASD-PL2F
- Duct Smoke Detector – Gamewell-FCI – Model ADPRF
- Fire Sprinkler Tamper Switch
- Fire Sprinkler Flow Switch
- Outside Horn with Black Box – Wheelock – Model AH-24WP-R WBBR
- Horn / Strobe Multi-Candela – Wheelock – Model ZNS-24MCW-FR
- Strobe Multi-Candela – Wheelock – Model ZRS-24MCW-FR

### Key Fire Alarm Components Locations

- Fire Alarm Control Panel is located on the ground floor on the South Side of the middle of the building in Room Ball 123. Refer to attached drawing FA1.1.
- Fire Alarm Expansion Panels. The first floor panel is located on the ground floor on the South Side of the middle of the building in Room Ball 123. Refer to attached drawing FS1.1. The second floor panel is located on the second floor on the South Side of the middle of the building in Room Storage 217. Refer to attached drawing FA2.2.
- Fire sprinkler riser / tamper switch / flow switch are located on the ground floor in the South / West corner in room Storage 113. Refer to attached drawing FA1.1.

- Manual Pull Stations are located throughout the building mounted at 48" A.F.F. at each exterior door. Refer to attached drawings for locations.
- Heat Detectors are located in the elevator equipment/machine rooms. Refer to attached drawings.
- Attic Heat Detectors are located throughout the building mounted above the ceiling in each attic space compartment. Refer to attached drawings.
- Duct Smoke Detectors are located throughout the building mounted in the ducts next to the fire smoke dampers at each penetration of fire rated walls. Refer to attached drawings.
- Duct Smoke Detectors are also located in the supply air plenums of the HVAC rooftop package units. These are not shown on the plans, but one is located in each unit.
- Outside Horns are located on the exterior of the building. Refer to attached drawings FA1.1 and FA1.2.
- Horn / Strobe Multi-Candela devices are located throughout the building mounted on the walls of most rooms and spaces. Refer to attached drawings.
- Strobe Multi-Candela devices are located throughout the building mounted on the walls of some storage and restrooms. Refer to attached drawings.

### **Fire Alarm Design Methodology**

The fire alarm system is designed to meet the requirements of NFPA 72. The components as installed cover each individual room or areas as required.

The smoke detectors which are spot-type smoke detectors have been designed to meet the requirements of NFPA 72 17.7.3.2 at 30 ft spacing.

Attic heat detectors layout is designed to meet the requirements of NFPA 71 Ch 17 and Annex B. The heat detectors are UL approved for 50 ft center to center and FM approved for 25 x 25 ft.

Typical layouts have been designed around these numbers.

### **Fire Alarm Notification Analyses**

#### **Audio / Visual Notification Appliances**

The audio / visual strobe appliances have been evaluated in the following locations (Typical First Floor Classroom, Typical Second Floor Classroom, Main Two Story Entry and the Library) locations are as indicated on attached FA sheets. All of these appliances have a rating of 90 dBA which is above the requirements of NFPA 72 18.4.3 which states that the audible requirements must be 15 dBA above the average ambient sound level and at least 5 dBA above

maximum sound level having duration of at least 1 minute. See the FA floor plan drawings in **Appendix C** for locations of all appliances

**Location A** (Typical First Floor Classroom, Kindergarten 1, Rm #109)

Ceiling Height is 9'-6", Room dimensions are 28'x33'-4"

(1) 75 cd device was used.

Per NFPA 72 Table 18.5.4.3.1(a) a single 75 cd wall mounted visible appliance will cover a maximum room size of 45'x45'.

Spacing for this room is correct.

**Location B** (Typical Second Floor Classroom, Classroom 12, Rm #205)

Ceiling Height is 10-0", Room dimensions are 28'x34'-6"

(1) 75 cd device was used.

Per NFPA 72 Table 18.5.4.3.1(a) a single 75 cd wall mounted visible appliance will cover a maximum room size of 45'x45'.

Spacing for this room is correct.

**Location C** (Library)

Ceiling Height is 9'-6", Room dimensions area max. Of 40'-6"x61'-6" in a non uniform shape.

(3) devices were used (1) 15 cd device, (1) 75 cd device and (1) 110 cd device

Per NFPA 72 Table 18.5.4.3.1(a)

a single 15 cd wall mounted visible appliance will cover a maximum room size of 20'x20'.

a single 75 cd wall mounted visible appliance will cover a maximum room size of 45'x45'.

a single 110 cd wall mounted visible appliance will cover a maximum room size of 54'x54'.

With layout used and the (3) devices spacing for this room is correct.

**Location D** (Main Entry, 2 Story, Corridor 101) and **Location H** (Corridors)

Ceiling Height is 29'-0" at Main Entry and 9'-6" or 10'-0" at Corridors

15 cd devices were used.

Spacing for the corridors was done in compliance with Per NFPA 72 18.5.4.4.

**Location E** (Secretary 127 and Reception 126)

Ceiling Height is 9'-6", Room dimensions are 29'-4"x39' in an L shape

(1) 75 cd device was used.

Per NFPA 72 Table 18.5.4.3.1(a) a single 75 cd wall mounted visible appliance will cover a maximum room size of 45'x45'.

Spacing for this room is correct.

**Location F** (Conference 128)

Ceiling Height is 9'-6", Room dimensions are 18'x12'

(1) 15 cd device was used.

Per NFPA 72 Table 18.5.4.3.1(a) a single 15 cd wall mounted visible appliance will cover a maximum room size of 20'x20'.

Spacing for this room is correct.

**Location G** (Work Room 107)

Ceiling Height is 9'-6", Room dimensions are 17'-6"x19'

(1) 15 cd device was used.

Per NFPA 72 Table 18.5.4.3.1(a) a single 15 cd wall mounted visible appliance will cover a maximum room size of 20'x20'.

Spacing for this room is correct.



## Fire Alarm Sequence of Operation

The following Diagram identifies the fire alarm sequence of operations.

FIRE ALARM SEQUENCE OF OPERATIONS							
DEVICE ACTION	MANUAL PULL STATION	SMOKE / HEAT DETECTOR	LOSS OF POWER	GROUND FAULT	WATERFLOW SWITCH	TAMPER SWITCH	DUCT SMOKE DETECTORS
ANNUNCIATE ALARM AT FIRE ALARM CONTROL PANEL	YES	YES	-	-	YES	-	YES
ANNUNCIATE TROUBLE AT FIRE ALARM CONTROL PANEL	-	-	YES	YES	-	-	-
ANNUNCIATE SUPERVISORY AT FIRE ALARM CONTROL PANEL	-	-	-	-	-	YES	-
ACTIVATE ALL AUDIBLE/ VISUAL ALARMS	YES	YES	-	-	YES	-	YES
TRANSFER TO BATTERY BACKUP	-	-	YES	-	-	-	-
ANNUNCIATE ALARM AT CENTRAL STATION -	YES	YES	-	-	YES	YES	YES
ANNUNCIATE TROUBLE AT CENTRAL STATION -	-	-	YES	YES	-	-	-
ANNUNCIATE SUPERVISORY AT CENTRAL STATION -	-	-	-	-	-	YES	-
CLOSE FIRE / SMOKE DAMPERS -	-	-	-	-	-	-	YES
SHUTDOWN A/C UNITS -	-	-	-	-	-	-	YES

Figure 12 – Fire Alarm Sequence of Operation

## **Fire Alarm Inspection Testing and Maintenance Requirements**

The inspection testing and maintenance of the alarm system will be the job of the company hired by the school district. NFPA guidelines, manufacturer and product guidelines and all local fire marshal requirements shall be followed.

## **Fire Alarm Riser**

Refer to attached drawings sheet FA0.3 for the Fire Riser Diagram.

## **Voltage Drop and Battery Calculations**

Refer to attached drawings sheet FA0.4 for the Fire Alarm Voltage Drop and Battery Calculations.

## **System Commissioning**

The system shall be required to be commissioned per the contract documents. Per the following specification sections listed below the system is required to be operational, functioning and warranted for a period of 1 year from the date of first beneficial use.

Specifications Sections:

16710, 1.03, B.

16710, 1.04, G.

16710, 1.06

16710, 1.07

16710, 2.06

Refer to attached project specifications in **Appendix F**

### **Inspection Testing and Maintenance Requirements**

The inspection testing and maintenance of the alarm system will be the job of the company hired by the school district. NFPA guidelines, manufacturer and product guidelines and all local fire marshal requirements shall be followed.

### **Approval Requirements**

Per the specifications section 16710, 1.03 the school district shall review and approve the equipment and system prior to any installation. Per specification section 16710, 1.04, G. the district shall review and approve the acceptance test procedures. Per specification section 16710, 2.06 the district and the local fire marshal shall be present to witness and approve testing. Refer to attached specifications.

### **Fire Alarm and Detection Summary**

The intent of the system is to comply with NFPA 72 and provide a complete Fire Alarm System that operates as required to meet the intent of the code. As reviewed and evaluated the installed system meets these requirements.

# Water-Based Fire Suppression

## General Site Information

The site is served by a 10 inch site fire water loop which serves the site fire hydrants and the fire sprinkler risers at the buildings. A fire hydrant is located on the south side of the building near the buildings center with drive in access for the fire department from gates at the street to the sports courts. The buildings fire riser is on the south east corner of the building on the exterior wall.

### Site Fire Water Plan

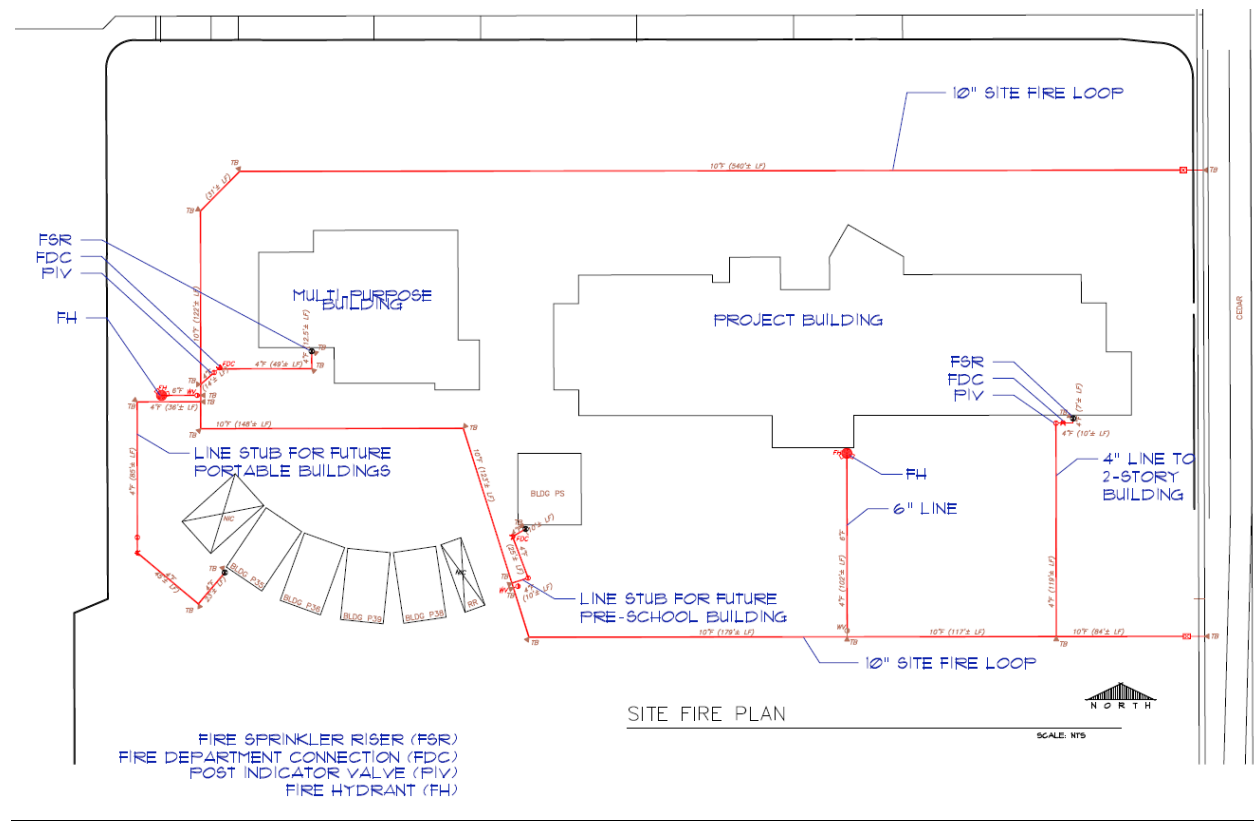


Figure 13 – Site Fire Layout

## General Building Fire Sprinkler Information

The building is completely fire sprinklered per the requirements of NFPA 13, 2002. Quick response pendent heads are located in the T-bar and hard ceilings in all rooms. Attic space is not required to be sprinklered per exceptions in NFPA 13, 8.15.1.2.1 and per DSA IR 9-1 for

buildings of non-combustible construction with fire sprinklers. The fire sprinkler riser is located in outside of the building at the South / East corner of the building. Sprinkler mains run above the ceilings of both floors.

### **Fire Sprinkler Material Information**

The following are key components of the fire sprinkler system:

- Viking, Easy Riser swing check valve Models E-1 and F-1
- Viking, Microfast Standard Quick Response Extended Coverage Pendent Sprinklers
- Viking, Microfast Standard Quick Response Upright and Conventional Sprinklers
- Viking, Microfast and Microfast HP Quick Response Pendent Sprinklers
- Viking, Microfast Standard Quick Response Extended Coverage HSW Sprinkler VK606
- Viking, Microfast HP Quick Response Horizontal Sidewall Sprinklers VK305 and VK319
- Sprinkler Wrenches and Cabinets
- Potter, Bells PBA-AC and MBA-DC
- Potter, WFSR-F Waterflow Alarm Switch
- Potter, PCVS-1 and 2 Control Valve and Supervisory Switch

Refer to **Appendix I** for key component Product Data Sheets

## Building Fire Water Supply Information

The fire sprinkler water supply is by a single fire riser to the building. The water supply serving the building is characterized as follows per the attached water supply information as provided by Fresno Fire on May 1, 2009 refer to letter in **Appendix G**. This information represents design data to be used for design as provided by Fresno Fire and is not the actual flow data from a flow test.

Static: 45 psi

Residual: 35 psi

Flow: 1800 gpm

A 10% “cushion” for design was not required as the actual flow test results were higher than the data given for the design model flow curve.

Design data for the sprinkler system matched that as provided by the City; reference the attached report data from the sprinkler hydraulic calculations **Appendix H** for the most hydraulically demanding classroom space.

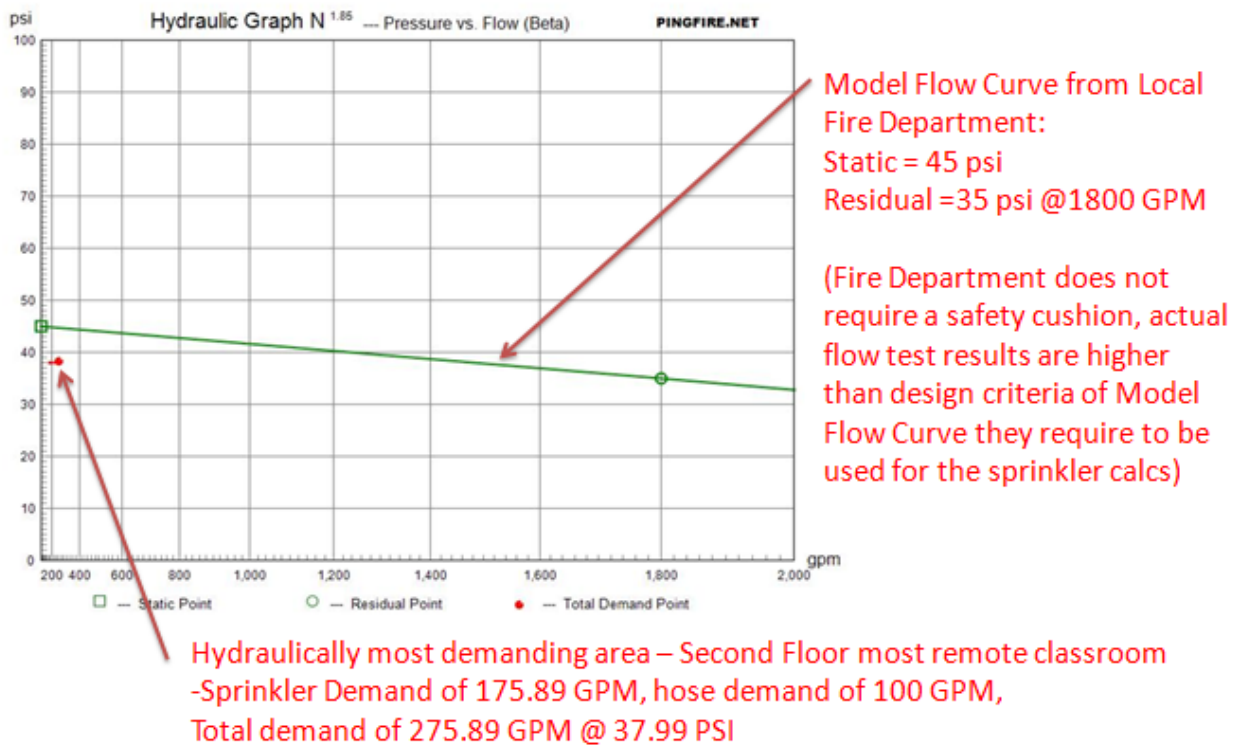
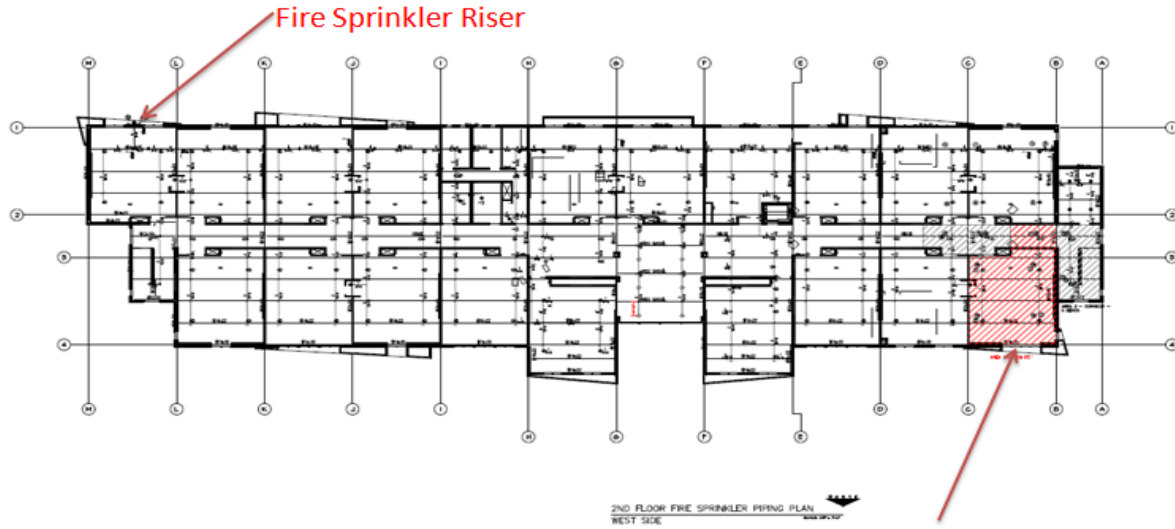


Figure 14 – Fire Suppression System Curve

## Building Sprinkler Hydraulic Demand Requirements

The most hydraulically demanding area of the system was determined to be the second floor classroom on the north side of the building at the west end of the building. This classroom was the furthest distance from the fire sprinkler riser which is located on the south side of the building at the east end of the building. The hydraulic calculations were done using the room design method from NFPA 13 section 14.4.4.1.2 and 11.2.3.3. This requires the use of 5 sprinkler heads in the calculation. Calculations included the four sprinkler heads in the room along with one sprinkler head from the corridor just outside of the classroom. The demand for this area was 175.89 gpm for the sprinklers and 100 gpm for the hose demand for a total of 275.89 gpm at 37.99 psi. Refer to **Appendix H** for a copy of the hydraulic calculations .

Refer the figure below for reference locations.



- Hydraulic Calculations were done using the Room Design Method (NFPA 13 section 14.4.4.1.2)
- the hydraulically most demanding area is the most remote classroom on the second floor.
- Calculations include the 4 sprinkler heads in the classroom and one in the corridor (calculations use a maximum of 5 heads per section 11.2.3.3.6)
- Occupancy classification is Light Hazard with a Density of 0.1 - GPM / SF
- Sprinkler Demand of 175.89 GPM, hose demand of 100 GPM,
- Total demand of 275.89 GPM @ 37.99 PSI

Figure 15 – Fire Sprinkler Hydraulic Demand Location

## **General Sprinkler Demand Requirements**

Typical classrooms and spaces are designed around the following:

Occupancy Hazard Classification = Light Hazard

Density = 0.10 gpm/ft<sup>2</sup>

Hose Stream Allowance = 100 gpm Inside and Outside

Water Supply Duration = 30 min duration

## **Computer Software**

The software used for the hydraulic calculations was Hydratec Inc. Fire Protection by Computer Design software.

## **Fire Sprinkler Plan Reference Plans**

Refer to **Appendix D**.



## Performance Based Analysis

### Performance Based Goals Overview

The main performance based goal of the new elementary school is to maintain life safety and minimize fire related injuries and the loss of life from fire. Secondary goals are to maintain property protection by minimizing damage to property and minimizing downtime of facility use from fire damage.

The tenability goals of the project are set at 2 meters above the walking surfaces. The smoke layer should be maintained above 2 m, when it drops below this level occupants become less likely to move through the smoke. The visibility criterion is to maintain 5 m in classrooms and 10 m for the corridors and entry areas. The maximum exposure of carbon monoxide is not to exceed 1,400 ppm. The heat exposure is to be less than 60 degrees C.

The available safe egress time (ASET) is the available safe egress time of the occupants in the event of a fire from the time of fire ignition to the time untenable conditions occur in the evacuation route. The required safe egress time (RSET) is the time required for occupants to reach an area of safety in the event of a fire from the time of fire ignition to the time evacuation is complete. These times need to be evaluated for each design fire scenario to determine if the ASET is greater than the RSET.

Design fires have been developed following the Design Fire Scenarios of NFPA 101 Ch 5 and evaluated using Fire Dynamics Simulator (FDS) version 5.5.3.

### Tenability Requirements

Tenability requirements for the building have been established based on a maximum evacuation time of 15 minutes or less which was derived from the code based and simulation based calculations from the building egress requirements. The building occupants range in age from pre-school age to senior citizen age with the majority in the age range of 4 to 13 years of age.

Visibility requirements for the elementary school are set at 5m for small enclosures such as classroom and restrooms and 10 m for corridors, entry areas and paths of travel [1], [3]. These numbers are the minimum values and should be met or exceeded. If visibility is less than these values occupants may stop attempting to exit the building.

Exposure to toxic gases shall be limited to allow safe evacuation of students and teachers. The exposure layer is 2m above the floor. The maximum exposure to carbon monoxide (CO) is

1,400 ppm for duration of 30 minutes. Oxygen (O<sub>2</sub>) should be 12% or greater and Carbon Dioxide (CO<sub>2</sub>) should be less than 6% [1].

Heat and temperature requirements for occupants are taken at 2 m above the floor. Radiant heat exposure should be limited to 2.5 KW/m<sup>2</sup> from the upper layer for a period of not more than 5 min. Convective heat of 100 degree C with 10% H<sub>2</sub>O is the maximum temperature for exposure for the duration of the 8 min is the maximum acceptable criteria for this building with design criteria of 60 degree C saturated for exposure duration of 30 min which covers the 15 min estimated maximum evacuation time [3]. Often the temperature of 120 degrees C [2], [4] is acceptable for exposure time of up to 7 min [2], [4] but due to the majority of the occupants being young children the lower values are being used to reduce risk and danger to them. The lower temperature which is more difficult to maintain will provide a greater level of safety.

## **Evacuation Time Calculations**

### **General Information**

The evacuation times for the building have been calculated using both hand calculation methods following the formulas in the NFPA Fire Protection Handbook 20<sup>th</sup> edition Chapter 2 Section 4. Additionally the building was modeled using Pathfinder Version 2012 software and evaluated in the SFPE mode using basic collisions as a double check of occupancy egress times.

For the hand calculations several assumptions were made. First it was assumed that people would evenly use the available exits. Second travel time in the rooms to the exits was not accounted for as the assumption that the persons nearest the door would begin exiting first and the remainder of the occupants would begin queuing behind.

The occupant load for the building used in the calculations was 630 occupants on the ground floor and 844 occupants on the second floor for a total of 1474 occupants. For the purpose of the hand calculations the administrative staff is counted in the total occupant load of the first floor and was calculated to use the main exits with the students. The second floor has four stairs to the first floor. The first floor has 7 sets of double doors. For the hand calculations it was found that comparing the movement time differences between the doors and the stair flow times that in all cases the stair flow times were the limiting factor. Due to this the stairs were used to calculate the egress time.

Pre-movement time for classrooms is estimated to be 30 seconds to allow for the teachers and students to realize that there is an alarm and began exiting the classrooms. This information is based on reading case studies in the SPPE Hand Book of Fire Protection Engineering Section 3-12.

An alarm time of 5 seconds has been used which is an industry standard that allows for the detection and alarm devices to receive and send signals.

## Egress Flow Calculations

- A. Estimate the flow capacity through the doors. From Table 4.2.8 the effective width of each double door is "free door width – (2) 6"".

Double doors have a free width of 68.5"

Use  $68.5'' - (2)6'' = 56.5''$

Per Table 4.2.8 use 24.0 persons / min/ft of flow

Using Equation 4 flow through double door =  $(56.5'' / 12'' \times 24.0 = 113 \text{ person / min.}$

Single door has a free width of 33.63"

Use  $33.63'' - (2)6'' = 21.63''$

Per Table 4.2.8 use 24.0 persons / min/ft of flow

Using Equation 4 flow through double door =  $(21.63'' / 12'' \times 24.0 = 43 \text{ person / min.}$

- B. Estimate the flow capability of the exit corridor. From Table 4.2.4 the effective width of the corridor is "free corridor width – (2) 6"". Corridor has a width of 60". Use  $60'' - (2) 6'' = 48''$

Per Table 4.2.8 use 24.0 persons / min/ft of flow in corridor.

Using equation 4 flow through stairs =  $(48'' / 12'') \times 24 = 96 \text{ person / min.}$

This is greater than the door flow for the corridor so use the door flow of 43 person / min.

- C. Estimate the flow capability of the stairway. From Table 4.2.4 the effective width of each stair is "free stair width – (2) 6"". Stairs have a width of 66". Use  $66'' - (2) 6'' = 54''$   
Per Table 4.2.8 stairs with 7.0" rise and 11" tread gives us 18.5 persons / min/ft of flow  
Using equation 4 flow through stairs =  $(54'' / 12'') \times 18.5 = 83 \text{ person / min.}$

- D. Estimate the movement time for the estimated stairway flow.

From Equation 1 the speed of movement down the stairs is  $212 - (2.86 \times 21 \times 0.175) = 105 \text{ ft/min}$

The travel distance between floors per Table 4.2.6 with stairs with a 7.0" rise and 11" tread = 1.85, so  $25.5 \times 1.85 = 47.25$  on the stair slope plus the travel landing of our stairs. Travel of the landing is 7.75.

Stairway travel time is  $47.75' + 7.75' = 55'$

$55' / 105 = 0.52 \text{ min.}$  for travel in stairway from second to first floor exit doors.

- E. Estimate the movement time to stairs and from stairs to exit doors (worst case using center stairs).

From Table 4.2.3 travel speed of 100 ft/min is used.

Travel distance to stairs = 15' and travel distance from stairs to exit door = 17'

Travel distance is  $15' + 17' = 32'$

Travel time =  $32' / 100 = 0.34$  min.

- F. Estimate the movement time to stairs and from stairs to exit doors (worst case using side stairs, for design fire where center stairs are not available).

From Table 4.2.3 travel speed of 100 ft/min is used.

Travel distance to stairs = 11' and travel distance from stairs to exit door = 7'

Travel distance is  $11' + 7' = 18'$

Travel time =  $18' / 100 = 0.18$  min.

### **Hand Calculation of Movement Time Standard Egress with All Stairs and Doors Available**

#### **(this is the Movement Time used for Design Fire 1 )**

Hand Calculations use the above numbers for determination of egress time.

Travel distance in initial room not included in calculations.

Estimate of Standard Evacuation Movement Time per above:

844 occupants on second floor / 4 stairs = 211 occupants per stair

Flow time through stairs = 211 people / 83 person / min. thru stairs = 2.54 min.

Estimated time for movement to and from stairs = 0.52 min.

Estimated time for movement to and from stairs = 0.34 min.

Total minimum evacuation time is  $2.54 + 0.52 + 0.34 = 3.40$  min. or 204 sec

### **Hand Calculation of Movement Time Egress with Main Entry Double Stairs and Doors Unavailable (this is the Movement Time used for Design Fire 2 )**

Hand Calculations use the above numbers for determination of egress time.

Travel distance in initial room not included in calculations.

Estimate of Standard Evacuation Movement Time per above:

844 occupants on second floor / 2 stairs = 422 occupants per stair

Flow time through stairs = 422 people / 83 person / min. thru stairs = 5.08 min.

Estimated time for movement through stairway = 0.52 min.

Estimated time for movement to and from stairs = 0.18 min.

Total minimum evacuation time is  $5.08 + 0.52 + 0.18 = 5.78$  min. or 347 sec

### **Hand Calculation of Movement Time Egress with One Side Stair Unavailable**

#### **(this is the Movement Time used for Design Fire 3 )**

Hand Calculations use the above numbers for determination of egress time.

Travel distance in initial room not included in calculations.

Estimate of Standard Evacuation Movement Time per above:

844 occupants on second floor / 3 stairs = 282 occupants per stair

Flow time through stairs = 282 people / 83 person / min. thru stairs = 3.4 min.

Estimated time for movement through stairway = 0.52 min.

Estimated time for movement to and from stairs = 0.34 min.

Total minimum evacuation time is  $3.4 + 0.52 + 0.34 = 4.26$  min. or 256 sec

## Pathfinder Movement Time Standard Egress with All Stairs and Doors Available

Results of Pathfinder run using SFPE mode with basic collisions = 221 sec

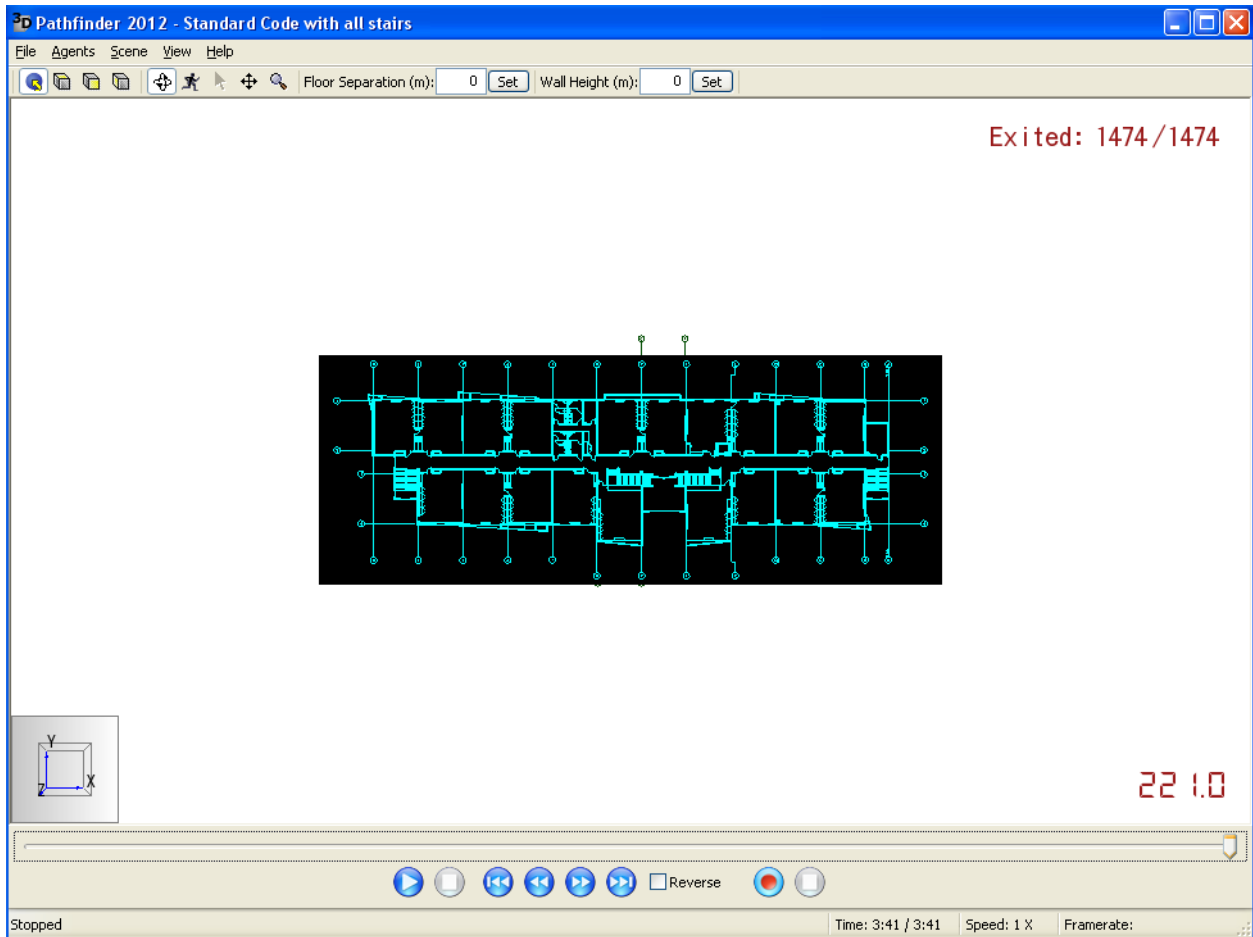


Figure 16 – Pathfinder Run with all egress available

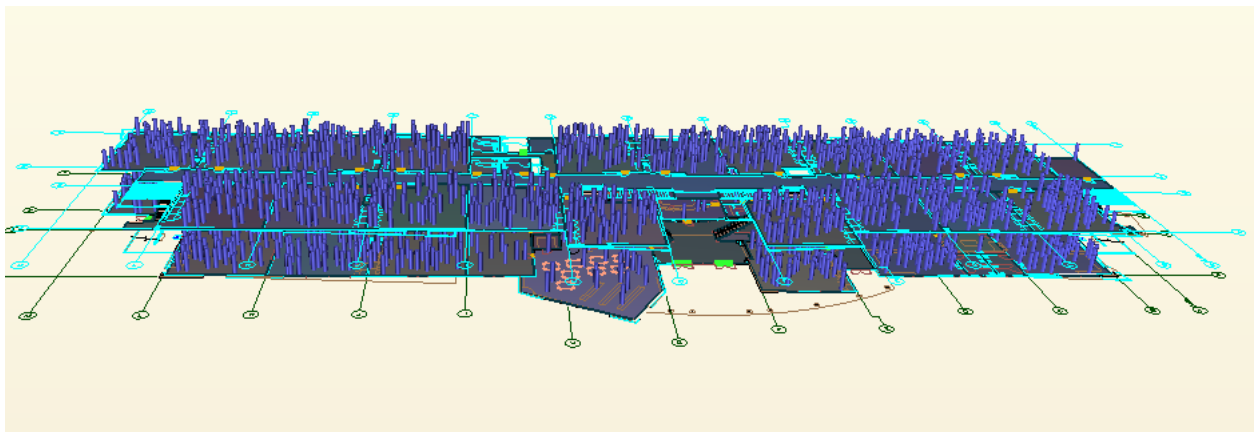


Figure 17 – Pathfinder Model

## Pathfinder Movement Time Egress with Main Entry Double Stairs and Doors Unavailable

Results of Pathfinder run using SFPE mode with basic collisions = 329 sec

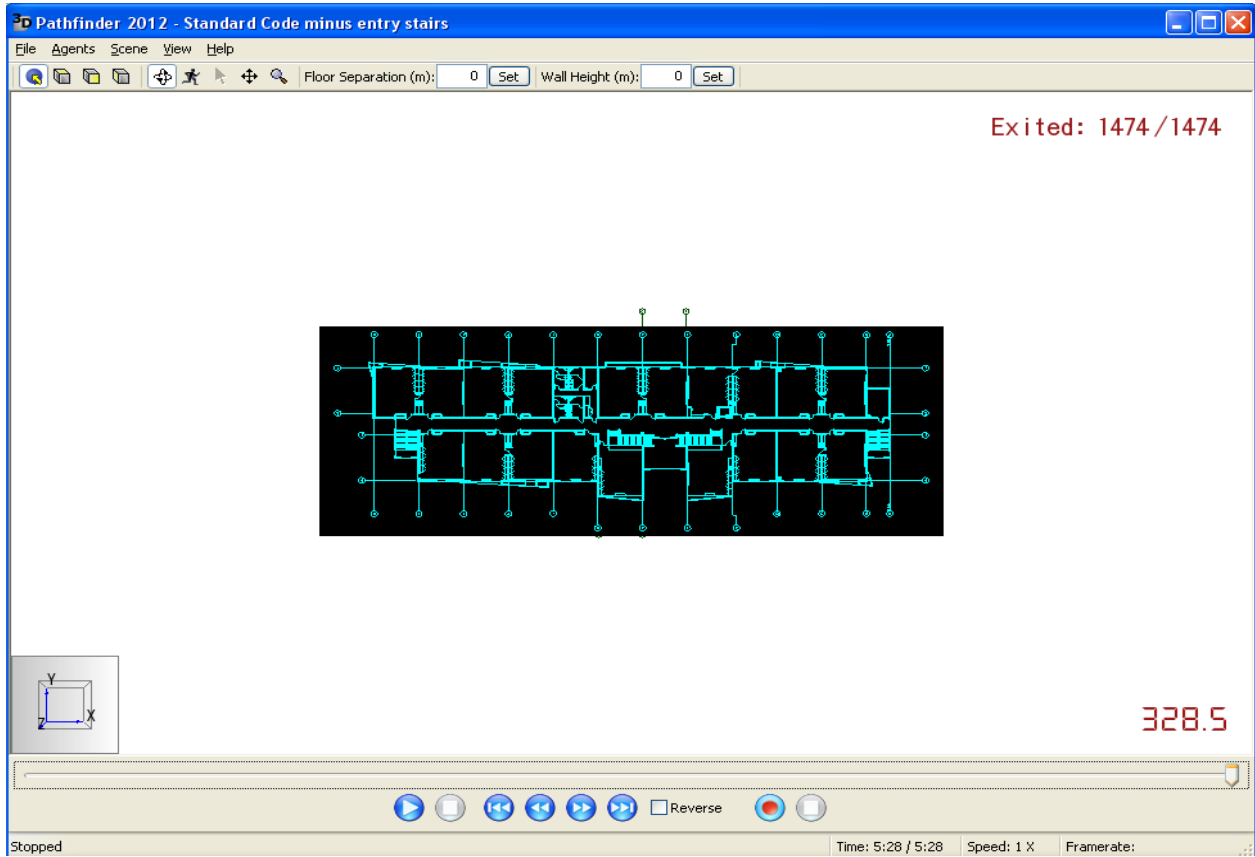


Figure 18 – Pathfinder Run with entry egress unavailable

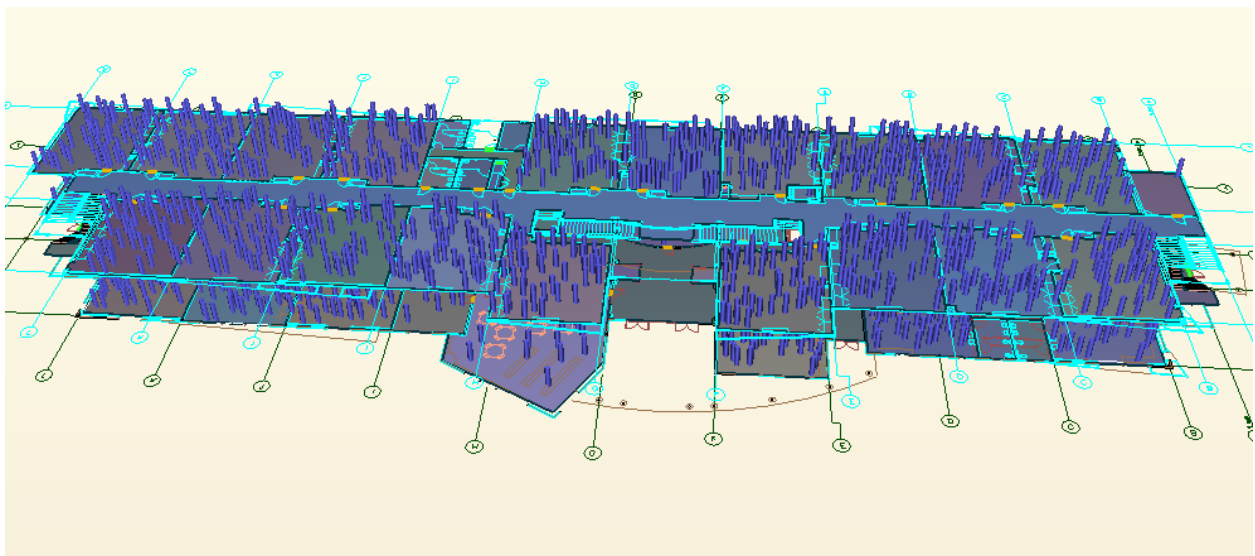


Figure 19 – Pathfinder Model with Center Stairs Removed

## Pathfinder Movement Time Egress with One Side Stair Unavailable

Results of Pathfinder run using SFPE mode = 223 sec

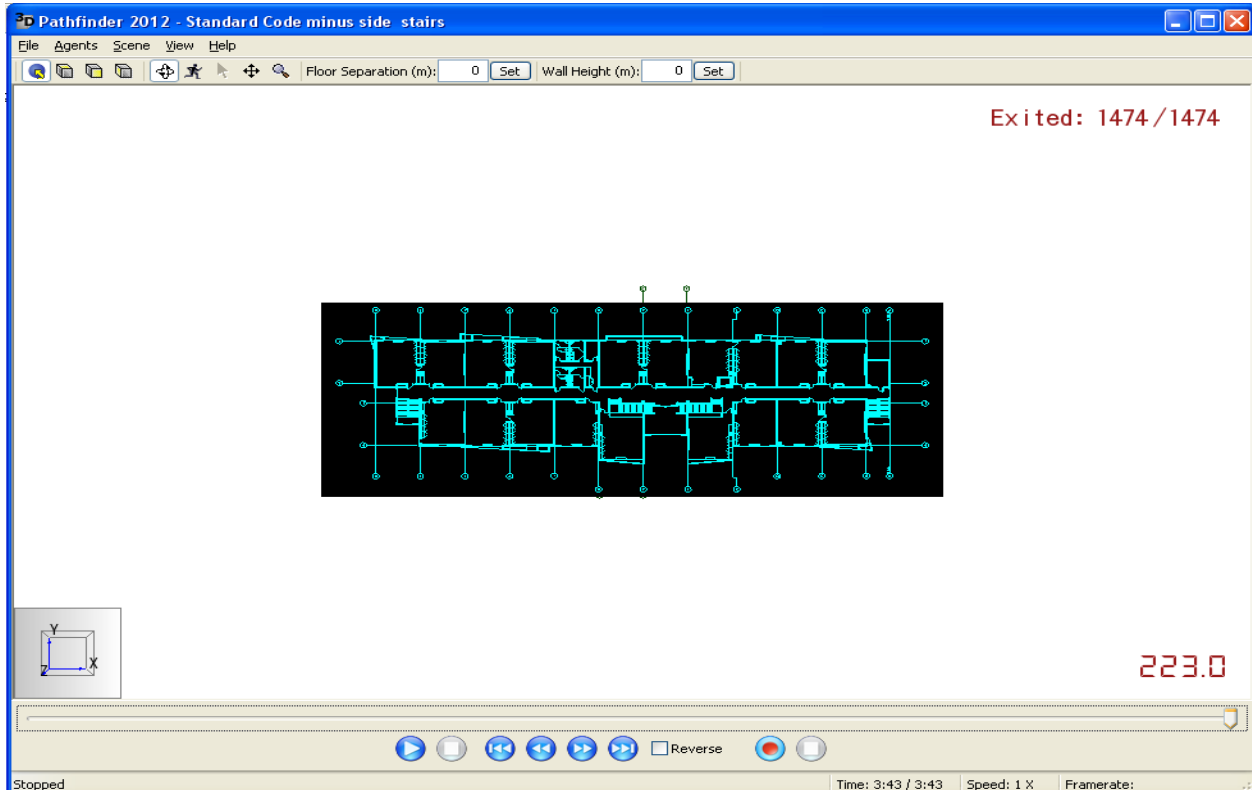


Figure 20 – Pathfinder Run with one side stair unavailable

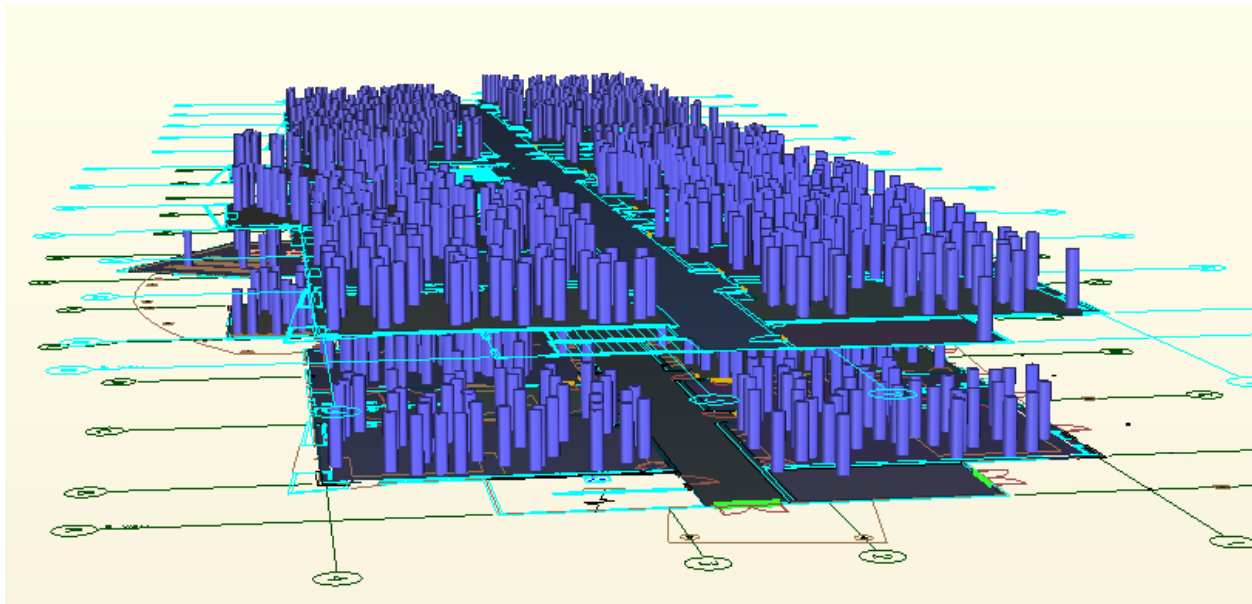


Figure 21 – Pathfinder Model with Side Stairs Removed



## Evacuation Movement Times

The evacuation movement time from the hand calculations compared to the times from the same run in Pathfinder using the SFPE mode with basic collisions showed a difference of between 5 % and 15 % for the various egress analysis. These are very close. For purposes of evaluating the RSET for the different design fire scenarios the hand calculation movement times are used as they were the more conservative times for two of the three egress analysis.

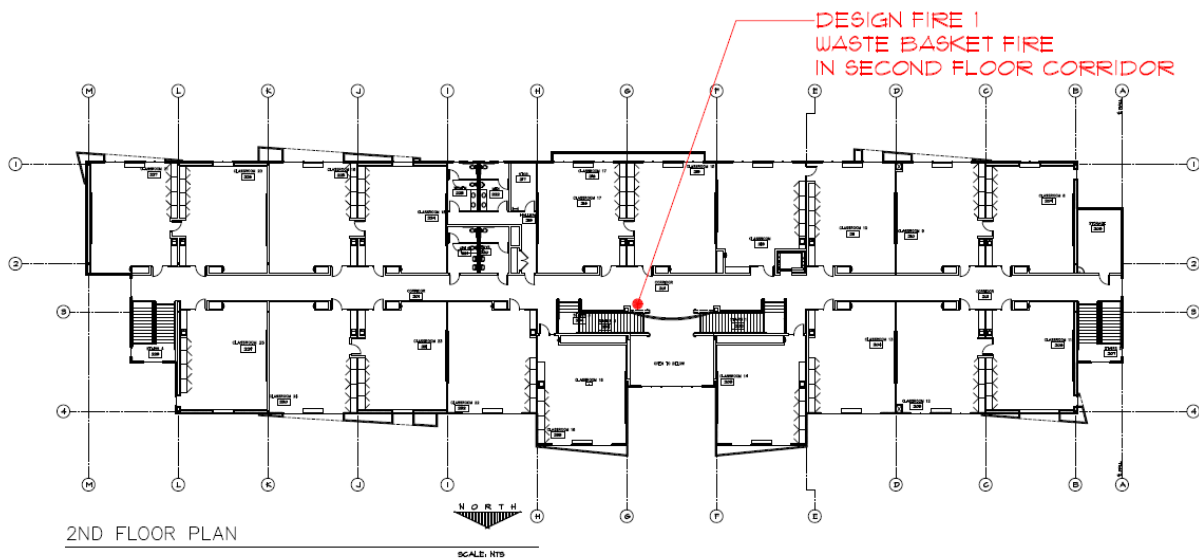
## Actual Occupant Loads

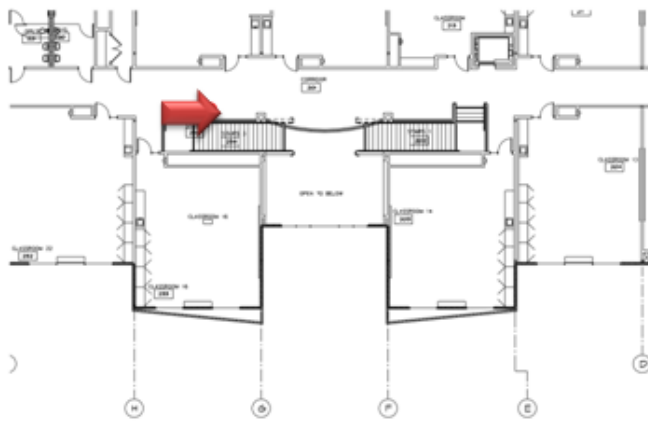
The occupant numbers used as required by code for educational facilities are generally conservative. Typical classrooms have between 27 and 35 students not the 44 to 48 as calculated by the code. This would result in a lower occupant load of approximately 175 occupants on the second floor and 100 occupants on the first floor for a total of 275 less occupants than used for calculations.

## Design Fire 1

### Scenario Overview

This performance design scenario involves a fire in the main entry area of the building. Typically this area is free of flammable material but at certain time of the year there is material which could be fuel for a fire in this area. In this scenario during the two times a year that the school does a student book fair a magazine / book rack is on display in the entry area which is located directly outside of the library. For this scenario the magazine / book rack is set on fire and causes the two main entry doors and two main stairs to the entry to be unavailable for egress.





Location of Design Fire 1

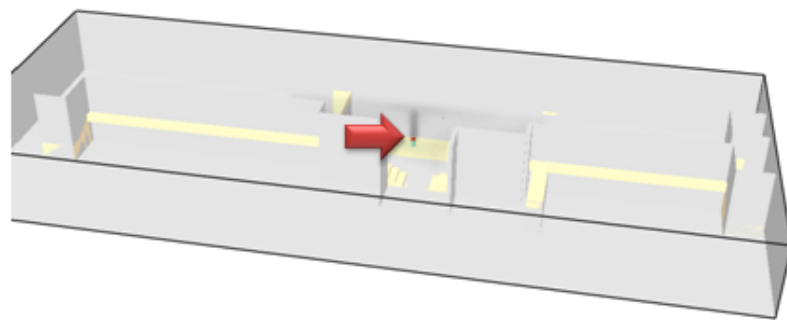


Figure 22 – Design Fire 1 Location

### **Fire Scenario Description**

This fire is similar to NFPA 101 Design Fire Scenario 1. NFPA 101 defines this fire scenario as follows:

- (1) It is an occupancy-specific fire representative of a typical fire for the occupancy.
- (2) It explicitly accounts for the following:
  - (a) Occupant activities
  - (b) Number and location of occupants
  - (c) Room size
  - (d) Contents and furnishings
  - (e) Fuel properties and ignition sources

- (f) Ventilation conditions
- (g) Identification of the first item ignited and its location

The conditions for this design fire scenario are as follows:

- Corridor 201, open to the primary entry access to the building and second floor egress corridors.
- Waste Basket in corridor is ignited.

The design fire used for this scenario is as follows:

- Design Fire Data the HRR of a standard Amtrak trash bag based on crumpled paper.
  - Based on SFPE data from Figure 3-1.100
  - Standard Trash bag with 110 sheets of crumpled newspaper in a 30 gallon HDPE container
  - Peak HRR of 175 kW

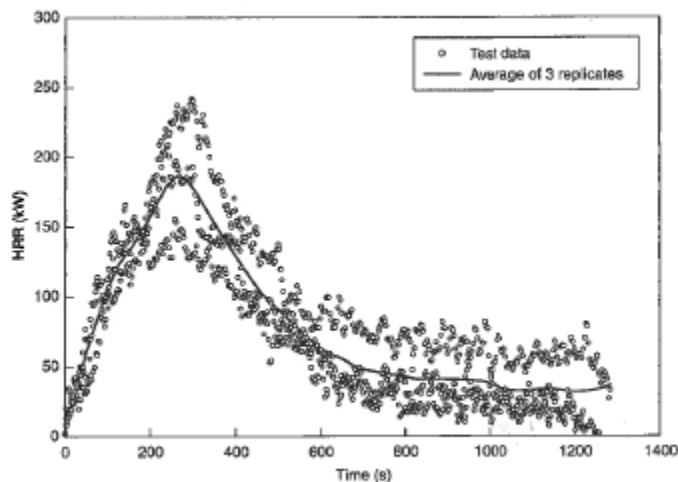


Figure 3-1.100. HRR of "standard" Amtrak trash bag, based on crumpled newspaper.

Figure 23 – Amtrak trash bag HRR Curves

### **Model Design Fire**

For this design fire the fire the fire grows to a peak HRR of 175 kW at a time of 276 seconds and then begins to taper off as the fuel cannot sustain further growth. This fire model was run to

600 seconds at which time the HRR had dropped to 60 kW. For this fire scenario there were two smoke detectors located in the ceiling space of the room, the first activated at a time of 20 seconds after the start of the fire. Due to the low HRR and the large volume of the space none of the six sprinklers located in the room activated.

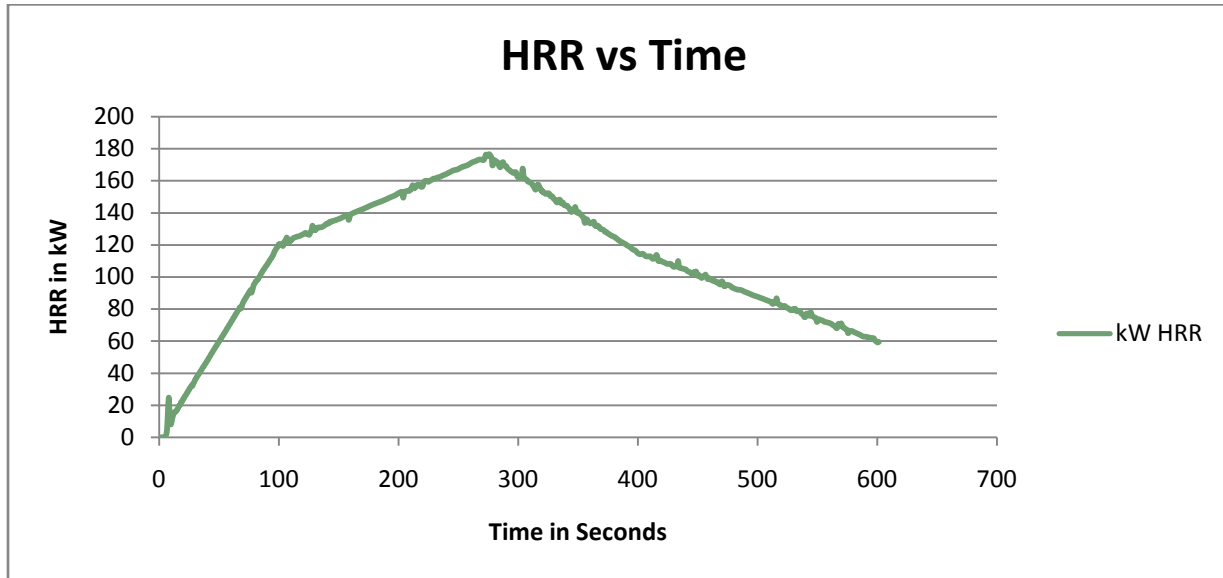


Figure 24 – Design Fire 1 HRR Curve

**Smoke Detector and Fire Sprinkler Activation**

For this fire the first smoke detector is activated at 20 s.

No fire sprinklers activated.

**DEVICE Activation Times**

7	SPR1	No Activation
8	SPR2	No Activation
9	SPR3	No Activation
10	SPR4	No Activation
11	SPR5	No Activation
12	SPR6	No Activation
13	SPR7	No Activation
14	SPR8	No Activation
15	SD1	28.7 s
16	SD2	19.4 s

Figure 25 – FDS Output of Device Activation

### **Design Fire 1 RSET**

For design fire 1 the RSET is 259 s or 4.32 min based on the following:

Detection Time	20 s	time of first smoke detector activation from FDS model run
Notification Time	5 s	time delay for smoke detector activation to signal
Pre-Movement Time	30 s	assumed time based on occupancy use
Movement Time	204 s	time from hand calculations with all stairs and doors used
RSET	259 s	total required time for safe evacuation

## Design Fire 1 ASET Times

For Design Fire 1 the ASET times for the various performance criteria are as follows:

The carbon monoxide level at 2 m above the second floor walking surface at the RSET time of 259 s is well below the 1,400 ppm tenability requirement. Criteria passes for RSET.

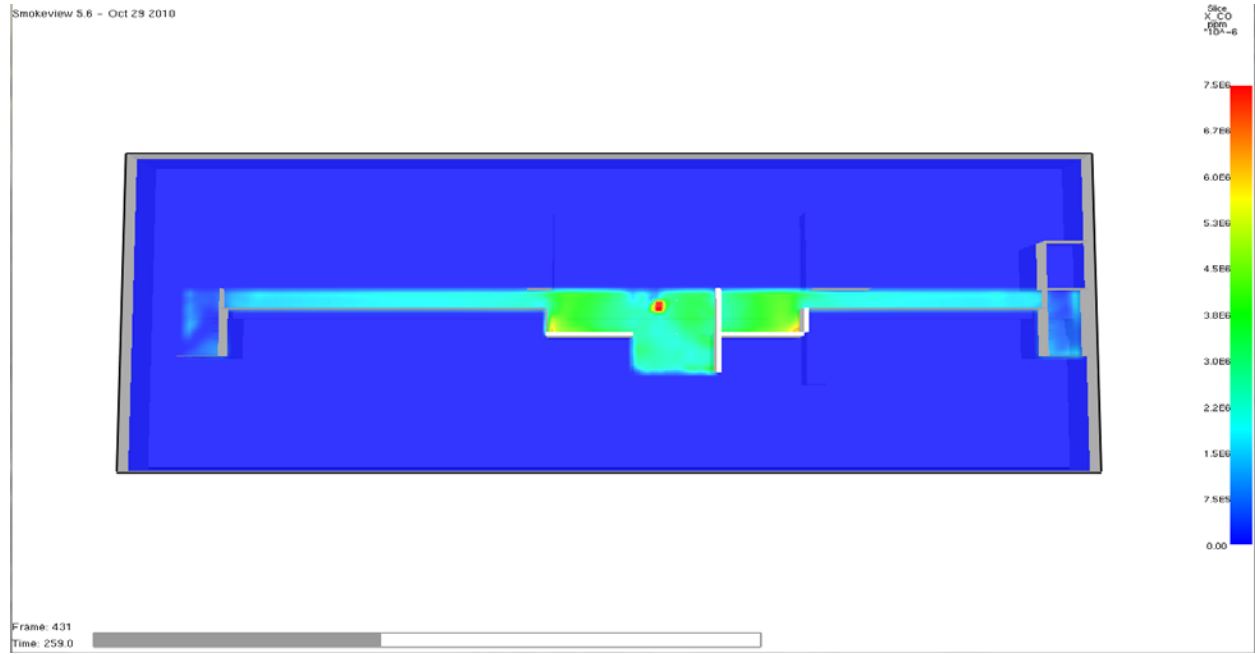


Figure 26 – FDS Design Fire 1 - CO at 259 s RSET

The carbon monoxide level at 2 m above the second floor walking surface at the end of the simulation run (600 s) is well below the 1,400 ppm tenability requirement.

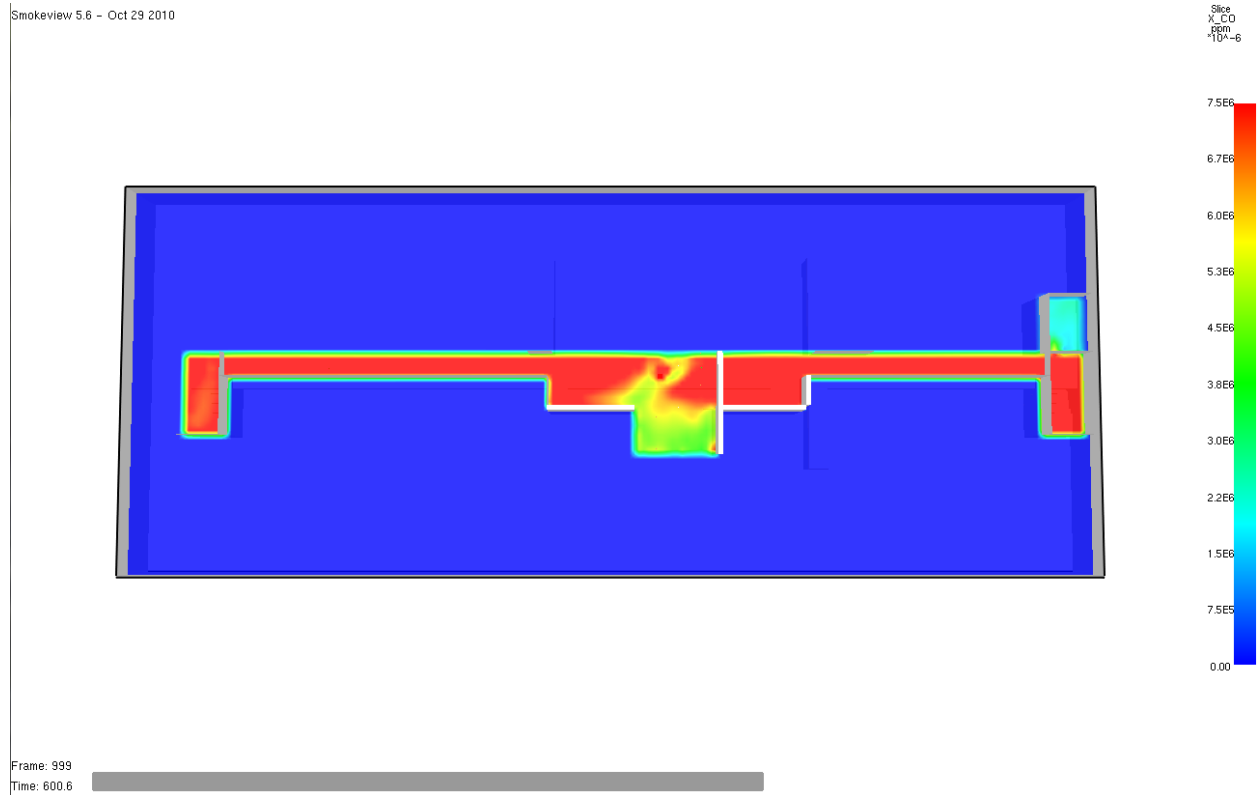
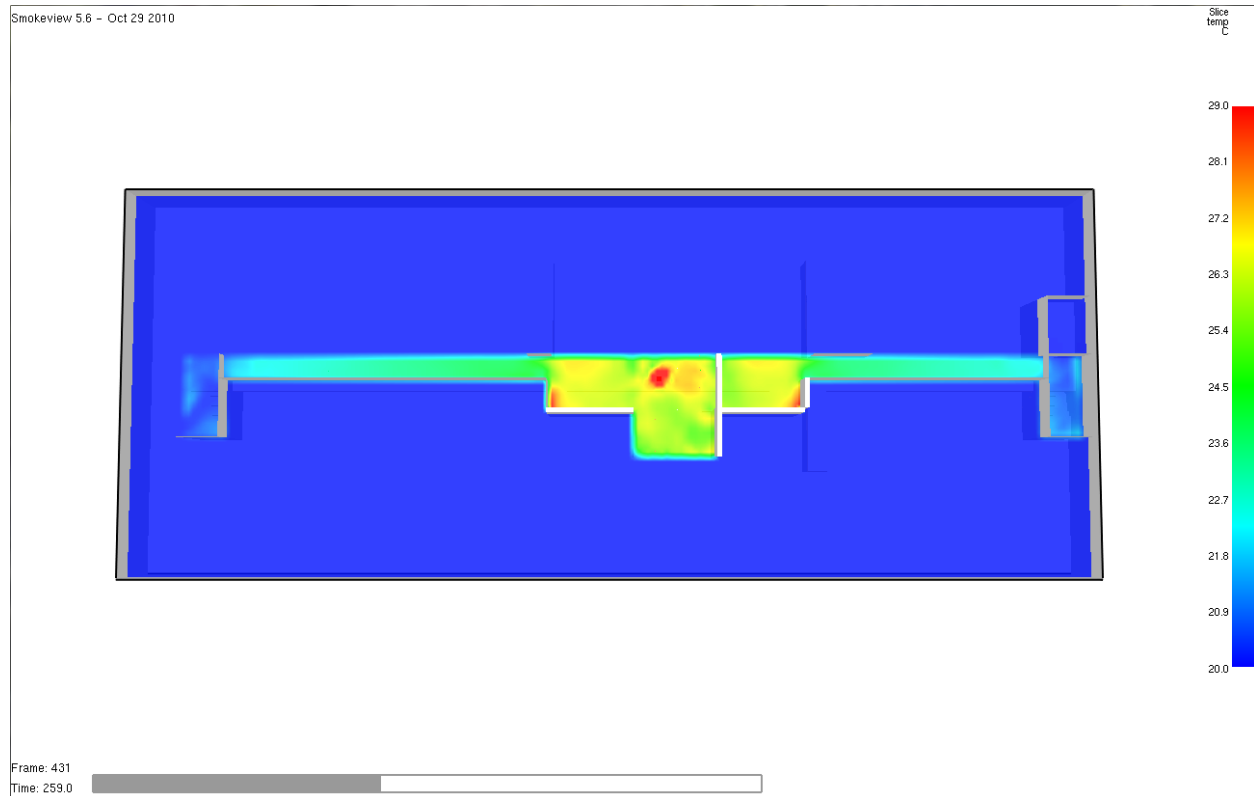


Figure 27 – FDS Design Fire 1 - CO at 600 s

The maximum temperature at 2 m above the second floor walking surface is under 30 degree C at all egress path areas which is well below the required 60 degree C criteria. Criteria passes.





The maximum temperature at 2 m above the second floor walking surface at the end of the simulation run (600 s) is well below the 60 degree C criteria.

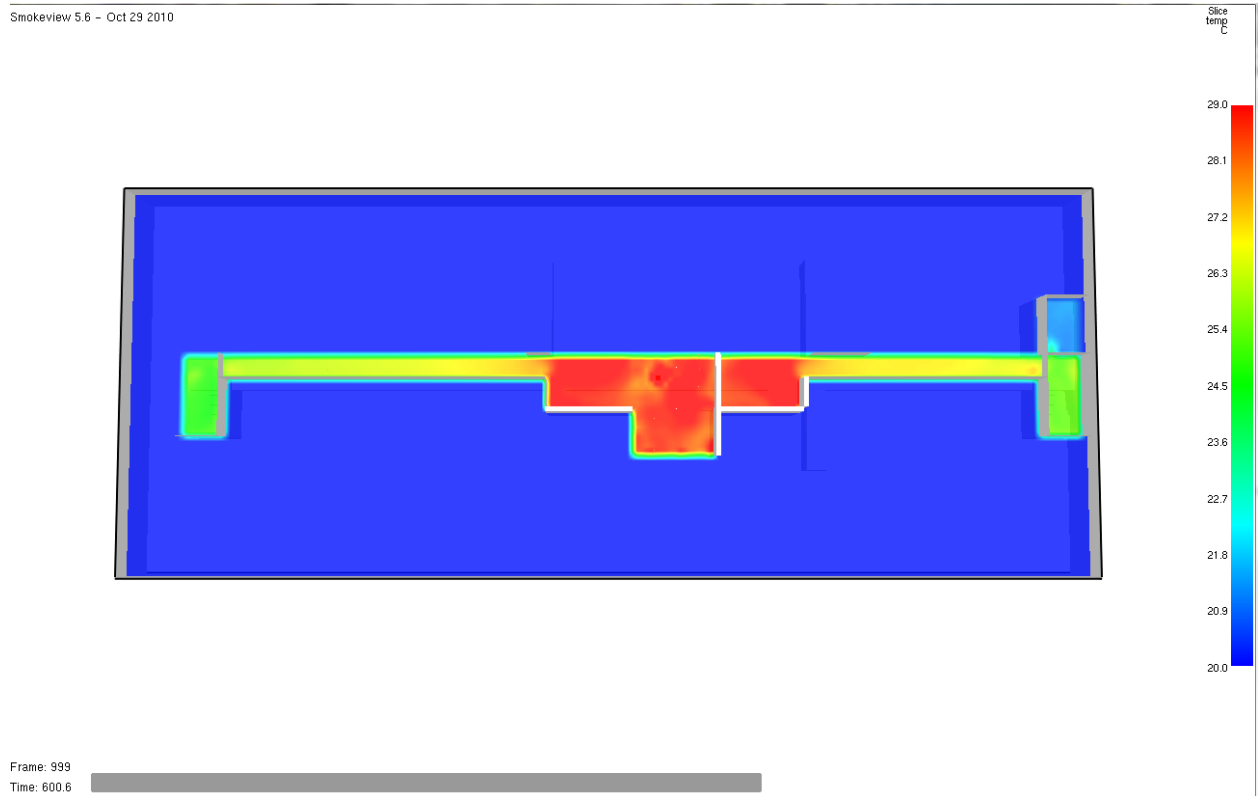


Figure 29 – FDS Design Fire 1 - Temperature at 600 s

The minimum visibility at 2 m above the second floor walking surface at the RSET time of 259 s is at over 45 m which is above the 10 m requirement. Criteria passes for RSET.

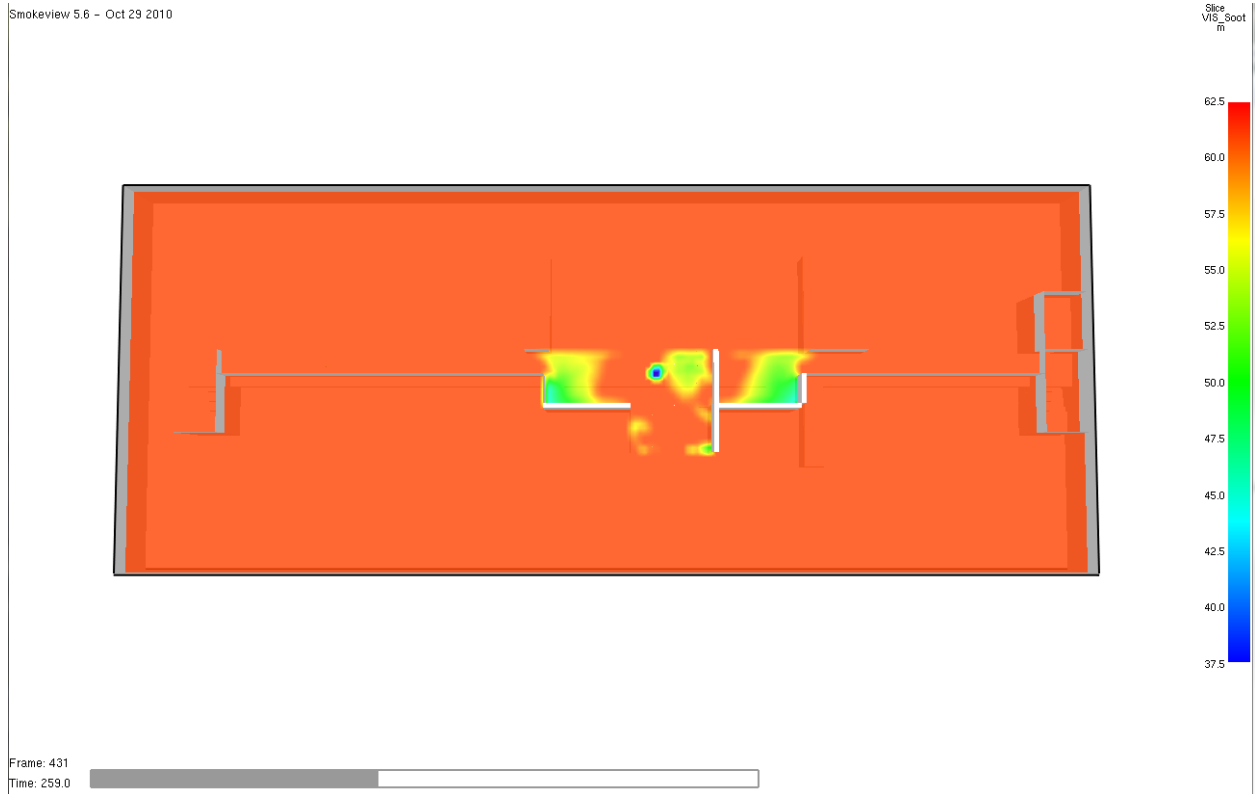


Figure 30 – FDS Design Fire 1 - Visibility at 259 s RSET

The minimum visibility at 2 m above the second floor walking surface at the end of the simulation run (600 s) is greater than 35 m which is above the 10 m visibility criteria.

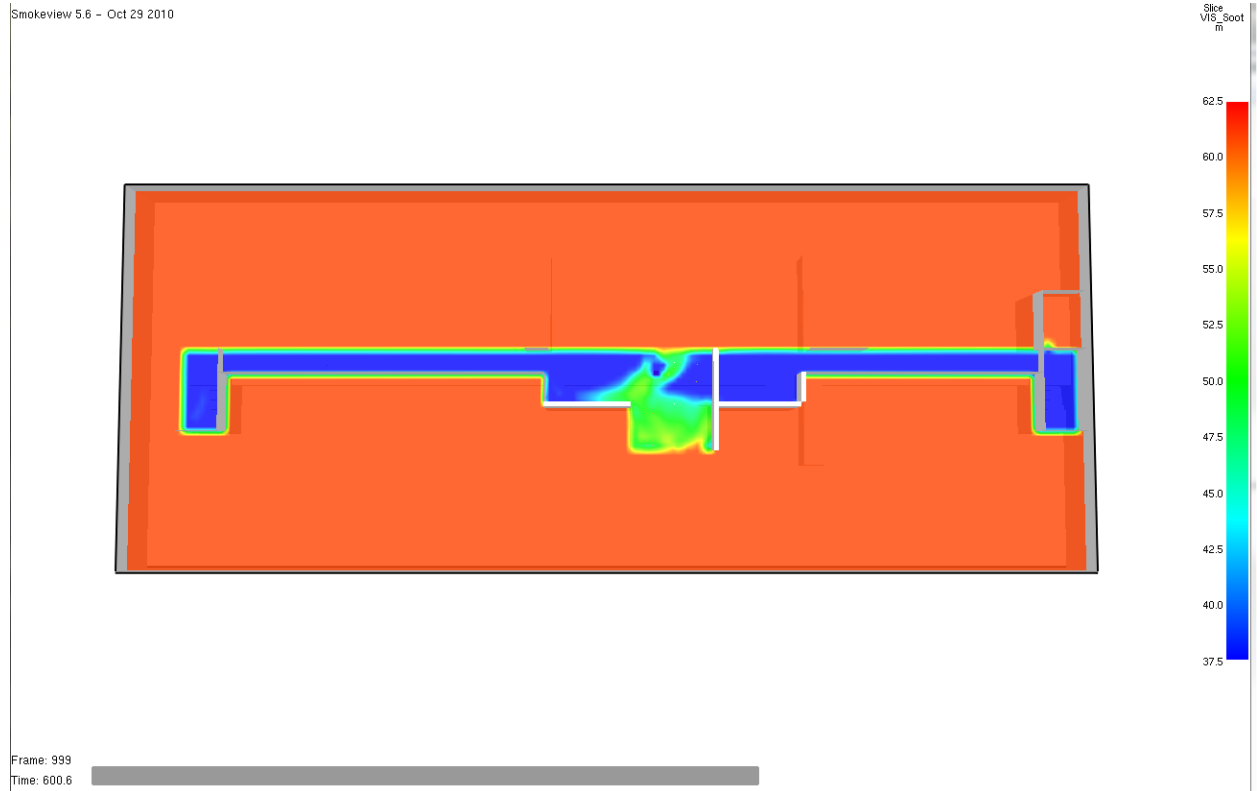


Figure 31 – FDS Design Fire 1 - Visibility at 600 s

The smoke layer drops below the 2 m requirement at 236 s as shown in the graph below. This criteria fails for RSET. (Note: Smoke layer height is taken at a single point in the middle of each corridor which results in a sharp drop in the smoke layer height as the smoke layer moves down the corridor and hits the measuring point).

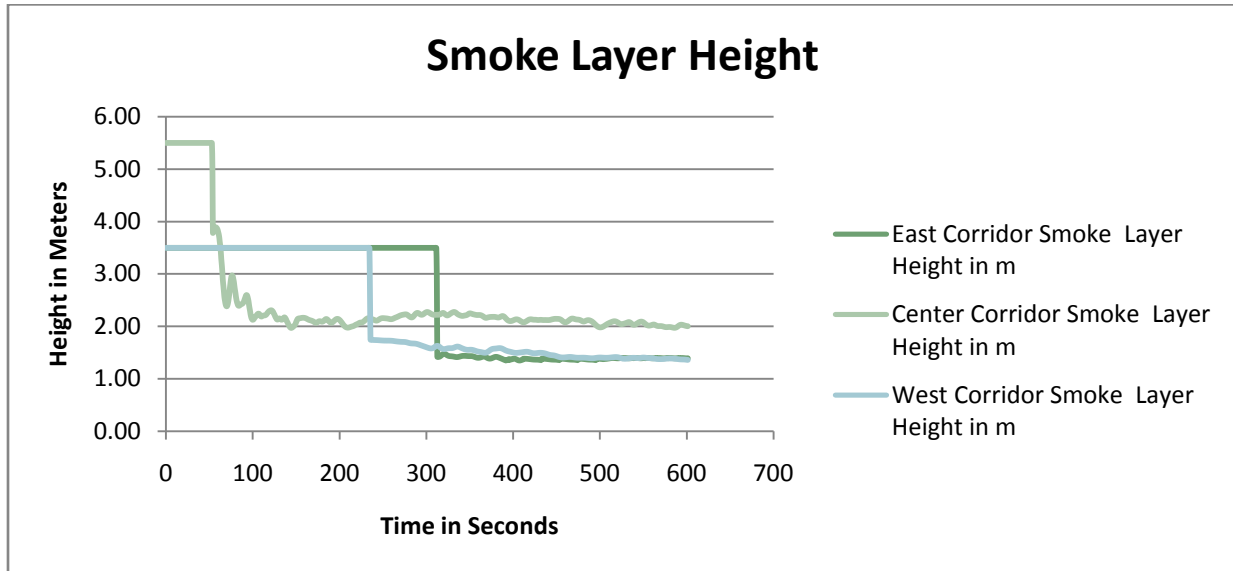


Figure 32 – FDS Design Fire 1 – Smoke Layer Height vs Time

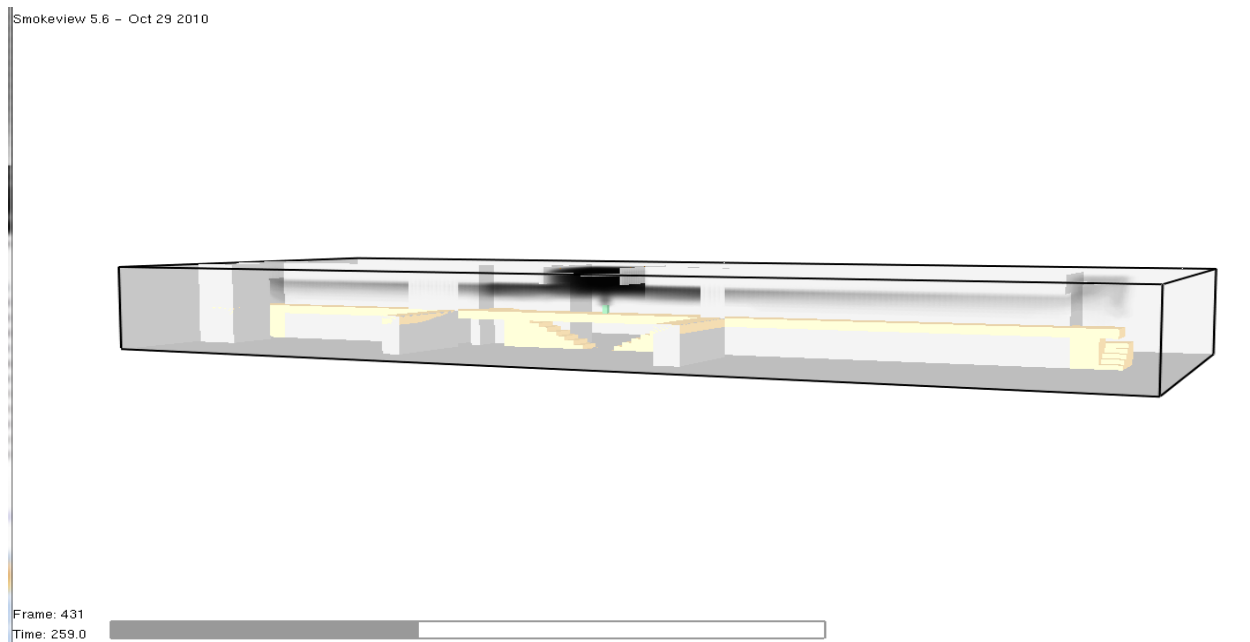


Figure 33 – FDS Design Fire 1 – Image Looking North at RSET

## Design Fire 1 Summary

This design fire scenario fails the performance criteria for the smoke layer height at a time of 236 seconds. The CO, temperature and visibility all pass the performance criteria at the RSET time of 259 s and remains below required levels to the end of the simulation at a time of 600 s.

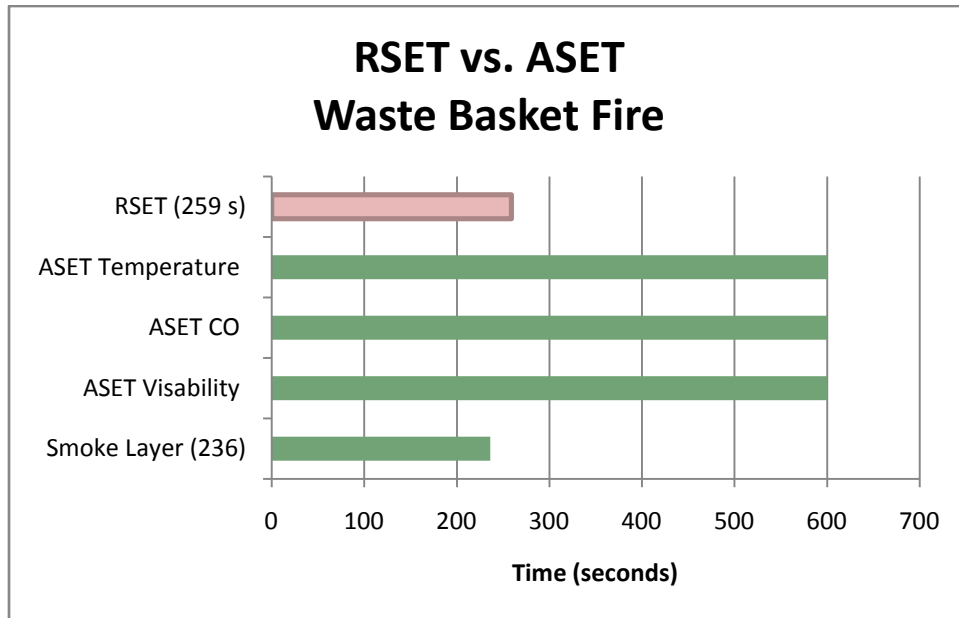
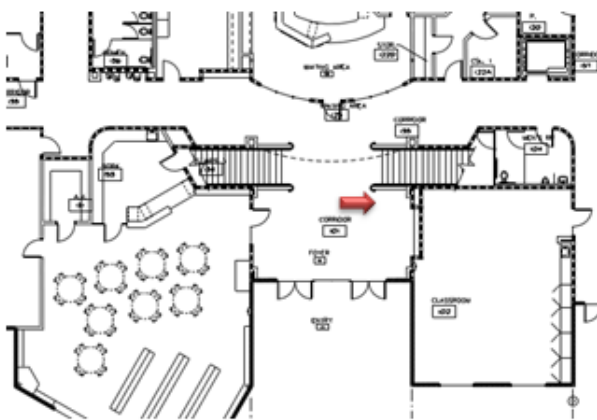
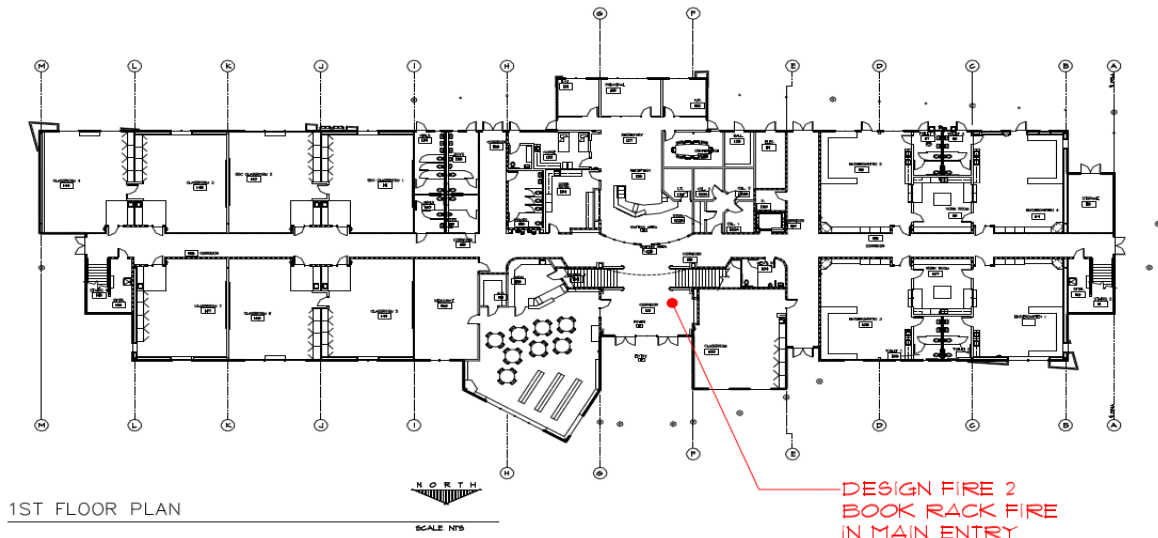


Figure 34 – FDS Design Fire 1 – RSET vs ASET Summary

## Design Fire 2

### Scenario Overview

This performance design scenario involves a fire in the main entry area of the building. Typically this area is free of flammable material but at certain time of the year there is material which could be fuel for a fire in this area. In this scenario during the two times a year that the school does a student book fair a magazine / book rack is on display in the entry area which is located directly outside of the library. For this scenario the magazine / book rack is set on fire and causes the two main entry doors and two main stairs to the entry to be unavailable for egress.



Location of  
Design Fire 2

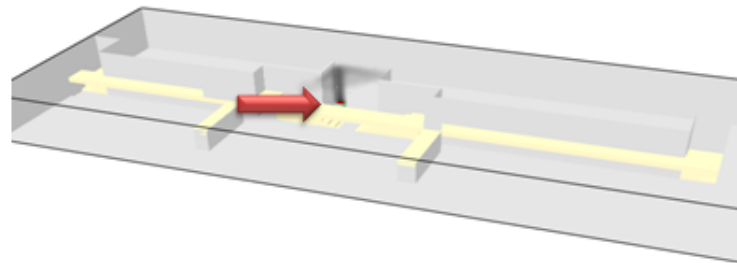


Figure 35 – Design Fire 2 Location

## **Fire Scenario Description**

This fire is similar to NFPA 101 Design Fire Scenario 2. NFPA 101 defines this fire scenario as follows:

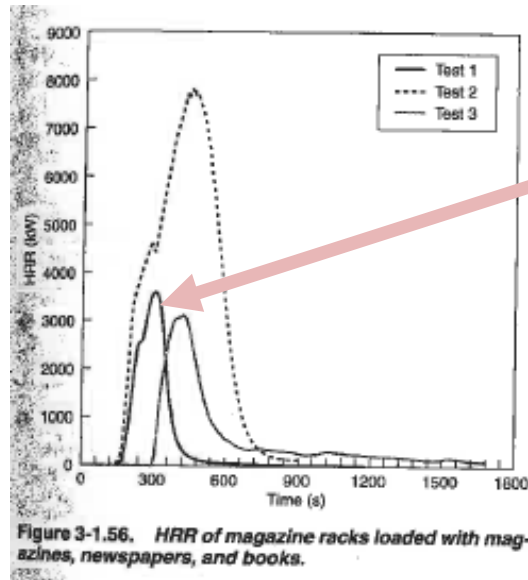
- (1) It is an ultrafast-developing fire, in the primary means of egress, with interior doors open at the start of the fire.
- (2) It addresses the concern regarding a reduction in the number of available means of egress.

The conditions for this design fire scenario are as follows:

- Foyer 101, open to second floor above and is the primary entry access to the building.
- Room serves as main access to the Media Lab / Library.
- A built in glass bookcase is on the West wall.
- Normally space is free of free standing display items.
- Fire Scenario Conditions
  - During the schools book fair a rolling magazine / book rack for display is located in the entry in front of the west wall built in glass bookcase.

The design fire used for this scenario is as follows:

- Design Fire Data for Magazine / Book Rack holding magazines, newspapers and books.
  - Based on SFPE data from Table 3-1.14 and Figure 3-1.56
    - Rack Size of 1 X 2.2 m
    - Mass of 15 kg
    - Ignition Source, 2 L of gasoline
    - Peak HRR of 3500 kw



Selected Design Fire Curve - 3600 kW

Figure 36 – Magazine Rack HRR from SFPE Figure 3-1.56

### Model Design Fire

For this design fire the develops very slowly at first and then at around 175 seconds ramps up very rapidly at a rate greater than an ultra fast fire ( growth to 1055 kW in 75 seconds). For this fire scenario there were two smoke detectors located in the ceiling space of the room, the first activated at a time of 178 seconds after the start of the fire. The room also has six fire sprinklers of which the first fire sprinkler is activated at 230 s. At this time the fire becomes a fire sprinkler controlled fire and the fire growth rate levels off at around 2500 kW and remains steady at this HRR for the duration of the scenario as the fuel available is able to sustain this HRR for the duration of the scenario. This fire model was developed by doing an initial model run with the fire growing till the first sprinkler activated. The model fire growth was then capped at the time the sprinkler discharge began to cover the fire and the model was re-run with the capped HRR. The HRR is shown below.



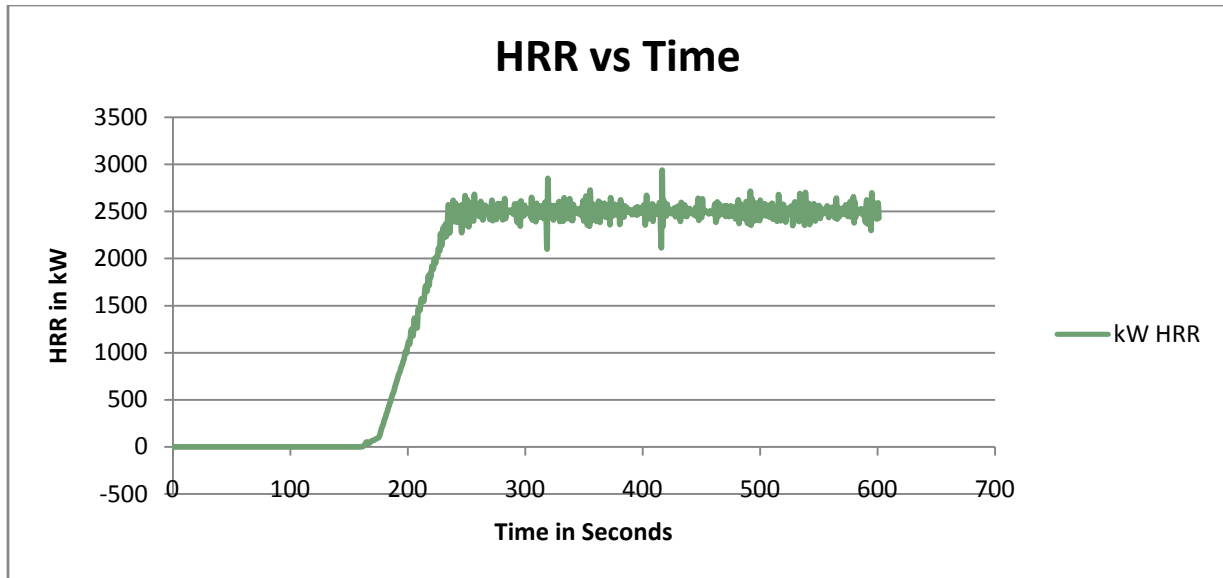


Figure 37 – Design Fire 2 HRR Curve

**Smoke Detector and Fire Sprinkler Activation**

For this fire the first smoke detector is activated at 230 s.

The first fire sprinkler is activated at 230 s.

**DEVICE Activation Times**

7	SPR1	479.5 s
8	SPR2	229.6 s
9	SPR3	284.6 s
10	SPR4	243.1 s
11	SPR5	No Activation
12	SPR6	308.8 s
13	SPR7	No Activation
14	SPR8	323.3 s
15	SD1	177.9 s
16	SD2	186.2 s

Figure 38 – FDS Output of Device Activation

## Design Fire 2 RSET

For design fire 2 the RSET is 560 s or 9.33 min based on the following:

Detection Time	20 s	time of first smoke detector activation from FDS model run
Notification Time	5 s	time delay for smoke detector activation to signal
Pre-Movement Time	30 s	assumed time based on occupancy use
Movement Time	347 s	time from hand calculations with all stairs and doors used
RSET	560 s	total required time for safe evacuation

## Design Fire 2 ASET Times

For Design Fire 1 the ASET times for the various performance criteria are as follows:

The carbon monoxide level at 2 m above the second floor walking surface at the RSET time of 560 s is well below the 1,400 ppm tenability requirement. Criteria passes for RSET.

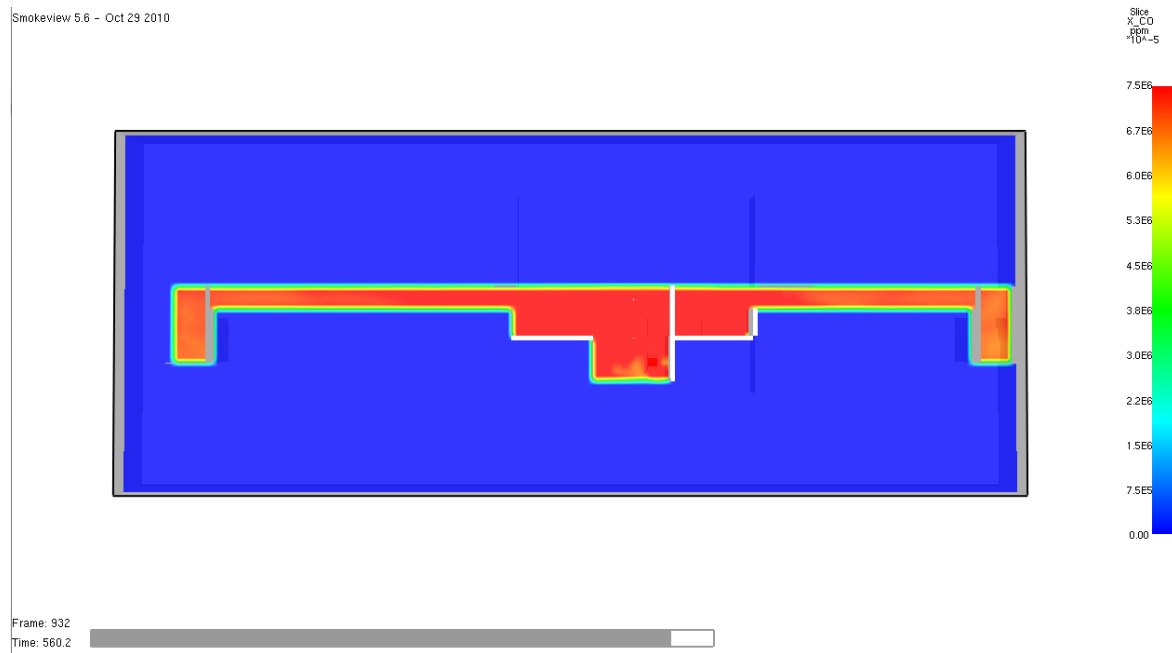


Figure 39 – FDS Design Fire 2 - CO at 560 s RSET

The carbon monoxide level at 2 m above the second floor walking surface at the end of the simulation run (600 s) is well below the 1,400 ppm tenability requirement.

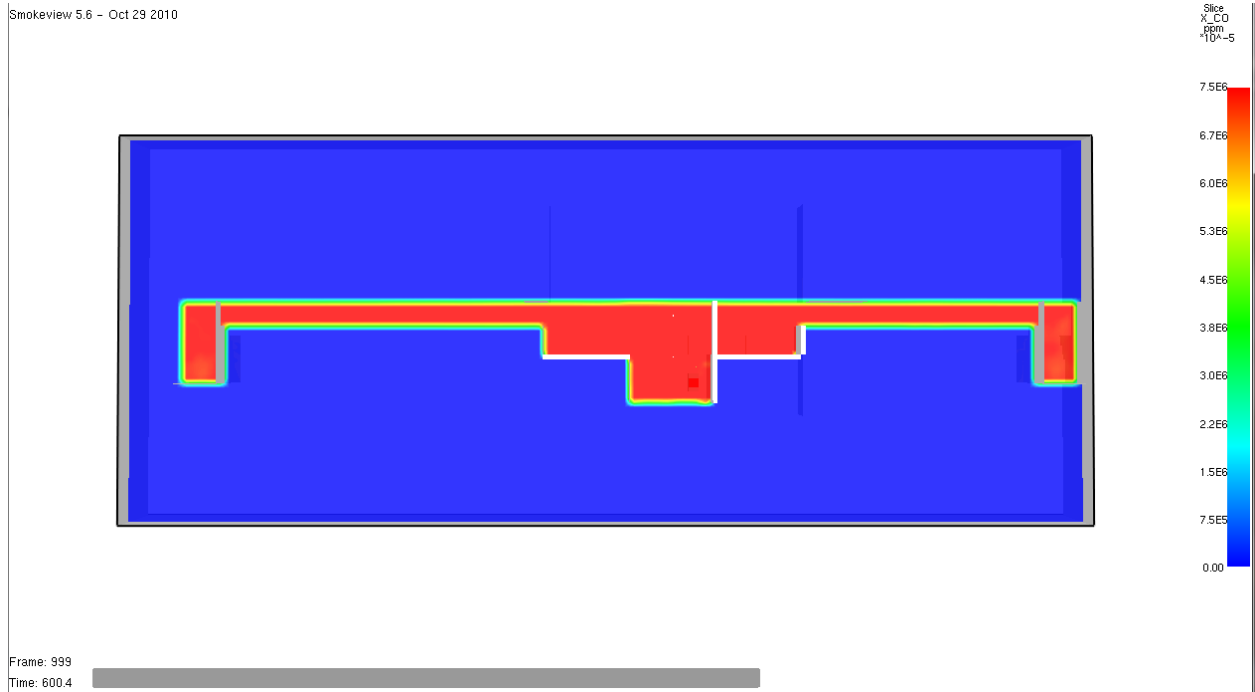


Figure 40 – FDS Design Fire 2 - CO at 600 s

The maximum temperature at 2 m above the second floor walking surface at all area is under the 60 degree C criteria. Criteria passes.

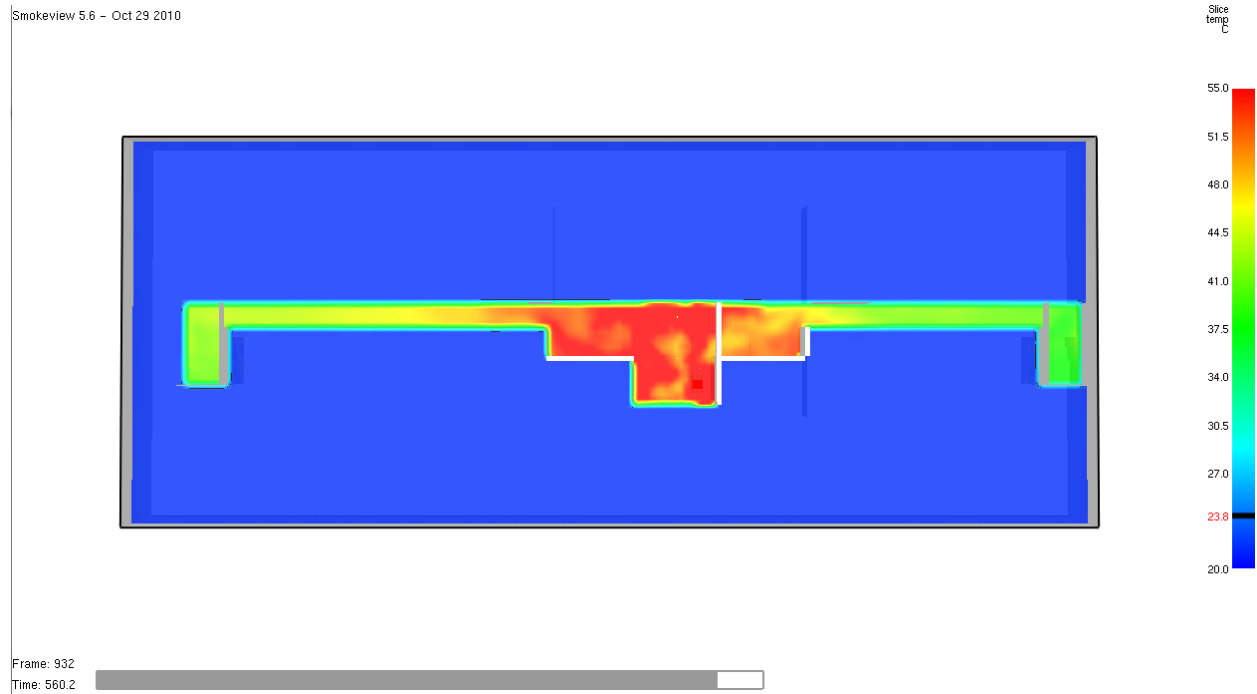


Figure 41 – FDS Design Fire 2 - Temperature at 560 s RSET

The maximum temperature at 2 m above the second floor walking surface at the end of the simulation run (600 s) is still below the 60 degree C criteria.

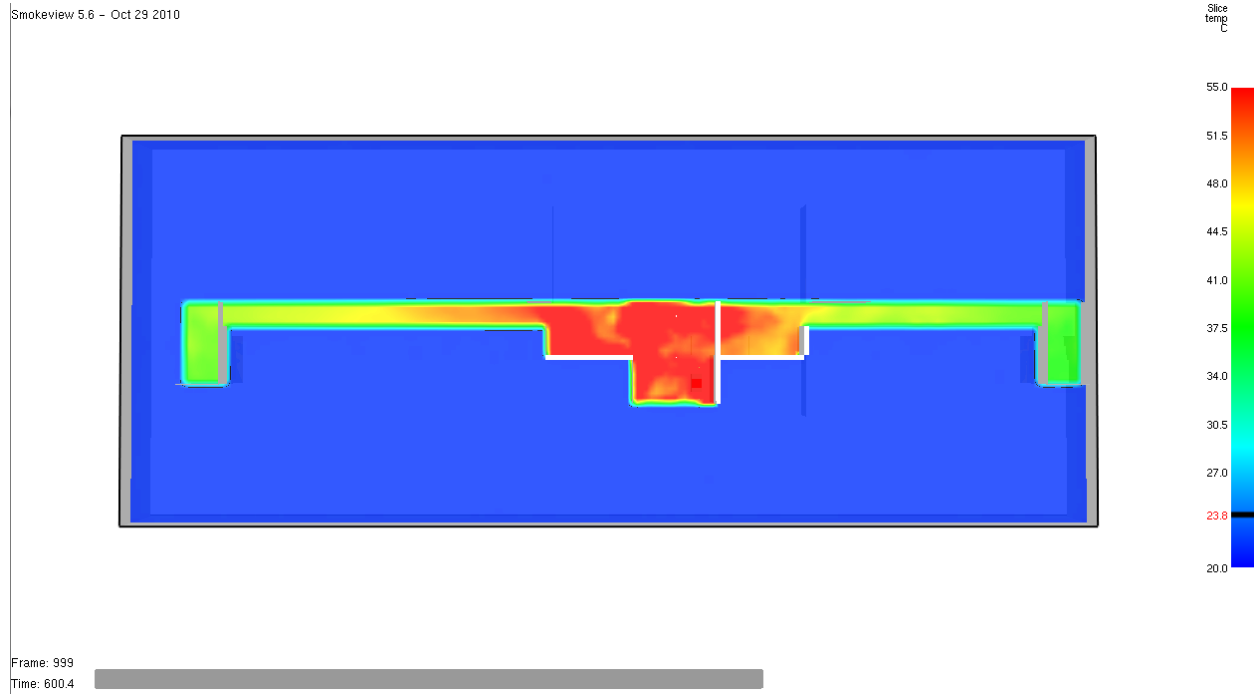


Figure 42 – FDS Design Fire 2 - Temperature at 600 s

The minimum visibility at 2 m above the second floor walking surface drops below the 10 m criteria at around 235 s. Criteria fails for RSET.

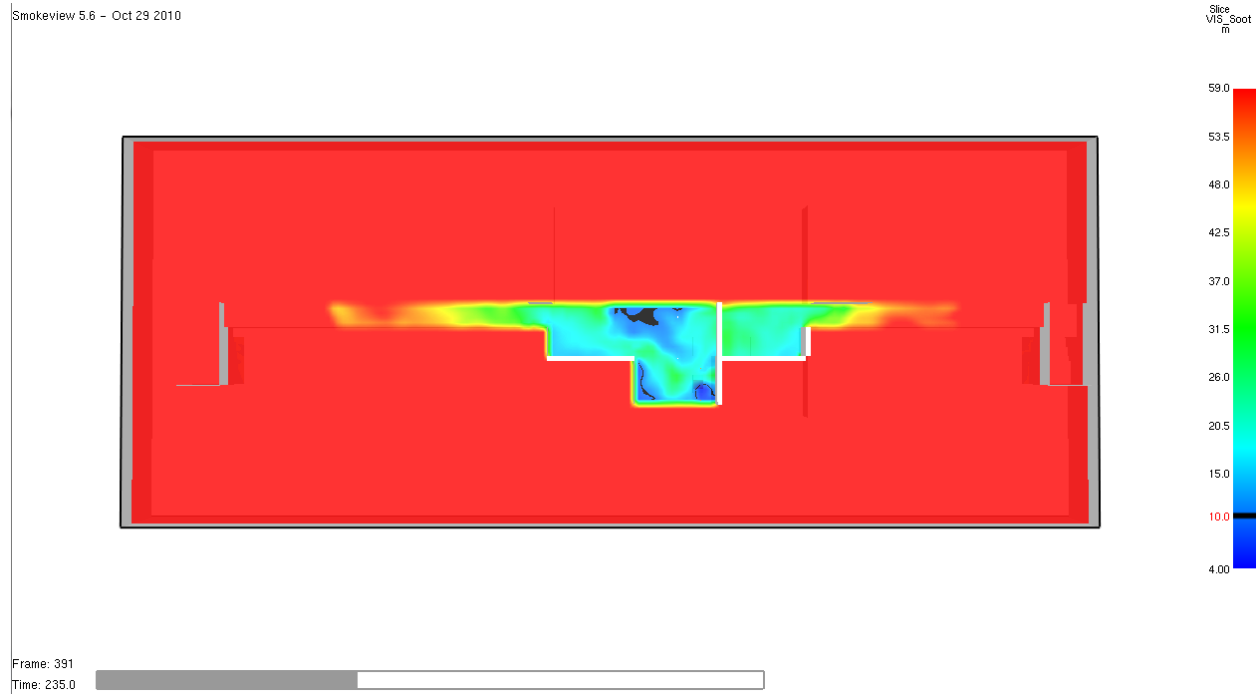


Figure 43 – FDS Design Fire 2 - Visibility at 235 s as it drops below criteria.

The minimum visibility at 2 m above the second floor walking surface at the end of the simulation run (600 s) is well below the 10 m criteria in a large portion of the second floor corridor.

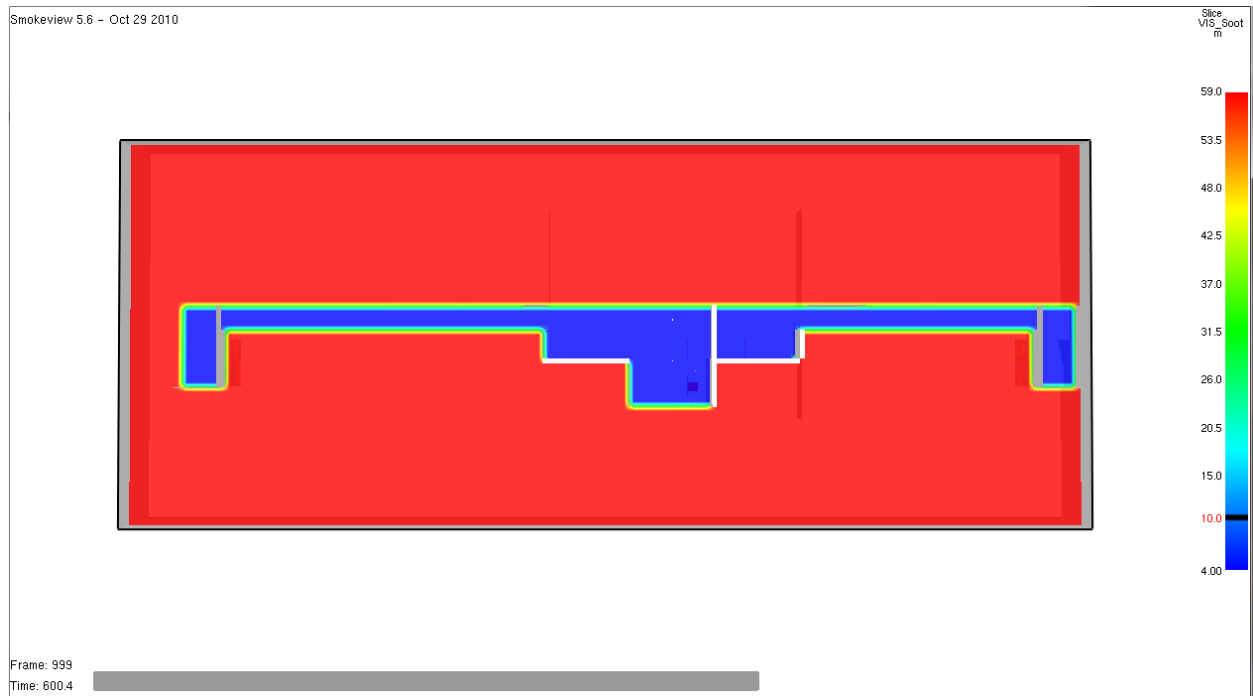


Figure 44 – FDS Design Fire 2 - Visibility at 600 s

The smoke layer drops below the 2 m requirement at 210 s as shown in the graph below. This criteria fails for RSET. (Note: Smoke layer height is taken at a single point in the middle of each corridor which results in a sharp drop in the smoke layer height as the smoke layer moves down the corridor and hits the measuring point).

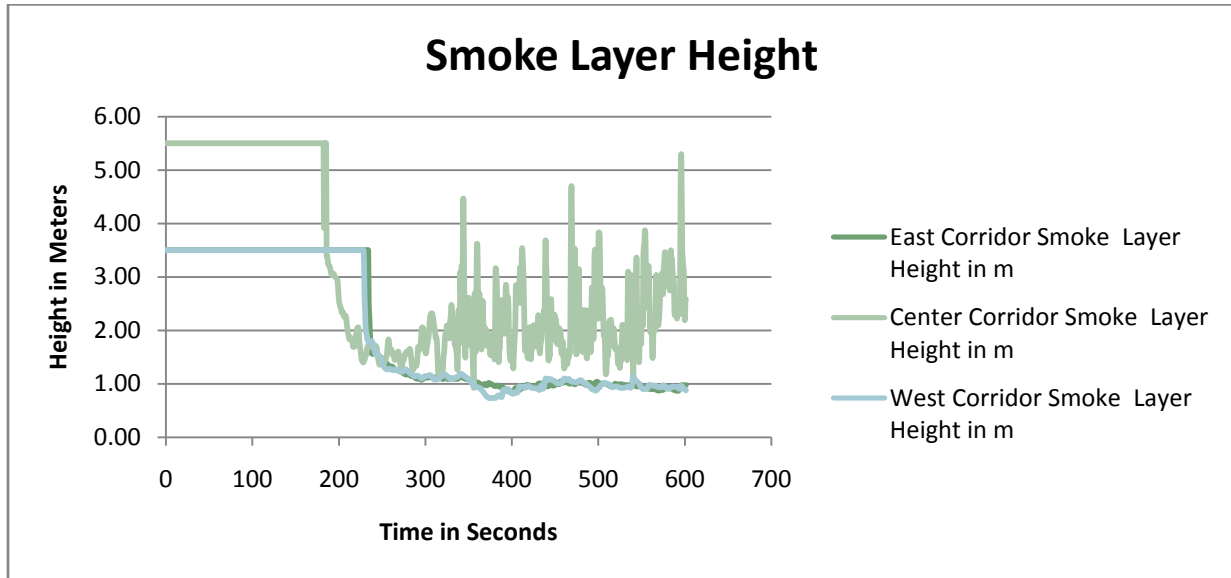


Figure 45 – FDS Design Fire 2 – Smoke Layer Height vs Time

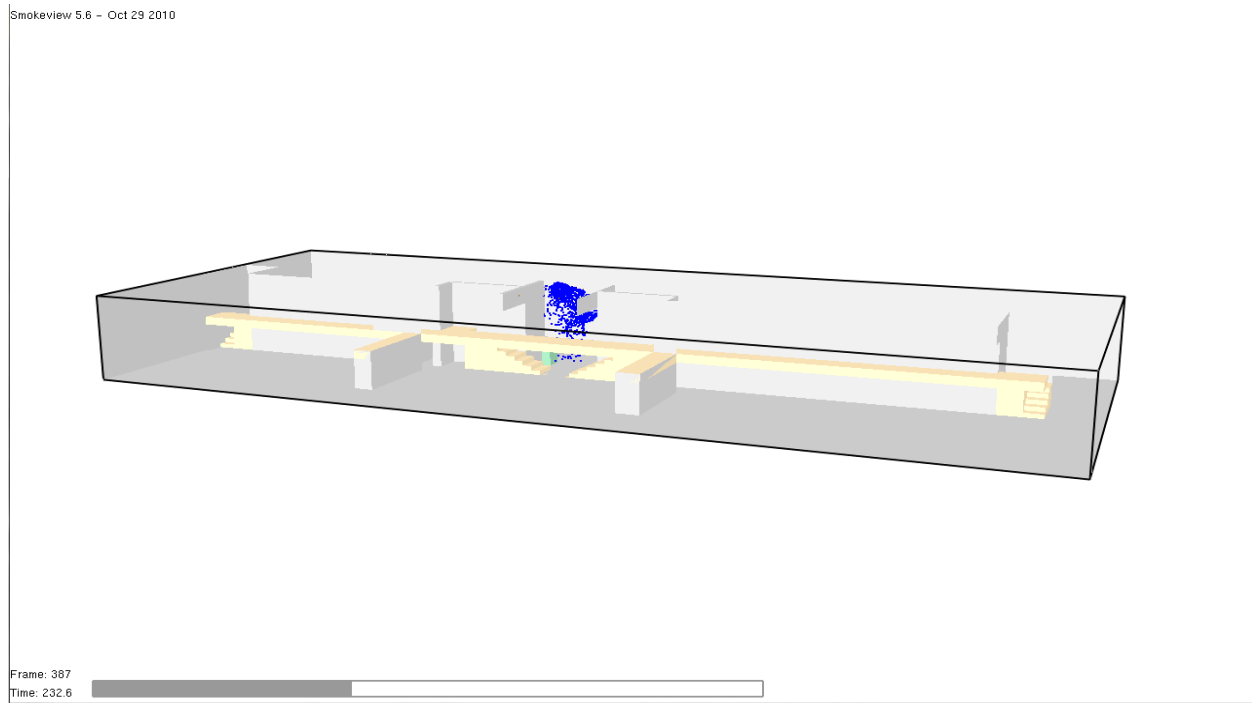


Figure 46 – FDS Design Fire 2 – Image Looking North at Sprinkler Activation



## Design Fire 2 Summary

This design fire scenario fails the performance criteria for the smoke layer height at a time of 210 seconds and fails the visibility criteria at 235 seconds both well below the RSET time of 560 seconds. The CO and temperature performance criteria pass at the RSET time of 560 s and remains below required levels to the end of the simulation at a time of 600 s.

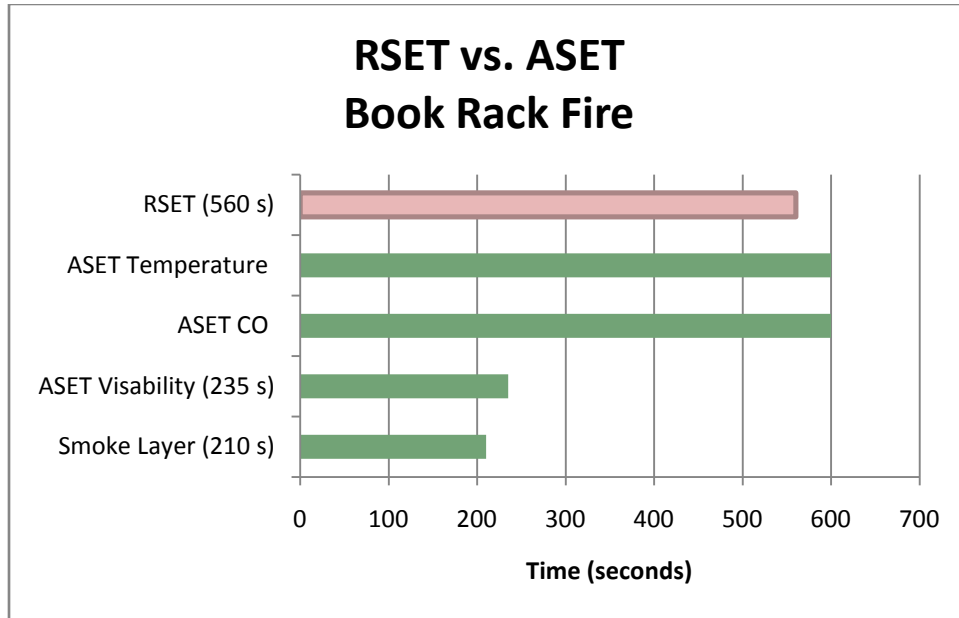
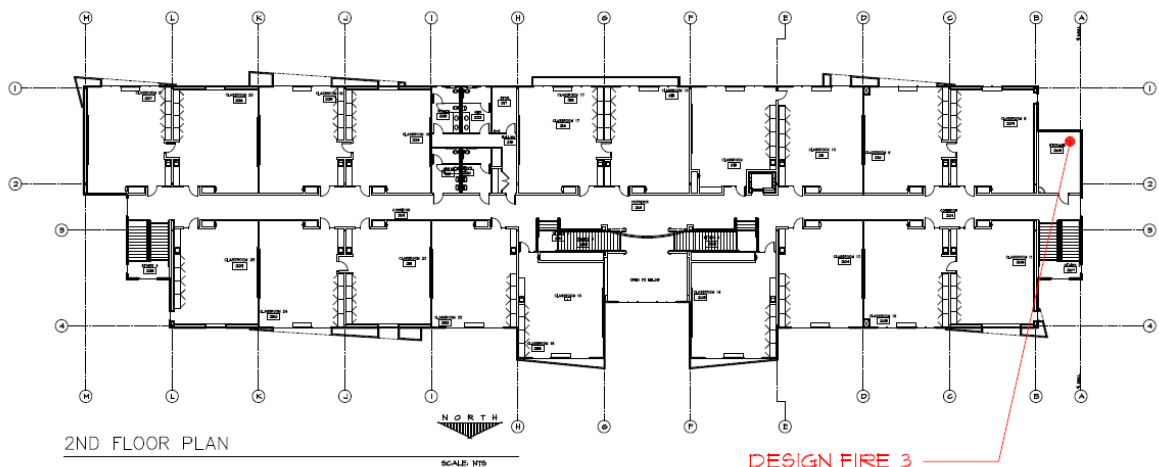


Figure 47 – FDS Design Fire 2 – RSET vs ASET Summary

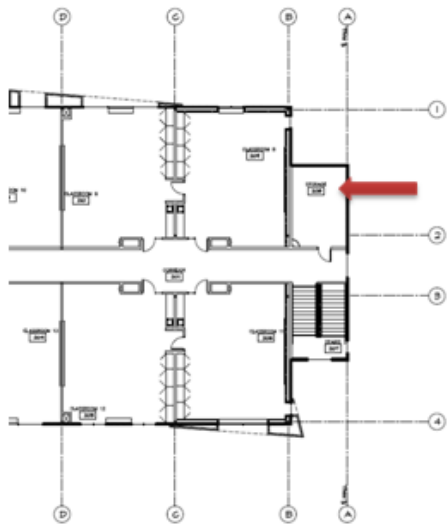
## Design Fire 3

### Scenario Overview

This performance design scenario involves a fire in the second floor storage room located at the West side stairs. This room is used as a both a janitorial room and a storage room. In this scenario stack of polystyrene foam boards used by teachers is stored in the back of the room and is ignited by an electric heater being used by the janitor at his desk which is located in the room. The door to this room is propped open in this scenario as the janitor is coming and going from the room as he works.



DESIGN FIRE 3  
 STORAGE FIRE  
 IN SECOND FLOOR STORAGE ROOM



Location of  
 Design Fire 3

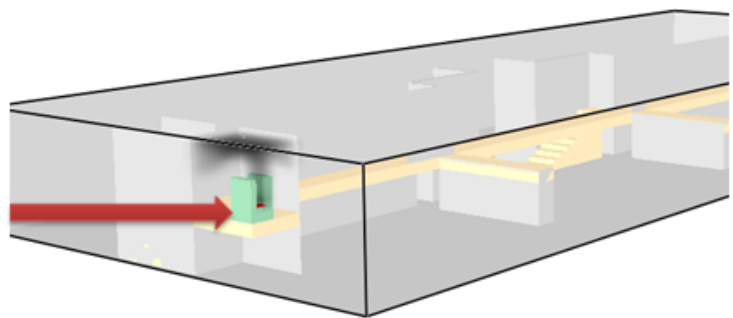


Figure 48 – Design Fire 3 Location

## Fire Scenario Description

This fire is similar to NFPA 101 Design Fire Scenario 2. NFPA 101 defines this fire scenario as follows:

- (1) It is an ultrafast-developing fire, in the primary means of egress, with interior doors open at the start of the fire.
- (2) It addresses the concern regarding a reduction in the number of available means of egress.

The conditions for this design fire scenario are as follows:

- One of the three primary egress paths for the second floor is located just outside of the room.
- The space is used for storage of various materials.
- The space is the main janitorial room and has a desk for the janitor to house paper work.

The design fire used for this scenario is as follows:

- Design Fire Data is based on storage room fire data from SFPE.
  - Based on SFPE data from Figure 3-1.15
    - Metal storage units, aisle with fuel
    - Peak HRR of 1580 kw

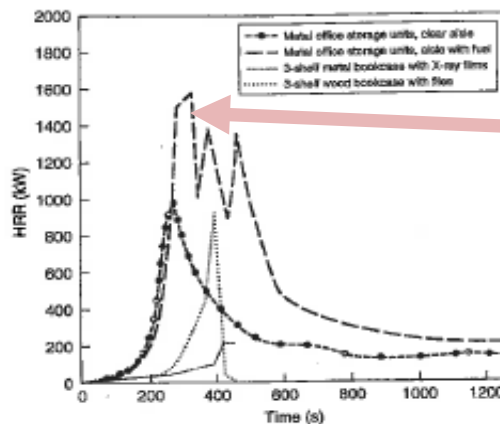


Figure 3-1.15. HRR of storage units.

Selected Design Fire Curve - 1580 kW

Figure 49 – Storage Unit HRR from SFPE Figure 3-1.15

### **Model Design Fire**

For this design fire the develops very slowly at first and then at around 150 seconds ramps up very rapidly at a rate similar to an ultra fast fire ( growth to 1055 kW in 75 seconds). For this fire scenario there is one smoke detector located in the ceiling space of the room which activates at a time of 162 seconds after the start of the fire. The room also has four fire sprinklers of which the first fire sprinkler is activated at 202 s. At this time the fire becomes a fire sprinkler controlled fire and the fire growth rate levels off at around 1050 kW and remains steady at this HRR for the duration of the scenario as the fuel available is able to sustain this HRR for the duration of the scenario. This fire model was developed by doing an initial model run with the fire growing till the first sprinkler activated. The model fire growth was then capped at the time the sprinkler discharge began to cover the fire and the model was re-run with the capped HRR. The HRR is shown below.

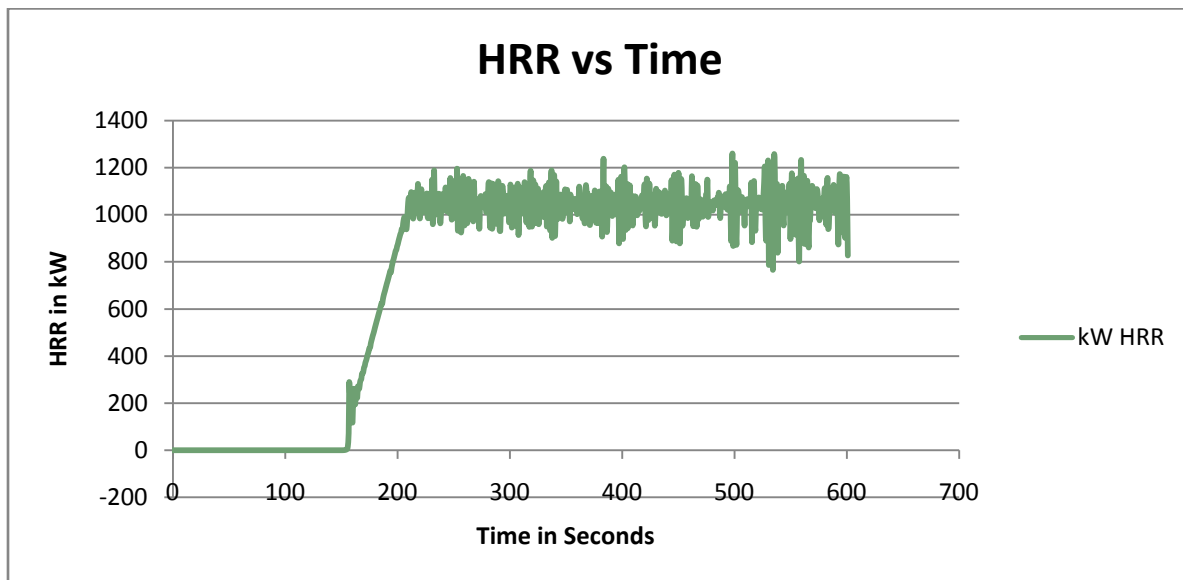


Figure 50 – Design Fire 3 HRR Curve

### **Smoke Detector and Fire Sprinkler Activation**

For this fire the first smoke detector is activated at 162 s.

The first fire sprinkler is activated at 202 s.

DEVICE Activation Times

10	SPR1	266.0 s
11	SPR2	211.7 s
12	SPR3	205.2 s
13	SPR4	201.2 s
14	SPR5	No Activation
15	SD1	161.8 s

---

Figure 51 – FDS Output of Device Activation

**Design Fire 3 RSET**

For design fire 3 the RSET is 453 s or 7.55 min based on the following:

Detection Time	20 s	time of first smoke detector activation from FDS model run
Notification Time	5 s	time delay for smoke detector activation to signal
Pre-Movement Time	30 s	assumed time based on occupancy use
Movement Time	256 s	time from hand calculations with all stairs and doors used
RSET	453 s	total required time for safe evacuation

### Design Fire 3 ASET Times

For Design Fire 3 the ASET times for the various performance criteria are as follows:

The carbon monoxide level at 2 m above the second floor walking surface at the RSET time of 453 s is well below the 1,400 ppm tenability requirement. Criteria passes for RSET.

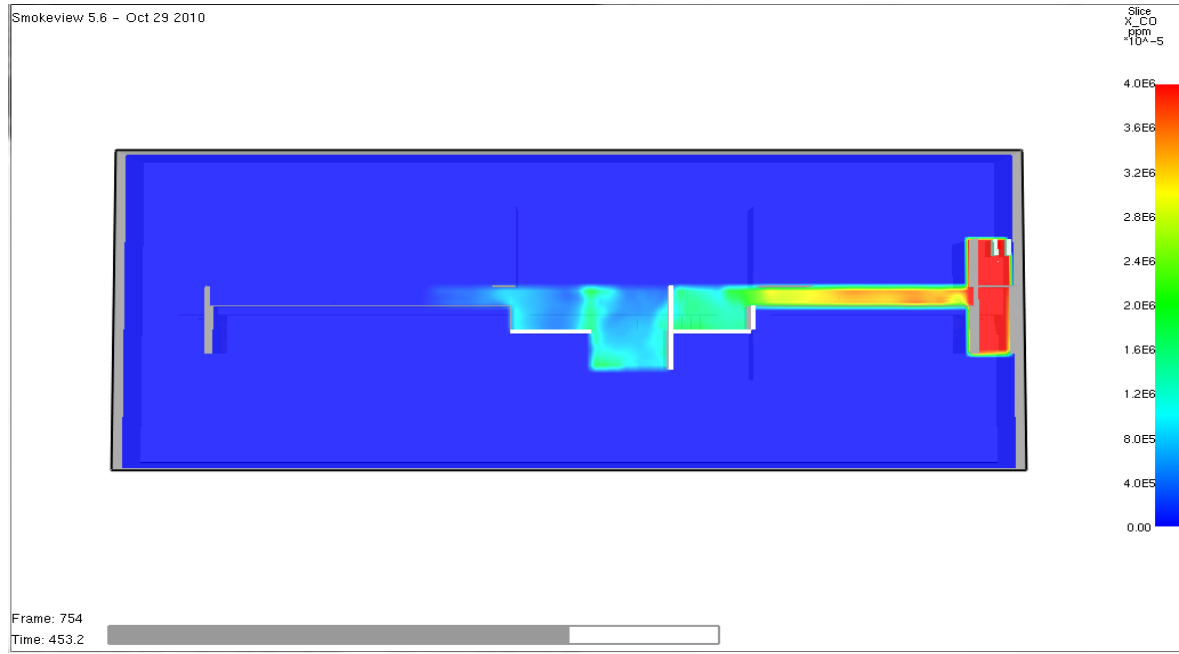


Figure 52 – FDS Design Fire 3 - CO at 453 s RSET

The carbon monoxide level at 2 m above the second floor walking surface at the end of the simulation run (600 s) is well below the 1,400 ppm tenability requirement.

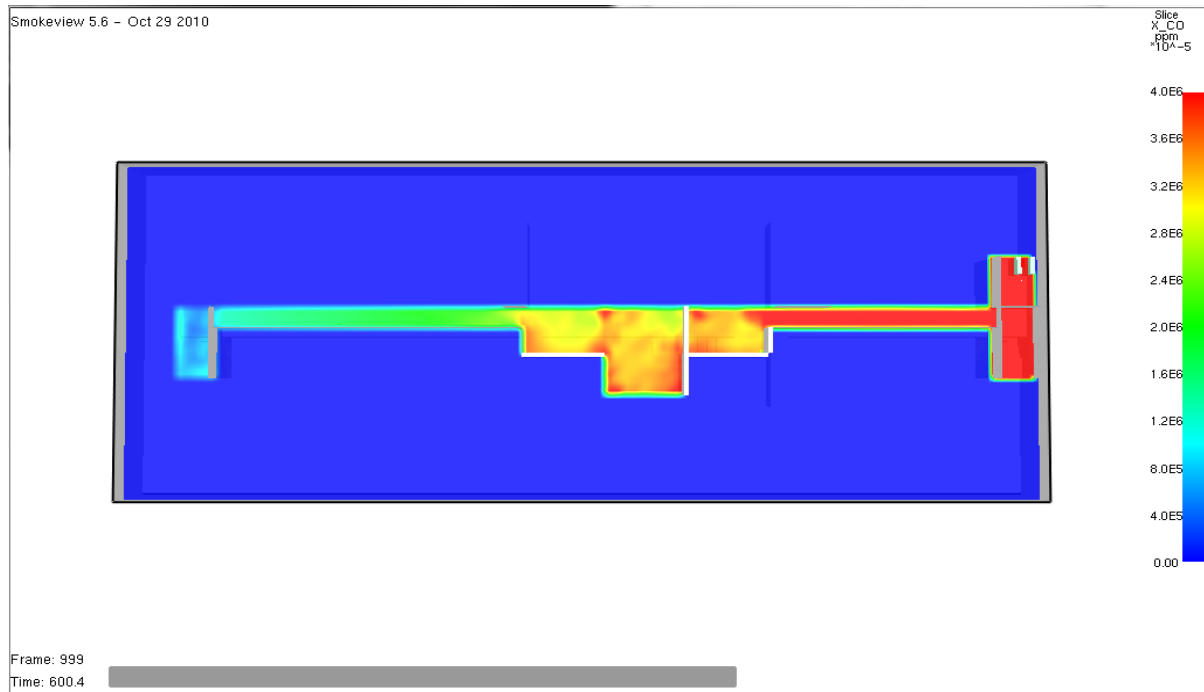


Figure 53 – FDS Design Fire 3 - CO at 600 s

The maximum temperature at 2 m above the second floor walking surface at all area is under the 60 degree C criteria. Criteria passes.

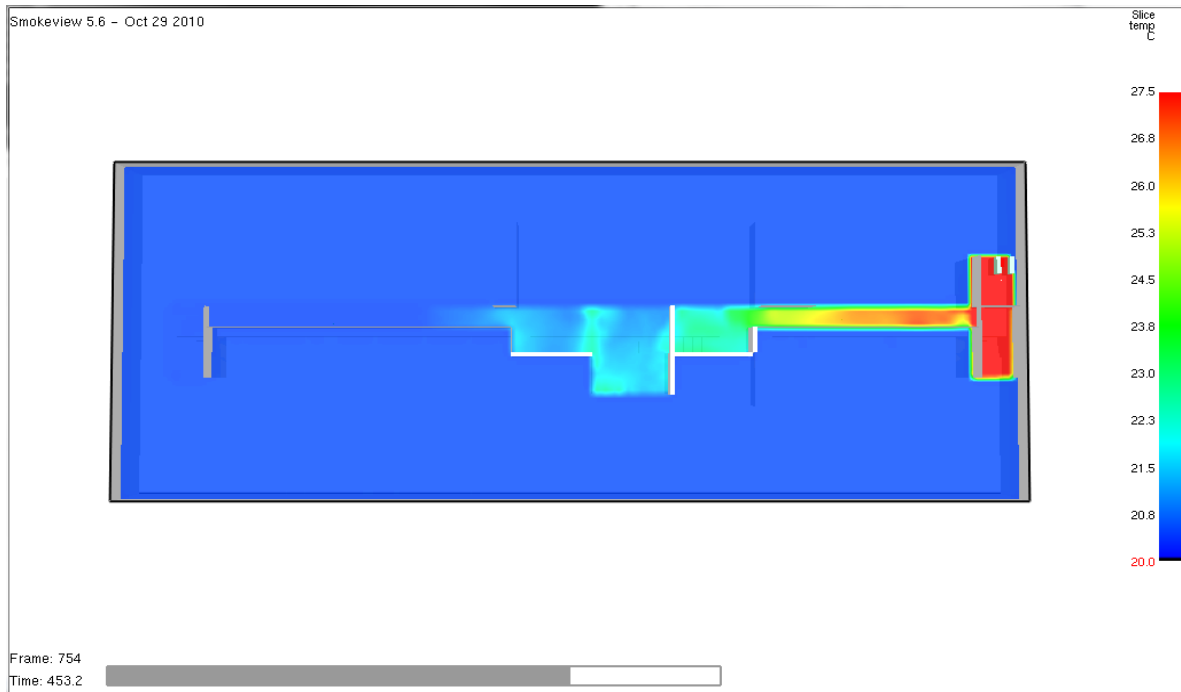


Figure 54 – FDS Design Fire 3 - Temperature at 453 s RSET



The maximum temperature at 2 m above the second floor walking surface at the end of the simulation run (600 s) is still below the 60 degree C criteria.

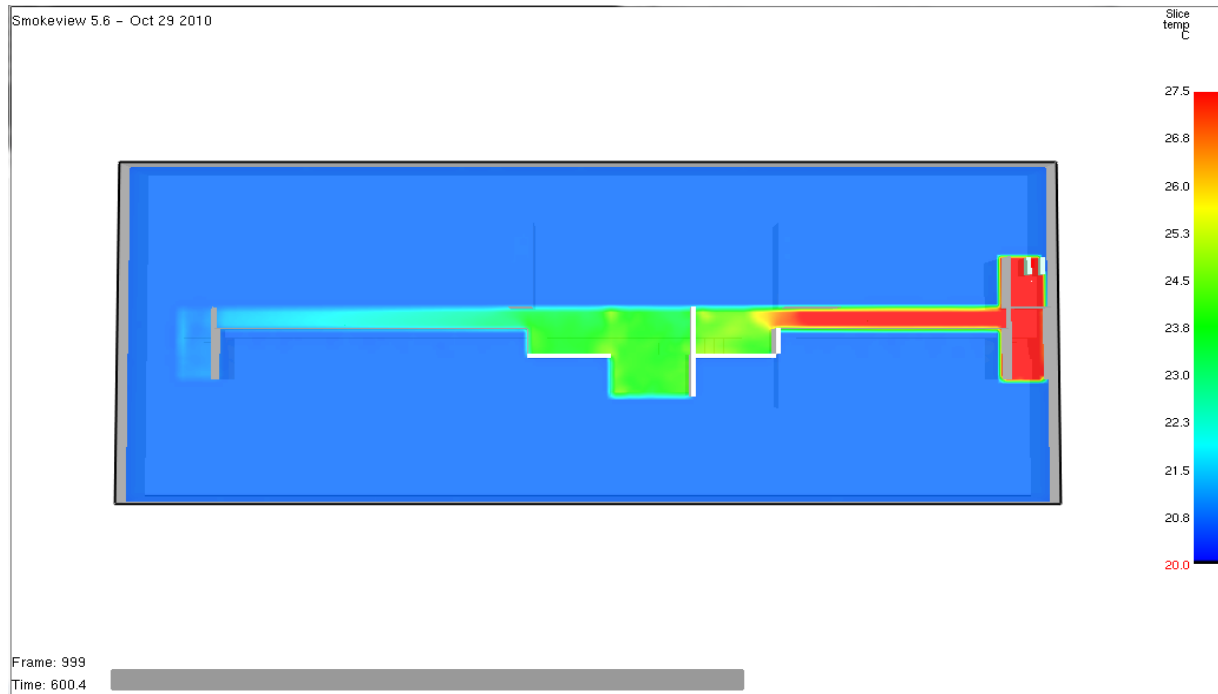


Figure 55 – FDS Design Fire 3 - Temperature at 600 s

The minimum visibility at 2 m above the second floor walking surface drops below the 10 m criteria at around 415 s. Criteria fails for RSET.

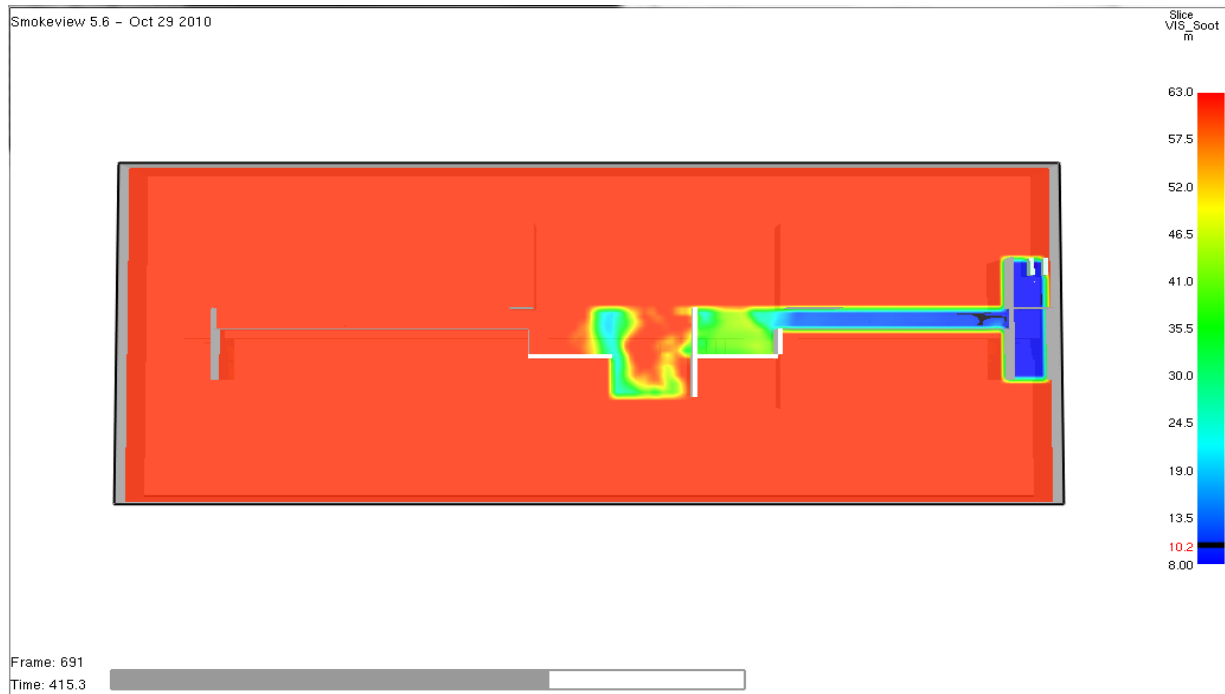


Figure 56 – FDS Design Fire 3 - Visibility at 415 s as it drops below criteria.

The minimum visibility at 2 m above the second floor walking surface at the end of the simulation run (600 s) is well below the 10 m criteria in a large portion of the second floor corridor.

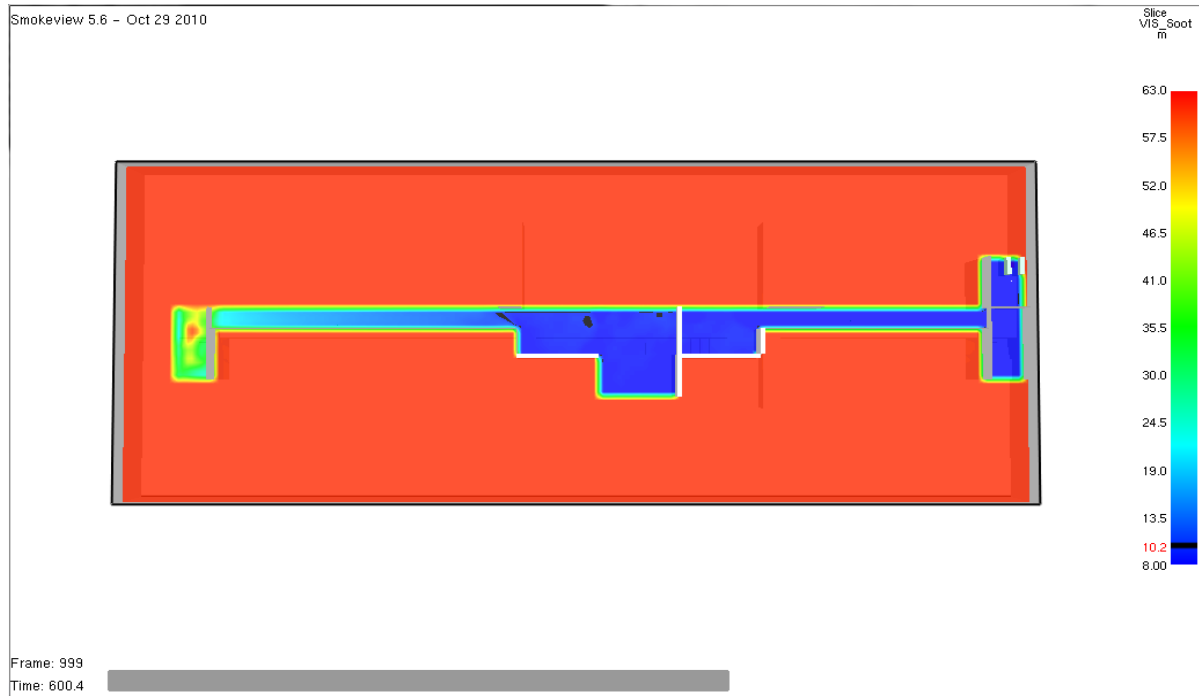


Figure 57 – FDS Design Fire 3 - Visibility at 600 s

The smoke layer drops below the 2 m requirement at 358 s as shown in the graph below. This criteria fails for RSET. (Note: Smoke layer height is taken at a single point in the middle of each corridor which results in a sharp drop in the smoke layer height as the smoke layer moves down the corridor and hits the measuring point).

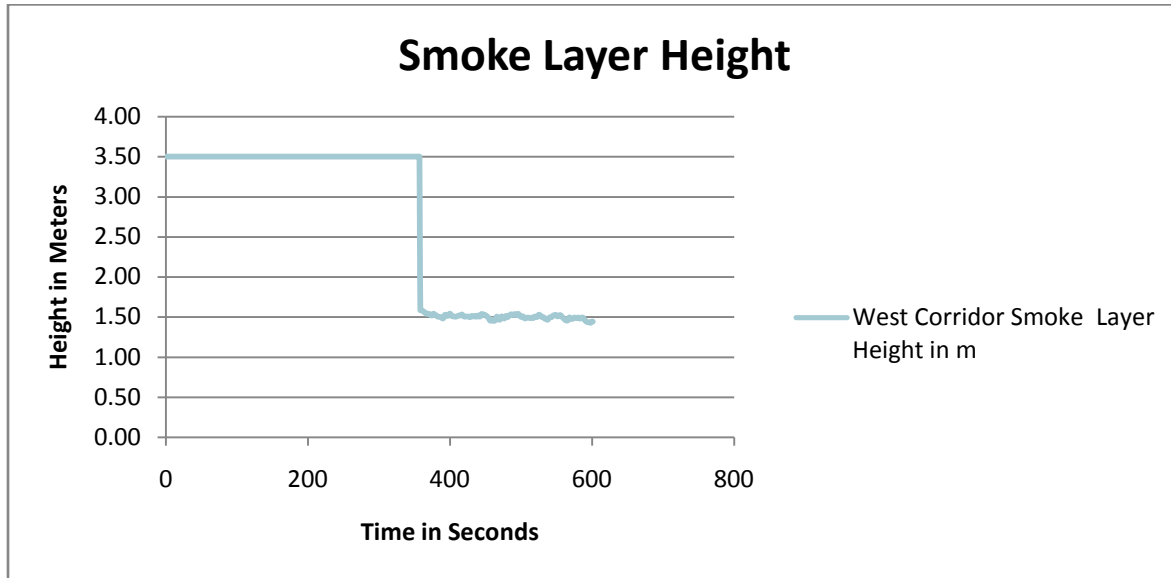


Figure 58 – FDS Design Fire 3 – Smoke Layer Height vs Time

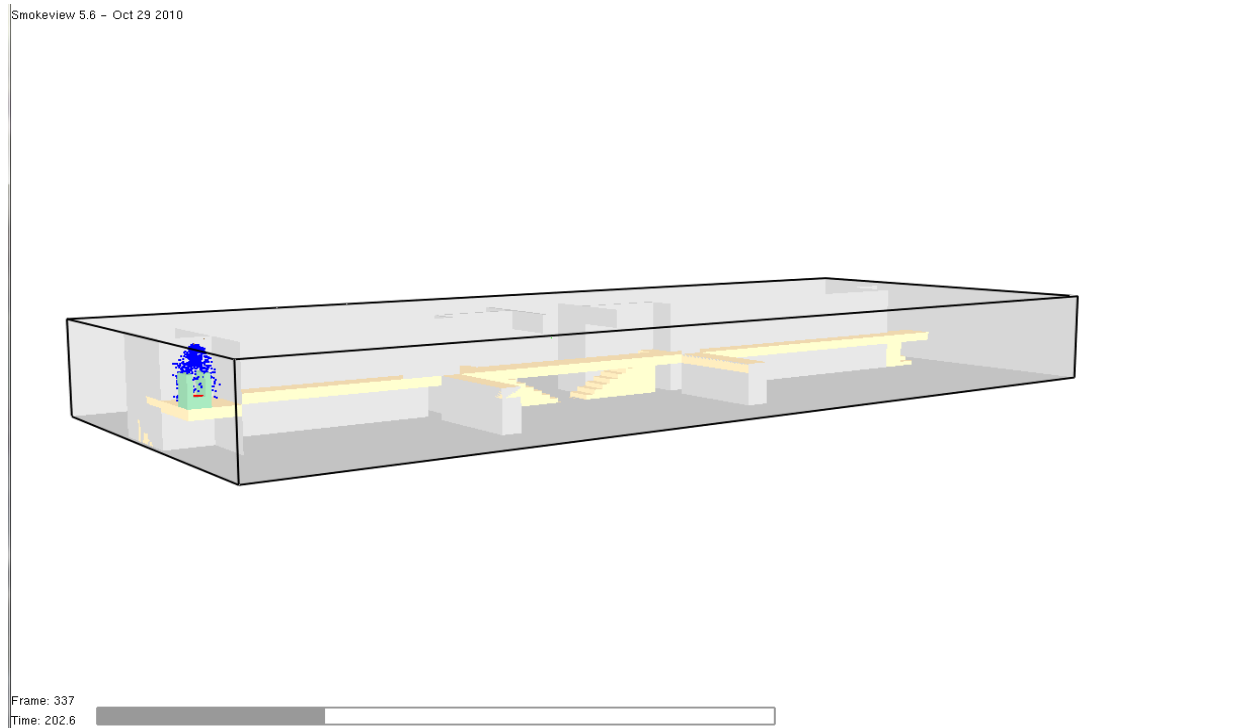


Figure 59 – FDS Design Fire 3 Looking North at Sprinkler Activation

### Design Fire 3 Summary

This design fire scenario fails the performance criteria for the smoke layer height at a time of 210 seconds and fails the visibility criteria at 235 seconds both well below the RSET time of 560 seconds. The CO and temperature performance criteria pass at the RSET time of 560 s and remain below required levels to the end of the simulation at a time of 600 s. The temperature of the room never approached flashover temperature of 500 C.

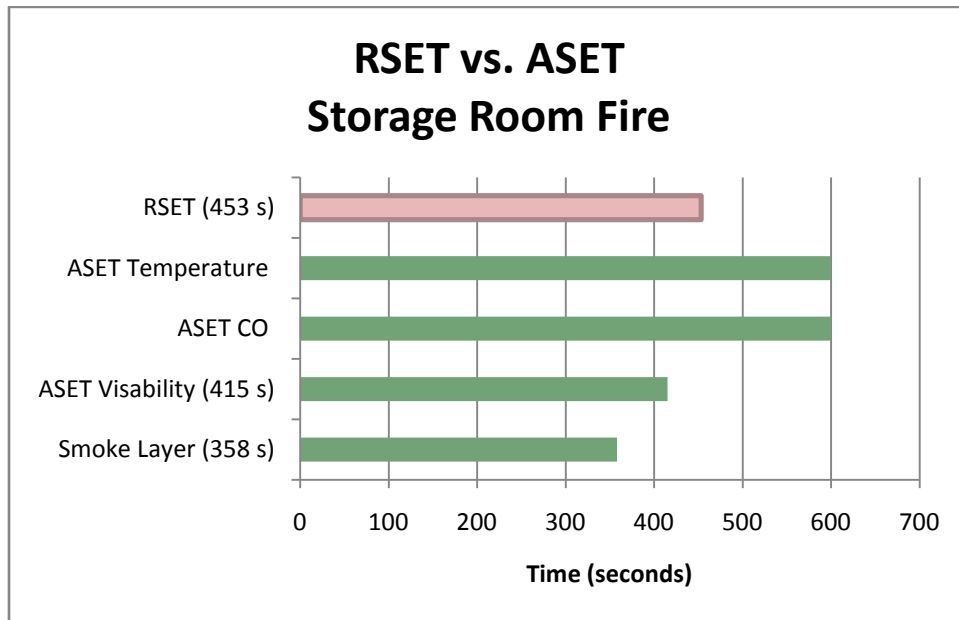


Figure 60 – FDS Design Fire 3 – RSET vs ASET Summary

## Fire and Life Safety Analysis Recommendations

The project building was constructed to and complies with the prescriptive requirements of the applicable codes at its time of design and plan approval. Review of the modeled design fires show that a fire directly in the main egress corridors or in rooms open to the corridors could potentially cause untenable conditions to occur in fire situations. The egress system is a combination of entry way area, corridors and open connected stair ways with the first and second floor egress being open to each other. Due to this design there is a high potential for the spread of smoke through the building in a fire scenario. The open egress areas should be left clear of any fuel sources during all times of the year to minimize any potential fires. Additionally it is also noted that the corridors on the second floor have dropped ceilings with the fire rated walls extending above them acting as a fire rated tunnel when they connect to the fire rated tunnel ceiling above the drop ceiling. These corridors are much lower than the main two story entry area of the building which is raised up to the bottom of the roof. If the drop ceiling was raised 2 to 3 feet this would provide an additional storage area for smoke in a fire event and extend the time before the smoke layer dropped to occupied spaces thus increasing the ASET. Refer to the Figure 61 below for section showing drop ceiling and rated tunnel above.

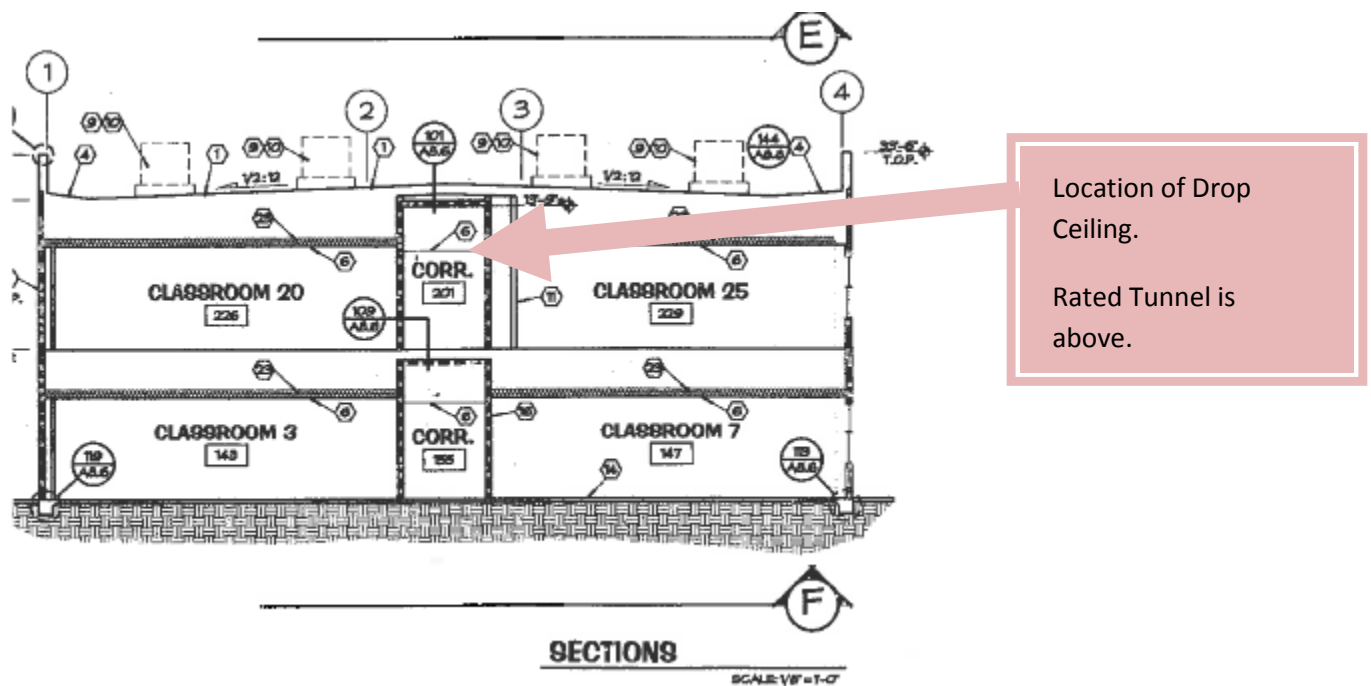


Figure 61 – Typical Section at Corridor

## References

- [1] "Tenability In Building Fires: Limits and Design Criteria" by Dr. Weng Poh
- [2] "Handbook of Smoke Control Engineering" by ASHRAE
- [3] "Fire Safety Engineering Concerning Evacuation from Buildings" CFP A Europe - European Guideline CFP A-E No 19:2009
- [4] "Toxicity Assessment of Combustion Products" by D. Purser from the SFPE Third Edition.

## Code and Standard References Used

The SFPE Handbook of Fire Protection Engineering, Fourth Edition

NFPA Fire Protection Handbook, 20<sup>th</sup> Edition

NFPA Life Safety Code 101, 2010

NFPA 13 Installation of Sprinkler Systems, 2002

NFPA 14 Standard for the Installation of Standpipe and Hose Systems, 2002

NFPA 72 Fire Alarm and Signaling Code, 2002

2007 California Building Code (Part2 Title 24), UBC with CA Amendments

2007 California Electrical Code (Part2 Title 24), NEC with CA Amendments

2007 California Mechanical Code (Part2 Title 24), UMC with CA Amendments

2007 California Fire Code (Part2 Title 24), UFC with CA Amendments

**APPENDIX A: EXIT PLANS**



# CAL POLY FPE PROJECT

PROJECT:

## FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

PROJECT DEVELOPMENT

DATE	ISSUED FOR

REVISIONS

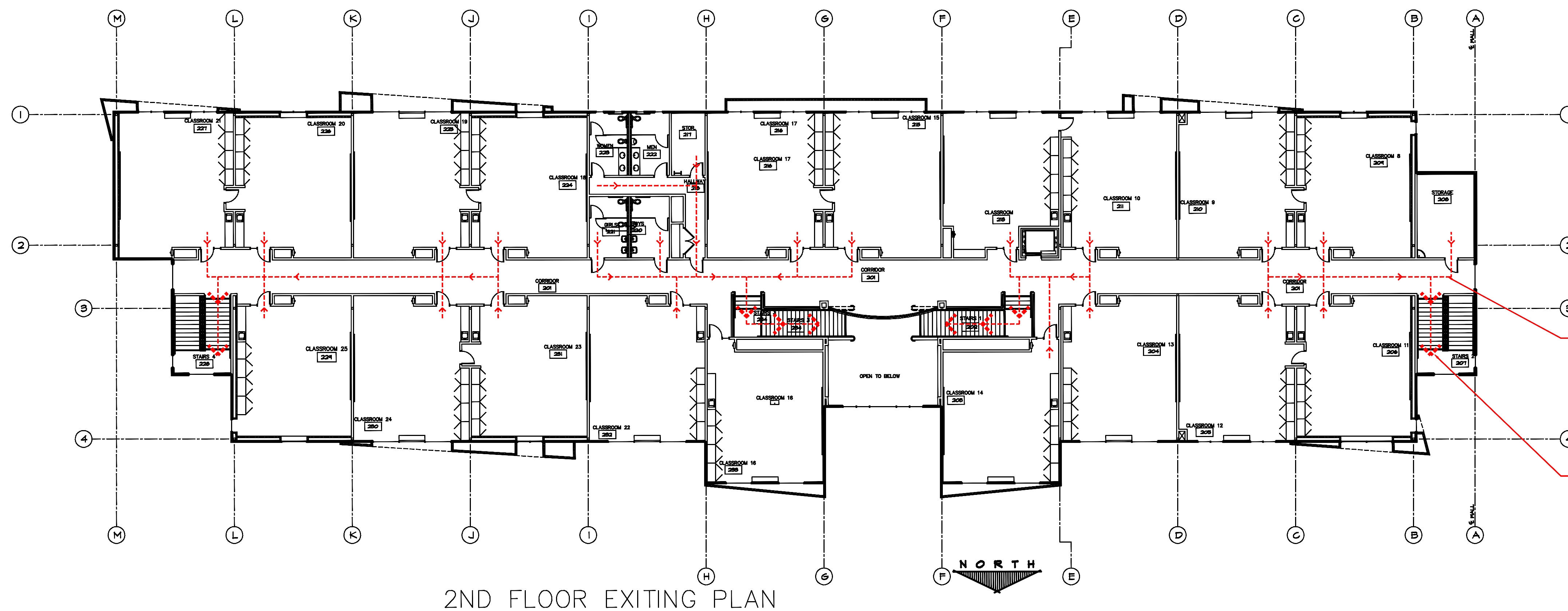
No.	DATE	DESCRIPTION

SHEET DESCRIPTION

### EXITING FLOOR PLANS

PROJECT COORDINATOR GAREN LENCIONI	SHEET No.
PROJECT NO. FPE 546 PROJECT	EP1.1
DATE 05/21/2013	
SCALE AS NOTED	

SEE SHEET FA1.2 FOR CONTINUATION

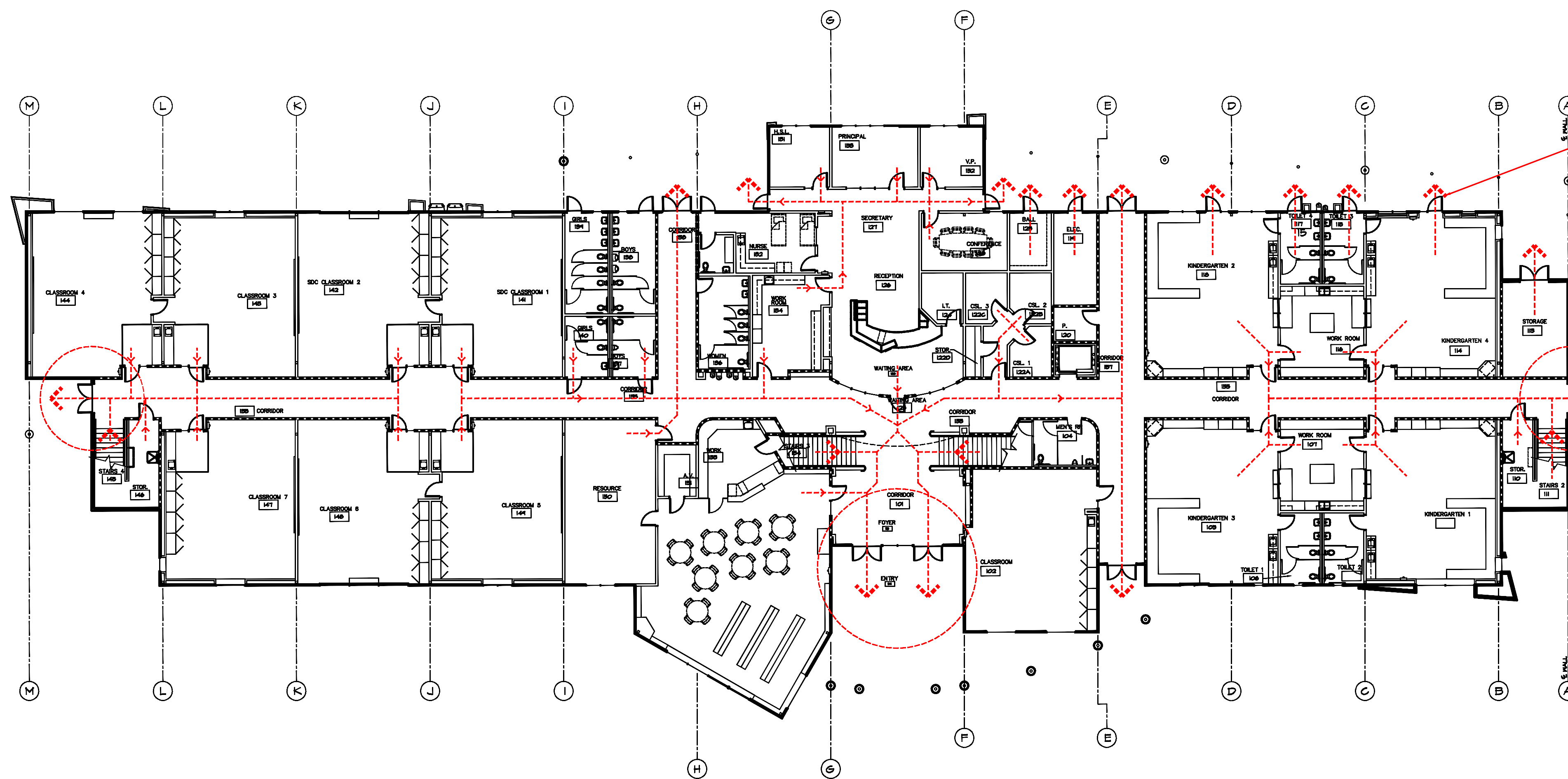


2ND FLOOR EXITING PLAN

SCALE: NTS

PROPOSED PATH OF  
TRAVEL (TYPICAL)

PATH OF TRAVEL TO FIRST  
FLOOR (TYPICAL)



1ST FLOOR EXITING PLAN

SCALE: NTS

EXIT TO EXTERIOR  
(TYPICAL)

EXIT TO EXTERIOR  
SERVING FIRST AND  
SECOND FLOOR  
(TYPICAL)

## APPENDIX B: FIRE RATED WALL PLANS

# CAL POLY FPE PROJECT

PROJECT:

## FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

PROJECT DEVELOPMENT

DATE	ISSUED FOR

REVISIONS

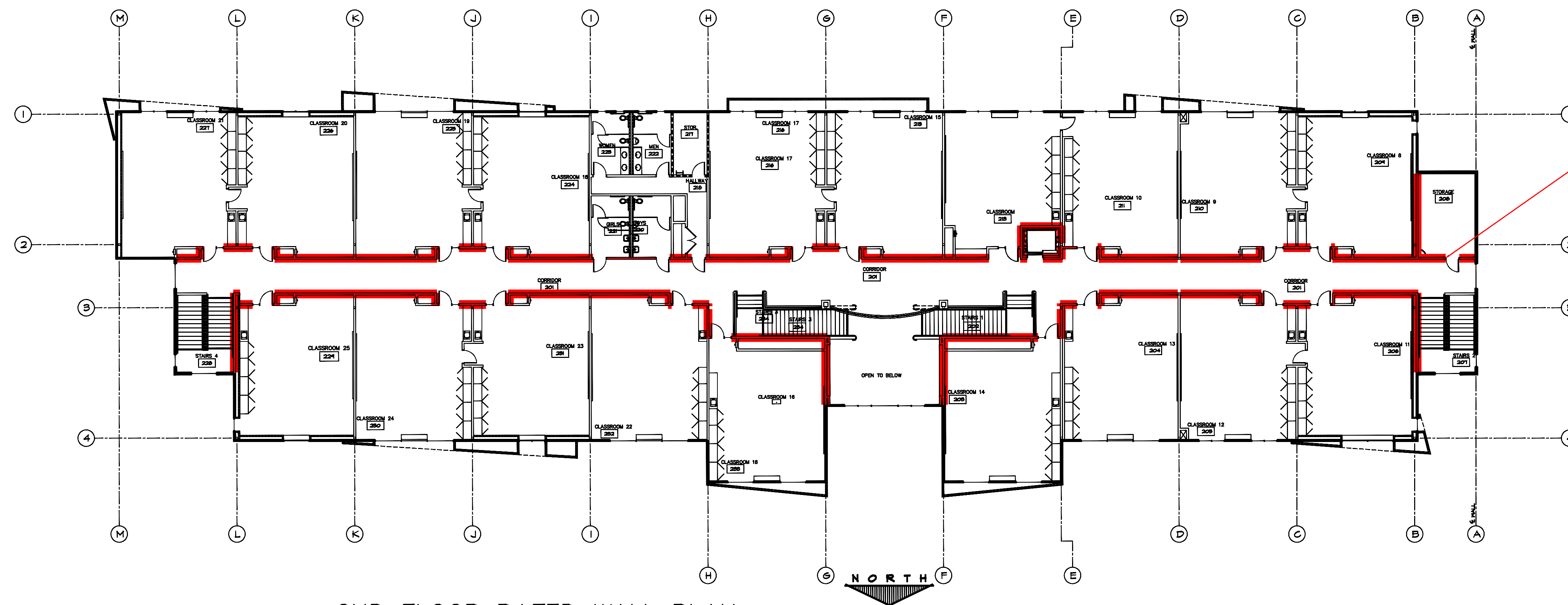
No.	DATE	DESCRIPTION

SHEET DESCRIPTION

### FIRE RATED WALL PLAN

MAIN - 1ST FLOOR

PROJECT COORDINATOR GAREN LENCIONI	SHEET No.  <b>FR1.1</b>
PROJECT NO. FPE 546 PROJECT	
DATE 05/21/2013	
SCALE AS NOTED	

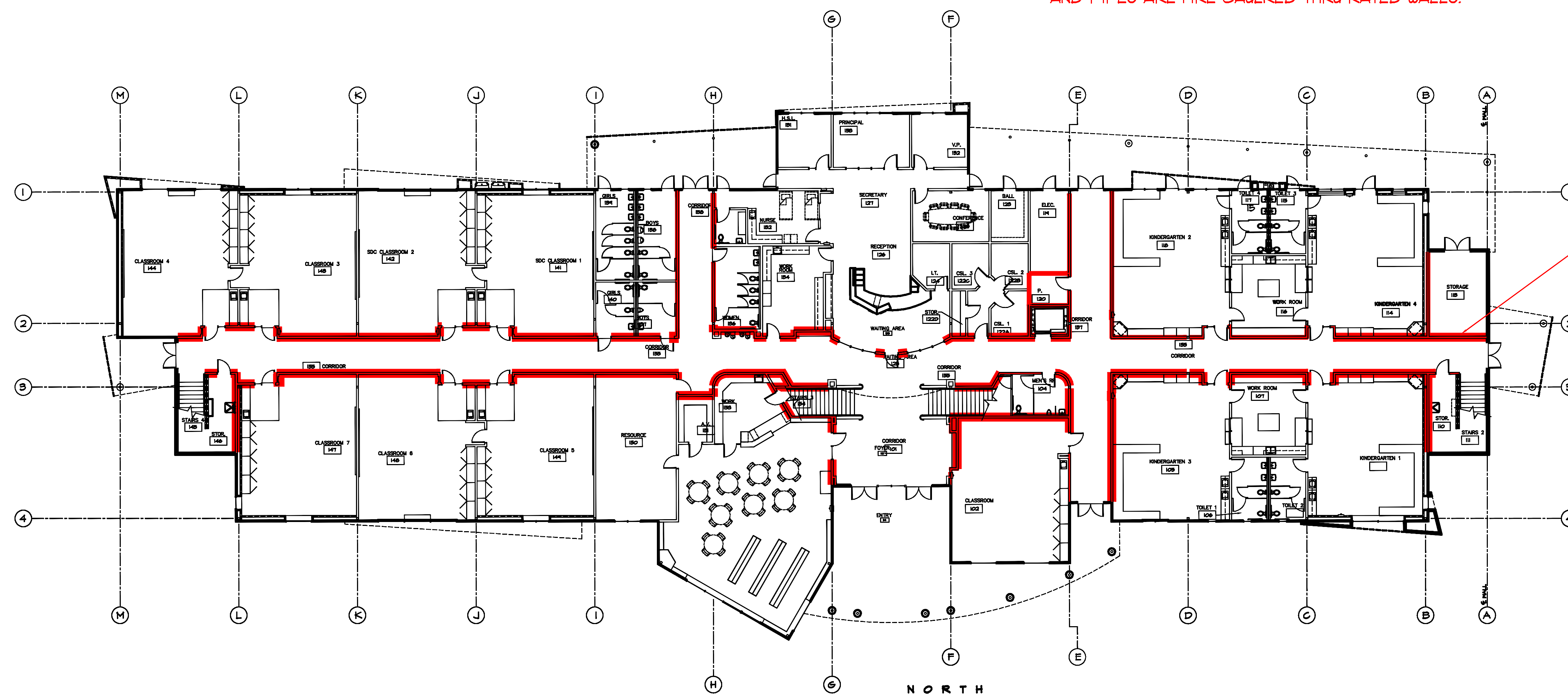


2ND FLOOR RATED WALL PLAN

SCALE: NTS

ALL DUCTS THRU RATED WALLS HAVE FIRE SMOKE DAMPERS  
AND PIPES ARE FIRE CAULKED THRU RATED WALLS.

1 HOUR RATED  
WALL TO BOTTOM  
OF ROOF DECK.



1ST FLOOR RATED WALL PLAN

SCALE: NTS

1 HOUR RATED  
WALL TO BOTTOM  
OF SECOND  
FLOOR.

SEE SHEET FA1.2 FOR CONTINUATION

## APPENDIX C: FIRE ALARM PLANS

# CAL POLY FPE PROJECT

PROJECT:

## FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

### CODES AND STANDARDS

THE FIRE ALARM SYSTEM WAS DESIGNED TO THE FOLLOWING CODES:  
 2007 CBC (PART 2, TITLE 24), UBC WITH CA AMENDMENTS,  
 2007 CEC (PART 2, TITLE 24), NEC WITH CA AMENDMENTS,  
 2007 CMC (PART 2, TITLE 24), UMC WITH CA AMENDMENTS,  
 2007 CFC (PART 2, TITLE 24), UFC WITH CA AMENDMENTS,  
 CA REFERENCED STANDARDS CODE (PART 12, TITLE 24),  
 2007 CBC STD. WITH CA ADMENDMENTS,  
 PUBLIC SAFETY (TITLE 19), STATE FIRE MARSHALL,  
 NFPA 72, FIRE ALARM CODE WITH CA AMENDMENTS, 2002 EDITION

### FIRE ALARM SYMBOL LIST

SYMBOL	MANUFACTURE	PART NUMBER	DESCRIPTION
	GAMEWELL-FCI	E3	FIRE ALARM CONTROL PANEL
	GAMEWELL-FCI	FF8	FIRE ALARM EXPANDER PANEL
	GAMEWELL-FCI	M5-1AF	MANUAL FULL STATION
	GAMEWELL-FCI	A&D-PL2F	SMOKE DETECTOR WITH SMOKE DETECTOR BASE
	GAMEWELL-FCI	ATD-HL2F	ATTIC HEAT DETECTOR, FIXED 130° HEAT DETECTOR BASE
	GAMEWELL-FCI	ADPRF	DUCT SMOKE DETECTOR WITH 5' SAMPLING TUBE
	GAMEWELL-FCI	ATD-L2F	HEAT DETECTOR, FIXED 135° HEAT DETECTOR BASE
	-	-	FIRE SPRINKLER TAMPER SWITCH
	-	-	FIRE SPRINKLER FLOW SWITCH
F/S	-	-	FIRE SMOKE DAMPER, BY MECHANICAL CONTRACTOR
	WHEELLOCK	AH-24WP-R WBBR	OUTSIDE HORN WITH BLACK BOX
	WHEELLOCK	ZN6-24MCW-FR	HORN/STROBE/MULTI-CANDELA - 15/30/15/110 CD
	WHEELLOCK	ZR6-24MCW-FR	STROBE/MULTI-CANDELA - 15/30/15/110 CD

#### PROJECT DEVELOPMENT

DATE	ISSUED FOR

#### REVISIONS

No.	DATE	DESCRIPTION

#### SHEET DESCRIPTION

### FIRE ALARM SYMBOLS & NOTES

PROJECT COORDINATOR GAREN LENCIONI	SHEET No.  <b>FA0.1</b>
PROJECT NO. FPE 546	
DATE 08/17/2011	
SCALE AS NOTED	

CAL POLY  
FPE  
PROJECT

PROJECT:

FRESNO  
ELEMENTARY  
SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

FIRE ALARM SEQUENCE OF OPERATIONS							
ACTION \ DEVICE	MANUAL FULL STATION	SMOKE / HEAT DETECTOR	LOSS OF POWER	GROUND FAULT	WATERFLOW SWITCH	TAMPER SWITCH	DUCT SMOKE DETECTORS
ANNUNCIATE ALARM AT FIRE ALARM CONTROL PANEL	YES	YES	-	-	YES	-	YES
ANNUNCIATE TROUBLE AT FIRE ALARM CONTROL PANEL	-	-	YES	YES	-	-	-
ANNUNCIATE SUPERVISORY AT FIRE ALARM CONTROL PANEL	-	-	-	-	-	YES	-
ACTIVATE ALL AUDIBLE/ VISUAL ALARMS	YES	YES	-	-	YES	-	YES
TRANSFER TO BATTERY BACKUP	-	-	YES	-	-	-	-
ANNUNCIATE ALARM AT CENTRAL STATION -	YES	YES	-	-	YES	YES	YES
ANNUNCIATE TROUBLE AT CENTRAL STATION -	-	-	YES	YES	-	-	-
ANNUNCIATE SUPERVISORY AT CENTRAL STATION -	-	-	-	-	-	YES	-
CLOSE FIRE / SMOKE DAMPERS -	-	-	-	-	-	-	YES
SHUTDOWN A/C UNITS -	-	-	-	-	-	-	YES

PROJECT DEVELOPMENT

DATE	ISSUED FOR

REVISIONS

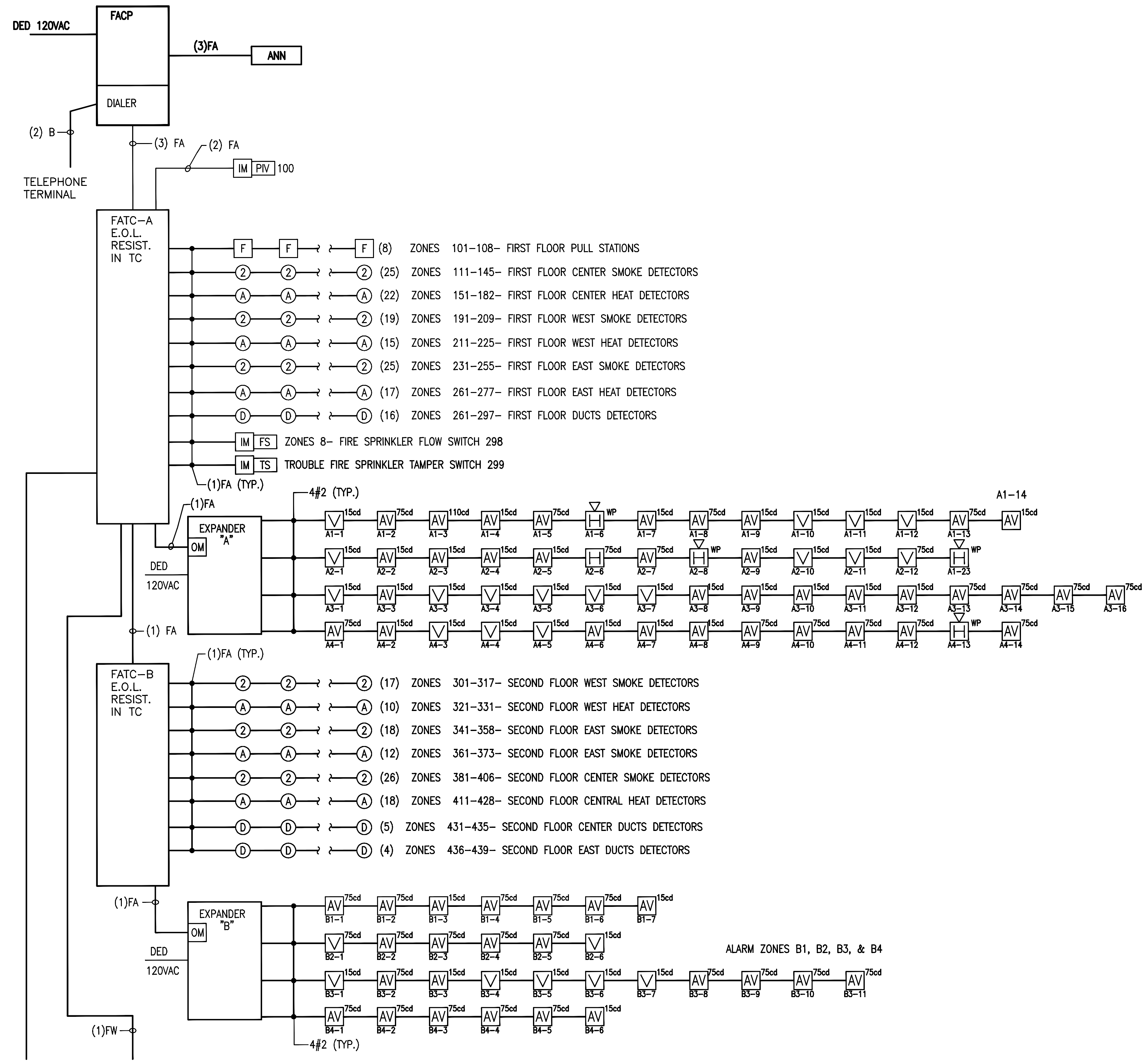
No.	DATE	DESCRIPTION

SHEET DESCRIPTION

FIRE ALARM  
SEQUENCE OF  
OPERATIONS

PROJECT COORDINATOR GAREN LENCIONI	SHEET No.  FA0.2
PROJECT NO. FPE 546	
DATE 08/17/2011	
SCALE AS NOTED	

# FIRE ALARM RISER



# CAL POLY FPE PROJECT

PROJECT:

# FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

PROJECT DEVELOPMENT

DATE	ISSUED FOR

REVISIONS

No.	DATE	DESCRIPTION

SHEET DESCRIPTION

## FIRE ALARM RISER

PROJECT COORDINATOR

GAREN LENCIONI

PROJECT NO.

FPE 546

DATE

08/17/2011

SCALE

AS NOTED

SHEET No.

# FA0.3

PROJECT:

FRESNO  
ELEMENTARY  
SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

PROJECT DEVELOPMENT

DATE	ISSUED FOR

REVISIONS

No.	DATE	DESCRIPTION

SHEET DESCRIPTION

FIRE ALARM  
VOLTAGE DROP

PROJECT COORDINATOR

GAREN LENCIONI

PROJECT NO.

FPE 546

DATE

08/17/2011

SCALE

AS NOTED

FA0.4

BATTERY CALCULATION - FIRE ALARM CONTROL PANEL

Fire Alarm Control Panel Battery Calculation

Qty.	Description	Supervisory Current		Alarm Current	
		Item	Total	Item	Total
1	E3 Fire Alarm Control Panel	0.000000	0.000000	0.000000	0.000000
1	DACT-E3 Digital Alarm Communicator	0.018000	0.018000	0.018000	0.018000
1	IU-MB-E3 Intelligent Loop Interface, Main Board	0.081000	0.081000	0.150000	0.150000
2	IU-S-E3 Intelligent Loop Interface, Expansion Board	0.081000	0.162000	0.150000	0.300000
1	LCD-E3 LCD Keypad Display	0.024000	0.024000	0.028000	0.028000
1	PM-9 Power Supply	0.000000	0.000000	0.050000	0.050000
0		0.000000	0.000000	0.000000	0.000000
15	MS-7A1" Pull Station	0.000300	0.004500	0.003000	0.045000
9	AMM-2F Point Monitor Module (PID)	0.000375	0.003375	0.000600	0.005400
4	AOM-25F Supervised Control Module (SCM)	0.000300	0.001200	0.000300	0.001200
174	ASD-PL2F Smoke Detectors	0.000300	0.052200	0.006500	1.113100
7	ATD-L2F Fixed Heat Detector 135"	0.000300	0.002100	0.006500	0.045500
0	ATD-L2F Rate of Rise Heat Detector 135"	0.000300	0.000000	0.006500	0.000000
164	ATD-HL2F Fixed Heat Detector 190"	0.000300	0.049200	0.006500	1.066000
25	ADPRF Duct Smoke Detector w/ Relay	0.026000	0.650000	0.087000	2.175000
0		0.000000	0.000000	0.000000	0.000000
0	AH-24WP-R Outside Horn	0.000000	0.000000	0.033000	0.000000
0	ZNS-24MCW-FR Horn/Strobes 15cd	0.000000	0.000000	0.099000	0.000000
0	ZNS-24MCW-FR Horn/Strobes 30cd	0.000000	0.000000	0.101000	0.000000
0	ZNS-24MCW-FR Horn/Strobes 75cd	0.000000	0.000000	0.177000	0.000000
0	ZNS-24MCW-FR Horn/Strobes 110cd	0.000000	0.000000	0.232000	0.000000
0	ZRS-24MCW-FR Strobes 15cd	0.000000	0.000000	0.060000	0.000000
0		0.000000	0.000000	0.000000	0.000000
Total Amps		1.048	4.997		
24 Hour Supervisory 1.048 x 24 Hrs				25.152	
5 Minute Alarm 4.997 x 0.083 Hrs				0.416	
				Subtotal - 25.568	
				25% Safety Factor - 6.392	
				Total Amp Hour Required - 31.960	
Battery Used: 35 Amp Hour Battery					

VOLTAGE DROP CALCULATIONS

Voltage Drop Calculation Formula  
 Voltage Drop for a given length of conductor =  $\frac{l \times \text{Feet} \times 10.8}{C.M.}$   
 Where:  $l$  = Amperes per terminal of load.  
 Feet = One way distance in feet measured from source of supply load.  
 10.8 = Constant (resistance of conductor @ 10.8 Ohms per L.M.).  
 C.M. = Cross sectional area in circular mils (see chart below).

Wire Size (AWG)	#12	#14	#16
Circular Mils (C.M.)	6530	4110	2500

Voltage Drop Calculation for FA EXP-A CIRCUIT A1  
 Total of Devices:  
 AH-24WP-R Outside Horn 1 x 0.033 = 0.033 amps  
 ZNS-24MCW-FR Horn/Strobes 15cd 4 x 0.066 = 0.264 amps  
 ZNS-24MCW-FR Horn/Strobes 75cd 4 x 0.177 = 0.708 amps  
 ZNS-24MCW-FR Horn/Strobes 110cd 1 x 0.232 = 0.232 amps  
 ZRS-24MCW-FR Strobes 15cd 4 x 0.060 = 0.240 amps  
 Approx. Length: 600 Feet Total Current Load: 1.477 amps  
 Voltage Drop =  $\frac{1.477 \times 600 \times 10.8}{6530} = \frac{9571}{6530} = 1.466$  Volts Drop  
 Percentage of Voltage Drop =  $\frac{1.466 \text{ Volts}}{24 \text{ Volts}} = 0.0611 \times 100 = 6.11 \%$

Voltage Drop Calculation for FA EXP-A CIRCUIT A2  
 Total of Devices:  
 AH-24WP-R Outside Horn 2 x 0.033 = 0.066 amps  
 ZNS-24MCW-FR Horn/Strobes 15cd 1 x 0.066 = 0.066 amps  
 ZNS-24MCW-FR Horn/Strobes 75cd 2 x 0.177 = 0.354 amps  
 ZRS-24MCW-FR Strobes 15cd 5 x 0.060 = 0.480 amps  
 Approx. Length: 800 Feet Total Current Load: 0.966 amps  
 Voltage Drop =  $\frac{0.966 \times 800 \times 10.8}{6530} = \frac{8340}{6530} = 1.278$  Volts Drop  
 Percentage of Voltage Drop =  $\frac{1.278 \text{ Volts}}{24 \text{ Volts}} = 0.0533 \times 100 = 5.33 \%$

Voltage Drop Calculation for FA EXP-B CIRCUIT B1  
 Total of Devices:  
 ZNS-24MCW-FR Horn/Strobes 15cd 2 x 0.066 = 0.132 amps  
 ZNS-24MCW-FR Horn/Strobes 75cd 5 x 0.177 = 0.885 amps  
 Approx. Length: 600 Feet Total Current Load: 1.017 amps  
 Voltage Drop =  $\frac{1.017 \times 600 \times 10.8}{6530} = \frac{13180}{6530} = 2.018$  Volts Drop  
 Percentage of Voltage Drop =  $\frac{2.018 \text{ Volts}}{24 \text{ Volts}} = 0.0841 \times 100 = 8.41 \%$

Voltage Drop Calculation for FA EXP-B CIRCUIT B2  
 Total of Devices:  
 ZNS-24MCW-FR Horn/Strobes 75cd 5 x 0.177 = 0.885 amps  
 ZRS-24MCW-FR Strobes 15cd 1 x 0.060 = 0.060 amps  
 Approx. Length: 600 Feet Total Current Load: 0.945 amps  
 Voltage Drop =  $\frac{0.945 \times 600 \times 10.8}{6530} = \frac{6124}{6530} = 0.938$  Volts Drop  
 Percentage of Voltage Drop =  $\frac{0.938 \text{ Volts}}{24 \text{ Volts}} = 0.0391 \times 100 = 3.91 \%$

Voltage Drop Calculation for FA EXP-A CIRCUIT A3  
 Total of Devices:  
 ZNS-24MCW-FR Horn/Strobes 15cd 6 x 0.066 = 0.396 amps  
 ZNS-24MCW-FR Horn/Strobes 75cd 4 x 0.177 = 0.708 amps  
 ZRS-24MCW-FR Strobes 15cd 6 x 0.060 = 0.360 amps  
 Approx. Length: 800 Feet Total Current Load: 1.464 amps  
 Voltage Drop =  $\frac{1.464 \times 800 \times 10.8}{6530} = \frac{12649}{6530} = 1.937$  Volts Drop  
 Percentage of Voltage Drop =  $\frac{1.937 \text{ Volts}}{24 \text{ Volts}} = 0.0807 \times 100 = 8.07 \%$

Voltage Drop Calculation for FA EXP-A CIRCUIT A4  
 Total of Devices:  
 AH-24WP-R Outside Horn 1 x 0.033 = 0.033 amps  
 ZNS-24MCW-FR Horn/Strobes 15cd 4 x 0.066 = 0.264 amps  
 ZNS-24MCW-FR Horn/Strobes 75cd 5 x 0.177 = 0.885 amps  
 ZRS-24MCW-FR Strobes 15cd 4 x 0.060 = 0.240 amps  
 Approx. Length: 800 Feet Total Current Load: 1.422 amps  
 Voltage Drop =  $\frac{1.422 \times 800 \times 10.8}{6530} = \frac{12280}{6530} = 1.881$  Volts Drop  
 Percentage of Voltage Drop =  $\frac{1.881 \text{ Volts}}{24 \text{ Volts}} = 0.0784 \times 100 = 7.84 \%$

Voltage Drop Calculation for FA EXP-B CIRCUIT B3  
 Total of Devices:  
 ZNS-24MCW-FR Horn/Strobes 15cd 2 x 0.066 = 0.132 amps  
 ZNS-24MCW-FR Horn/Strobes 75cd 5 x 0.177 = 0.885 amps  
 ZRS-24MCW-FR Strobes 15cd 4 x 0.060 = 0.240 amps  
 Approx. Length: 800 Feet Total Current Load: 1.257 amps  
 Voltage Drop =  $\frac{1.257 \times 800 \times 10.8}{6530} = \frac{10860}{6530} = 1.663$  Volts Drop  
 Percentage of Voltage Drop =  $\frac{1.663 \text{ Volts}}{24 \text{ Volts}} = 0.0693 \times 100 = 6.93 \%$

Voltage Drop Calculation for FA EXP-B CIRCUIT B4  
 Total of Devices:  
 ZNS-24MCW-FR Horn/Strobes 15cd 2 x 0.066 = 0.132 amps  
 ZNS-24MCW-FR Horn/Strobes 75cd 4 x 0.177 = 0.708 amps  
 Approx. Length: 800 Feet Total Current Load: 0.840 amps  
 Voltage Drop =  $\frac{0.840 \times 800 \times 10.8}{6530} = \frac{7258}{6530} = 0.669$  Volts Drop  
 Percentage of Voltage Drop =  $\frac{1.111 \text{ Volts}}{24 \text{ Volts}} = 0.0463 \times 100 = 4.63 \%$



# CAL POLY FPE PROJECT

## FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

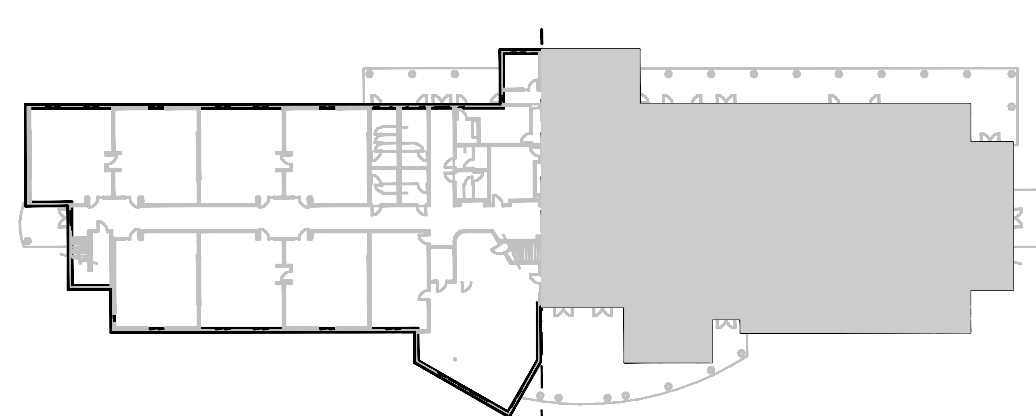
### KEYNOTES (NOT ALL USED)

- 1 MANUAL FULL STATION.
- 2 HEAT DETECTOR.
- 3 ATTIC HEAT DETECTOR.
- 4 SMOKE DETECTOR.
- 5 DUCT SMOKE DETECTOR. SHOWN AT LOCATION OF FIRE / SMOKE DAMPER AT DUCT PENETRATION THRU FIRE RATED WALL.
- 6 FIRE SPRINKLER TAMPER SWITCH.
- 7 FIRE SPRINKLER FLOW SWITCH.
- 8 FIRE ALARM CONTROL PANEL.
- 9 HORN / STROBE MULTI-CANDELA.
- 10 STROBE MULTI-CANDELA.
- 11 OUTSIDE HORN.
- 12 FIRE ALARM EXPANDER PANEL.

### WALL LEGEND



### KEY PLAN

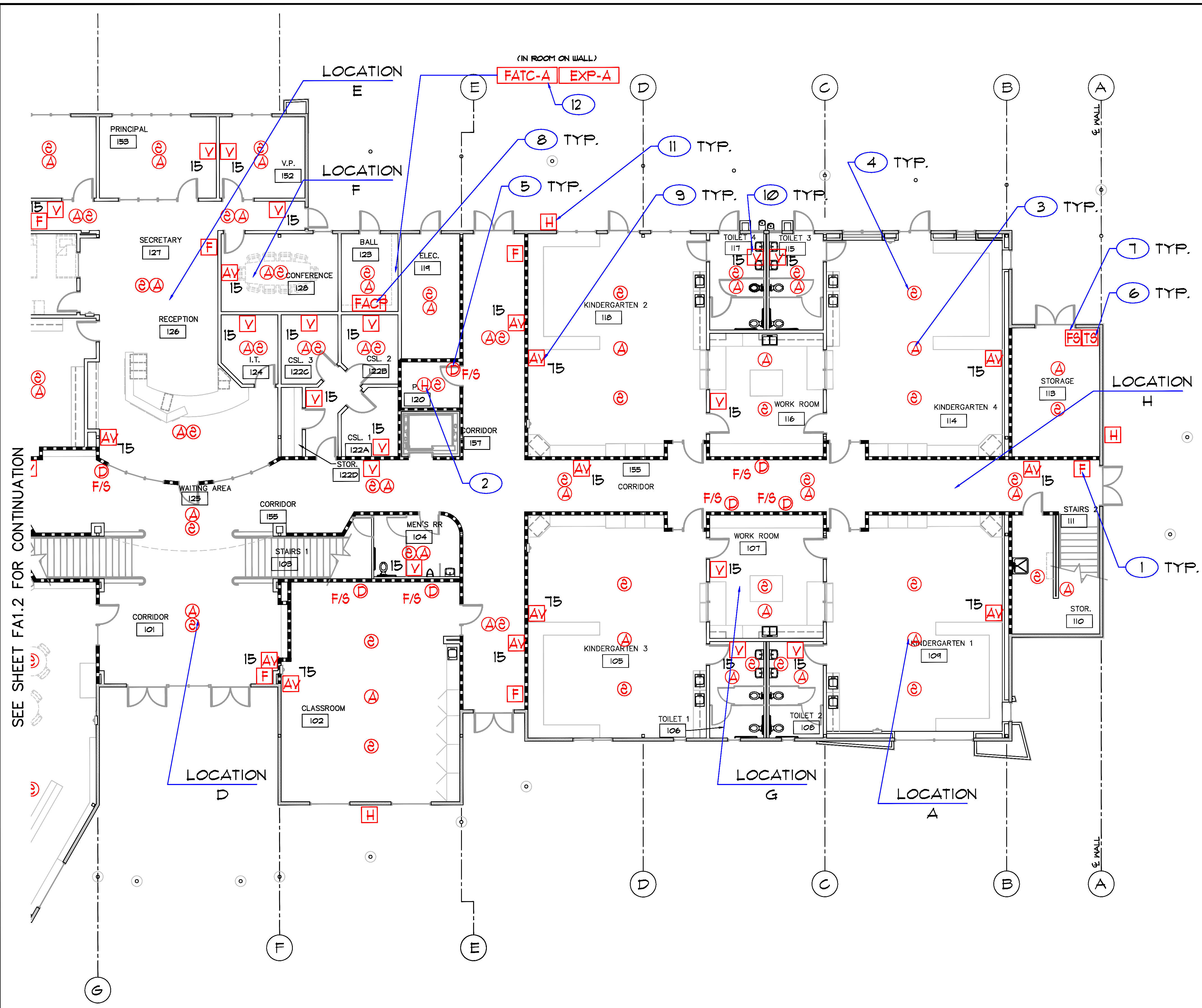


PROJECT DEVELOPMENT	
DATE	ISSUED FOR

REVISIONS		
No.	DATE	DESCRIPTION

### SHEET DESCRIPTION

FIRE ALARM FLOOR PLAN		MAIN - 1ST FLOOR	
PROJECT COORDINATOR GAREN LENCIONI	SHEET No.	FA1.1	
PROJECT NO. FPE 546	DATE 09/17/2011		
SCALE AS NOTED			



1ST FLOOR FIRE ALARM PLAN  
WEST SIDE



SCALE: 1/8" = 1'-0"

SEE SHEET FA1.2 FOR CONTINUATION

# CAL POLY FPE PROJECT

PROJECT:

# FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

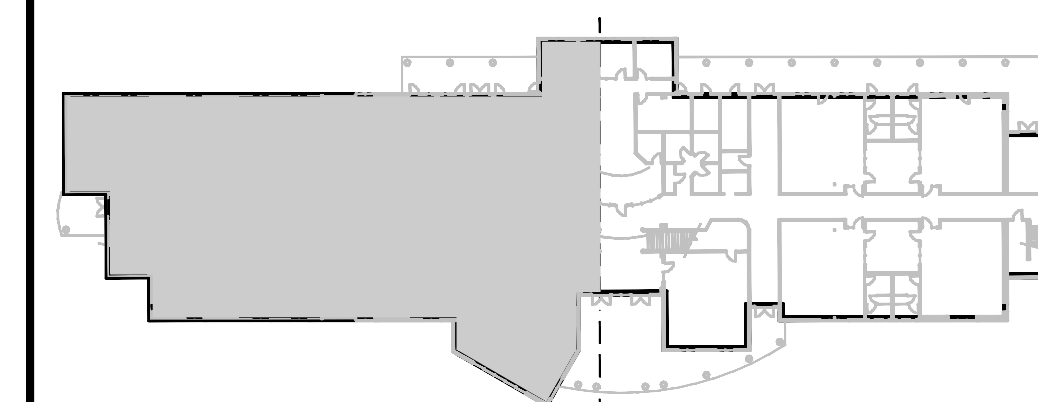
## KEYNOTES (NOT ALL USED)

- 1 MANUAL FULL STATION.
- 2 HEAT DETECTOR.
- 3 ATTIC HEAT DETECTOR.
- 4 SMOKE DETECTOR.
- 5 DUCT SMOKE DETECTOR. SHOWN AT LOCATION OF FIRE / SMOKE DAMPER AT DUCT PENETRATION THRU FIRE RATED WALL.
- 6 FIRE SPRINKLER TAMPER SWITCH.
- 7 FIRE SPRINKLER FLOW SWITCH.
- 8 FIRE ALARM CONTROL PANEL.
- 9 HORN / STROBE MULTI-CANDELA.
- 10 STROBE MULTI-CANDELA.
- 11 OUTSIDE HORN.
- 12 FIRE ALARM EXPANDER PANEL.

## WALL LEGEND

— 1 HR. RATED WALL

## KEY PLAN



1ST FLOOR FIRE ALARM PLAN  
EAST SIDE



SCALE: 1/8" = 1'-0"

SEE SHEET FA1.1 FOR CONTINUATION

## PROJECT DEVELOPMENT

DATE	ISSUED FOR

## REVISIONS

No.	DATE	DESCRIPTION

## SHEET DESCRIPTION

## FIRE ALARM FLOOR PLAN

MAIN - 1ST FLOOR

PROJECT COORDINATOR GAREN LENCIONI	SHEET No.
PROJECT NO. FPE 546	FA1.2
DATE 09/17/2011	
SCALE AS NOTED	

# CAL POLY FPE PROJECT

## FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

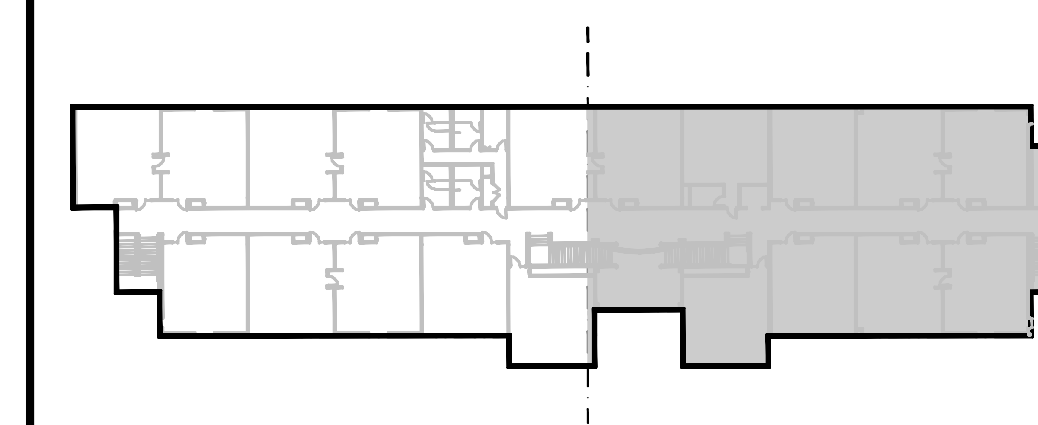
### KEYNOTES (NOT ALL USED)

- ① MANUAL FULL STATION.
- ② HEAT DETECTOR.
- ③ ATTIC HEAT DETECTOR.
- ④ SMOKE DETECTOR.
- ⑤ DUCT SMOKE DETECTOR. SHOWN AT LOCATION OF FIRE / SMOKE DAMPER AT DUCT PENETRATION THRU FIRE RATED WALL.
- ⑥ FIRE SPRINKLER TAMPER SWITCH.
- ⑦ FIRE SPRINKLER FLOW SWITCH.
- ⑧ FIRE ALARM CONTROL PANEL.
- ⑨ HORN / STROBE MULTI-CANDELA.
- ⑩ STROBE MULTI-CANDELA.
- ⑪ OUTSIDE HORN.
- ⑫ FIRE ALARM EXPANDER PANEL.

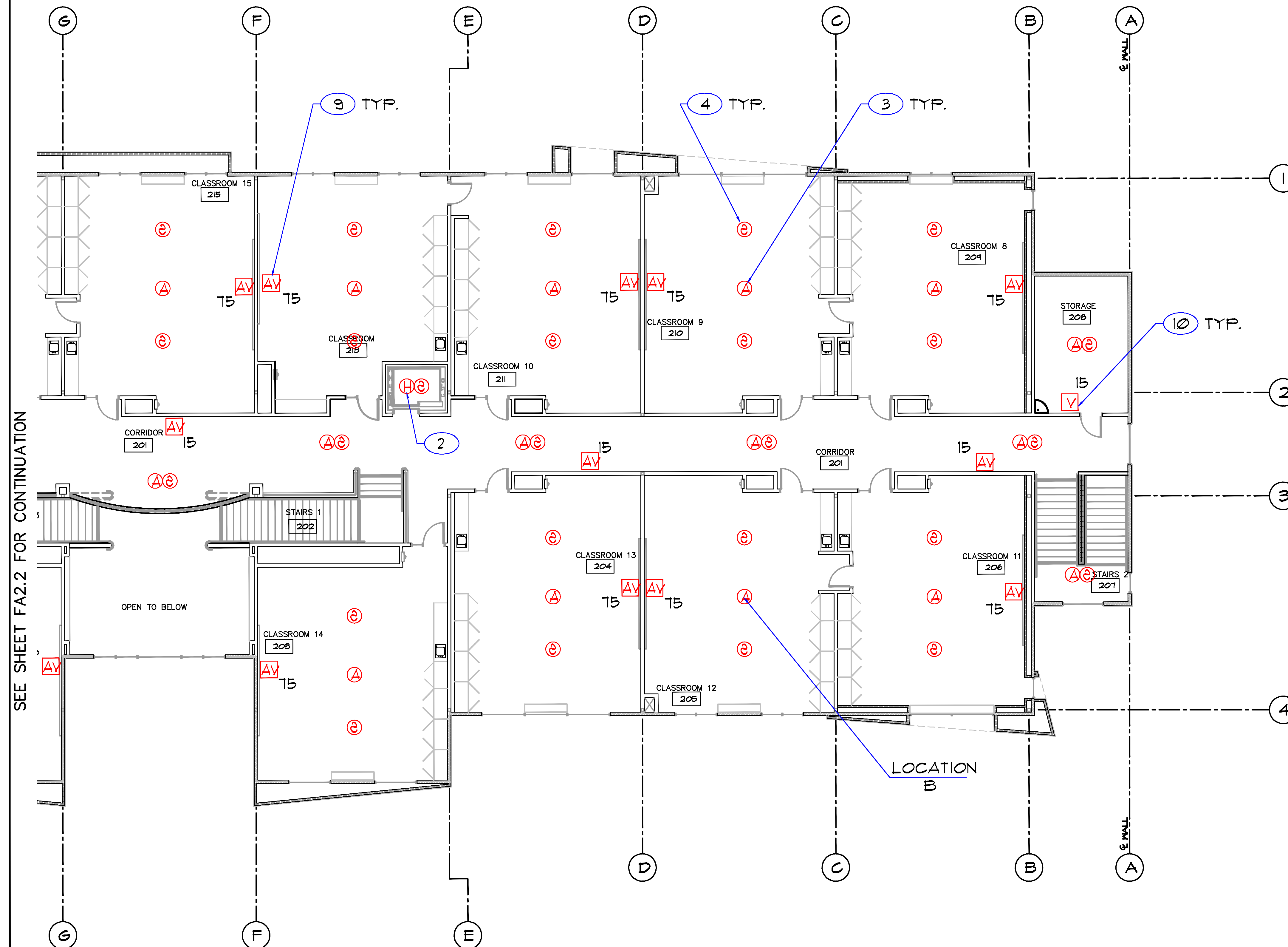
### WALL LEGEND

----- 1 HR. RATED WALL

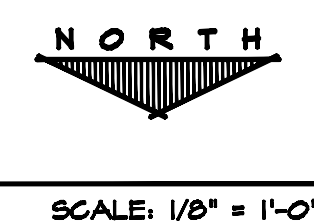
### KEYPLAN



SEE SHEET FA2.2 FOR CONTINUATION



2ND FLOOR FIRE ALARM PLAN  
WEST SIDE



PROJECT DEVELOPMENT		
DATE	ISSUED FOR	
REVISIONS		
No.	DATE	DESCRIPTION
SHEET DESCRIPTION		
FIRE ALARM FLOOR PLAN		
MAIN - 2ND FLOOR		
PROJECT COORDINATOR GAREN LENCIONI	SHEET No.	
PROJECT NO. FPE 546	FA2.1	
DATE 09/17/2011		
SCALE AS NOTED		

# CAL POLY FPE PROJECT

## PROJECT: FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

### KEYNOTES (NOT ALL USED)

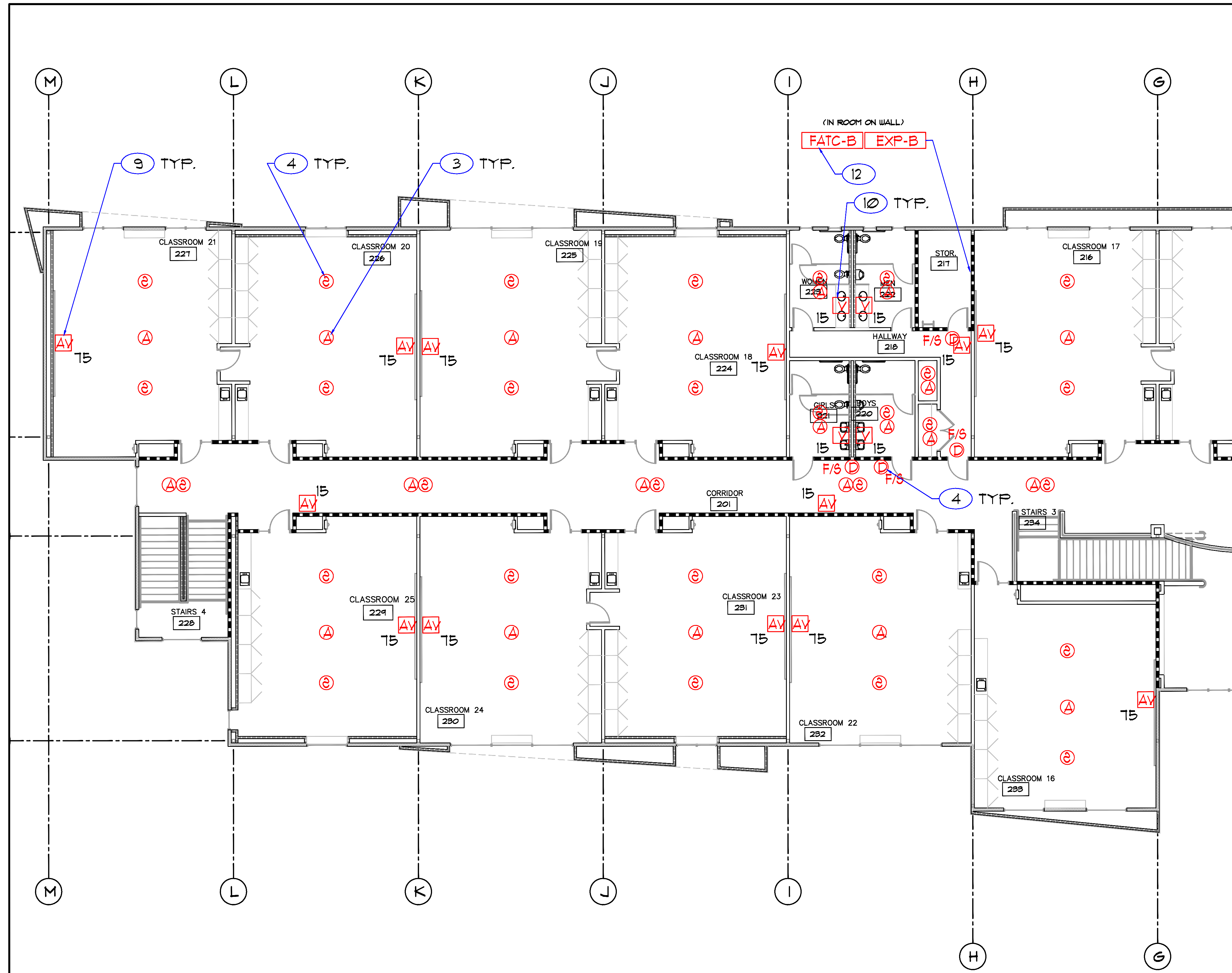
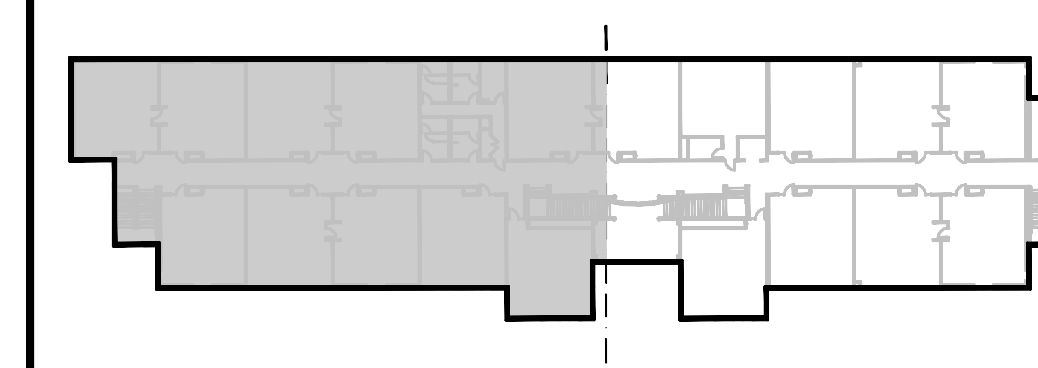
- ① MANUAL PULL STATION.
- ② HEAT DETECTOR.
- ③ ATTIC HEAT DETECTOR.
- ④ SMOKE DETECTOR.
- ⑤ DUCT SMOKE DETECTOR. SHOWN AT LOCATION OF FIRE / SMOKE DAMPER AT DUCT PENETRATION THRU FIRE RATED WALL.
- ⑥ FIRE SPRINKLER TAMPER SWITCH.
- ⑦ FIRE SPRINKLER FLOW SWITCH.
- ⑧ FIRE ALARM CONTROL PANEL.
- ⑨ HORN / STROBE MULTI-CANDELA.
- ⑩ STROBE MULTI-CANDELA.
- ⑪ OUTSIDE HORN.
- ⑫ FIRE ALARM EXPANDER PANEL.

SEE SHEET FA2.1 FOR CONTINUATION

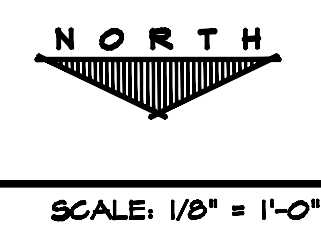
### WALL LEGEND

— 1 HR. RATED WALL

### KEY PLAN

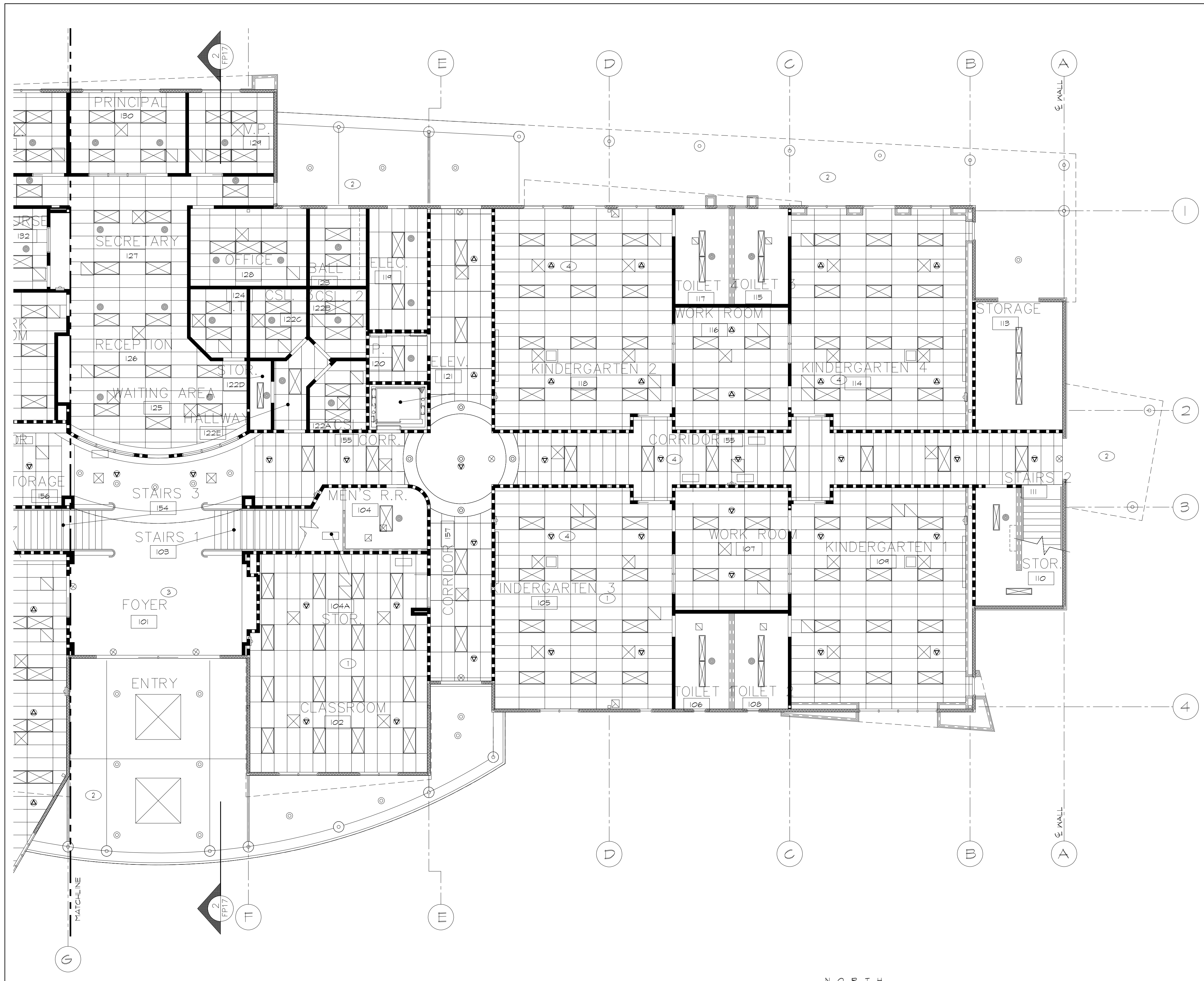


2ND FLOOR FIRE ALARM PLAN  
EAST SIDE



PROJECT DEVELOPMENT		
DATE	ISSUED FOR	
REVISIONS		
No.	DATE	DESCRIPTION
SHEET DESCRIPTION		
FIRE ALARM FLOOR PLAN		
MAIN - 2ND FLOOR		
PROJECT COORDINATOR GAREN LENCIONI	SHEET No.	
PROJECT NO. FPE 546	FA2.2	
DATE 09/17/2011		
SCALE AS NOTED		

**APPENDIX D: FIRE SPRINKLER PLANS**



1ST FLOOR FIRE SPRINKLER REFLECTED CEILING PLAN  
WEST SIDE

SCALE: 1/8" = 1'-0"

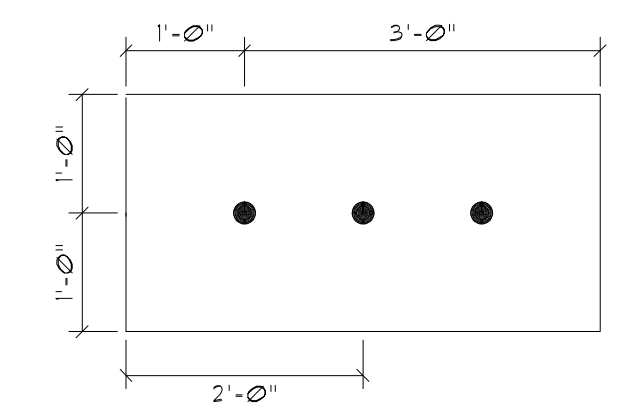


SYMBOLS AND DESCRIPTIONS										
SYM	QUANT	TYPE	FINISH	TEMP	K FACTOR	THRD	SN #	MRG	MODEL	ESCUTCHEON
▲	98	EC58P	CHROME	155	112	1/2"	VK532	VIKING	MICROFAST	BEMI REC
●	48	58P	CHROME	155	5.6	1/2"	VK302	VIKING	MICROFAST	BEMI REC
▲	1	58P	CHROME	155	5.6	1/2"	VK305	VIKING	MICROFAST	BEMI REC
148		TOTAL SHEET FP1 & FP2								

FIRE SPRINKLER INFORMATION IS FOR DSA REVIEW ONLY. INSTALLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING ACCURATE SPRINKLER LAYOUT AND QUANTITIES. NO PRICING ADJUSTMENT WILL BE ALLOWED FOR ADDITIONAL SPRINKLER HEADS ADDED BY CONTRACTOR.

KEYNOTES

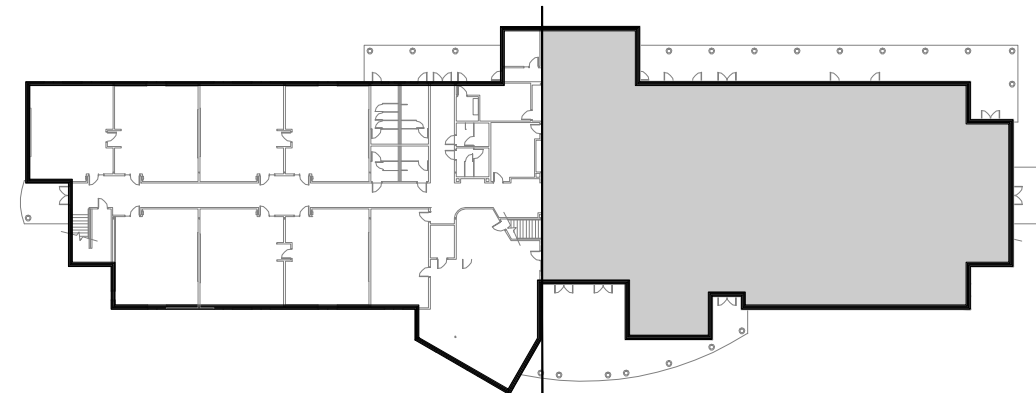
- 1 PENDENT FIRE SPRINKLERS TO BE LOCATED IN CENTERLINE OF CEILING TILE IN THE 2'-0" DIMENSION AND AT 12" INCREMENTS IN THE 4'-0" DIMENSION.
- 2 NONCOMBUSTIBLE OVERHANG. SPRINKLERS ARE NOT REQUIRED PER NFPA13, 2002 ED., 5.13.8.1.
- 3 OPEN TO ABOVE
- 4 EXTENDED COVERAGE PENDENT SPRINKLERS ARE DESIGNED TO COVER AN AREA OF 18' X 18'.



WALL LEGEND

1 HR. RATED WALL

KEY PLAN



CAL POLY  
FPE  
PROJECT

FRESNO  
ELEMENTARY  
SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

PROJECT DEVELOPMENT	
DATE	ISSUED FOR

REVISIONS		
No.	DATE	DESCRIPTION

SHEET DESCRIPTION  
FIRE SPRINKLER  
REFLECTED CEILING  
PLAN - WEST

PROJECT COORDINATOR GAREN LENCIONI	SHEET No. FP1
PROJECT NO. FPE 546	
DATE 05/22/2013	
SCALE	

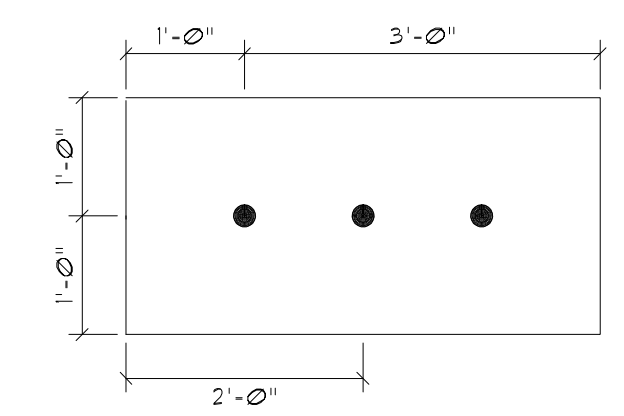
# CAL POLY FPE PROJECT

## FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

### KEYNOTES

- PENDENT FIRE SPRINKLERS TO BE LOCATED IN CENTERLINE OF CEILING TILE IN THE 2'-0" DIMENSION AND AT 12" INCREMENTS IN THE 4'-0" DIMENSION.
- NONCOMBUSTIBLE OVERHANG. SPRINKLERS ARE NOT REQUIRED PER NFPA13, 2002 ED., 5.13.8.1.
- OPEN TO ABOVE
- EXTENDED COVERAGE PENDENT SPRINKLERS ARE DESIGNED TO COVER AN AREA OF 18' X 18'.



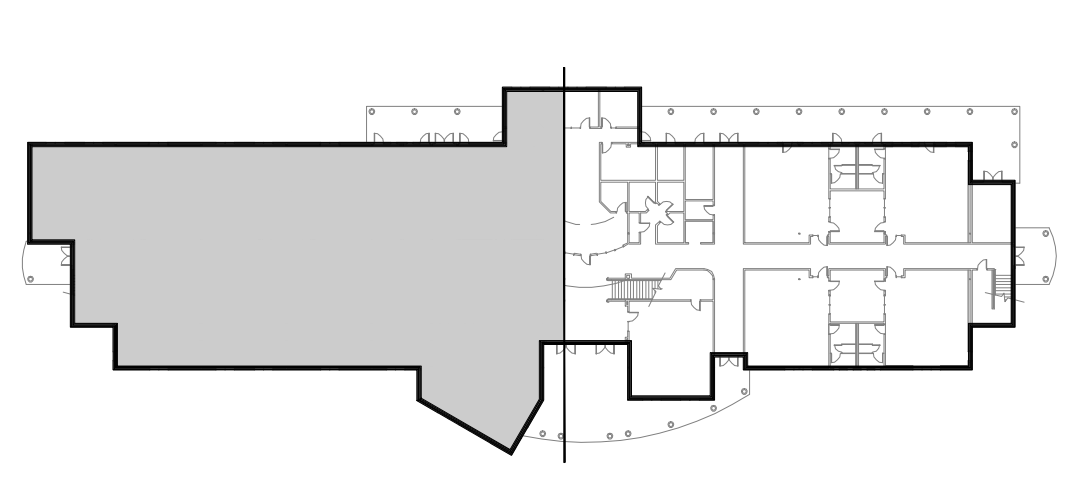
### GENERAL NOTES

- SEE SHEET FP1 AND FP2 FOR FIRE SPRINKLER SYSTEM NOTES.

### WALL LEGEND

--- 1 HR. RATED WALL

### KEY PLAN



PROJECT COORDINATOR  
GAREN LENCIONI

PROJECT NO.  
FPE 546

DATE  
05/22/2013

SCALE

### PROJECT DEVELOPMENT

DATE	ISSUED FOR

### REVISIONS

No.	DATE	DESCRIPTION

SHEET DESCRIPTION  
**FIRE SPRINKLER REFLECTED CEILING PLAN**

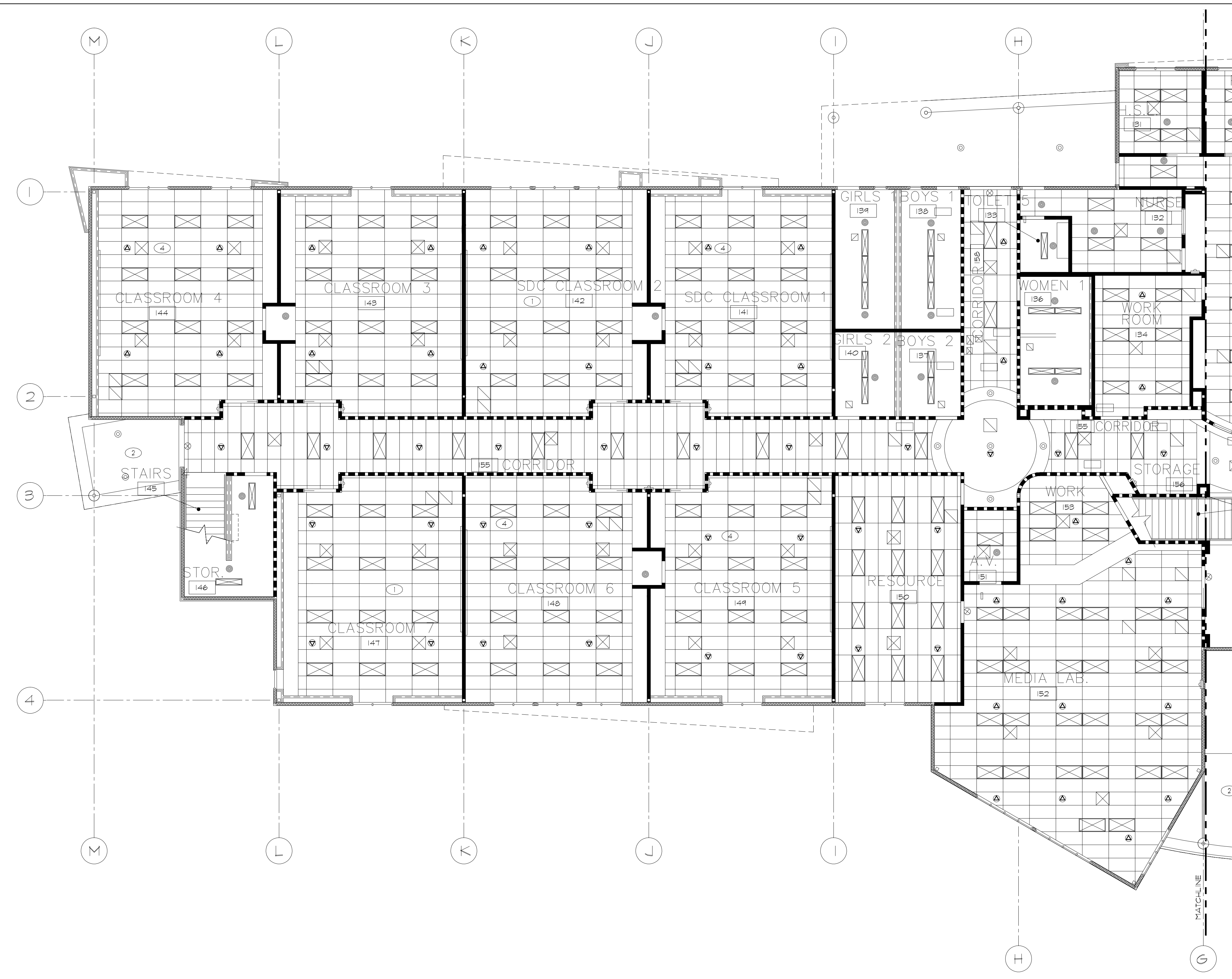
PROJECT COORDINATOR  
GAREN LENCIONI

PROJECT NO.  
FPE 546

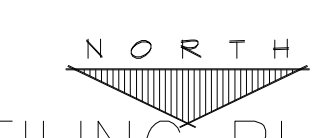
DATE  
05/22/2013

SCALE

SHEET No.  
**FP2**



1ST FLOOR FIRE SPRINKLER REFLECTED CEILING PLAN  
EAST SIDE  
SCALE: 1/8" = 1'-0"



### SYMBOLS AND DESCRIPTIONS

SYM	QUANT	TYPE	FINISH	TEMP	K FACTOR	THRD	SN #	MRG	MODEL	ESCUTCHEON
▲	98	EC58P	CHROME	155	112	1/2"	VK532	VIKING	MICROFAST	SEMI REC
●	48	58P	CHROME	155	5.6	1/2"	VK302	VIKING	MICROFAST	SEMI REC
▲	1	58P	CHROME	155	5.6	1/2"	VK305	VIKING	MICROFAST	SEMI REC
	148	TOTAL SHEET FP1 & FP2								

FIRE SPRINKLER INFORMATION IS FOR DSA REVIEW ONLY. INSTALLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING ACCURATE SPRINKLER LAYOUT AND QUANTITIES. NO PRICING ADJUSTMENT WILL BE ALLOWED FOR ADDITIONAL SPRINKLER HEADS ADDED BY CONTRACTOR.

# CAL POLY FPE PROJECT

PROJECT:

# FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013



1ST FLOOR FIRE SPRINKLER PIPING PLAN  
WEST SIDE

SCALE: 1/8" = 1'-0"

### SYMBOLS AND DESCRIPTIONS

SYM	QUANT	TYPE	FINISH	TEMP	K FACTOR	THRD	SN *	MRG	MODEL	ESCUTCHEON
▲	98	ECSSP	CHROME	155	112	1/2"	VK532	VIKING	MICROFAST	SEMI REC
●	48	SSP	CHROME	155	5.6	1/2"	VK302	VIKING	MICROFAST	SEMI REC
▲	1	SSP	CHROME	155	5.6	1/2"	VK308	VIKING	MICROFAST	SEMI REC
148 TOTAL SHEET FPIB 4 FPIB										

FIRE SPRINKLER INFORMATION IS FOR DSA REVIEW ONLY. INSTALLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING ACCURATE SPRINKLER LAYOUT AND QUANTITIES. NO PRICING ADJUSTMENT WILL BE ALLOWED FOR ADDITIONAL SPRINKLER HEADS ADDED BY CONTRACTOR.

### KEYNOTES

- NONCOMBUSTIBLE OVERHANG. SPRINKLERS ARE NOT REQUIRED PER NFPA13, 2002 E.D., 5.13.8.1.
- OPEN TO ABOVE

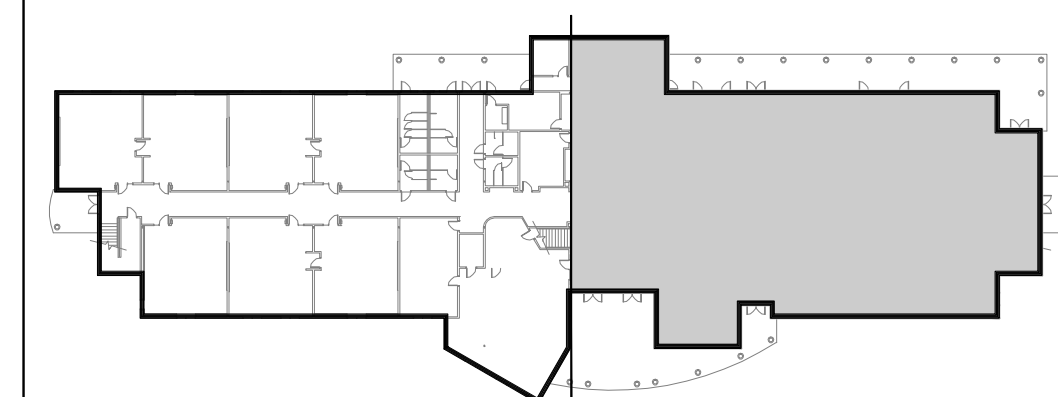
### GENERAL NOTES

- SEE SHEET FP2 FOR FIRE SPRINKLER NOTES.
- HANGER RODS TO BE LESS THAN 6" FROM TOP OF PIPE TO STRUCTURAL ATTACHMENT. NO LATERAL EARTHQUAKE BRACING OR BRANCHLINE RESTRAINT REQUIRED.
- UNO ALL HANGERS ARE #2 (C-CLAMP WITH RETAINER STRAP 3/8" ATR AND RING. DETAIL 6/FPIB. FOR ADDITIONAL HANGER DETAILS SEE FPIB.
- FOR EQ BRACE DETAILS SEE SHEET 4 4 5/FPI6.
- 4" NOMINAL CLEARANCE TO BE PROVIDED AROUND PIPE PASSING THROUGH RATED WALLS (PER NFPA 13). SEE 10/FPIB FOR FIRESTOP DETAIL.
- FOR RISER DETAIL SEE 1/FPI6

### WALL LEGEND

----- 1 HR. RATED WALL

### KEY PLAN



### PROJECT DEVELOPMENT

DATE	ISSUED FOR

### REVISIONS

No.	DATE	DESCRIPTION

### SHEET DESCRIPTION

## FIRE SPRINKLER PIPING PLAN

PROJECT COORDINATOR  
GAREN LENCIONI

SHEET No.

PROJECT NO.  
FPE 596

DATE  
05/22/13

SCALE

FP3



# CAL POLY FPE PROJECT

PROJECT:

# FRESNO ELEMENTARY SCHOOL

## KEYNOTES

- 1 NONCOMBUSTIBLE OVERHANG. SPRINKLERS ARE NOT REQUIRED PER NFPA13, 2002, ED. 5.13.8.1.
- 2 OPEN TO ABOVE

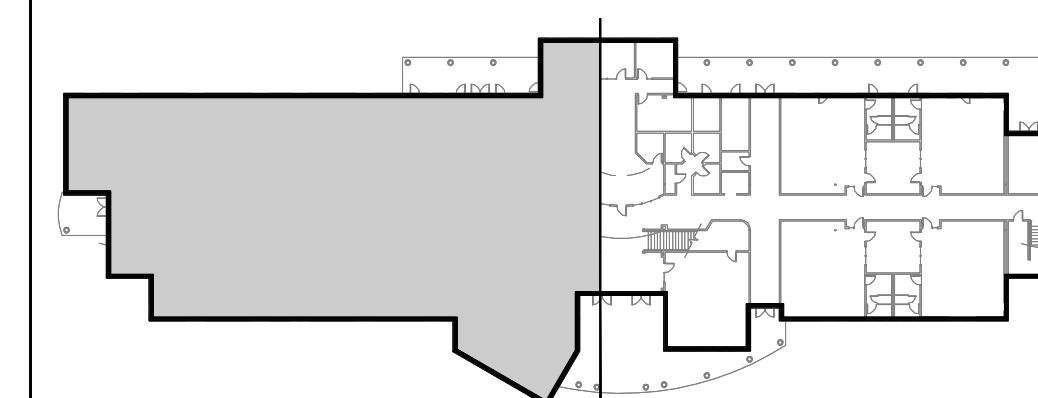
## GENERAL NOTES

1. SEE SHEET FP2 FOR FIRE SPRINKLER NOTES.
2. HANGER RODS TO BE LESS THAN 6" FROM TOP OF PIPE TO STRUCTURAL ATTACHMENT. NO LATERAL EARTHQUAKE BRACING OR BRANCHLINE RESTRAINT REQUIRED.
3. UNO ALL HANGERS ARE #2 (C-CLAMP WITH RETAINER STRAP 3/8" ATR AND RING. DETAIL 6/FP15. FOR ADDITIONAL HANGER DETAILS SEE FP15.
4. FOR EQ BRACE DETAILS SEE SHEET 4 & 5/FP16.
5. 4" NOMINAL CLEARANCE TO BE PROVIDED AROUND PIPE PASSING THROUGH RATED WALLS (PER NFPA 13). SEE 10/FP15 FOR FIRESTOP DETAIL.
6. FOR RISER DETAIL SEE 1/FP16.

## WALL LEGEND

----- 1 HR. RATED WALL

## KEY PLAN



1ST FLOOR FIRE SPRINKLER PIPING PLAN  
EAST SIDE

SCALE: 1/8" = 1'-0"

### SYMBOLS AND DESCRIPTIONS

SYM	QUANT	TYPE	FINISH	TEMP	K FACTOR	THRD	SN #	MPG	MODEL	ESCUTCHEON
▲	98	ECSSP	CHROME	155	112	1/2"	VK532	VIKING	MICROFAST	BEMI REC
●	48	SSP	CHROME	155	5.6	1/2"	VK302	VIKING	MICROFAST	BEMI REC
⊙	1	SSP	CHROME	155	5.6	1/2"	VK309	VIKING	MICROFAST	
	148	TOTAL SHEET FP3 & FP10								

FIRE SPRINKLER INFORMATION IS FOR DSA REVIEW ONLY. INSTALLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING ACCURATE SPRINKLER LAYOUT AND QUANTITIES. NO PRICING ADJUSTMENT WILL BE ALLOWED FOR ADDITIONAL SPRINKLER HEADS ADDED BY CONTRACTOR.

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

### PROJECT DEVELOPMENT

DATE	ISSUED FOR

### REVISIONS

No.	DATE	DESCRIPTION

### SHEET DESCRIPTION

## FIRE SPRINKLER PIPING PLAN

PROJECT COORDINATOR  
GAREN LENCIONI

SHEET No.

PROJECT NO.

FPE 596

DATE

05/22/2013

SCALE

FP4

# CAL POLY FPE PROJECT

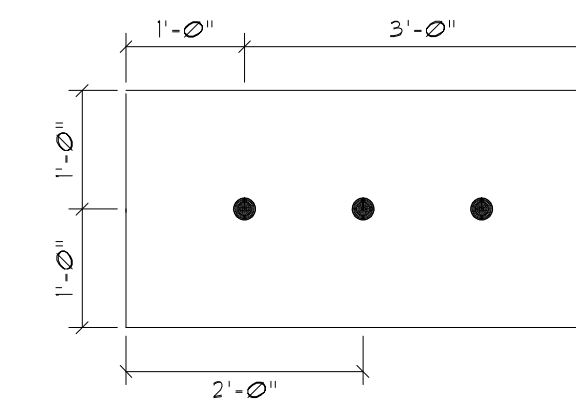
PROJECT:

# FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

## KEYNOTES

- ① PENDENT FIRE SPRINKLERS TO BE LOCATED IN CENTERLINE OF CEILING TILE IN THE 2'-0" DIMENSION AND AT 12" INCREMENTS IN THE 4'-0" DIMENSION.



- ② EXPOSED  
③ EXTENDED COVERAGE PENDENT SPRINKLERS ARE DESIGNED TO COVER AN AREA OF 18' X 18'.

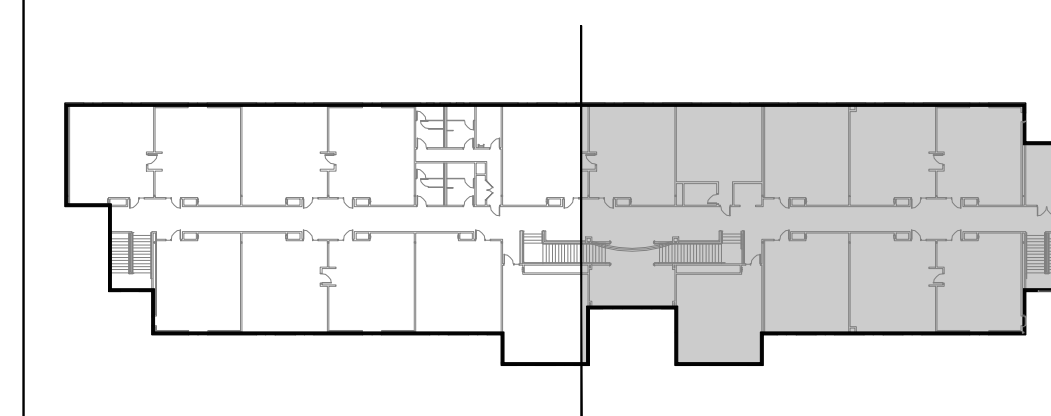
## GENERAL NOTES

1. SEE SHEET FP1 AND FP2 FOR FIRE SPRINKLER SYSTEM NOTES.

## WALL LEGEND

----- 1 HR. RATED WALL

## KEY PLAN



## PROJECT DEVELOPMENT

DATE	ISSUED FOR

## REVISIONS

No.	DATE	DESCRIPTION

## SHEET DESCRIPTION

FIRE SPRINKLER  
REFLECTED CEILING  
PLAN

PROJECT COORDINATOR  
GAREN LENCIONI

SHEET No.

PROJECT NO.

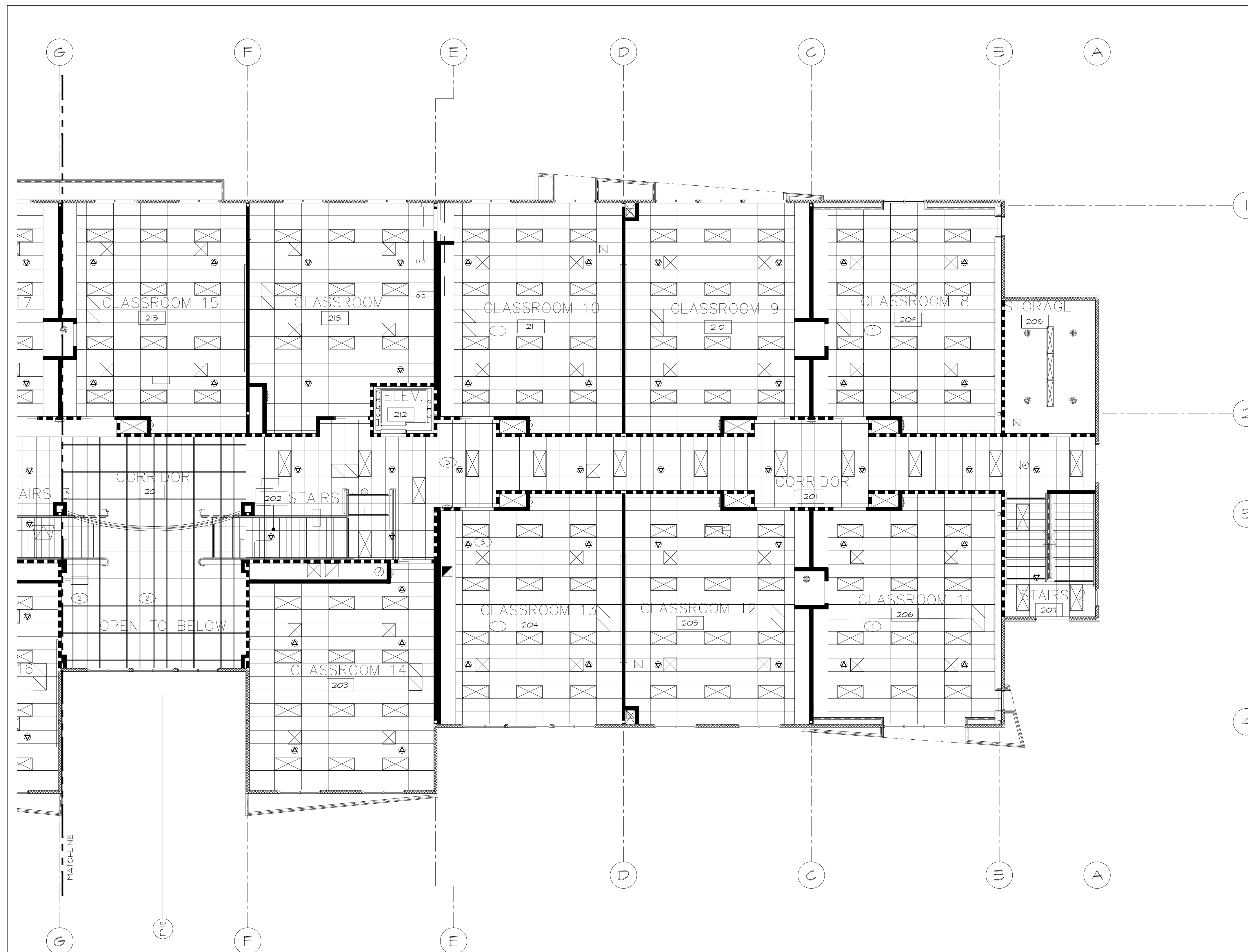
FPE 596

DATE

05/22/2013

SCALE

FP5



2ND FLOOR FIRE SPRINKLER REFLECTED CEILING PLAN  
WEST SIDE  
SCALE: 1/8" = 1'-0"

## SYMBOLS AND DESCRIPTIONS

SYM	QUANT	TYPE	FINISH	TEMP	K FACTOR	THRD	SN #	MRG	MODEL	ESCUTCHEON
△	105	ECSSP	CHROME	155	112	1/2"	VK532	VIKING	MICROFAST	BEMI REC
⊙	15	SSP	CHROME	155	5.6	1/2"	VK302	VIKING	MICROFAST	BEMI REC
○	9	SSP	CHROME	155	5.6	1/2"	VK305	VIKING	MICROFAST	BEMI REC
	129	TOTAL SHEET FP11 & FP12								

FIRE SPRINKLER INFORMATION IS FOR DSA REVIEW ONLY. INSTALLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING ACCURATE SPRINKLER LAYOUT AND QUANTITIES. NO PRICING ADJUSTMENT WILL BE ALLOWED FOR ADDITIONAL SPRINKLER HEADS ADDED BY CONTRACTOR.

# CAL POLY FPE PROJECT

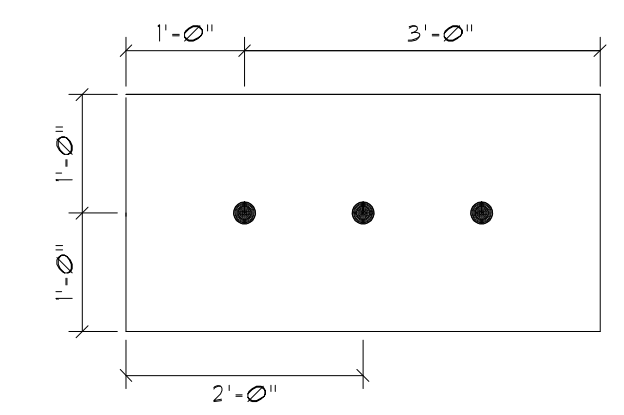
PROJECT:

# FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

### KEYNOTES

① PENDENT FIRE SPRINKLERS TO BE LOCATED IN CENTERLINE OF CEILING TILE IN THE 2'-0" DIMENSION AND AT 12" INCREMENTS IN THE 4'-0" DIMENSION.



② EXPOSED

③ EXTENDED COVERAGE PENDENT SPRINKLERS ARE DESIGNED TO COVER AN AREA OF 18' X 18'.

### GENERAL NOTES

1. SEE SHEET FP1 AND FP2 FOR FIRE SPRINKLER SYSTEM NOTES.

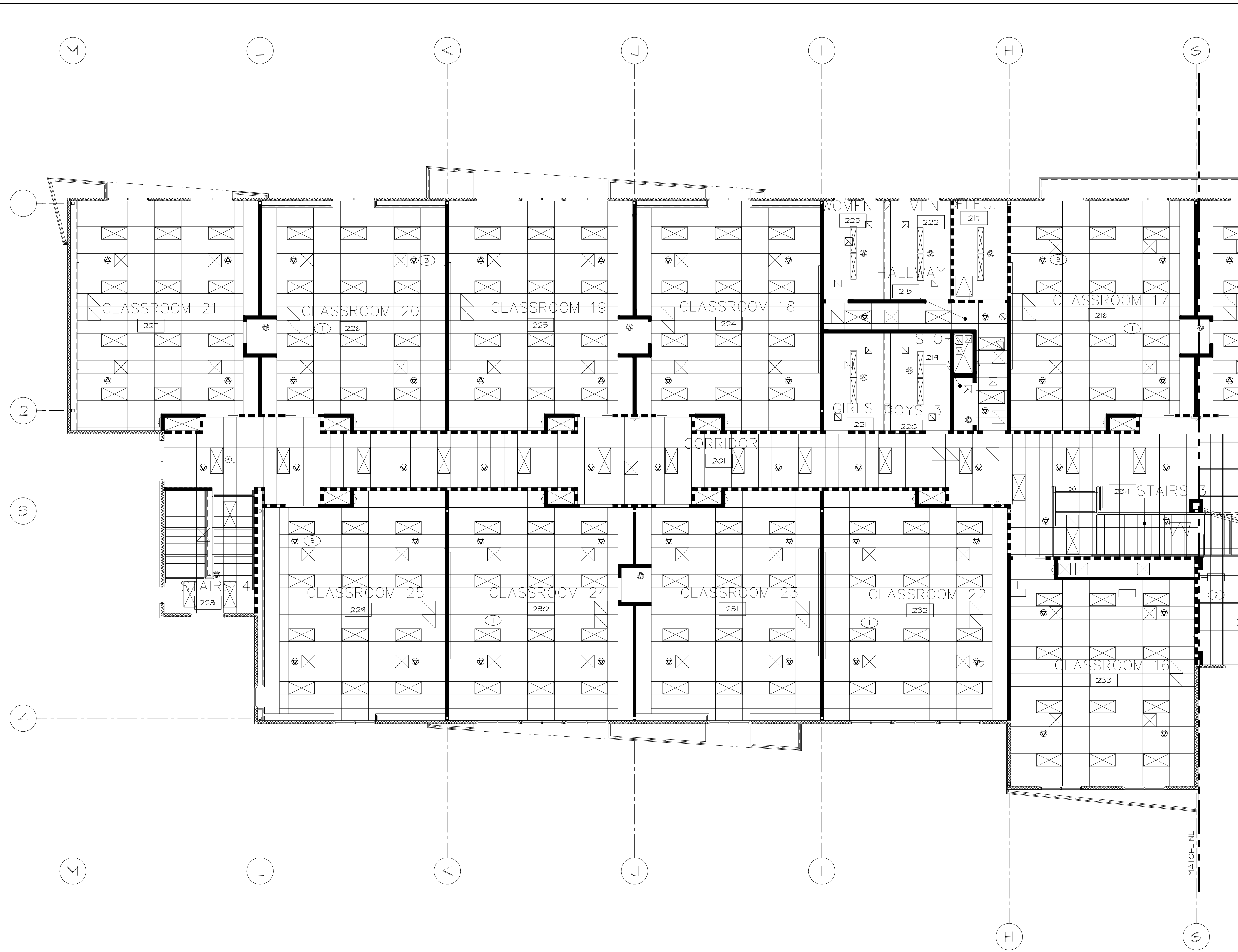
### WALL LEGEND

----- 1 HR. RATED WALL

### KEY PLAN



PROJECT DEVELOPMENT		
DATE	ISSUED FOR	
REVISIONS		
No.	DATE	DESCRIPTION
SHEET DESCRIPTION		
FIRE SPRINKLER REFLECTED CEILING PLAN		
PROJECT COORDINATOR	SHEET No.	
GAREN LENCIONI	FP6	
PROJECT NO.	FPE 596	
DATE	05/22/2013	
SCALE		



2ND FLOOR FIRE SPRINKLER REFLECTED CEILING PLAN  
EAST SIDE  
SCALE: 1/8" = 1'-0"  
NORTH

### SYMBOLS AND DESCRIPTIONS

SYM	QUANT	TYPE	FINISH	TEMP	K FACTOR	THRD	SIN #	MFG	MODEL	ESCUTCHEON
△	105	EC88P	CHROME	155	11.2	1/2"	VK532	VIKING	MICROFAST	SEMI REC
⊙	15	88P	CHROME	155	5.6	1/2"	VK302	VIKING	MICROFAST	SEMI REC
○	9	88P	CHROME	155	5.6	1/2"	VK305	VIKING	MICROFAST	SEMI REC
	129	TOTAL SHEET FP1 & FP2								

FIRE SPRINKLER INFORMATION IS FOR DSA REVIEW ONLY. INSTALLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING ACCURATE SPRINKLER LAYOUT AND QUANTITIES. NO PRICING ADJUSTMENT WILL BE ALLOWED FOR ADDITIONAL SPRINKLER HEADS ADDED BY CONTRACTOR.

# CAL POLY FPE PROJECT

PROJECT:

# FRESNO ELEMENTARY SCHOOL

## KEYNOTES

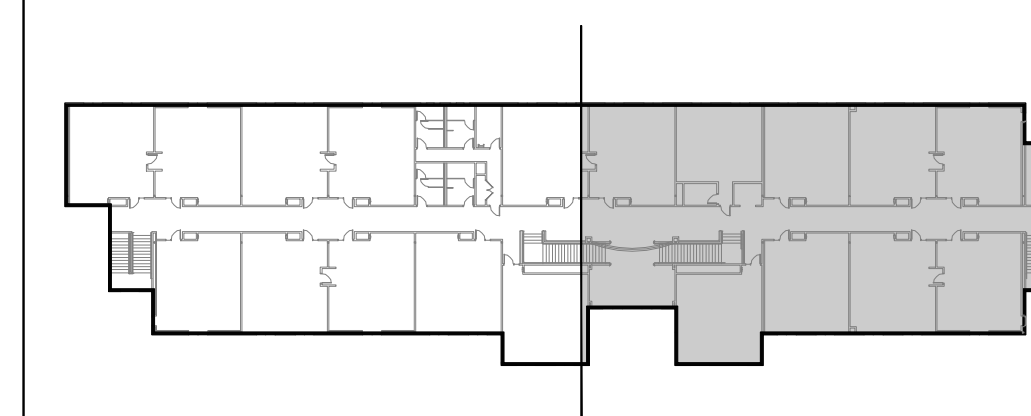
## GENERAL NOTES

- SEE SHEET FP2 FOR FIRE SPRINKLER NOTES.
- HANGER RODS TO BE LESS THAN 6" FROM TOP OF PIPE TO STRUCTURAL ATTACHMENT. NO LATERAL EARTHQUAKE BRACING OR BRANCHLINE RESTRAINT REQUIRED.
- UNO ALL HANGERS ARE #2 (C-CLAMP WITH RETAINER STRAP) 3" ATR AND RING. DETAIL 6/FP15. FOR ADDITIONAL HANGER DETAILS SEE FP15.
- FOR EQ BRACE DETAILS SEE SHEET 4 4 5/FP16.
- 4" NOMINAL CLEARANCE TO BE PROVIDED AROUND PIPE PASSING THROUGH RATED WALLS (PER NFPA 13). SEE 10/FP15 FOR FIRESTOP DETAIL.
- FOR RISER DETAIL SEE 1/FP16

## WALL LEGEND

----- 1 HR. RATED WALL

## KEY PLAN



SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

## PROJECT DEVELOPMENT

DATE	ISSUED FOR

## REVISIONS

No.	DATE	DESCRIPTION

## SHEET DESCRIPTION

## FIRE SPRINKLER PIPING PLAN

PROJECT COORDINATOR  
GAREN LENCIONI

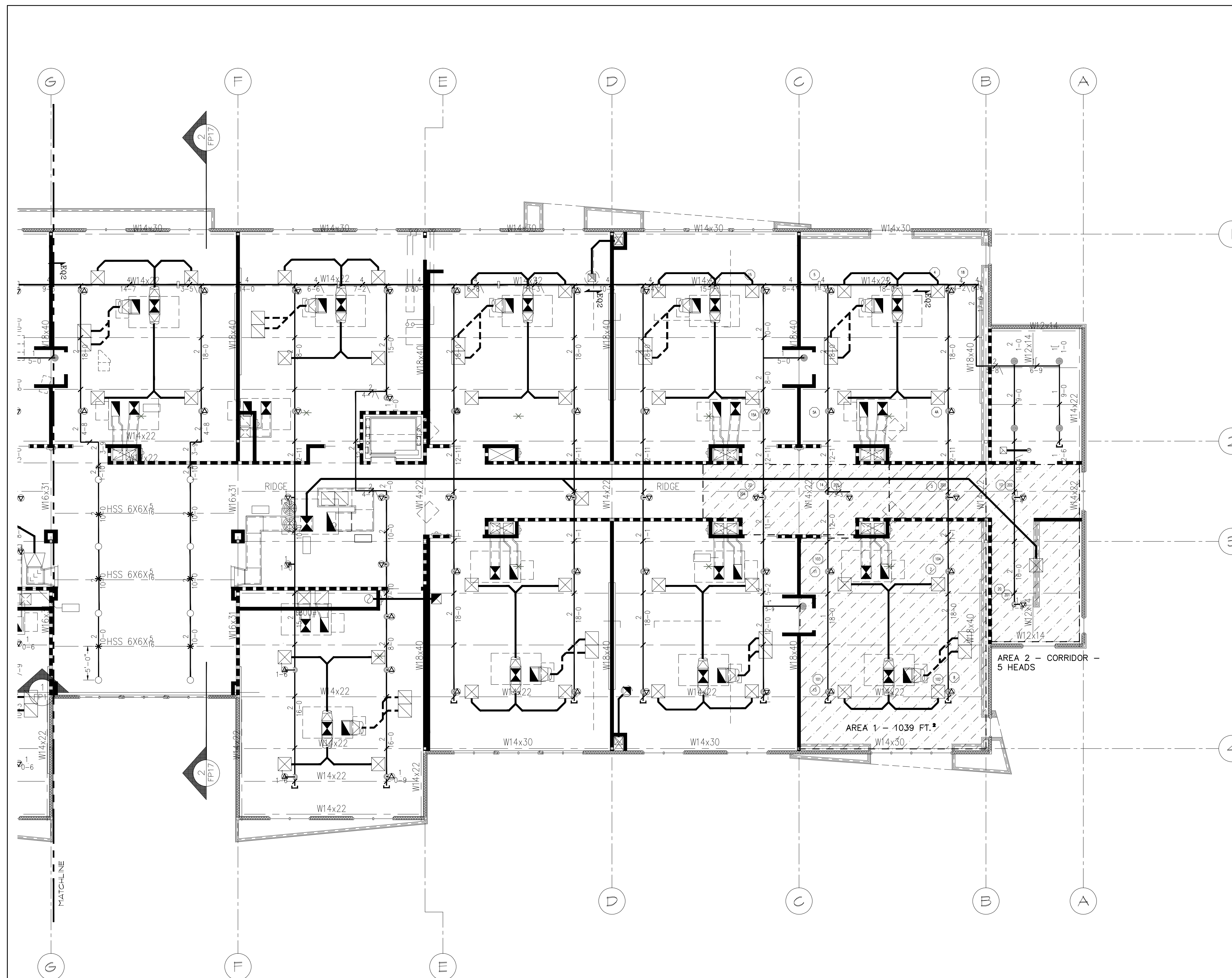
SHEET No.

PROJECT NO.  
FPE 596

DATE  
05/22/2013

SCALE

FP7



2ND FLOOR FIRE SPRINKLER PIPING PLAN  
WEST SIDE

SCALE: 1/8" = 1'-0"

## SYMBOLS AND DESCRIPTIONS

SYM	QUANT	TYPE	FINISH	TEMP	K FACTOR	THRD	SIN *	MEG	MODEL	ESQCUT/CEON
▲	105	EC50P	CHROME	155	112	1/2"	VK532	VIKING	MICROFAST	SEMI REC
●	15	SSP	CHROME	155	5.6	1/2"	VK302	VIKING	MICROFAST	SEMI REC
○	9	SSP	CHROME	155	5.6	1/2"	VK305	VIKING	MICROFAST	SEMI REC
	129	TOTAL SHEET FP13 4 FP14								

FIRE SPRINKLER INFORMATION IS FOR DSA REVIEW ONLY. INSTALLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING ACCURATE SPRINKLER LAYOUT AND QUANTITIES. NO FRICING ADJUSTMENT WILL BE ALLOWED FOR ADDITIONAL SPRINKLER HEADS ADDED BY CONTRACTOR.

# CAL POLY FPE PROJECT

PROJECT:

# FRESNO ELEMENTARY SCHOOL

## KEYNOTES

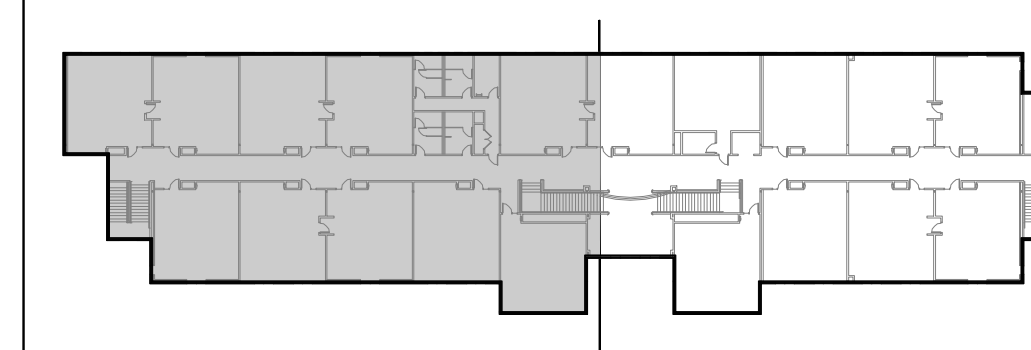
## GENERAL NOTES

- SEE SHEET FP2 FOR FIRE SPRINKLER NOTES.
- HANGER RODS TO BE LESS THAN 6" FROM TOP OF PIPE TO STRUCTURAL ATTACHMENT. NO LATERAL EARTHQUAKE BRACING OR BRANCHLINE RESTRAINT REQUIRED.
- UNO ALL HANGERS ARE #2 (C-CLAMP WITH RETAINER STRAP) 3" ATR AND RING. DETAIL 6/FP15. FOR ADDITIONAL HANGER DETAILS SEE FP15.
- FOR EQ BRACE DETAILS SEE SHEET 4 & 5/FP16.
- 4" NOMINAL CLEARANCE TO BE PROVIDED AROUND PIPE PASSING THROUGH RATED WALLS (PER NFPA 13). SEE 10/FP15 FOR FIRESTOP DETAIL.
- FOR RISER DETAIL SEE 1/FP16.

## WALL LEGEND

----- 1 HR. RATED WALL

## KEY PLAN



SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

## PROJECT DEVELOPMENT

DATE	ISSUED FOR

## REVISIONS

No.	DATE	DESCRIPTION

## SHEET DESCRIPTION

## FIRE SPRINKLER PIPING PLAN

PROJECT COORDINATOR  
GAREN LENCIONI

SHEET No.

PROJECT NO.

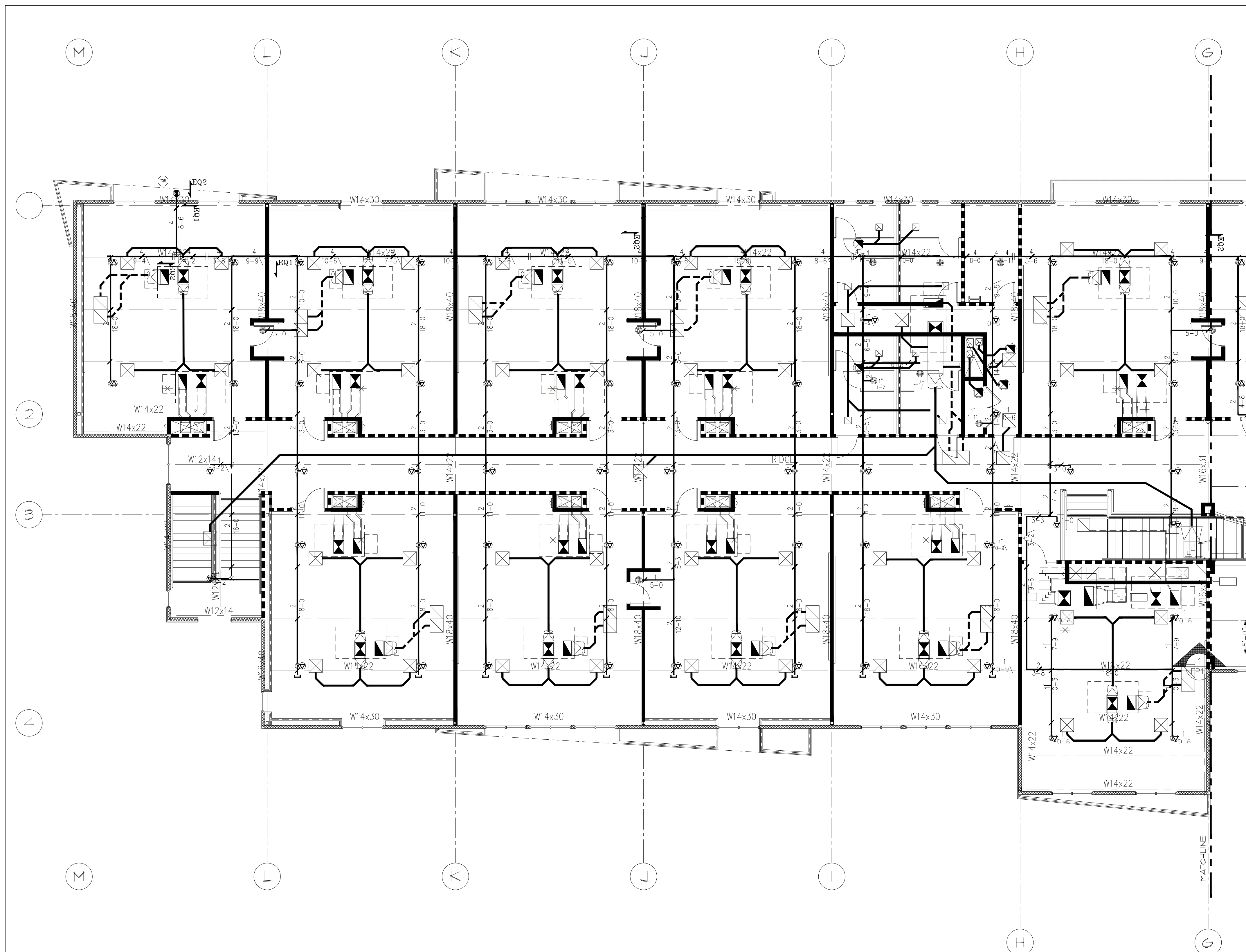
FPE 596

DATE

05/22/2013

SCALE

FP8



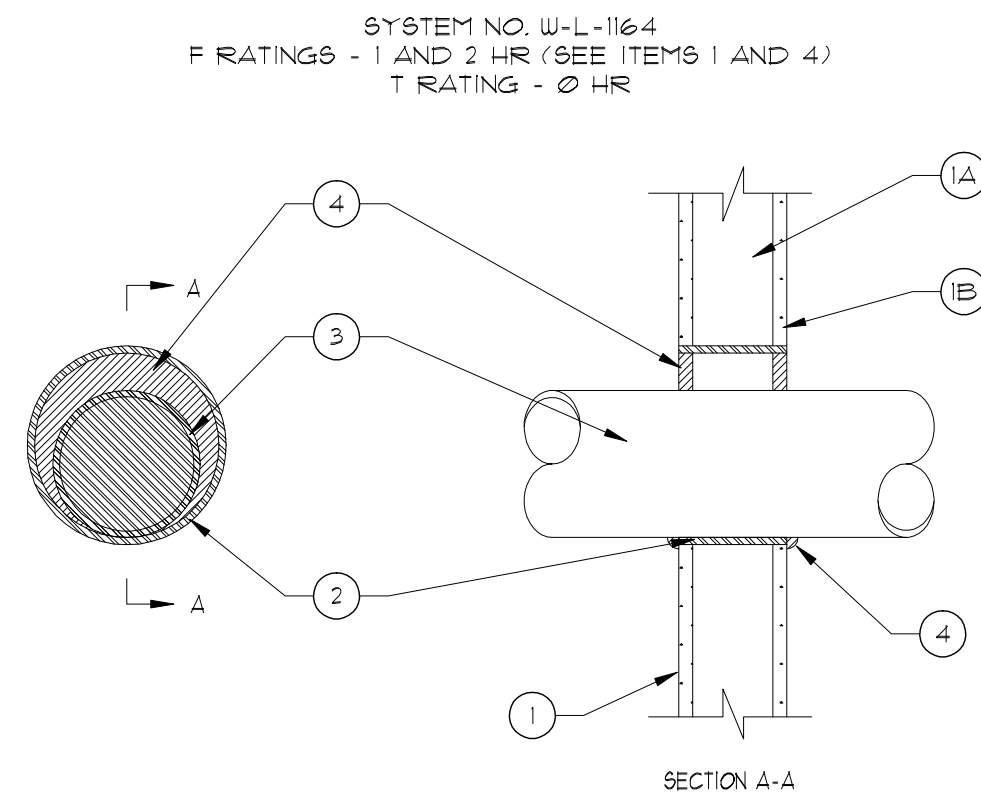
2ND FLOOR FIRE SPRINKLER PIPING PLAN  
EAST SIDE

SCALE: 1/8" = 1'-0"

## SYMBOLS AND DESCRIPTIONS

SYM	QUANT	TYPE	FINISH	TEMP	K FACTOR	THRD	SN *	MEG	MODEL	ESCUTCHEON
▲	105	EC88P	CHROME	155	11.2	1/2"	VK532	VIKING	MICROFAST	SEMI REC
●	15	88P	CHROME	155	5.6	1/2"	VK302	VIKING	MICROFAST	SEMI REC
○	9	88P	CHROME	155	5.6	1/2"	VK305	VIKING	MICROFAST	SEMI REC
	129	TOTAL SHEET FP13 & FP14								

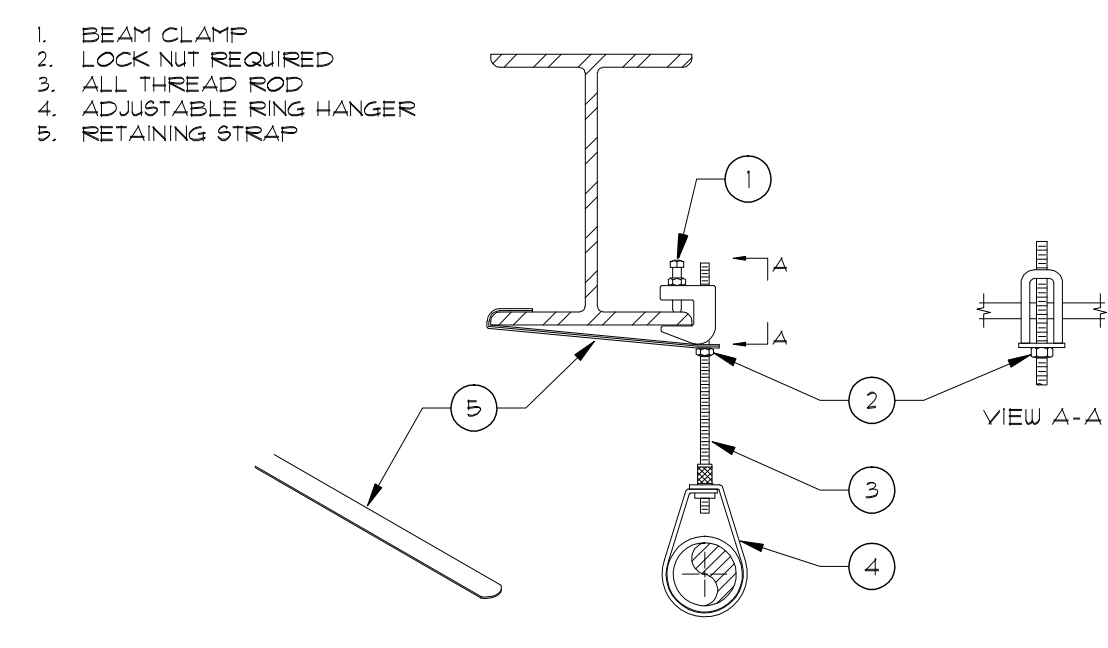
FIRE SPRINKLER INFORMATION IS FOR DSA REVIEW ONLY. INSTALLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING ACCURATE SPRINKLER LAYOUT AND QUANTITIES. NO FRICING ADJUSTMENT WILL BE ALLOWED FOR ADDITIONAL SPRINKLER HEADS ADDED BY CONTRACTOR.



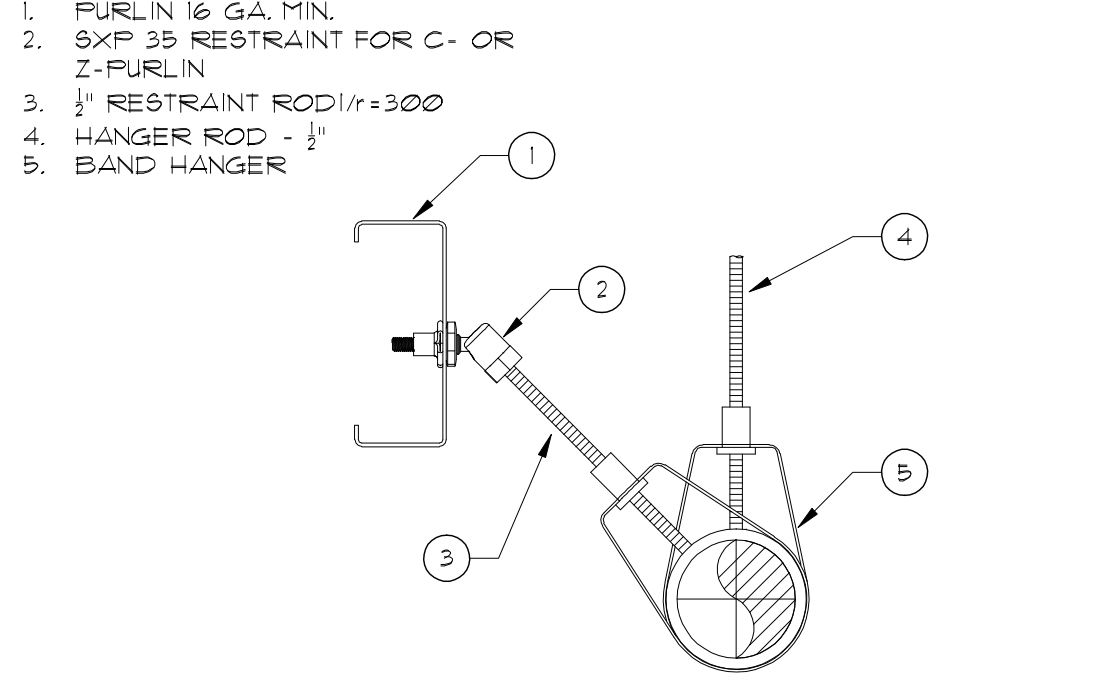
SYSTEM NO. W-L-1164  
F RATINGS - 1 AND 2 HR (SEE ITEMS 1 AND 4)  
T RATING - 0 HR

I. Wall Assembly The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 Series Wall or Partition Design in the U.L. Fire Resistance Directory and shall include the following construction features:  
A. Studs Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of non 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw-attached to the steel studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diam of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides.  
B. Gypsum Board The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the U.L. Fire Resistance Directory. Max diam of opening in steel stud walls is 32 in. Max diam of openings in wood stud walls is 14-1/2 in.  
The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

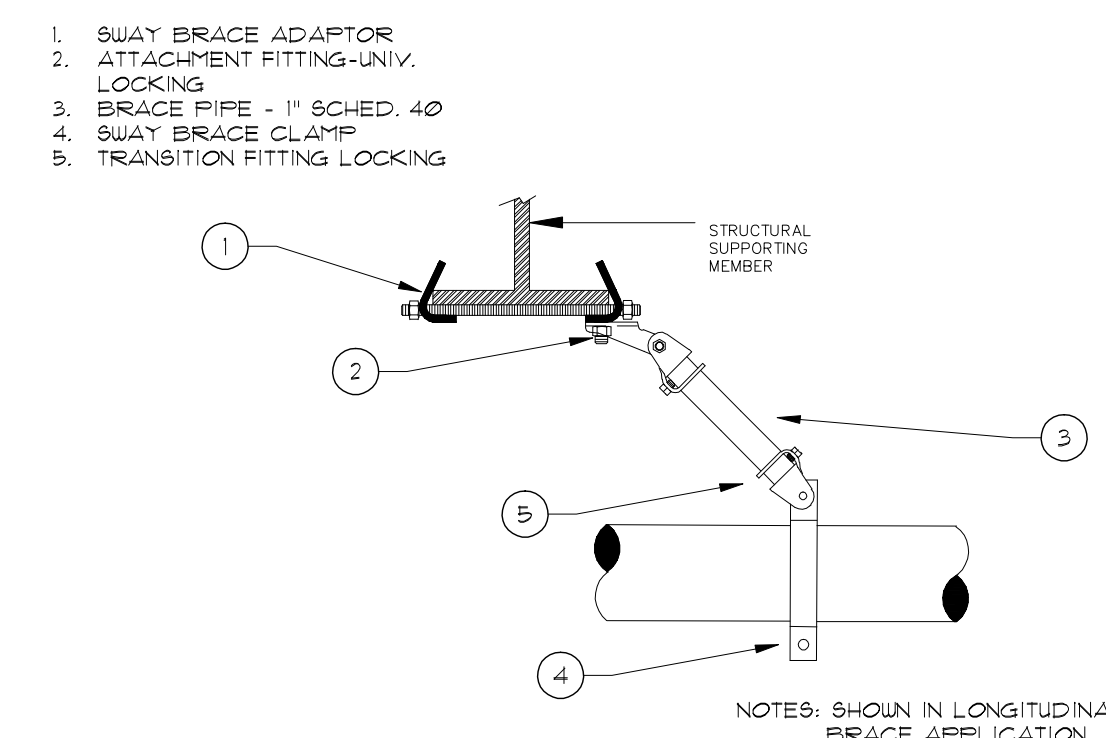
10 FIRE STOP DETAIL FOR RATED WALLS  
NTS



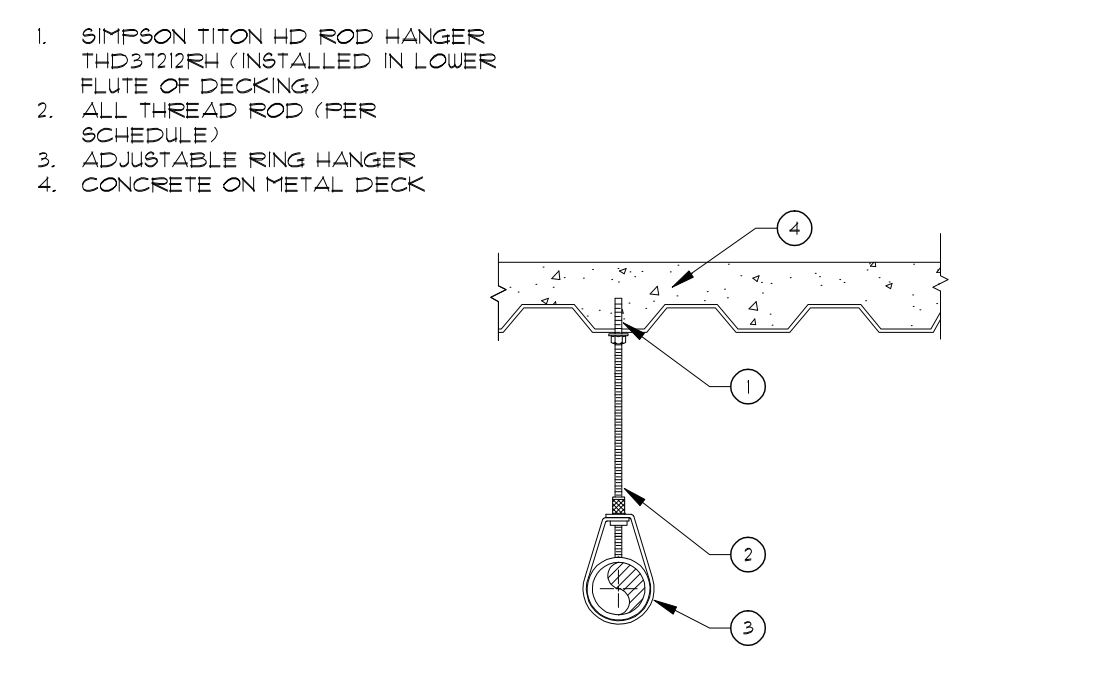
7 BOTTOM BEAM CLAMP, ROD, AND RING  
NTS



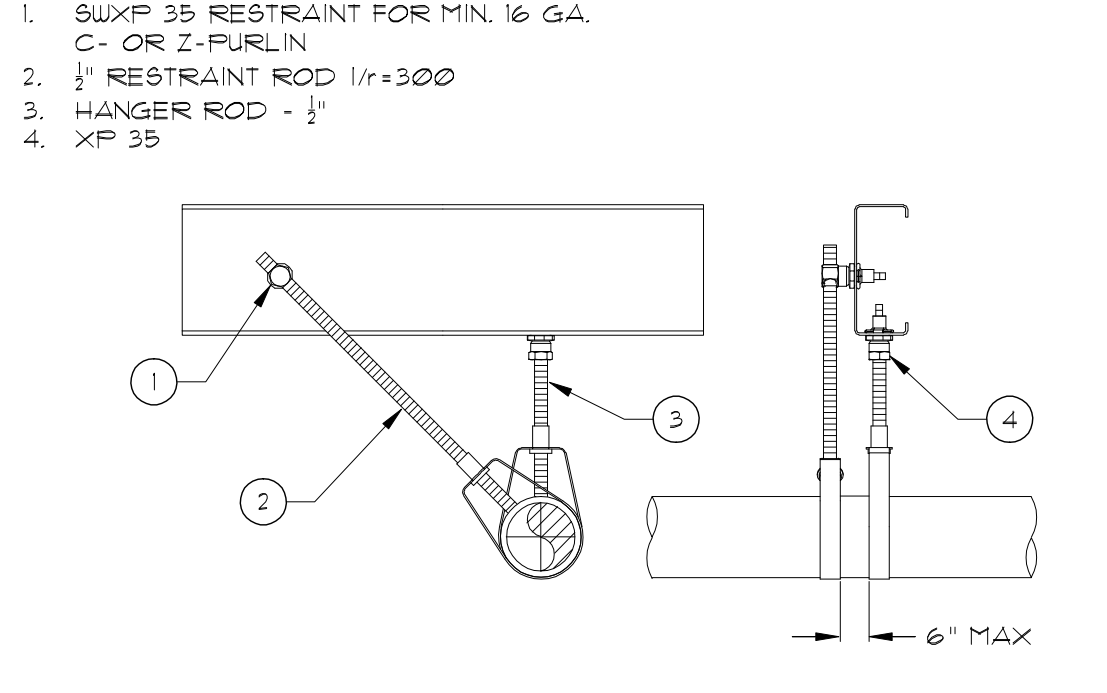
4 LONGITUDINAL EARTHQUAKE BRACE  
RELOCATABLES EQ3 NTS



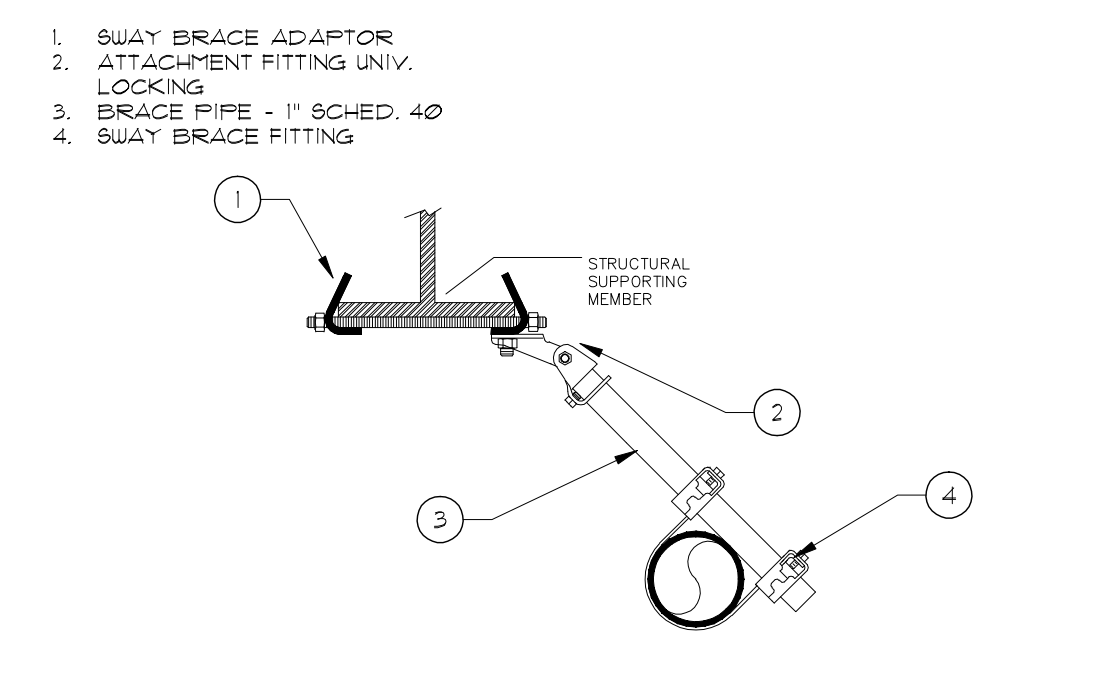
1 SWAY BRACE ATTACHMENT TO STEEL I-BEAM  
EQ2 NTS



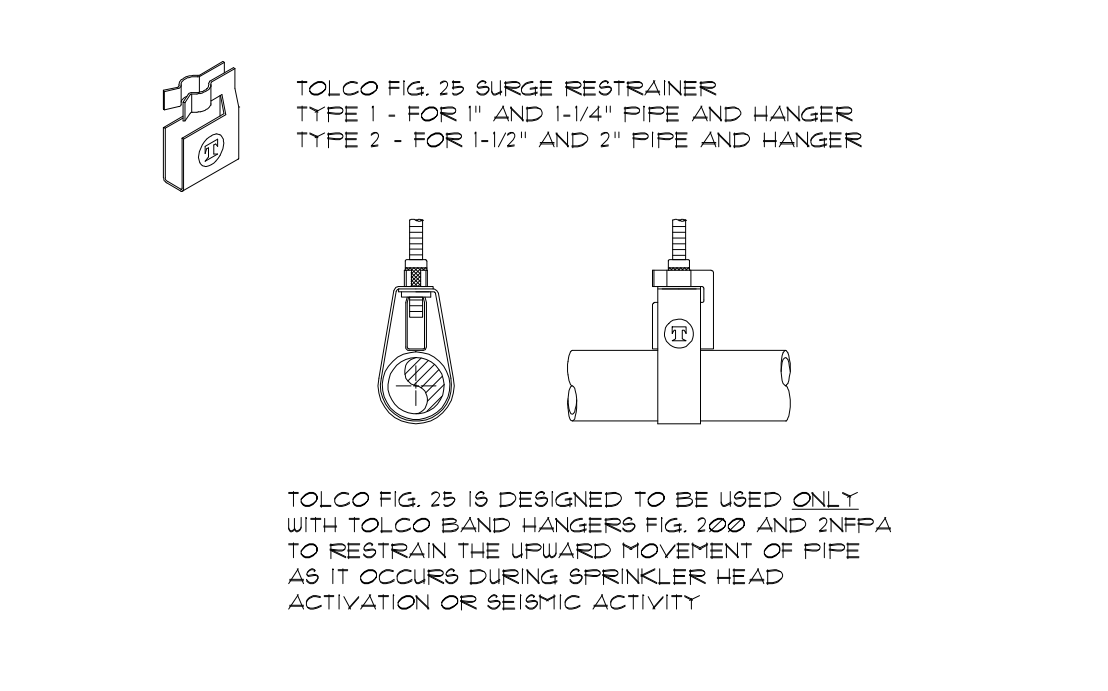
8 CONCRETE THREADED ROD HANGER  
NTS



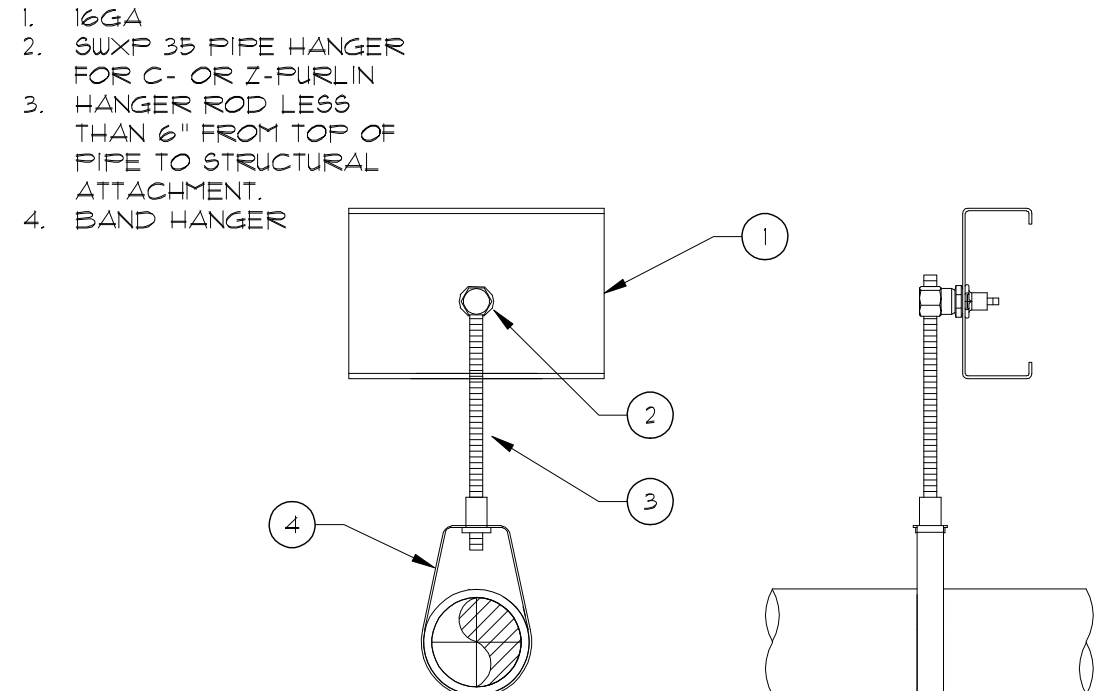
5 LATERAL EARTHQUAKE BRACE  
RELOCATABLES EQ4 NTS



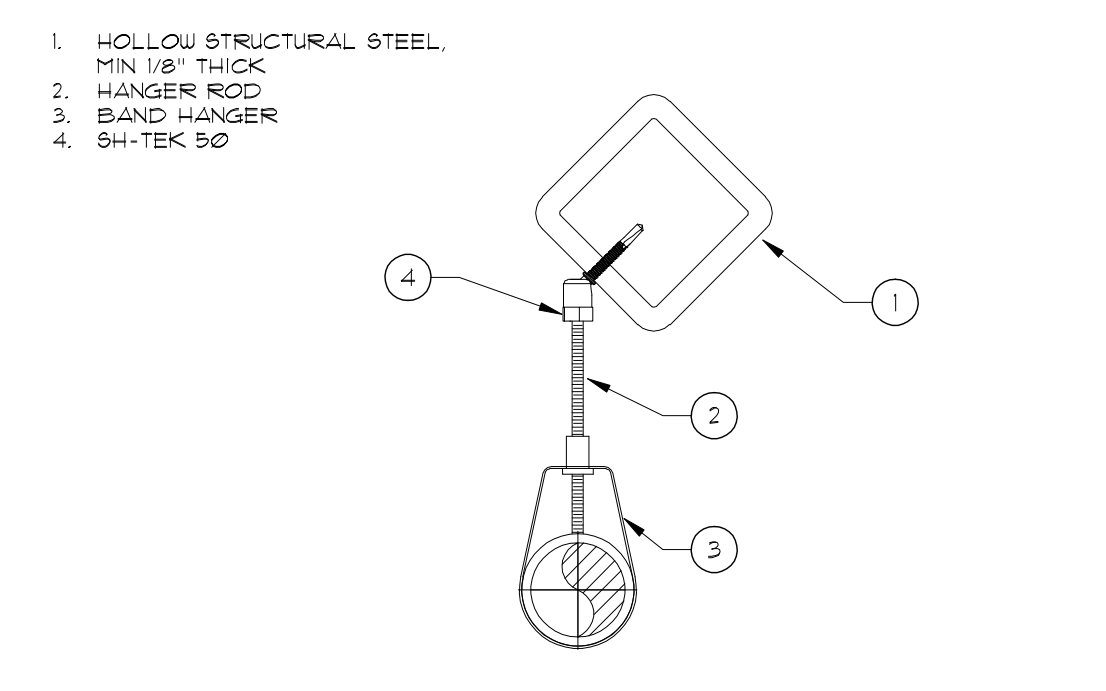
2 SWAY BRACE ATTACHMENT TO STEEL I-BEAM  
EQ1 NTS



9 SURGE RESTRAINER  
NTS



6 SAMMY SCREW HANGER  
RELOCATABLES NTS



3 SAMMY SCREW TO TUBE STEEL  
NTS

# CAL POLY FPE PROJECT

PROJECT:  
FRESNO ELEMENTARY SCHOOL

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

PROJECT DEVELOPMENT	
DATE	ISSUED FOR

REVISIONS		
No.	DATE	DESCRIPTION

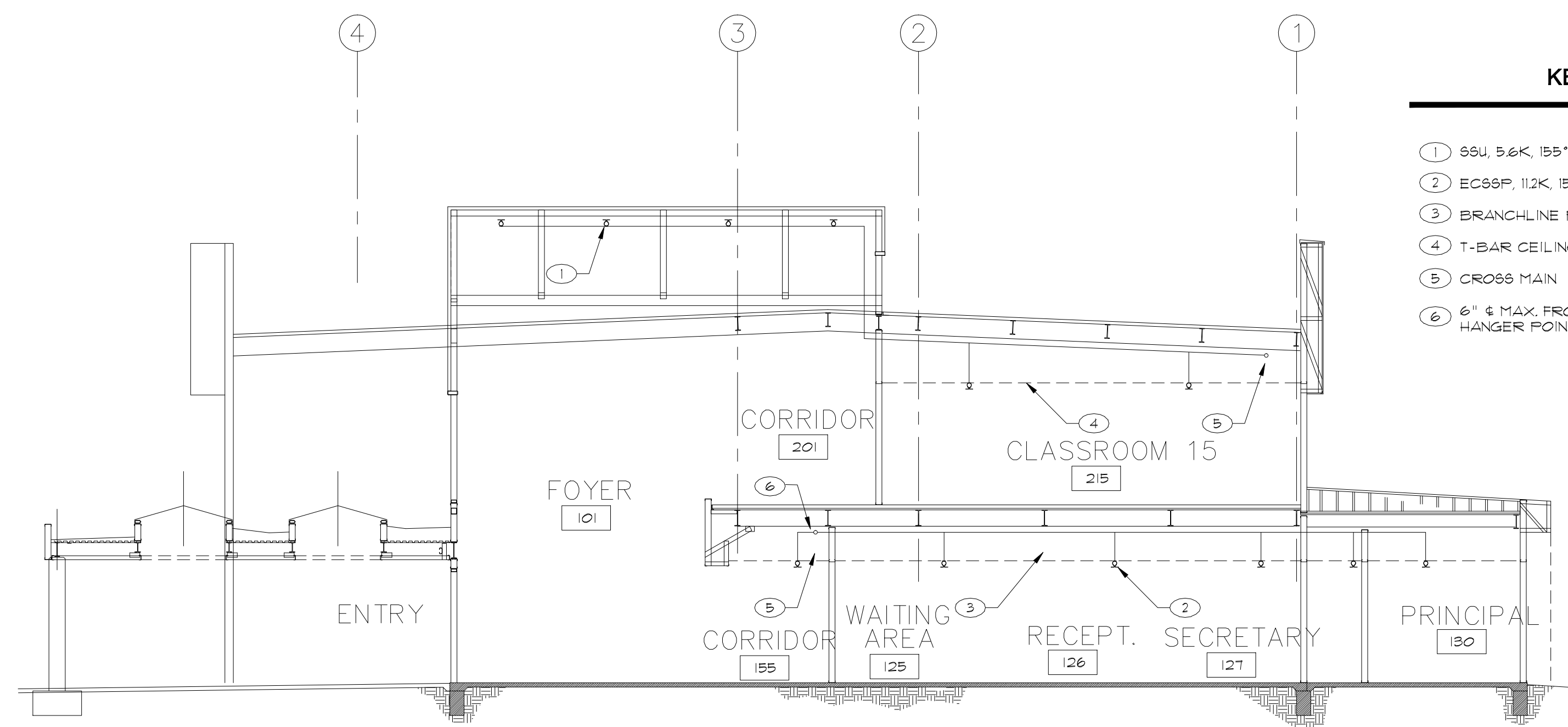
SHEET DESCRIPTION  
FIRE SPRINKLER DETAILS

PROJECT COORDINATOR	SHEET No.
GAREN LENCIONI	FP9
PROJECT NO.	
FPE 546	
DATE	
05/22/2013	
SCALE	

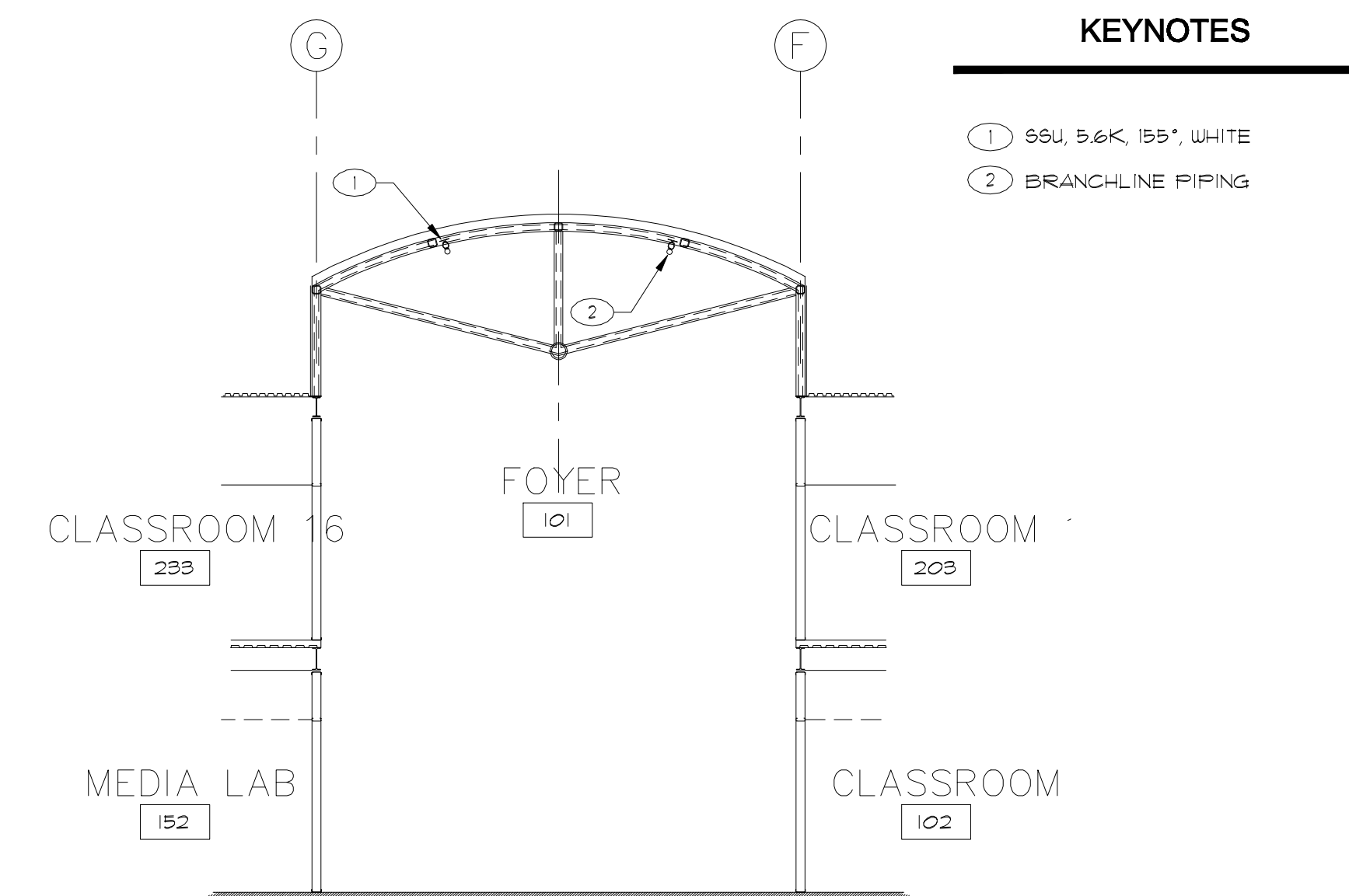
# CAL POLY FPE PROJECT

PROJECT:

## FRESNO ELEMENTARY SCHOOL



2 FIRE SPRINKLER BUILDING CROSS SECTION – MAIN BUILDING  
SCALE: 1/8" = 1'-0"



1 FIRE SPRINKLER BUILDING CROSS SECTION – MAIN BUILDING  
SCALE: 1/8" = 1'-0"

SUBMITTED BY  
GAREN LENCIONI  
JUNE 2013

PROJECT DEVELOPMENT

DATE	ISSUED FOR

REVISIONS

No.	DATE	DESCRIPTION

SHEET DESCRIPTION

FIRE SPRINKLER  
BLDG. CROSS SECTION

PROJECT COORDINATOR GAREN LENCIONI	SHEET No.
PROJECT NO. FPE 546	FP10
DATE 05/22/2013	
SCALE	

## APPENDIX E: FIRE ALARM CUT SHEETS





by Honeywell

FACTP

Fire Alarm  
Control Panel

# E3 Series® Control Panel

## Description

The E3 Series® Expandable Emergency Evacuation System by Gamewell-FCI is in the forefront of the latest generation of fire alarm control panels. Employing the new high-speed Velociti® sensors, the E3 Series provides previously unattainable polling speed and response together with the flexibility demanded by today's emergency evacuation systems. In addition to their high-speed polling rate, the Velociti Series of sensors feature bi-polar LEDs that flash green for normal polling, and light red steadily to indicate an alarm.

The E3 Series is equipped with an 80-character LCD-E3 alphanumeric LCD display that allows 40 characters to be user-defined for customizing installations. Up to six (6), keyboard LCD displays may also be remotely located in addition to five of the familiar LCD-7100 remote displays, allowing for instant system status information to be available in any desired area of an installation.

A high-speed 32-bit processor easily tackles a wide array of applications from small office buildings to sophisticated high-rise installations.

The (64) node networking is made possible by 625K baud/ARCNET communications using twisted-pair copper cable, fiber-optic cable, or a combination of both. In addition, the Addressable Node Expander (ANX) board expands the network to one hundred and twenty-two (122) nodes.

The basic E3 Series is equipped with an ILI-MB-E3/ILI95-MB-E3 Intelligent Loop Interface-Main Board, ILI-S-E3/ILI95-S-E3 Intelligent Loop Interface Expansion Board, ANX, and ASM-16 Addressable Switch Module that features sixteen (16), software programmable switches, each accompanied by red, green and yellow LEDs that can be programmed to indicate operation of the switches. Additional ASM-16 modules may be added to expand the operation to a plateau previously unimagined.

The Intelligent Loop Interface - Expansion Board (ILI-S-E3/ILI95-S-E3) provides the E3 Series control panel with two (2), additional signaling line circuits. The layout is similar to the ILI-MB-E3/ILI95-MB-E3 with the exception that a number of components are omitted. It occupies one node on the Broadband network.

E3 Series® and Velociti® are registered trademarks of Honeywell International Inc.  
UL® is a registered trademark of Underwriters Laboratories Inc.

## Expandable Emergency Evacuation System



E3 Series

## Features

- IBC Seismic Certified
  - Listed under UL® Standard 864, 9th Edition
  - UL Listed for smoke control (dedicated and non-dedicated) when properly configured
  - FM/UL Listed for Pre-action/Deluge use
  - Styles 4, 6, or 7\* signaling line circuits
  - Two to (244) SLCs each supporting 159 sensors and 159 modules
  - 625K baud ARCNET communications using wire, fiber, or mixed configurations for installation flexibility
  - High-speed 32 bit processor and 4100 event history log
  - Advanced Boolean logic-based programming such as AND, OR, NOT, time delay and calendar functions configurable via computer programming
  - Supports up to (16), ASM-16 addressable switch or ANU-48 LED driver modules per ILI-MB-E3/ILI95-MB-E3
  - Two (2), Class A, Style Z or Class B, Style Y, notification appliance circuits rated at 2.0 amps. per circuit
  - Integral city connection
  - Flexible 115,200 baud high speed RS-232 interface
  - 40 character user-defined text per device
  - Supports up to five (5), LCD-7100 displays and six (6), LCD-E3 keyboard displays per ILI-MB-E3/ILI95-MB-E3
- \*Style 7 wiring requires the use of System Sensor M500X Isolator Modules.

continued on next page

An ISO 9001-2000 Company

SIGNALING



S1869



3025415



231-06-E



7165-1703:125



High Rise



VBA-488461C

## GAMEWELL-FCI

12 Clintonville Road, Northford, CT 06472-1610 USA • Tel: (203) 484-7161 • Fax: (203) 484-7118

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[www.gamewell-fci.com](http://www.gamewell-fci.com)

9020-0637 Rev. K page 1 of 2

## Description (Continued)

Each ILI-MB-E3/ILI95-MB-E3 can support as many as sixteen (16), ANU-48 LED Driver modules supporting hundreds of LEDs on a 3rd party graphic annunciator for remote annunciation. The ANU-48 modules may be installed in any Listed remote annunciator. It can be remotely located via an RS-485 serial interface.

An array of cabinets allows for neat, compact, attractive installations.

## Installation

The E3 Series expandable emergency evacuation system offers four (4), cabinet size options. A typical cabinet includes a backbox, an inner door, and an outer door. The E3 Series cabinet assembly is a compact 19 3/8" (49 cm) wide wall-mounted enclosure.

Cabinet A includes the following four options:

- Cabinet A1 inner door mounted to the backbox. The backbox houses one NGA module.
- Cabinet A2 inner door mounted to the backbox. The backbox houses one LCD-E3 module.
- Two or three-bay inner door mounted to the backbox. The backbox typically houses one (1) LCD-E3, or one (1) NGA, and one (1) or two (2), ASM-16 modules.

Cabinet B contains a space for the ILI-MB-E3/ILI95-MB-E3, PM-9/PM-9G modules and batteries set inside the backbox. Additional module options mounted on the backbox include the DACT-E3, and RPT-E3 or ILI-S-E3/ILI95-S-E3/ANX. The 2-bay inner door houses one (1), LCD-E3 module and one (1), ASM-16 module.

Both Cabinets C and D include the following:

- Pre-assembled outer door that gives visibility to the fire fighter's phone handset and a microphone voice messaging system.
- Two inner door panel selections that may contain optional modules to meet the facility operation requirements.

In the Cabinet B, C and D backboxes, the ANX appears in the same place as the ILI-MB-E3/ILI95-MB-E3 and PM-9/PM-9G. For information on the installation instructions for any of the E3 Series cabinets, refer to the E3 Series® Expandable Emergency Evacuation Installation/Operating Manual Part Number: 9000-0574.

## Specifications

<b>Operating Voltage:</b>	24 VDC
<b>Operating Temperature:</b>	Not to exceed the range of 32° to 120° F (0 to 49° C)
<b>Relative Humidity:</b>	Not to exceed 93% non-condensing at 90° F (32° C)

## Features (Continued)

### Velociti® Intelligent Sensor Features:

- Poll 318 devices in less than two (2) seconds
- Activate up to 159 outputs in less than five (5) seconds
- LED's blink associated device address during Walk Test
- Fully digital, hi-precision protocol
- Up to 9 levels of sensitivity adjustment
- Pre-Alarm adjustable between 15 levels for both Alert and Action
- Day/night automatic sensing adjustment
- Sensitivity windows:
  - Ion .05 to 2% obscuration
  - Photo 1 to 3% obscuration
  - Laser .02 to 2% obscuration
  - MCS Acclimate2F .5 to 4%, also self-adjustable options 1 to 2%, 2 to 3%, and 3 to 4%
  - HARSH 1 to 3% obscuration
- Drift compensation
- Each Loop Card has its own integral processor providing maximum survivability on loss of any other component. SLC provides full response on loss of any other system processor
- Optional programmable switches can be configured to enable, disable or group any combination of output devices
- Integrated point or Grouped Cross Zoning allows for numerous devices installed at any location to cooperate and determine alarm condition
- Automatic detector sensitivity testing
- DIRTY and VERY DIRTY detector maintenance alerts

## Ordering Information

Part Number	Description
ILI-MB-E3	Intelligent Loop Interface-Main Board
ILI95-MB-E3	Intelligent Loop Interface-Main Board
ILI-S-E3	Intelligent Loop Interface-Expansion Board
ILI95-S-E3	Intelligent Loop Interface-Expansion Board
ANX-SR	Addressable Node Expander-Single Ring
ANX-MR-FO	Addressable Node Expander-Multi-Ring Fiber Optic
ANX-MR-UTP	Addressable Node Expander-Multi-Ring Twisted-pair
LCD-E3	LCD-E3, LCD Keypad Display
RPT-E3-FO	Network Repeater (fiber and twisted-pair)
RPT-E3-UTP	Network Repeater (twisted-pair only)
DACT-E3	Digital Alarm Communicator Transmitter
ANU-48	ANU-48 LED Driver Module
ASM-16	Addressable Switch Module
NGA	LCD Network Graphic Annunciator
PM-9	Power Supply Module
PM-9G	Power Supply Module
LCD-7100	Remote LCD Display

For additional information on the cabinets, refer to the E3 Series Cabinets data sheet (Part Number: 9020-0649).

### Seismic Battery Bracket Kits

For information on the types of Seismic Battery Bracket Kits that are available and the Seismic Battery Bracket Kit Part Numbers, refer to the following documents:

- Seismic Battery Bracket Installation Guide, P/N: 53839
- E3 Series Cabinets Data Sheet, P/N: 9020-0649

### GAMEWELL-FCI



by Honeywell

EXP  
Fire Alarm  
Expander  
Panel

# FireForce 8

## Description

The FireForce 8 (FF8) from Gamewell-FCI is a Notification Appliance Circuit (NAC) extender panel designed to extend the power capabilities of existing NACs and provide power (1.5 A) for other ancillary devices. The FF8 will connect to any brand of a UL-Listed Fire Alarm Control Panel (FACP) to provide Notification Appliance Circuit expansion.

Designed with advanced switch-mode power-supply technology, the FireForce 8 provides filtered and electronically-regulated power distributed to four (4) NACs. Each NAC is rated at 3.0 Amp. maximum, with a total output capacity of 8.0 Amp. The outputs may be configured as the following:

- Four (4), Class B (Style W, X, Y)
- Two (2), Class A (Style Z)
- Two (2), Class B and one Class A
- Four (4), Class A (Style Z) with the optional Class A adaptor installed

The FF8 includes an internal battery charger.

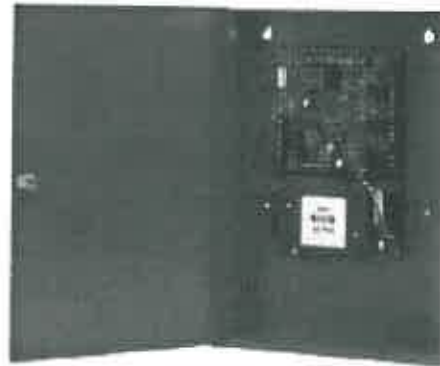
Gamewell-FCI's FF8 provides independent output circuit supervision. In the event of a NAC fault, the FF8 can be configured to notify the FACP. The FF8 has field-selectable, built-in strobe and horn sync protocols. Protocols support Faraday, Gentex, System Sensor, Amseco, and Cooper-Wheelock devices; or pass through a pre-generated sync protocol from a single synchronization source. This eliminates the need for additional individual sync modules. Independent horn silencing via sync protocol allows synchronized horns and strobes to operate on a single circuit.

One of the most challenging aspects of a retrofit application is locating the existing EOL resistor. In retrofit applications that have EOL values other than the 3.9K ohm EOL resistor normally used with the FF8, a single resistor matching the existing EOL can be used as a reference EOL for all outputs. This feature speeds installation and system check-out. The reference resistor must be within a range of 2K ohm to 25K ohm.

"FireForce 8" labeling is placed on the cabinet front, making the FF8 ideal for all retrofit applications.

For enhanced notification appliance circuit survivability, the FF8 can utilize its dual-activation inputs for redundant trip operation.

## NAC Expander/Power Supply



FireForce 8

## Features

- Provides two fully-supervised input/control circuits
- Redundant activation option for survivability
- Multiple sync protocols, compatible with the following appliances: Cooper-Wheelock, Faraday, System Sensor, Amseco, and Gentex-as field-selectable options
- Four (4) configurable supervised NAC outputs
- 8.0 Amp., 24 VDC, fully regulated full-load output (power-limited)
- Output fault notification to FACP
- 1.5 A auxiliary power output
- Eight trouble and status LEDs
- Common trouble Form-C relay
- Isolated AC Fail Form-C relay, immediate or delayed six hours
- Ground fault detection
- 26 AH battery charger capability
- Selectable temporal coding
- Facilitates multiple NAC synchronization for large areas
- Optional multipack for up to four FF8s in a single lockable enclosure
- Optional Class A adaptor

An ISO 9000-2000 Company



### GAMEWELL-FCI

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CS-2282 Rev. a page 1 of 2

## Engineer's Specifications

The Fire Alarm System shall be designed with remotely located Notification Appliance Circuit (NAC) Expander/Power Supplies for the support of notification appliances. The remote Power Supplies shall be fully supervised and shall provide 8.0 Amps. of notification appliance power and 1.5 Amps. of auxiliary power output. The NAC Extender Panel shall be able to select strobe synchronization protocol via an internal dip switch. There shall be five selectable protocols available. The NAC Extender Panel shall synchronize all outputs simultaneously. The NAC Extender Panel shall be able to use existing notification appliance circuit's end-of-line resistors in the range of 2K – 25K ohms for retrofit applications. The internal battery charging circuit shall charge up to 26 AH batteries. The NAC Expander/Power Supply shall be a Gamewell-FCI FireForce 8.

## Options

### 31081

SCE-95 mounting plate provides a means to install two (2) SCE-95 modules. The addition of SCE-95s provides a means to run on FF8 outputs via a panel command on an SLC. The 31081 mounts over the main PCB and is hinged for access to FF8 terminal.

### FF8-MP

Multipack FF8 option provides a means to place up to four (4) FF8s or 31085s (XP95 device mounting plates) in a single lockable enclosure. UL approved.

### 31076

Class A adaptor converts the four (4) Class B outputs to four (4) Class A outputs.

## Specifications

**Primary Input Power:** 120 VAC, 60 Hz, 3.0 A or 220 V, 1.5 A; jumper selectable

**Secondary Power:** 24-volt operation: two 7 – 24 AH batteries

### Battery Charging

**Capacity:** Up to 26 AH batteries

**Battery Space:** Up to two 12 AH batteries maximum inside the FF8 cabinet. Larger batteries require a separate battery cabinet

**Total Output Power:** 8.0 A maximum

**Standby Current:** 0.030 A

### Auxiliary Power

**Output:** 0.15 A under all conditions  
1.5 A, if load is removed during operation (external relay or AC Fail relay use required).

**NAC Output Ratings:** 24 VDC fully regulated, 3.0 A maximum per circuit (8.0 A total)

### End-of-Line Resistor

**Range:** 2K to 25K, 1/2 watt

### Common Trouble

**Relay, AC Fail Relay:** 2.0 A/28 VDC or 120 VAC

## Specifications (Continued)

**Input Control Circuit:** 16 – 30 VDC @ 5 mA minimum

**Temperature Rating:** 32°F to 120°F (0°C to 49°C)

**Relative Humidity:** 10 - 93%, non-condensing

### Dimensions:

#### FF8 Cabinet:

18.0" H x 12.5" W x 4.5" D  
(45.72 H x 31.75 W x 11.43 D cm)

#### FF8-MP Cabinet:

37.2" H x 24.0" W x 6.0" D  
(94.49 H x 60.96 W x 15.24 D cm)

Field Selectable NAC Signaling	
INPUT	OUTPUT (Follows Input)
Steady	Temporal
Steady	Steady - SYNC
Steady	Steady with Noise Eliminated
Sync	Sync

## Ordering Information

Model	Description
FF8	24 VDC, 8.0 Amp., fire alarm NAC expander/ power supply with integral battery charger
FF8-MP	Multipack cabinet with one FF8 and space for up to three additional FF8-CMs or 31085s (See Options Section).
FF8-CM	Chassis assembly version of FF8, for mounting in FF8-MP spaces
31076	Class A adaptor, converts signal circuits to Class A wiring (See Options Section).
31081	Mounting plate for placing up to two SCE-95 modules into the FF8 (FF8 and FF8-MP compatible, See Options Section).
31085	Mounting plate for placing XP95 devices into the FF8-MP; includes standoffs for eight devices
BAT-1270	Battery, 12 VDC, 7 AH (two required for 24 V operation)
BAT-12120	Battery, 12 VDC, 12 AH (two required for 24 V operation)

### GAMEWELL-FCI

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F

Manual  
Pull Station

# MS-7 Series

by Honeywell

## Description

The Gamewell-FCI, MS-7 Series manual fire alarm stations are available in a wide variety of configurations. The Stations comply with the Americans with Disabilities Act (ADA) 5-lb. maximum pull force requirement. Operating instructions and Braille text are engraved in the handle. All stations have a key lock/reset which is keyed alike with Gamewell-FCI fire alarm control panels and other manual fire alarm stations.

### MS-7AF Velociti Addressable Station

The MS-7AF Velociti® Series addressable station is a double action station designed for installation in the signaling line circuit of Gamewell-FCI analog addressable control panels. Activation of the station causes its assigned address to register at the control panel. The door contains an LED which flashes green in normal condition and lights steady red when the station has been activated.\* The station features screw terminals.

### MS-7ASF Velociti Addressable Station

The MS-7ASF Velociti® Series addressable station is a single action station designed for installation in the signaling line circuit of Gamewell-FCI analog addressable control panels. Activation of the station causes its assigned address to register at the control panel. The door contains an LED which flashes green in normal condition and lights steady red when the station has been activated.\* The station features screw terminals.

The Velociti® Series stations use a communication protocol that substantially increases the speed of communication between the sensors and certain Gamewell-FCI analog addressable fire alarm controls. These devices operate in a grouped fashion. If one of the devices in the group has a status change, the panel's microprocessor stops the group poll and focuses on the single device. The net effect is response speed up to five times greater than earlier designs.

### MS-7 Double Action Station

The MS-7 double action station is used with conventional fire alarm control panels. It features a set of single pole contacts and screw terminals for connection to an initiating circuit.

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LEXAN® is a registered trademark of GE Plastics, a subsidiary of General Electric Company.

## Non-Coded, Manual Fire Alarm Stations



MS-7

## Features

- Addressable stations compatible with all Gamewell-FCI analog addressable fire alarm controls
  - Conventional stations suitable for use with any UL® Listed control panel
  - Both single and double action stations available
  - Tumbler lock for test and reset keyed alike with Gamewell-FCI controls
  - Surface or semi-flush mounting
  - Shock and vibration resistant
  - Stations (MS-7LOB) Listed for outdoor applications
  - Complies with ADA pull force requirements
- \*Only the red LED is operative in panels that do not operate in Velociti mode.

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### MS-7S Single Action Station

The MS-7S single action station is used with conventional fire alarm control panels. It features a set of single pole contacts and wire leads for connection to an initiating circuit.

### MS-7SP Double Action Station

The MS-7SP is a double action station similar to the MS-7 station, with the additional feature of both English and Spanish instructions molded into the unit.

### MS-7LR Dual-action Agent Release Station

The MS-7LR is designed for use with the Gamewell-FCI fire alarm control panels with releasing capabilities and Flex Series releasing systems. It features a set of single pole contacts and screw terminals for connection to an initiating circuit.

### MS-7LRA Agent Release Station with Abort

The MS-7LRA is designed for use with the Gamewell-FCI fire alarm control panels with releasing capabilities and Flex Series releasing systems where system abort capabilities are required. It consists of an MS-7LR mounted on a plate with an abort switch and LED indicators for system normal, and system activated status.

### MS-7LOB Double Action Station (Listed for Outdoor Applications)

The MS-7LOB station must be mounted on a Model SB-I/O backbox. In retrofit applications, the station is UL Listed for use with the WP-10 backbox. It is intended for use with conventional control panels and has a set of single pole contacts and screw terminals.

### Mounting

The MS-7 interior stations may be surface mounted or semi-flush mounted on a standard double-gang, or 4-inch (10.2 cm) square electrical box. An optional trim ring (BG12TR) may also be used for semi-flush mounting.

### NYC-Plate

The NYC-Plate provides the backplate for the manual pull station. (See Figure 1).



Figure 1 NYC-Plate

## Specifications

<b>Material:</b>	Lexan®
<b>Contact Ratings:</b>	0.25 amps. @ 30 VAC/VDC (resistive)
<b>Dimensions:</b>	5 5/8" H x 4 1/4" W x 1 1/4" D (14 x 10.1 x 3.2 cm)
<b>Operating Temperature</b>	
<b>(MS-7AF, MS-7ASF):</b>	32° to 120° F (0° to 49° C)
<b>(MS-7LOB):</b>	-30° to 150° F (-35° to 66° C)
<b>Relative Humidity</b>	
<b>(MS-7AF, MS-7ASF):</b>	10 to 93% (non-condensing)
<b>(MS-7LOB):</b>	85% ± 5% @ 86° ± 3.6° (30° ± 2° C)
<b>Alarm Current:</b>	.0030 amp. 0.007 for LED
<b>Supervisory Current</b>	
<b>(MS-7AF, MS-7ASF):</b>	.00030 amps.

## Ordering Information

Part Number	Description
MS-7	Double action station
MS-7AF**	Velociti addressable double action station
MS-7ASF**	Velociti addressable single action station
MS-7S	Single action station, wire leads
MS-7SP	Double action station, English and Spanish instructions
MS-7LR	Agent release station, dual-action
MS-7LRA	Agent release station with abort switch, LED indicators, dual-action
MS-7LOB	Double action station, outdoor use (Includes SB-I/O - Indoor/outdoor use backbox)
SB-I/O	Indoor/outdoor use backbackbox
SB-10	Surface backbox
BG12TR	Trim ring for semi-flush mount, plastic
NY-PLATE	NYC backplate for manual pull station

\*\*For use with the Gamewell-FCI analog addressable control panels only.

### GAMEWELL-FCI



by Honeywell

(H) Heat Detector

(A) Attic Heat Detector

# Velociti® Series ATD-L2F, ATD-RL2F

§ ATD-HL2F

## Description

The Gamewell-FCI Velociti® Series, addressable plug-in thermal sensors with integral communication provide features that surpass conventional sensors. Point ID capability allows each sensor's address to be set, providing exact locations for pinpointing alarm locations and for selective maintenance. ATD thermal sensors use an innovative thermistor sensing circuit to produce 135°F/57°C fixed-temperature (ATD-L2F). The ATD-RL2F provides a combination 15°/minute rate-of-rise with 135° fixed thermal detection that is included in a low-profile package. The ATD-HL2F provides fixed high-temperature detection at 190°F/88°C. These thermal sensors provide cost-effective, addressable property protection in a variety of applications.

The Velociti® Series uses a communication protocol that substantially increases the speed of communication between the sensors and Gamewell-FCI analog addressable fire alarm controls. These devices operate in a grouped fashion. If one of the devices in the group has a status change, the panel's microprocessor stops the group poll and concentrates on the single device. The net effect is response speed up to five times greater than earlier designs.

## Installation

ATD plug-in sensors use a separate base to simplify installation, service, and maintenance. A special tool allows maintenance personnel to plug-in and remove sensors without using a ladder.

Mount the base on a box which is at least 1.5" (3.8 cm) deep. Suitable mounting base boxes include:

- 4.0" (10.2 cm) square box.
- 3.5" (8.9 cm) or 4.0" (10.2 cm) octagonal box.
- Single-gang box (except relay or isolator base).
- With B200SR base, mounted on a 4.0" (10.2 cm) square box.
- With B224RB or B224BI base, mounted on a 3.5" (8.9 cm) octagonal box, or a 4.0" (10.2 cm) octagonal or square box.

NOTE: Because of the inherent supervision provided by the SLC, end-of-line resistors are not required. Wiring "T-taps" or branches are permitted for Style 4 (Class "B") wiring.

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ULC® is a registered trademark of Underwriters Laboratories Canada Inc.

## Addressable Thermal Sensor



ATD-L2F

## Features

- Sleek, low-profile design
- Visual rotary switch addressing
- Built-in functional test switch activated by an external magnet
- Bicolor LEDs flash green whenever the sensor is addressed, and light steadily red on alarm\*
- Optional relay, isolator, or sounder bases
- Low standby current
- Addressable communication
- Stable communication technique with noise immunity
- Optional remote, single-gang LED accessory (RA-400Z)
- Suitable for installation in ducts

Note: \*Only the red LED is operative in panels that do not operate in Velociti® mode.

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SIGNALING



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S2332

3023594

219-02-E Vol.VI

7270-1703:115

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## Specifications

<b>Size:</b>	2.1" (5.3 cm) high x 4.1" (10.4 cm) diameter installed in B501 base, 6.1" (15.5 cm) diameter installed in the ADB-FLF base
<b>Shipping Weight:</b>	4.8 oz. (137 g)
<b>Operating Temperature:</b>	
<b>ATD-L2F or ATD-RL2F</b>	-4° F to 100° F (-20° C to 38°C)
<b>ATD-HL2</b>	-4° F to 150°F (-20 C to 66°C)
<b>Sensor Spacing:</b>	UL® approved for 50 ft. (15.2 m) center to center FM approved for 25 x 25 ft. (7.6 x 7.6 m) spacing
<b>Relative Humidity:</b>	10 – 93% (non-condensing)
<b>ATD-L2F</b>	Fixed-temperature setpoint 135°F (57°C)
<b>ATD-RL2F</b>	Combination 135° F fixed temperature and 15° (8.3°c) per minute rate-of-rise°
<b>ATD-HL2F</b>	Fixed-temperature setpoint 190°F (88°C)

## Electrical Specifications

<b>Voltage Range:</b>	15 - 32 volts DC peak
<b>Standby Current:</b>	200 mA @ 24 VDC (without communication)
<b>(max. avg.)</b>	.0003 A @ 24 VDC (one communication every 5 seconds with LED enabled)
<b>LED Current (max.)</b>	.0065 A @ 24 VDC (LED lit)
<b>Voltage Range</b>	15 -32 volts DC peak

## Specifications

### Bases and Options

<b>ADB-FLF</b>	6.1" (15.5 cm) diameter standard base
<b>B501</b>	4.1" (10.4 cm) diameter flangeless base
<b>B200SR</b>	Standard Sounder base, UL® 864 9th Edition compliant, ULC® Listed
<b>Diameter:</b>	6.875" (17.46 cm)
<b>B224RB</b>	Relay Base Up to 14 AWG (2.0 mm <sup>2</sup> ) Relay type: Form-C
<b>Rating:</b>	2.0A @ 30 VDC resistive 0.3 A @ 110 VDC inductive 1.0 A @ 30 VDC inductive
<b>B224RB</b>	Relay Base
<b>Dimensions:</b>	6.2" (15.7 cm) x 1.2" (3.0 cm)
<b>B224BI</b>	Isolator Base
<b>Dimensions:</b>	6.2" (15.7 cm) x 1.2" (3.0 cm) Maximum 25 devices between isolator bases
<b>RA-400Z</b>	Remote alarm indicator, LED
<b>BCK-200</b>	Black detector covers (box of 10)

## Ordering Information

Model	Description
<b>ATD-L2F</b>	Addressable thermal sensor, fixed, 135° F
<b>ATD-RL2F</b>	Addressable thermal sensor, combination fixed, 135° F and 15°/minute rate-of-rise.
<b>ATD-HL2F</b>	Addressable thermal sensor, fixed, 190° F

### GAMEWELL-FCI





by Honeywell

② Smoke Detector

# Velociti® Series ASD-PL2F, ASD-PTL2F and ASD-PL2FR

## Description

The Gamewell-FCI Velociti® Series, analog addressable plug-in smoke sensors with integral communication provide features that surpass conventional sensors. Sensitivity can be programmed in the control panel software, and is continuously monitored and reported to the panel. Point ID capability allows each sensor's address to be set, providing exact locations for selective maintenance when the chamber contamination reaches an unacceptable level. The ASD-PL2F photoelectric sensor's unique optical sensing chamber is engineered to sense smoke produced by a wide range of combustion sources. Dual electronic thermistors add 135°F (57°C) fixed-temperature thermal sensing on the ASD-PTL2F model.

The Velociti® Series use a communication protocol that substantially increases the speed of communication between the sensors and certain Gamewell-FCI analog addressable fire alarm controls. These devices operate in a grouped fashion. If one of the devices in the group has a status change, the panel's microprocessor stops the group poll and concentrates on the single device. The net effect is a response speed up to five times greater than earlier designs.

## Ordering Information

Model	Description
ASD-PL2F	Analog, addressable photoelectronic smoke sensor
ASD-PTL2F	Analog, addressable photoelectronic smoke sensor with thermal sensing
ASD-PL2FR	Analog, addressable photoelectronic smoke sensor used with the DNR duct base when the remote test is required.

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UL® is a registered trademark of Underwriters Laboratories Inc.

## Analog, Addressable Photoelectronic Smoke Sensor



ASD-PL2F/ASD-PTL2F



ASD-PL2FR

## Features

- Sleek, low-profile design
- Visual rotary, decimal switch addressing (01-159)
- Built-in functional test switch activated by an external magnet
- Bicolor LEDs flash green whenever the sensor is addressed, and light steady red on alarm\*
- Optional relay, isolator, or sounder bases
- Low standby current
- Analog addressable communication
- Stable communication technique with noise immunity
- Optional remote, single-gang LED Indicator (RA400Z)
- Compatible with Gamewell-FCI analog addressable panels

Note: \*Only the red LED is operative in panels that do not operate in Velociti® mode.

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SIGNALING



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219-02-E Vol.VI 7272-1703:121

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## Installation

ASD-PL2F plug-in sensors use a separate base to simplify installation, service, and maintenance. A special tool allows maintenance personnel to plug-in and remove sensors without using a ladder.

Mount the base on a box which is at least 1.5" (3.8 cm) deep. Suitable mounting base boxes include:

- 4.0" (10.2 cm) square box
- 3.5" (8.9 cm) or 4.0" (10.2 cm) octagonal box
- Single-gang box (except relay or isolator bases)
- With B200SR base, mounted on a 4.0" (10.2 cm) square box
- With B224RB or B224BI base, mounted on a 3.5" (8.9 cm) octagonal box, or a 4.0" (10.2 cm) octagonal or square box

**NOTE:** Because of the inherent supervision provided by the SLC, end-of-line resistors are not required. Wiring "T-taps" or branches are permitted for Style 4 (Class "B") wiring.

### Sensor Spacing

Gamewell-FCI recommends that the spacing sensors be used in compliance with NFPA 72.

## Specifications

**Size:** 2.1" (5.1 cm) high x 4.1" (10.4 cm) diameter installed in the B501 base, 6.1" (15.5 cm) diameter installed in the ADB-FL base.

**Shipping Weight:** 5.2 oz. (147 g)

### Operating

**Temperature:** ASD-PL2F:  
32° F to 120° F (0° C to 49° C)  
ASD-PTL2F:  
32° F to 100° F (0° C to 38° C)

### UL®-Listed

**Velocity Range:** 0-4000 ft./min. (1,219.2 m/min.), suitable for installation in ducts.

### Relative

**Humidity:** 10-93% (non-condensing)

**Thermal Ratings:** Fixed-temperature setpoint  
135° F (57° C)

## Electrical Specifications

**Voltage Range:** 15 – 32 volts DC peak

**Standby Current:** (max. avg.): .0003 A @ 24 VDC  
(one communication every 5 seconds with LED enabled)

### Maximum Alarm

**Current:** .0065 A @ 24 VDC (LED) lit.

## Bases and Options

**ADB-FL** 6.1" (15.5 cm) diameter  
**B200SR** 6.875" (17.46 cm) Base Diameter  
2.0" (5.08 cm) Base Height

### B224RB

#### Relay Base

Screw terminals:

Up to 14 AWG (2.0 mm<sup>2</sup>)

Relay type: Form-C

Rating:

2.0A @ 30 VDC resistive;

0.3 A @ 110 VDC inductive;

1.0 A @ 30 VDC inductive.

Dimensions:

6.2" x 1.2" (15.7 x 3.0 cm)

**Maximum:** 25 devices between isolator bases.

### RA400Z

### BCK-200

### DNR

Remote alarm indicator, LED.

Black detector covers (box of 10)

Duct smoke housing

## GAMEWELL-FCI



by Honeywell

D

Duct  
Smoke  
Detector

# Velociti® Series ADPF and ADPRF

## Description

The Gamewell-FCI Velociti® Series, low-flow photoelectric air duct smoke sensors are capable of sensing smoke in air velocities from 100 to 4,000 feet per minute (0.5 to 20.32 m/sec.).

ADPF sensors feature low-flow technology that enables duct smoke detection throughout a broad range of airflow environments. Many difficult to solve HVAC applications occur in low airflow duct applications where reliable smoke detection is critical. ADPF low-flow technology can detect smoke at air speed velocities of 100 feet per minute or greater, while continuing the same reliable performance to 4,000 feet per minute.

The ADPF sensor samples air currents passing through a duct and gives dependable performance for shutdown of fans, blowers, and air conditioning systems, preventing the spread of toxic smoke and fire gases through the protected area.

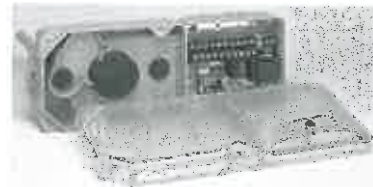
The Velociti® Series use a communication protocol that substantially increases the speed of communication between the sensors and certain Gamewell-FCI analog addressable fire alarm controls. These devices operate in a grouped fashion. If one of the devices in the group has a status change, the panel's microprocessor stops the group poll and concentrates on the single device. The net effect is a response speed up to five times greater than earlier designs.

These intelligent sensors communicate and are continuously monitored through the signaling line circuit. Sensor sensitivity changes caused by dirt, temperature, or humidity are reported to the panel, allowing compensation algorithms to maintain the sensor's set sensitivity. An advance indication at the panel specifies the sensor address, allowing for selected maintenance to be performed as needed.

## Analog Addressable Low-Flow Duct Sensor



ADPF



ADPRF

## Features

- Air velocity rating from 100 to 4,000 feet per minute (0.5 to 20.32 m/sec.)
- Patented telescopic sampling tube
- Easily accessible code switches
- Outside mounting tabs
- **Easy** and quick mounting to round or rectangular ducts from 1'-12' (0.3-3.7 meters) wide
- Easy to clean
- UL recognized field-replaceable power and sensor boards
- Transparent cover for convenient visual inspection. Bi-color LEDs flash green whenever the sensor is addressed, and light steady red on alarm

\*Note: Only the red LED is operative in panels that do not operate in Velociti mode.

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## Description (continued)

Remote alarm annunciation can be accomplished by using the RA400Z remote annunciator or the RTS451 or RTS451KEY remote test station. Both these devices allow testing of the sensor from a remote location.

ADPF low-flow duct sensors are designed for simplified installation and easy maintenance. The modular construction allows for easy cleaning and uncomplicated field replacement of the UL recognized power and sensor boards.

The ADPF (non-relay) has outputs for a remote LED display and remote test switch. It incorporates zener diodes to conserve power for communications to other devices. The ADPF is a 2-wire device that requires signaling line circuit power only.

The ADPRF (with relay) has powered outputs for remote LED indication with a remote test switch and audible sounder. Two form "C" auxiliary contacts can be configured as a relay version or jumpered to mimic the non-relay version. It has a patented cover tamper trouble signal. The ADPRF is a 4-wire device that requires both signaling line circuit power and either 24VAC/DC or 120/240VAC for proper operation.

## Specifications

<b>Operating Temperature</b>	32° to 131° F (0° to 55° C)
<b>Operating Humidity</b>	10 to 93% relative humidity
<b>Range:</b>	(non-condensing)
<b>Storage Temperature</b>	-22° to 158° F
<b>Range:</b>	(-30° to +70° C)
<b>Duct Air Velocity:</b>	100-4000 ft./min. (0.5—20.32 m/s)
<b>Shipping Weight:</b>	ADPF: 3.35 lbs. (1.5 kg) ADPRF: 3.90 lbs. (1.8 kg)
<b>Dimensions</b>	
<b>Length:</b>	14 3/4" (37 cm)
<b>Width:</b>	5 1/2" (14 cm)
<b>Depth:</b>	2 3/4" (7 cm)

### Model ADPF (Non-relay)

<b>Voltage Range:</b>	15 to 32 VDC
<b>Standby Current:</b>	300 $\mu$ A @ 24 VDC (one communication every 5 seconds with LED flash enabled)

## Model ADPRF (with Relay)

### Current Requirements (using no accessories)

<b>Power</b>				
<b>Supply Voltage:</b>	20-30 VDC	30 VAC,	120 VAC,	22/240 VAC,
		50-60 Hz	50-60 Hz	50-60 Hz
<b>Max. Standby</b>				
<b>Current:</b>	26 mA	65 mA RMS	44 mA RMS	25 mA RMS
<b>Max. Alarm</b>				
<b>Current:</b>	87 mA	182 mA RMS	52 mA RMS	30 mA RMS
<b>Alarm Response</b>				
<b>Time:</b>	3 to 10 sec.	3 to 10 sec.	3 to 10 sec.	3 to 10 sec.

### Auxiliary Relay Contact Ratings

Alarm auxiliary contacts\* (DPDT):

10 A @ 30 VDC
10 A @ 277 VAC (0.75 power factor)
240 VA @ 249 VAC (0.4 power factor)
1/8 HP @ 120 VAC
1/4 HP @ 240 VAC

Supervisory contact (SPST):

2.0 A @ 30 VDC (resistive)

Minimum switching current for auxiliary contact must be 100 mA DC minimum @ 5 VDC.

### Accessory Current Loads at 24 VDC

Device	Standby	Alarm
PA400	0 mA	15 mA Max.
RA400Z	0 mA	12 mA Max.
RTS451/ RTS451KEY	0 mA	10 mA Max.

## Ordering Information

### Part Number Description

<b>ADPF</b>	Analog addressable low-flow photoelectric non-relay duct smoke sensor
<b>ADPRF</b>	Analog addressable low-flow photoelectric with relay duct smoke sensor
<b>ST-1.5</b>	Sampling tube duct widths 1'-2'
<b>ST-3</b>	Sampling tube duct widths 2'-4'
<b>ST-5</b>	Sampling tube duct widths 4'-8'
<b>ST-10</b>	Sampling tube duct widths 8'-12'
<b>A5060</b>	Replacement power board for ADPF-RF (w/relay)
<b>A5067</b>	Replacement power board for ADPF (w/o relay)

### Accessories Description

<b>RTS451</b>	Remote test station
<b>RTS451KEY</b>	Remote test station w/key
<b>RA400Z</b>	Remote LED
<b>F36-09-11</b>	Replacement filters
<b>M02-04-00</b>	Test magnet
<b>P48-21-00</b>	End cap of metal sampling tube
<b>P48-61-00</b>	End cap for plastic sampling tube
<b>S08-39-01</b>	Replacement photo insect screen

### GAMEWELL-FCI

**Weatherproof Appliances - Series AH Audibles, AS Audible Strobes, MT Multitone Strobes, RSS Strobes and ET70 Speaker Strobes and Weatherproof Mounting Accessories**



H Outside Horn

**Description:**

Designed for life safety, performance and reliability, Cooper Wheelock's cost effective weatherproof notification appliances include:

<p>Weatherproof Appliances Strobes Horn Strobes → Horns Multitone Horn Strobes Multitone Horns Speaker Strobes Speakers</p>	<p>Series RSSWP ASWP AH-24WP, AH-12WP MTWP MT ET70WP ET-1010</p>
---	--

All strobe models are UL dual listed - meeting both UL1638 and UL1971 requirements. As dual listed appliances, these weatherproof strobes, horn strobes and speaker strobes are listed for outdoor applications under UL 1638 as well as under UL 1971, the Standard for Safety Signaling Devices for Hearing Impaired. With an extended temperature range of -31°F to 150°F (-40°C to 66°C), Wheelock weatherproof appliances meet or exceed UL outdoor test requirements for rain, humidity and corrosion resistance while providing multiple strobe intensity options, including the highest strobe ratings available for area coverage per NFPA 72 strobe spacing tables (up to 185 candela for wall mounting and 177 candela for ceiling mounting).

To enable weatherproof mounting, Cooper-Wheelock provides the industry's widest choice of mounting options for surface or unique semi-flush installation. Models are available for surface mounting to Wheelock weatherproof backboxes on walls or ceilings. The optional WP-KIT allows the weatherproof backboxes (IOB, WPBB or WPSBB) to be mounted to a recessed electrical box for concealed conduit installation. For semi-flush installation, the WPA\* and WFPA\* kits allow a customer to mount the weatherproof appliances to a recessed electrical box without the need for an external weatherproof backbox. See the Backboxes, Plates and Gaskets Table on page three of this document for a summarization of these mounting options and the required accessories.

All models may be synchronized using the Wheelock SM, DSM Sync Modules, Wheelock Power Supplies or other manufacturers panels incorporating the Wheelock Patented Sync Protocol. The horn output of horn strobes can be independently controlled on 2-wire circuits using the Wheelock patented sync protocol. MTWP horn strobe models are 4-wire appliances; the strobes can be synchronized while the audible can be connected to a coded fire alarm system or can be set to produce any of eight selectable tones.

**Features:**

- Approvals include: UL Standards 1971, 1638, 464 and 1480 California State Fire Marshal (CSFM) and New York City (MEA), Factory Mutual (FM) and Chicago (BFP) . See agency approvals by model number on page two of this document
- Compliance with the following requirements: NFPA, UFC, ANSI 117.1, OSHA Part 29, 1910.165, ADA
- Weatherproof with extended temperature range of -40°F to 150°F (-40°C to 66°C)\*
- Dual Listed strobe models (UL 1638 and UL 1971)
- Industry's highest strobe candela options
- Synchronize using the Wheelock Sync Modules or panels with built-in Wheelock Patented Sync Protocol
- Models with field selectable tone, dBA and candela settings
- Wall or ceiling mounting options
- Surface of semi-flush mounting
- IN/OUT wiring termination accepting two #12-18 AWG wires at each terminal

\*The series RSSWP, ASWP, MTWP and ET70WP have UL approval down to -40°F. The AH-24WP, MT-12/24 and the ET-1010 have been ULC tested and approved to -40°F, but not submitted to UL. The AH-12WP has UL/ULC approval to -31°F.



E5946  
S5391  
S2652



151-92-E



7125-0785:131 (ASWP)  
7125-0785:146 (ET70WP)  
7125-0785:156 (MTWP)  
7300-0785:154 (RSSWP)



\* Patent Pending

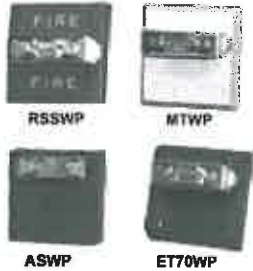
**NOTE: All CAUTIONS and WARNINGS are identified by the symbol ▲. All warnings are printed in bold capital letters.**

**▲ WARNING: PLEASE READ THESE SPECIFICATIONS AND ASSOCIATED INSTALLATION INSTRUCTIONS CAREFULLY BEFORE USING, SPECIFYING OR APPLYING THIS PRODUCT. VISIT WWW.COOPERWHEELLOCK.COM OR CONTACT COOPER WHEELLOCK FOR THE CURRENT INSTALLATION INSTRUCTIONS. FAILURE TO COMPLY WITH ANY OF THESE INSTRUCTIONS, CAUTIONS OR WARNINGS COULD RESULT IN IMPROPER APPLICATION, INSTALLATION AND/OR OPERATION OF THESE PRODUCTS IN AN EMERGENCY SITUATION, WHICH COULD RESULT IN PROPERTY DAMAGE, AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.**

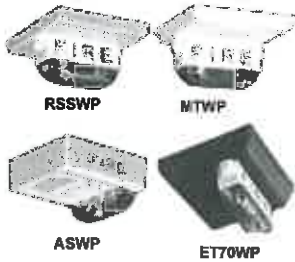
**General Notes:**

- Strobes are designed to flash at 1 flash per second minimum over their UL Listed Regulated Voltage Range.
- All candela ratings represent minimum effective Strobe intensity based on UL Standards 1971 and 1638 as indicated in candela ratings table.

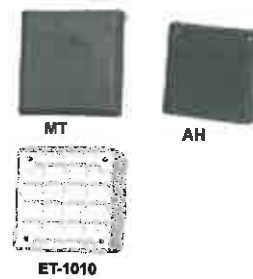
**Wall Mount**



**Ceiling Mount**



**Wall or Ceiling Mount**



Strobe		Order Code
RSSWP-2475W-FR	Red	9013
RSSWP-2475W-FW	White	3034
RSSWP-24MCWH-FR	Red	5161
RSSWP-24MCWH-FW	White	5165

Audible Strobe		Order Code
ASWP-2475W-FR	Red	9012
ASWP-24MCWH-FR	Red	5137
ASWP-24MCWH-FW	White	5140

Multi-tone Strobe		Order Code
MTWP-2475W-FR	Red	8420
MTWP-2475W-FW	White	3112
MTWP-24MCWH-FR	Red	5132
MTWP-24MCWH-FW	White	5134

Speaker Strobe		Order Code
ET70WP-2475W-FR	Red	9077
ET70WP-2475W-FW	White	3179
ET70WP-24185W-FR	Red	4885
ET70WP-24185W-FW	White	4891
ET70WP-24135W-FR	Red	4872
ET70WP-24135W-FW	White	4875

Strobe		Order Code
RSSWP-2475C-FR	Red	4338
RSSWP-2475C-FW	White	4446
RSSWP-24MCCH-FR	Red	5167
RSSWP-24MCCH-FW	White	5187

Audible Strobe		Order Code
ASWP-2475C-FR	Red	4251
ASWP-2475C-FW	White	4502
ASWP-24MCCH-FR	Red	5149
ASWP-24MCCH-FW	White	5157

Multi-tone Strobe		Order Code
MTWP-2475C-FR	Red	4457
MTWP-2475C-FW	White	4478
MTWP-24MCCH-FR	Red	5102
MTWP-24MCCH-FW	White	5122

Speaker Strobe		Order Code
ET70WP-2475C-FR	Red	4452
ET70WP-2475C-FW	White	4454
ET70WP-24177C-FR	Red	4845
ET70WP-24177C-FW	White	4859
ET70WP-24115C-FR	Red	4550
ET70WP-24115C-FW	White	4732

Audible		Order Code
AH-24WP-R	Red	7416
AH-12WP-R	Red	7415

Horn		Order Code
MT-12/24-R	Red	5023

Speaker		Order Code
ET-1010-R	Red	3135
ET-1010-W	White	3137

UL Max. Current	AH	
	24 VDC	12 VDC
High (99) dBA	0.080	0.192
Med (95) dBA	0.043	0.108
Low (90) dBA	0.021	0.058

UL Reverberant dBA @ 10 Feet							
Watts	1/8	1/4	1/2	1	2	4	8
ET-1010	77	80	83	86	87	92	94
ET70WP	78	81	84	87	90	93	95

Series	Candela Ratings						
	UL 1971	UL 1638 @ 77°F	UL 1638 @ -40°F	RSS, ET70WP and MTWP UL Max Current (Strobe Only)	ASWP		
					High	Med	Low
2475	30**	180	115	0.138	0.168	0.155	0.150
MCWH	135	135	56	0.300	0.355	0.340	0.335
	185	185	77	0.420	0.480	0.465	0.460
MCCH	115	115	47	0.300	0.355	0.340	0.335
	177	177	73	0.420	0.480	0.465	0.460
24185	185	185	77	0.420	**Wall mount rating only		
24177	177	177	73	0.420			

UL Max. Current (Audible)	MTWP/MT 24 VDC		MT 12 VDC	
	HI	STD	HI	STD
Horn	0.108	0.044	0.177	0.034
Bell	0.053	0.024	0.095	0.020
March Time	0.104	0.038	0.142	0.034
Code 3 Horn	0.091	0.035	0.142	0.034
Code 3 Tone	0.075	0.035	0.105	0.021
Slow Whoop	0.098	0.037	0.142	0.035
Siren	0.104	0.036	0.152	0.030
Hi/Lo	0.057	0.025	0.114	0.026

Model Number	Agency Approvals				
	UL	MEA	CSFM	FM	BFP
<b>Strobe</b>					
RSSWP-2475	X	X	X	X	*
RSSWP-24MCWH	X	*	X	*	*
RSSWP-24MCCH	X	*	X	*	*
<b>Audible Strobe</b>					
ASWP-2475	X	X	X	X	X
ASWP-MCWH	X	*	X	*	*
ASWP-MCCH	X	*	X	*	*
<b>Multitone Strobe</b>					
MTWP-2475	X	X	X	X	*
MTWP-MCWH	X	*	X	*	*
MTWP-MCCH	X	*	X	*	*
<b>Horns/Audibles</b>					
AH-24WP	X	X	X	-	X
AH-12WP	X	X	X	-	X
MT-12/24	X	X	X	X	X
<b>Speaker Strobe</b>					
ET70WP-2475	X	X	X	*	*
ET70WP-185	X	*	X	*	*
ET70WP-177	X	*	X	*	*
ET70WP-115	X	*	X	*	*
ET70WP-135	X	*	X	*	*

\*Pending

## Mounting Accessories

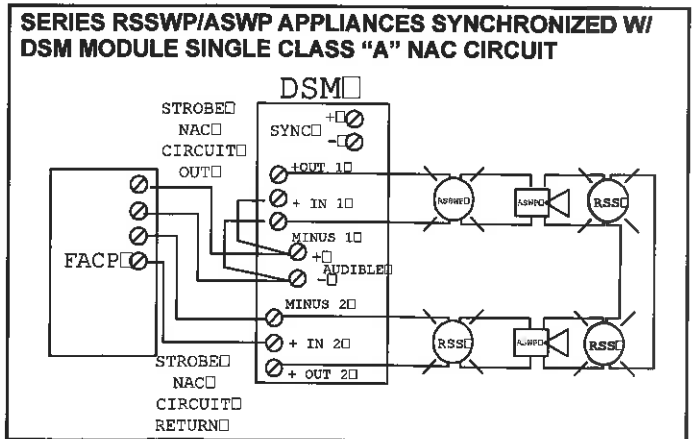
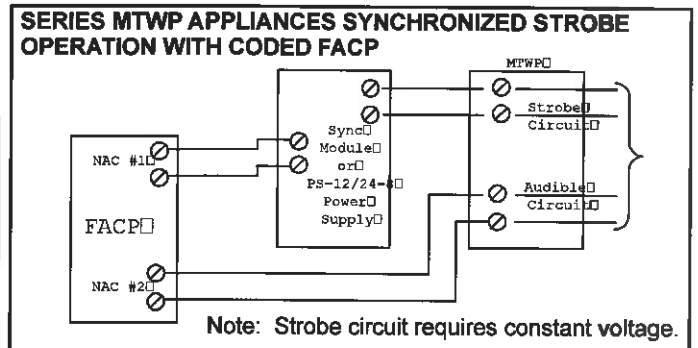
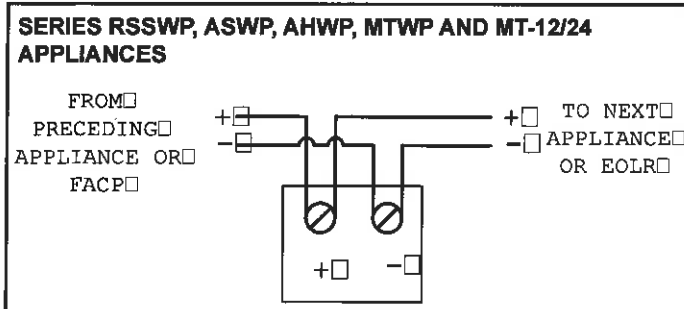
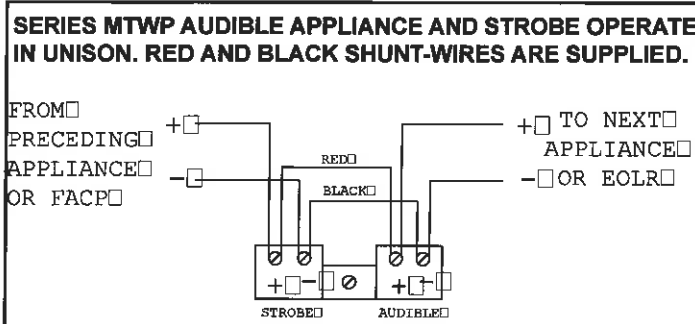


Gasket Kit		Order Code
WP-KIT		4486
Flush Plates		
WFPA-R	Red	4698
WFPA-W	White	4701
WFP-R	Red	4696
WFP-W	White	4697
Backboxes		
IOB-R	Red	5046
IOB-W	White	5047
WPSBB-R	Red	9751
WPSBB-W	White	3033
WPBB-R	Red	9014
WPBB-W	White	4692
WBB-R	Red	2959
WBB-W	White	2960

### Mounting Options:

	Backboxes, Plates, Gasket Kits		
	Surface Mount		Flush Mount
	Exposed Conduit	Concealed Conduit	
RSSWP Strobes	WPSBB	WPSBB + WP-KIT	WFP
ET70WP Speaker Strobes	IOB	IOB + WP-KIT	WFP
ASWP Horn Strobes	WPBB	WPBB + WP-KIT	WFPA
AHWP Horns	WBB	-	WFP
ET-1010 Speakers	WBB	-	WFP
MTWP Multitone Horn Strobes	IOB	IOB + WP-KIT	WFP
Multitone Horn	IOB	IOB + WP-KIT	WFP

## Wiring Diagrams



Note: Models are available in Red or White. Contact Customer Service for Order Code and Delivery.  
#Refer to Data Sheet S7000 for Mounting Options

**NOTE: Due to continuous development of our products, specifications and offerings are subject to change without notice in accordance with Wheelock Inc. standard terms and conditions.**

## ARCHITECTS AND ENGINEERS SPECIFICATIONS

### General

Weatherproof notification appliances shall be UL listed for outdoor use. Weatherproof Strobe appliances shall be listed under UL Standard 1638 (Standard for Visual Signaling Appliances) for Indoor/Outdoor use and UL Standard 1971 (Standard for Safety Signaling Devices for Hearing Impaired). The appliances shall be available for optional wall mounting or ceiling mounting to weatherproof backboxes using either exposed conduit or concealed conduit, or semi-flush mounting to a recessed electrical box in walls or ceilings using Wheelock mounting accessories.

### Weatherproof Strobes

Weatherproof Strobe appliances shall produce a minimum flash rate of 60 flashes per minute over the UL Regulated Voltage Range of 16 to 33 VDC and shall incorporate a Xenon flashtube. The weatherproof strobes shall be available with UL 1971 candela ratings up to 185 cd for wall mounting and 177 cd for ceiling mounting. UL 1638 candela ratings up to 180 cd at 77°F shall be available. The strobes shall operate over an extended temperature range of -40°F to 150°F (-40°C to 66°C) and be listed for maximum humidity of 95% RH. Strobe inputs shall be polarized for compatibility with standard reverse polarity supervision of circuit wiring by a Fire Alarm Control Panel (FACP).

**Weatherproof Audibles and Audible/Strobe Combinations** Weatherproof horns and multitone audibles shall be listed for Indoor/Outdoor use under UL Standard 464. The horns shall be able to produce a continuous output or a temporal code-3 output that can be synchronized. The horns shall have at least 3 sound level settings. Horn/Strobe combinations shall be able to be synchronized on a single NAC.

Multitone audibles shall be able to produce 8 distinct tones selectable by dip switch and shall have at least 2 sound level settings. Multitone Audible/Strobe combinations shall have independent inputs for the audible and strobe. The strobes shall be able to be synchronized. The audibles shall be able to be coded when operated on a separate NAC.

### Weatherproof Speakers and Speaker/Strobes

Weatherproof speakers and speaker/strobes shall be listed for Indoor/Outdoor use under UL Standard 1480. All speakers shall provide field selectable taps for 1/8W to 8W operation for either 25 VRMS or 70 VRMS audio systems and shall incorporate a sealed back construction for extra protection and improved audibility. Speakers without strobes shall be Wheelock Series ET-1010. They shall be listed to produce up to 94 dBA and shall incorporate a vandal resistant grille design. Speaker with strobes shall be Wheelock Series ET70WP. They shall be available for surface or semi-flush mounting to walls or ceilings and shall be listed to produce up to 93 dBA.

### Synchronization Modules

When synchronization of strobes or temporal code-3 audibles is required, the appliances shall be compatible with the Wheelock Series SM, DSM Sync Modules, Wheelock Power Supplies or other manufacturers panels with built-in Wheelock Patented Sync Protocol. The strobes and audibles shall not drift out of synchronization at any time during operation.

Series ASWP audibles and strobes shall be able to be synchronized on a 2-wire circuit with the ability to silence the audible if required. The strobes on Series MT multitone audible/strobe appliances shall be able to be synchronized and shall be able to be operated on a separate circuit from the audibles while the audible circuit is connected to a coded or continuous NAC.

### Weatherproof Mounting Accessories

Weatherproof mounting options shall include surface mounting or semi-flush mounting to walls or ceilings. Surface mounted appliances shall mount to Wheelock IOB, WBB, WPBB or WPSBB weatherproof backboxes using either exposed conduit or concealed conduit. For concealed conduit the weatherproof backbox shall be mounted to a recessed electrical box with Wheelock's WP-KIT to provide a weatherproof seal for the electrical box. Semi-flush mounted appliances shall mount to a recessed electrical box using Wheelock WFP or WFPA flush plates to provide a weatherproof seal between the electrical box and the appliance.



WE ENCOURAGE AND SUPPORT NICET CERTIFICATION

3 YEAR WARRANTY

Made in USA

S9004 WP 11/09

#### NJ Location

273 Branchport Ave.  
Long Branch, NJ 07740

P: 800-631-2148

F: 732-222-8707

[www.coopernotification.com](http://www.coopernotification.com)

#### FL Location

7565 Commerce Ct.  
Sarasota, FL 34243

P: 941-487-2300

F: 941-487-2389

#### VA Location

P: 877-459-7726

F: 703-294-6560

Cooper Notification is Wheelock®    

**COOPER** Notification



**Series ZRS Strobes, ZNS Horn Strobes and Series ZNH Horns**

**SNAP**



AV  
V

Horn / Strobe Multi-Candela  
Strobe Multi-Candela



**Series ZNS**

**Series ZNH**

**Series ZRS**

**Series ZRS**

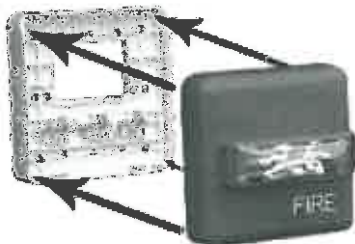
**Description:**

The Wheelock Series Z notification appliances feature an easy snap on base that is designed to simplify the installation and testing of horns, strobes, and horn/strobes. The separate Series Z snap on base can be pre-wired so circuit wiring can be fully tested before the appliance is installed and before the walls are covered. Once all surrounding work is complete, the appliance can be simply installed by snapping it on the base. Shorting contacts in the base, which provide continuity for circuit testing, are permanently opened when the appliance is installed so any subsequent removal of the appliance will indicate a trouble condition on that circuit at the control panel when circuit supervision is enabled. The same base is used for all Series Z horns, strobes and horn/strobes to provide consistent installation and easy replacement of appliances if required. A locking screw is also included for the appliance to provide extra secure installation.

The Wheelock Series Z appliances incorporate the same dependable circuitry and high efficiency optics that are used in Wheelock RSS strobes, NS horn/strobes and NH horns and have the same high performance ratings. The Series Z appliances are compatible with all UL listed "Regulated" panels and all panels that are compatibility listed with Wheelock RSS, NS and NH appliances.

**Features:**

- Approvals include: UL Standard 1971, UL Standard 464, New York City (MEA), California State Fire Marshal (CSFM), Factory Mutual (FM) and Chicago (BFP). See approvals by model number in Specifications and Ordering Information
- ADA/NFPA/UFC/ANSI and OSHA 29, Part 1910, 165 compliant
- EZ Mount SNAP design, with separate base plate, provides ability to pre-wire the base and test the circuit wiring before the walls are covered
- The base plate is protected by a disposable cover and the appliances can quickly snap onto the base after the walls are painted.
- Patented EZ Mount Universal Mounting Plate (ZBASE) – uses single plate for ceiling and wall mount installations
- Wall Mount models feature field selectable candela settings of 15/30/75/110cd and 135/185cd
- Ceiling Mount models feature field selectable candela settings of 15/30/75/95cd and 115/177cd
- Synchronize using the Wheelock Sync Modules or panels with built-in Wheelock Patented Sync Protocol
- 12 and 24 VDC models with UL "Regulated Voltage" using filtered DC or unfiltered VRMS input voltage
- Strobes produce 1 flash per second over the "Regulated Voltage" range (ZNS, ZRS models)
- Selectable Continuous Horn or Temporal (Code-3) Tones with selectable 90 or 95 dBA setting (ZNH, ZNS models)
- Selectable 12 or 24VDC in 1 appliance (ZNH model)



ZNS, ZNH and ZRS appliances go onto the base plate in a SNAP.



**NOTE: All CAUTIONS and WARNINGS are identified by the symbol . All warnings are printed in bold capital letters.**

**▲ WARNING: PLEASE READ THESE SPECIFICATIONS AND ASSOCIATED INSTALLATION INSTRUCTIONS CAREFULLY BEFORE USING, SPECIFYING OR APPLYING THIS PRODUCT. VISIT [WWW.COOPERWHEELLOCK.COM](http://WWW.COOPERWHEELLOCK.COM) OR CONTACT COOPER WHEELLOCK FOR THE CURRENT INSTALLATION INSTRUCTIONS. FAILURE TO COMPLY WITH ANY OF THESE INSTRUCTIONS, CAUTIONS OR WARNINGS COULD RESULT IN IMPROPER APPLICATION, INSTALLATION AND/OR OPERATION OF THESE PRODUCTS IN AN EMERGENCY SITUATION, WHICH COULD RESULT IN PROPERTY DAMAGE, AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.**

**General Notes:**

- Strobes are designed to flash at 1 flash per second minimum over their "Regulated Voltage Range".
- All candela ratings represent minimum effective strobe intensity based on UL Standard 1971.
- Series ZNS Strobe products are listed under UL Standards 1971 and 464 for indoor use with a temperature range of 32°F to 120°F (0°C to 49°C) and maximum humidity of 93% (± 2%).
- Series ZNH horns are listed under UL Standard 464 for audible signal appliances (Indoor use only).
- "Regulated Voltage Range" is the newest terminology used by UL to identify the voltage range. Prior to this change UL used the terminology "Listed Voltage Range".

**Table 1: Series ZNS Ratings Per UL Standard 1971**

Model	Input Voltage VDC	Regulated Voltage Range VDC/FWR	Strobe Candela (CD)
ZNS-MCW	24	16.0 - 33.0	15/30/75/110
ZNS-MCWH	24	16.0 - 33.0	135/185
ZNS-MCC	24	16.0 - 33.0	15/30/75/95
ZNS-MCCH	24	16.0 - 33.0	115/177

**Table 2: Series ZNS/ZNH Horn dBA Ratings**

Description	Volume	Reverberant dBA @ 10ft per UL 464		Anechoic dBA @ 10 ft	
		12 VDC	24 VDC	12 VDC	24 VDC
Continuous Horn	High	83	87	89	95
	Low	76	81	84	90
Code 3 Horn	High	79	82	89	95
	Low	72	76	84	90

**Table 3: Series ZNS UL Max. Current\***

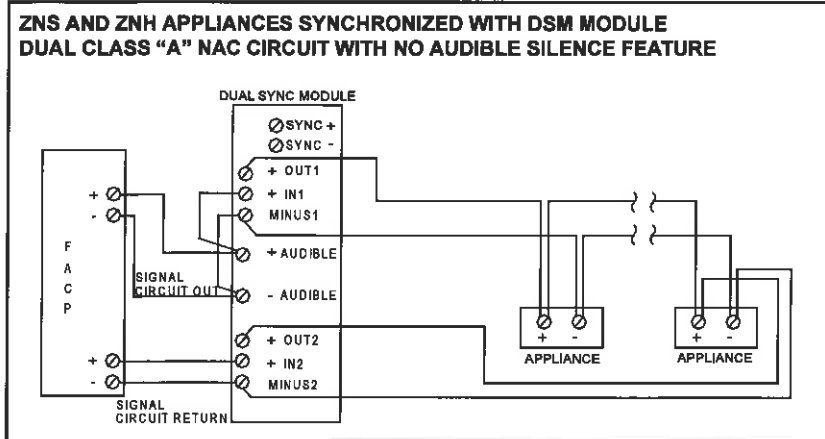
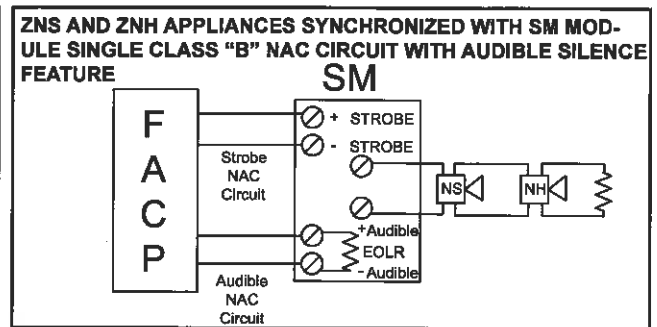
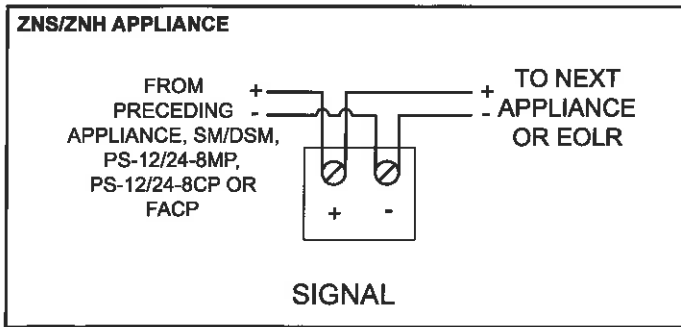
Series ZNS/ZNH 24 VDC		Audible ZNH-12/24	Wall Mount Strobe Models						Ceiling Mount Strobe Models					
			ZNS-MCW				ZNS-MCWH		ZNS-MCC			ZNS-MCCH		
			15cd	30cd	75cd	110cd	135cd	185cd	15cd	30cd	75cd	95cd	115cd	177cd
High (95) dBA	16-33 VDC	0.044	0.074	0.107	0.184	0.244	0.350	0.477	0.082	0.124	0.209	0.275	0.350	0.477
Low (90) dBA		0.018	0.066	0.101	0.177	0.232	0.306	0.429	0.071	0.114	0.201	0.261	0.306	0.429
Series ZNS/ZNH 12VDC		Audible ZNH-12/24												
High (89) dBA	8-17.5 VDC	0.021												
Low (84) dBA		0.012												

**Table 4: Series ZRS UL Max. Current\***

ZRS 24VDC Models	ZRS - Wall Mount						ZRS - Ceiling Mount					
	MCW				MCWH		MCC				MCCH	
	15cd	30cd	75cd	110cd	135cd	185cd	15cd	30cd	75cd	95cd	115cd	177cd
16-33 vdc	0.060	0.092	0.165	0.220	0.300	0.420	0.065	0.105	0.189	0.249	0.300	0.420

\* UL max current rating is the maximum RMS current within the listed voltage range (16-33v for 24v units). For strobes the UL max current is usually at the minimum listed voltage (16v for 24v units). For audibles the max current is usually at the maximum listed voltage (33v for 24v units). For unfiltered FWR ratings, see installation instructions.

## Wiring Diagrams\*



**NOTE: ZNS/ZNH must be set on Code-3 horn tone to achieve synchronized temporal (Code-3) tone. Refer to Installation Instruction (P83983, P83600 respectively).**

\* For detail using SM or DSM Sync Module refer to Data Sheet S3000 or Installation Instructions P83123 for SM and P83177 for DSM. For wiring information on the power supplies refer to Installation Instructions P84662 for PS-24-8MC.

## SPECIFICATION & ORDERING INFORMATION

Model Number	Order Code	Strobe Candela	Sync w/ SM, DSM or PS-24-8MC	24 VDC	12 VDC	Mounting Options#	Agency Approvals				
							UL	MEA	CSFM	FM	BFP
ZNS-MCW-FR	0304	15/30/75/110	X	X	-	B, D, E, F	X	*	X	X	*
ZNS-MCW-FW	0305	15/30/75/110	X	X	-	B, D, E, F	X	*	X	X	*
ZNS-MCWH-FR	0306	135/185	X	X	-	B, D, E, F	X	*	X	X	*
ZNS-MCWH-FW	0307	135/185	X	X	-	B, D, E, F	X	*	X	X	*
ZNH-R	0300	-	X	X	X	B, D, E, F	X	*	X	X	*
ZNH-W	0301	-	X	X	X	B, D, E, F	X	*	X	X	*
ZNS-MCC-FR	0310	15/30/75/95	X	X	-	B, D, E, F	X	*	X	X	*
ZNS-MCC-FW	0311	15/30/75/95	X	X	-	B, D, E, F	X	*	X	X	*
ZNS-MCCH-FR	0312	115/177	X	X	-	B, D, E, F	X	*	X	X	*
ZNS-MCCH-FW	0313	115/177	X	X	-	B, D, E, F	X	*	X	X	*
ZRS-MCW-FR	4085	15/30/75/110	X	X	-	B, D, E, F	X	*	X	X	*
ZRS-MCW-FW	0302	15/30/75/110	X	X	-	B, D, E, F	X	*	X	X	*
ZRS-MCWH-FR	5242	135/185	X	X	-	B, D, E, F	X	*	X	X	*
ZRS-MCWH-FW	0303	135/185	X	X	-	B, D, E, F	X	*	X	X	*
ZRS-MCC-FW	0309	15/30/75/95	X	X	-	B, D, E, F	X	*	X	X	*
ZRS-MCC-FR	0308	15/30/75/95	X	X	-	B, D, E, F	X	*	X	X	*
ZRS-MCCH-FR	5240	115/177	X	X	-	B, D, E, F	X	*	X	X	*
ZRS-MCCH-FW	0314	115/177	X	X	-	B, D, E, F	X	*	X	X	*
ZBASE	5268	Accessory - Includes base, dust cover, mounting screws and installation sheet									
ZBB-R	6036	Backbox for indoor surface mounting of all SNAP models									
ZBB-W	6045	Backbox for indoor surface mounting of all SNAP models									

\*Pending

#The ZRS, ZNS and ZNH will mount to single-gang, double-gang, 4" octal, 4" square and 3-1/2" octal back boxes.

**NOTE: Due to continuous development of our products, specifications and offerings are subject to change without notice in accordance with Wheelock Inc. standard terms and conditions.**

## ARCHITECTS AND ENGINEERS SPECIFICATIONS

### General

Audible/visual notification appliances shall be listed for indoor use and shall meet the requirements of FCC Part 15 Class B. These appliances shall be listed under UL Standard 1971, (Standard for Safety Signaling Devices for Hearing Impaired) and UL Standard 464 (Fire Protective Signaling). The appliances shall use a Patented Universal EZMount backplate that shall allow mounting to a single-gang, double-gang, 4-inch square, 4" octal, or a 3-1/2" octal backbox. Two wire appliance wiring shall be capable of directly connecting to the mounting back plate. Continuity checking of the entire NAC circuit prior to attaching any audible/visual notification appliances shall be allowed. A dust cover shall fit and protect the mounting plate. The dust cover shall be easily removed when the appliance is installed over the backplate. Removal of an appliance shall result in an alarm condition by the Fire Alarm Control Panel (FACP).

### Strobes

Strobe appliances shall produce a minimum flash rate of 60 flashes per minute (1 flash per second) over the Regulated Voltage Range of 16 to 33 VDC and shall incorporate a Xenon flashtube enclosed in a rugged Lexan lens. The strobes shall be available with two or four field selectable settings in one unit and shall be rated, per UL 1971, for up to 185 cd for wall mounting and 177 cd for ceiling mounting. The strobes shall operate over an extended temperature range of 32°F to 120°F (0°C to 49°C) and be listed for maximum humidity of 95% RH. Strobe inputs shall be polarized for compatibility with standard reverse polarity supervision of circuit wiring by a Fire Alarm Control Panel (FACP).

### Audibles and Audible/Strobe Combinations

Horns and horn/strobes shall be listed for Indoor use under UL Standard 464. The horns shall be able to produce a continuous output or a temporal code-3 output that can be synchronized. The horns shall have at least 2 sound level settings of 90 and 95 dBA.

### Synchronization Modules

When synchronization of strobes or temporal Code-3 audibles is required, the appliances shall be compatible with the Wheelock Series SM, DSM Sync Modules Wheelock Power Supplies or other manufacturers panels with built-in Wheelock Patented Sync Protocol. The strobes shall not drift out of synchronization at any time during operation. Audibles and strobes shall be able to be synchronized on a 2-wire circuit with the capability to silence the audible if required. If the sync module or power supply fails to operate (i.e., contacts remain closed), the strobes shall revert to a non-synchronized flashrate



WE ENCOURAGE AND SUPPORT NICET CERTIFICATION  
3 YEAR WARRANTY

Z1000 ZNS/ZNH ZRS 12/08

NJ Location  
273 Branchport Ave.  
Long Branch, NJ 07740  
P: 800-631-2148  
F: 732-222-8707

FL Location  
7555 Commerce Ct.  
Sarasota, FL 34243  
P: 941-487-2300  
F: 941-487-2389

VA Location  
P: 877-459-7726  
F: 703-294-6560

[www.coopernotification.com](http://www.coopernotification.com)

Cooper Notification is Wheelock®  SAFEPATH® WAVES®  

**COOPER** Notification

Features an easy snap on base designed to simplify the installation and testing of strobes, horns and horn strobes.

**Available features and options:**

**Color:** Red or white

**Mounting:** Wall or ceiling

**EZ mount SNAP design**

**Universal mounting plate - single plate for wall and ceiling mount installations**

**Disposable cover to protect base plate**

**Strobes produce 1 flash per second over the Regulated Voltage Range**

**Strobes**



**Wall Mount Strobes**

ZRS-MCW-FR	Red	4085
ZRS-MCW-FW	White	0302
ZRS-MCWH-FR	Red	5242
ZRS-MCWH-FW	White	0303

**Ceiling Mount Strobes**

ZRS-MCC-FW	White	0309
ZRS-MCC-FR	Red	0308
ZRS-MCCH-FW	White	0314
ZRS-MCCH-FR	Red	5240

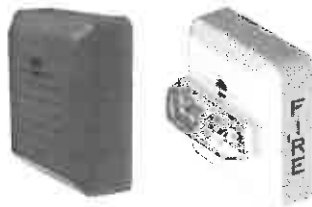
UL Max. Current	15cd	30cd	75cd	110cd
24 VDC	0.060	0.092	0.165	0.220

UL Max. Current	135cd	185cd
24 VDC	0.300	0.420

UL Max. Current	15cd	30cd	75cd	95cd
24 VDC	0.065	0.105	0.189	0.249

UL Max. Current	115cd	177cd
24 VDC	0.300	0.420

**Horns and Horn Strobes**



**Wall or Ceiling Mount Horn**

ZNH-R	Red	0300
ZNH-W	White	0301

**Wall Mount Horn Strobe**

ZNS-MCW-FR	Red	0304
ZNS-MCW-FW	White	0305
ZNS-MCWH-FR	Red	0306
ZNS-MCWH-FW	White	0307

**Ceiling Mount Horn Strobe**

ZNS-MCC-FW	White	0311
ZNS-MCC-FR	Red	0310
ZNS-MCCH-FW	White	0313
ZNS-MCCH-FR	Red	0312

UL Max. Current	15cd	30cd	75cd	110cd	
High (95) dBA	24 VDC	0.074	0.107	0.184	0.244
Low (90) dBA	24 VDC	0.066	0.101	0.177	0.232

UL Max. Current	15cd	30cd	75cd	95cd	
High (95) dBA	24 VDC	0.082	0.124	0.209	0.275
Low (90) dBA	24 VDC	0.071	0.114	0.201	0.261

UL Max. Current	115cd	177cd
High (95) dBA	0.350	0.477
Low (90) dBA	0.306	0.429

UL Max. Current	Audible	
24 VDC	12 VDC	
High (95) dBA	0.044	0.021
Low (90) dBA	0.018	0.012

## APPENDIX F: FIRE ALARM SPECIFICATIONS

## **FIRE ALARM SYSTEM**

### **SECTION 16710**

#### **PART 1: GENERAL**

##### **1.01 DESCRIPTION:**

###### **A. Work Included:**

1. The furnishing of all labor, equipment, materials and performance of all operations in connection with the installation of the Fire Alarm System as shown on the drawings and as herein specified.
2. The complete installation shall conform to the applicable sections of NFPA-72 National Electrical Code.
3. All equipment, devices and cables shall be listed by Underwriters' Laboratories, Inc. and or approved by Factory Mutual for the purpose of fire alarm systems and shall be listed with the California State Fire Marshall.
4. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required for work indicated or specified in this Section or work specified in other Sections, it shall be the responsibility of the Contractor to provide all material and equipment which is usually furnished with such systems in order to complete the installation, whether mentioned herein or not.

##### **1.02 DESIGN REQUIREMENTS:**

A. The Fire Detection System shall be responsible for continually supervising and monitoring by zone the following initiating, signaling and monitoring circuits designated as:

1. Manual fire pull stations.
2. Smoke and heat detectors, including those install under other Sections.
3. Alarm signaling circuits (alarm bells and visual alarm unit).
4. Remote Annunciator.
5. The system controls shall be Underwriters' Laboratory listed for power-limited applications per NEC 760-23.

B. The Fire Alarm System configurations for the projects shall be as follows:

1. Horns shall be used for fire alarm signaling. Class change signaling shall

be independent of the fire alarm system.

2. Activation of duct smoke detectors in the Air Handling ducts shall be annunciated at the main Fire Alarm Control panel.

**1.03 DISTRICT APPROVAL:**

- A. All fire alarm, signal and control equipment shall be approved by the District in addition to other required approvals.
- B. Certification: Installation of the Fire Alarm System shall not be started until drawings, including State Fire Marshal listed numbers of all fire alarm components, are submitted to and approved by the State Fire Marshal (OSA). Written certification by the fire alarm equipment distributor or manufacturer shall be submitted to the Architect and the State Fire Marshal stating that the system and its component parts are as "approved and listed" by the State Fire Marshal and that the installation conforms in all respects to the requirements set forth in Article 72, Title 24, California Administrative Code.
- C. The equipment and services described in these Specifications represent those supplied and supported by Fire Control Instruments Company, unless noted otherwise.
- D. All equipment described has been established by Fresno Unified School District as the standard for service product in the School District. Fresno Unified School District has standardized on Fire Control Instruments as the sole manufacturer of its Fire Alarm master equipment to reduce parts required for repair and expansion. We have also chosen this manufacturer because of reduced personal training and high product reliability.
- E. All equipment to be supplied under this section shall be 100% solid state in design.

**1.04 SUBMITTALS:**

- A. All submittals shall be made in accordance with Section 01300.
- B. Shop Drawings: Show equipment locations, wiring schematics, details, panel's configuration and size and a point-to-point schematics of circuits and zone schedules. Include front elevations, cabinet dimensions, type of mounting, doors, barriers, catalog number of locks, and finishes for all terminal cabinets. Show interfaces to equipment furnished by others, identifying numbers of wires and termination requirements. Responsibility for each end of the interfaces shall be noted.
- C. Complete descriptive data indicating Underwriters' Laboratories and California State Fire Marshal listings for all system components.
- D. Complete sequence of operations of the system.
- E. Complete system wiring diagrams for components connected to the system and



interfaces to existing equipment.

- F. A copy of any State or Local Fire Alarm System equipment approvals.
- G. Provide one copy of acceptance test procedures for review.
- H. Provide supplier's qualifications indicating years in business, service policies, warranty definitions and list of similar installations.
- I. Equipment, other than specified, will be considered for approval provided it meets previous Items A through H and the following is submitted in writing by the Electrical Contractor to the Engineer to Allow approval at least 14 days before the bid date:
  - 1. Complete lists, descriptions and drawings of materials to be used, including all SFM listing numbers.
  - 2. A complete riser diagram of fire alarm system.
  - 3. A complete list of current drain requirements during normal supervisory conditions, trouble conditions and alarm system.
  - 4. Battery standby calculations showing total standby needed to meet the system requirements as specified.
  - 5. If any attempt is made to substitute that brand of equipment specified it shall be the Contractor's obligation to submit the above data and information to allow the specifying engineer time to consider the equality of the substituted items to that specified. It is the Contractor's responsibility to meet the entire intent of the Specifications. Deviations from the specified items shall be at the risk of the Contractor until the date of final acceptance by the Architect, Engineer and Owner's representative.
  - 6. Approved submittals on substitute equipment shall only allow the Contractor to proceed with installing a substituted item and shall not be considered equal until such time as the Architect, Engineer and the Owner's representative have completely accepted the substituted item. All cost for removal, relocations or replacement of a substituted item shall be at the risk of the Electrical Contractor.
- J. The Fire Alarm System shall be supplied from a single source and shall be labeled with the manufacturer's name and logo on all system equipment and devices.

#### 1.05 QUALITY ASSURANCE:

- A. Work shall be done by qualified Contractor holding C-10 and other licenses required by authorities having jurisdiction.
- B. Each system shall be installed by an authorized manufacturer's representative with duly authorized local representation who can, upon request, give evidence

satisfactory to the Engineer that he maintains a fully equipped service organization stocking the manufacturer's standard parts and capable of furnishing, in the sole judgment of the Engineer, adequate inspections and service to the system. All signal equipment shall be supplied and installed by a licensed and bonded signal contractor holding a valid California State Electrical Contractor's license with the proper endorsements for performing work of this specification.

**1.06 WARRANTY:**

- A. The Contractor shall warrant the completed Fire Alarm System wiring and equipment to be free from inherent mechanical and electrical defects for a period of one year from the date of the completed and certified test or from the date of first beneficial use.
- C. **Trouble Calls:** The Contractor shall guarantee response to a trouble call within 24 hours after the receipt of such a call.
- B. The equipment manufacturer shall make available to the Owner a Maintenance Contract Proposal to provide a minimum of two inspections and tests per year in compliance with NFPA-72H guidelines.

**1.07 PERFORMANCE:**

- A. Furnish and install a complete Fire Alarm System as described herein and as shown on the drawings to be wired, connected, and left in first class operating condition. The system shall use closed loop initiating device circuits with individual zone supervision, individual indicating appliance circuit supervision, incoming and standby power supervision. Include a control panel, manual pull stations, automatic fire detectors, horns, flashing lights, annunciator, all wiring, connections to devices, outlet boxes, junction boxes and all other necessary material for a complete operating system.

**1.08 FUNCTION: FIRE ALARM EVACUATION SYSTEM:**

- A. The operation of a manual station or automatic activation of any smoke detector, heat detector or waterflow device shall cause:
  - 1. All evacuation horns to sound and strobes to flash in a temporal code three pattern. All horns, horn circuits, strobes and strobe circuits shall be synchronized. Indicate on the control panel the zone in alarm. Indicate on the remote annunciator the zone in alarm. Automatically close all magnetically held doors. Perform any additional function as specified herein or as shown on the plans. Summon the fire department. The operated device is returned to normal and the control panel is manually reset, except that the alarms may be silenced as described elsewhere in these specifications.
    - a. An alarm may be silenced by a switch on the zone card in the control alarm. When silenced this shall not prevent the resounding of subsequent alarms if another zone should alarm (subsequent



- H. Circuitry shall be provided in the control panel to permit transmission of trouble and alarm signals over leased telephone cables to a remote central station. A reverse polarity transmitter and/or a masterbox circuit as required shall also be provided in the control panel. There shall be one supervised zone to allow testing of the fire alarm system without transmitting an alarm signal to the central station.
- I. The control unit shall be beige in color and shall include the following features:
1. Auxiliary SPDT contacts in the control unit per zone and one set of SPDT contacts, which will operate on general alarm.
  2. Auxiliary circuitry in the control panel to operate remote relays to control blowers in air handlers.
  3. 24 hours of battery standby (as required) using rechargeable batteries with automatic hi-low rate charger to maintain standby batteries and operate the general trouble devices as specified herein but shall not cause an alarm to be sounded.
  4. A power transfer circuit that will switch to standby power automatically and instantaneously if normal power fails. This circuit shall not be an integral part of the power supply but of the basic fire card to allow operation of the completed fire alarm system on the secondary source of power with the primary power supply removed.
  5. Ground fault detector to detect positive or negative grounds on the initiating circuits, signal circuits, power circuits, and telephone line circuit. The ground fault detector shall have an individual LED for visual indication of either a positive or negative ground fault and operate the general trouble devices as specified herein but shall not cause an alarm to be sounded.
  6. A short circuit LED shall be a standard feature of the fire alarm control panel. This circuit shall monitor the signal circuits for short circuits and shall have an individual LED for visual indication of circuits as well as operating trouble devices as specified herein, but shall not cause an alarm to be sounded.
  7. All relays on printed circuit boards shall be plug-in type with dust proof protecting covers.
  8. All transistors on common control and individual zone printed circuit boards shall be of the same exact type and shall be plug-in.
  9. Lightning protection shall be a standard feature of the fire alarm control panel and shall be incorporated in the power supply circuit, common control circuits, signal circuits, smoke detector power circuits, and telephone line circuit. Systems that require an optional module to provide this protection will not be considered equal.
  10. Individual circuit fuses shall be provided for the following: smoke detector

power, main power supply, signal circuit #1, signal circuit #2, battery standby power and auxiliary output.

11. A battery test switch shall be a standard feature of the fire alarm control panel and shall test all supervised red alarm LED's and yellow trouble LED's power zone.
12. An overvoltage sensing circuit shall cause an amber LED to light and operate the system trouble devices should a fault occur within the power supply causing too high a voltage being supplied to the FC-72 system.
13. Provisions for supervised remote reset capabilities.
14. Provisions for a remote drill switch capability.
15. The control unit shall be flush mounted in a textured finish, #16 gauge steel cabinet equipped with a hinged door, and secured by a lock keyed common to the manual stations. Reset switches, silence switches, fuses, etc., shall be clearly marked and shall be behind the locked door to prevent unauthorized entry. Opening of the main door shall expose all components for inspection or adjustment without further dismantling of the cabinet, control unit or wiring. The panel shall have provisions for a supervised remote trouble indication.
16. The audible trouble signal shall be an integral part of the control unit. Provisions shall be provided for an optional supervised remote trouble signal.
17. The 120VAC main power shall be converted to low voltage, rectified and regulated 24VDC for system operation. The entire system shall operate on 24VDC.
18. The rated current available from the power supply shall be 4 amps of filtered and regulated DC and shall comply with the latest issue of UL Standard #864.
19. Battery charging unit shall be an automatically dual-rate type, having both a high rate and float charge capability.
20. Stations shall be capable of having a break-glass rod as a standard feature, but shall not depend on the glass rod to hold the station in normal position.
21. Stations shall be of extruded aluminum design with Fire Lettering on each side, for semi-flush or surface mounting and shall be of the double action design. Once activated, it must be clearly visible which station was activated from either the front or side view. Stations shall not be resettable without the use of a key and physically opening the station to reset. The key shall be the same as that used to open the control panel.
22. Audible and visual indicating devices shall be horn and flashing light

assembly with the word "FIRE" on two sides. The horn and light assembly shall be capable of being flush or semi-flush mounted. Units shall be installed where shown on plans using supervised circuits. There are to be no more than 20 horn and light combination units per signal circuit.

23. All magnetic door holders shall operate through the contacts of the panel after an alarm condition has been initiated from any zone on the fire alarm control panel. All door holder circuits shall be separately fused.
24. The electromagnetic door holder devices shall hold fire and smoke barrier doors open until released by an alarm condition. The door holders have approximately 35 lb. (15.9 kg) holding power and offer fail safe operation.

## **PART 2: PRODUCTS**

### **2.01 FIRE ALARM CONTROL PANEL:**

- A. Where shown on the drawings, provide and install an FCI - 7100 series Fire Alarm Control Panel

### **2.02 REMOTE ANNUNCIATOR:**

- A. Where shown on the drawings, provide and install an FCI Weatherproof Annunciator. The annunciator shall be provided one alarm LCD-7100. The remote annunciator shall be electrically supervised from the control panel.
- B. Provide output module at control panel for connection to District Central Station monitoring.

### **2.03 PERIPHERAL DEVICES:**

- A. **Manual Stations:**  
FCI Model MS-7AF
- B. **Duct Smoke Detectors:**  
Duct smoke detectors shall be FCI Model No. ASD-PL2F / ADB-FL Provide remote power/alarm indicator/key switch, Model RCM-601 for each detector. Duct sampling tube shall be sized to extend over full width of duct.
- C. **Visual Signal:**  
Visual signal shall be Wheelock RSS-24MCW-FR, Candela to depend on application.
- D. **Horns:**  
Alarm horns shall be Wheelock mt12-24WP-R. The horn assembly shall be capable of being flush or semiflush mounted. Horns shall be polarized and operated by 24V.D.C. Unit shall be in die cast red housing.
- E. **Mini Horns:**  
Mini Horns shall be Wheelock MIZ-TC24-R. Combination horn strobe unit shall

be Wheelock NS appliance.

- F. Heat Detectors:  
Heat Detectors shall be FCI No. ATD-L2F / ADB-FL and FCI No. ATD-HL2F / ADB-FL fixed temperature detectors.

#### 2.04 WIRING:

- A. Raceways: All wiring shall be installed in raceways sized not to exceed 40% fill, or run exposed along the ceiling structure where indicated. Where run exposed, wiring shall be tied to structure at intervals so that wire ways present a neat and uniform appearance.
- B. Cables:
1. Alarm signaling circuits (alarm horns and visual alarm unit) cable shall be #12 Stranded wire, THHN Red and Black.
  2. Detection (above ground) cable shall West Penn Cable, #970 (2-#18 awg, solid).
- C. Splices: No splices shall be installed in conduit, Christy boxes or any inaccessible place. All splices shall be made on terminal blocks specifically designed for that purpose in terminal cabinets or locations as specifically approved by the Engineer.
- D. Racks, Terminals, Cabinets and Special Assemblies:
1. Wiring shall be neatly bundled, fanned, tagged and laced. Leave minimum three-inch horizontal wiring between terminal block connection and fan.
  2. Terminate incoming (homerun) cables on left of terminal block; with cables to devices terminated on right side.
  3. Terminal Barrier Strips: Cinch 142 series barrier strips (minimum 6 points) for Fire Alarm system. Provide minimum two (2) space separation points between types of system cables. Strips shall include provisions for up to four (4) spare termination points. Ensure that system circuit loops are located on adjacent termination points on the barrier strip.
- E. All underground conduit runs shall only use stranded type wires.
- F. Wire terminators to devices and on terminal barrier strips shall be with "spade" type terminal connections (Thomas and Betts Sta-Kon or Engineer approved equivalent). Contractor shall use an approved Thomas and Betts Sta-Kon lugging tool.
- G. All cables shall be labeled with Panduit Label, size MP-150C thru MP-350. The size will depend on the amount of information needed on each label. All labels shall contain information as to the source and the destination of the wire including

the location and terminal can numbers.

**2.05 System Upgrades:**

When upgrading an existing system, the existing fire alarm shall be tested in the presence of a Fresno Unified employee prior to any work being started by a contractor. Upon completion of testing, it shall be the contractor's responsibility to note any discrepancy with the existing system. It will be contractor's responsibility to provide and complete working system, minus any discrepancies noted.

When upgrading an existing system, all end of line resistors shall be changed out to meet manufacturer's specifications for each individual fire panel. The contractor shall make a reasonable effort to locate the end of line resistors. If locations cannot be determined Fresno Unified shall provide assistance to the contractor.

When specifications call for a zone to be added, the contractor shall provide all equipment and terminations to make a completed working system, including all equipment necessary to annunciate the system to Fresno Unified's central station. It will be the contractor's responsibility to ensure that the equipment has sufficient space to accommodate extra zones.

When specifications call for the removal of existing equipment all equipment shall be returned to Fresno Unified School District's Electronics Shop.

**2.06 Testing:**

Upon completion of new system or an upgrade to an existing system, the contractor shall provide a minimum of two personnel for testing. Testing shall be done in the presence of an assigned Fresno Unified School District employee. The contractor shall provide reasonable notification prior to scheduling of any tests, so that Fresno Unified personnel can be in attendance. The Local Fire Marshall is required to be present during testing, and it shall be the contractor's responsibility to notify the fire department having jurisdiction.

**END OF SECTION**



## APPENDIX G: WATER FLOW MEMO

Randy R. Bruegman  
Fire Chief



---

Bureau of Fire Prevention and Investigative Services  
450 M Street  
Fresno, California 93721-3083  
(559) 621-4000 FAX (559) 498-4323  
[www.fresno.gov](http://www.fresno.gov)

### E-Mail Memorandum

To: Frank Sen, PE,  
Blair, Church and Flynn Consulting Engineers

From: Byron Beagles, Fire Prevention Engineer

Date: May 1, 2009

Subject: Water flow information for FUSD school site bounded by Hamilton, Cedar, Heaton and Tenth Avenues

The Fresno Fire Department uses water supply modeling for fire hydrant and fire sprinkler hydraulic calculations based on the water main infrastructure of the subject project area. The operating parameters of the City of Fresno Water Division are well documented and communication and cooperation between the Water and Fire departments is open and ongoing. The City of Fresno Water Division has an ISO Class I rating.

The following information assumes connection to the existing 10" transmission grid main in S. Cedar Ave:

Fresno Fire requires private fire hydrant fire flows of 1500 gpm for buildings with fire sprinklers and 2500 gpm for buildings without fire sprinklers. We provide the following parameters to design the onsite fire hydrant system:

1500 gpm: maximum friction loss from the most remote hydrant shall not exceed 23 psi from the source. This corresponds to a model curve of 50 static, 43 residual, 1500 gpm flow.

2500 gpm: maximum friction loss allowed is 12 psi (if two or more hydrants, flow may be split between the two most remote hydrants). This corresponds to a model curve of 50 static, 34 residual, 2500 gpm flow.

For purposes of fire sprinkler calculations, a flow curve of 45 static, 35 residual, and a flow of 1800 gpm would be required to be used for plans submitted to Fresno Fire.

Why the difference for fire sprinkler vs. hydrants? Fire sprinkler demand is typically much lower than fire flow and may not draw down system pressure enough to activate nearby water well pumps. The most critical design parameter for most fire sprinkler systems is available pressure.

An actual flow test was conducted in June of 2008 by ISO at the corner of Tenth and Woodward, just a few blocks from this site. Results were 54 static, 46 residual, and flow of 1700 gpm. As this an other flow tests are generally not taken at peak demand time of day or year, Fresno Fire would not allow this test to be used for hydraulic design. When using the model curve information above, we do not require a 10% "cushion".

If you have any further questions, please feel free to contact our office.

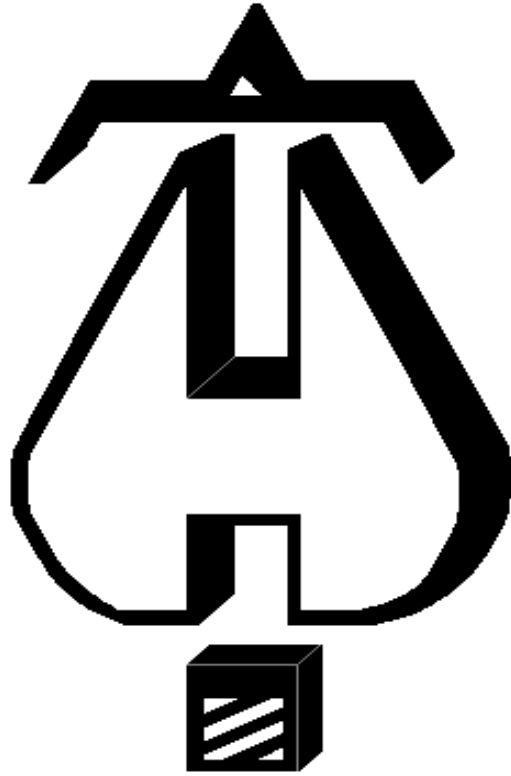
*Byron H. Beagles*

Fire Prevention Engineer  
Fire Prevention and Investigation Division  
Fresno Fire Department  
911 "H" Street, Fresno California 93721-3083  
559-621-4112 (office) 559-498-4323 (fax)

*Fire Sprinklers Save Lives*

*"To protect and serve and to put service above all else."*

## APPENDIX H: HYDRAULIC CALCULATIONS



**. . . Fire Protection by Computer Design**



Job Name : Second Floor Piping Plan  
Building : MAIN BLDG. - SECOND FLOOR  
Location : HYDRAULIC CALCULATION AREA #1  
System : 1  
Contract : 09-1032.2  
Data File : Second Floor Piping Plan-Area 1 AREA 1.wxf

---

**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** CEDAR AND HEATON ELEMENTARY SCHOOL

**Location:** HYDRAULIC CALCULATION AREA #1

**Drawing no:** MAIN BLDG. - SECOND FLOOR

**Date:** 7-5-11

**Design**

**Remote area number:** 1

**Remote area location:**

**Occupancy classification:** LIGHT HAZARD

**Density:** .1 - Gpm/SqFt

**Area of application:** 1039 - SqFt

**Coverage per sprinkler:** 324 MAX - SqFt

**Type of sprinklers calculated:** PENDENT

**No. of sprinklers calculated:** 5

**In-rack demand:** N/A - GPM

**Hose streams:** 100 - GPM

**Total water required (including hose streams):** 287.36 - GPM @ 44.46 - Psi

**Type of system:** WET

**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 5-1-09

**Location:** CEDAR AND HEATON

**Source:** BYRON BEAGLES, CITY OF FRESNO FIRE DEPARTMENT

**Name of contractor:**

**Address:**

**Phone number:**

**Name of designer:**

**Authority having jurisdiction:** DSA

**Notes: (Include peaking information or gridded systems here.)**

# Water Supply Curve C

Second Floor Piping Plan

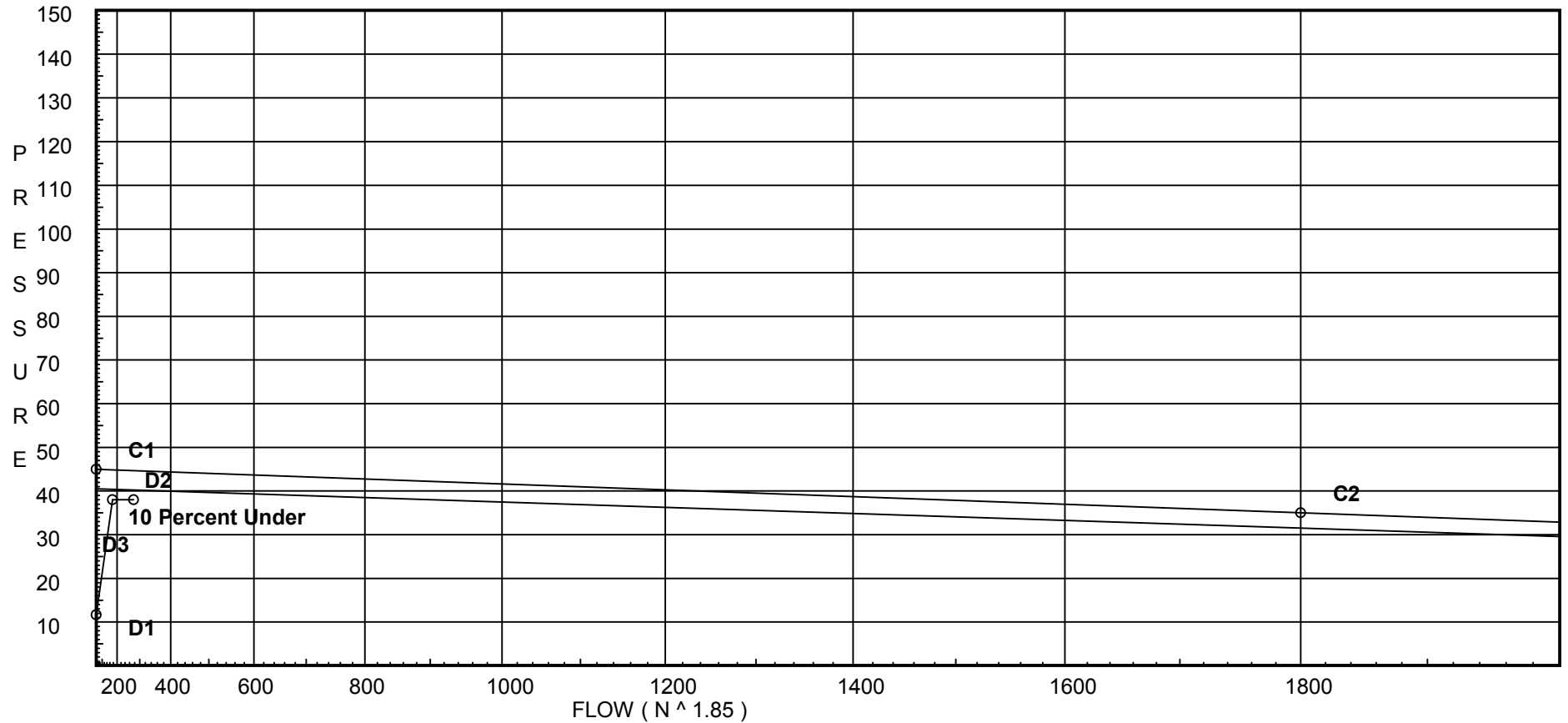
Page 2  
Date

### City Water Supply:

C1 - Static Pressure : 45  
C2 - Residual Pressure: 35  
C2 - Residual Flow : 1800

### Demand:

D1 - Elevation : 11.694  
D2 - System Flow : 175.89  
D2 - System Pressure : 37.987  
Hose ( Demand ) : 100  
D3 - System Demand : 275.89  
Safety Margin : 6.702



# Flow Diagram

## Second Floor Piping Plan

---

4      34.2  
3      → 203  
↑  
|      100.9  
|      36.1  
5      11 → 103

6      TEST

# Fittings Used Summary

## Second Floor Piping Plan

### Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
C	Roll Groove Coupling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

### Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with \*. The fittings marked with a \* show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a \* will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.



# Pressure / Flow Summary - STANDARD

## Second Floor Piping Plan

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
104	27.0	11.2	9.03	na	33.66	0.1	324	8.7
2	28.0		12.77	na				
3	28.0		13.7	na				
4A	28.0		14.93	na				
4	28.0		18.18	na				
5	28.0		18.23	na				
TOR	0.0		32.96	na				
BOR	-3.0		34.48	na				
D	0.0		34.64	na	100.0			
SRCA	0.0		37.99	na				
102	27.0	11.2	8.7	na	33.04	0.1	324	8.7
8	28.0		12.55	na				
203	27.0	11.2	9.32	na	34.18	0.1	324	8.7
101	27.0	11.2	12.05	na	38.88	0.1	324	8.7
13	28.0		14.73	na				
11	0.0		27.15	na				
14	28.0		15.64	na				
5A	28.0		16.35	na				
103	27.0	11.2	10.41	na	36.13	0.1	324	8.7

The maximum velocity is 14.43 and it occurs in the pipe between nodes 101 and 13

Second Floor Piping Plan

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
<b>*REMOTE HEAD TO SUPPLY</b>									
104	33.66	1.097	2E	4.974	4.000	9.033		K Factor = 11.20	
to		120.0	1T	6.217	11.191	-0.433			
2	33.66	0.2742		0.0	15.191	4.166		Vel = 11.43	
2	33.04	2.067	1T	10.0	11.080	12.766			
to		120.0		0.0	10.000	0.0			
3	66.7	0.0444		0.0	21.080	0.936		Vel = 6.38	
3	34.18	2.067		0.0	12.860	13.702			
to		120.0		0.0	0.0	0.0			
4A	100.88	0.0955		0.0	12.860	1.228		Vel = 9.65	
4A	0.0	2.067	1T	10.0	24.000	14.930			
to		120.0		0.0	10.000	0.0			
4	100.88	0.0955		0.0	34.000	3.247		Vel = 9.65	
4	0.0	4.26		0.0	18.000	18.177			
to		120.0		0.0	0.0	0.0			
5	100.88	0.0028		0.0	18.000	0.051		Vel = 2.27	
5	75.01	4.26	1T	26.334	277.330	18.228			
to		120.0	2E	26.334	52.668	12.127			
TOR	175.89	0.0079		0.0	329.998	2.604		Vel = 3.96	
TOR	0.0	4.26	1C	1.317	27.000	32.959			
to		120.0		0.0	1.317	1.299			
BOR	175.89	0.0079		0.0	28.317	0.223		Vel = 3.96	
BOR	0.0	4.07	3E	47.796	140.000	34.481			
to		150.0	1G	3.186	82.846	-1.299			
D	175.89	0.0065	1T	31.864	222.846	1.453		Vel = 4.34	
D	100.00	9.42	1E	24.61	1260.000	34.635		Qa = 100	
to		150.0	4F	49.22	135.353	3.000		** Fixed Loss = 3	
SRCA	275.89	0.0003	1G	5.593	1395.353	0.352		Vel = 1.27	
			1T	55.931					
	0.0								
	275.89					37.987		K Factor = 44.76	
<b>*NEW PATH</b>									
102	33.04	1.049	2E	4.0	4.000	8.700		K Factor = 11.20	
to		120.0	1T	5.0	9.000	-0.433			
8	33.04	0.3293		0.0	13.000	4.281		Vel = 12.27	
8	0.0	2.067		0.0	18.000	12.548			
to		120.0		0.0	0.0	0.0			
2	33.04	0.0121		0.0	18.000	0.218		Vel = 3.16	
	0.0								
	33.04					12.766		K Factor = 9.25	
<b>*NEW PATH</b>									
203	34.18	1.049	2E	4.0	4.740	9.315		K Factor = 11.20	
to		120.0	1T	5.0	9.000	-0.433			
3	34.18	0.3508		0.0	13.740	4.820		Vel = 12.69	
	0.0								
	34.18					13.702		K Factor = 9.23	
<b>*NEW PATH</b>									
101	38.88	1.049	3E	6.0	1.000	12.050		K Factor = 11.20	
to		120.0		0.0	6.000	-0.433			
13	38.88	0.4450		0.0	7.000	3.115		Vel = 14.43	

# Final Calculations - Hazen-Williams

## Second Floor Piping Plan

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
13 to 11	0.0 38.88	2.067 120.0 0.0163	0.0 0.0 0.0	18.000 0.0 18.000	14.732 12.127 0.294		Vel = 3.72		
11 to 14	36.13 75.01	2.067 120.0 0.0552	0.0 0.0 0.0	11.080 0.0 11.080	27.153 -12.127 0.612		Vel = 7.17		
14 to 5A	0.0 75.01	2.067 120.0 0.0552	0.0 0.0 0.0	12.920 0.0 12.920	15.638 0.0 0.713		Vel = 7.17		
5A to 5	0.0 75.01	2.067 120.0 0.0552	1T 10.0 0.0 0.0	24.000 10.000 34.000	16.351 0.0 1.877		Vel = 7.17		
	0.0 75.01				18.228		K Factor = 17.57		
*NEW PATH									
103 to 11	36.13 36.13	1.049 120.0 0.3886	2E 4.0 1T 5.0 0.0	4.000 9.000 13.000	10.407 11.694 5.052		K Factor = 11.20 Vel = 13.41		
	0.0 36.13				27.153		K Factor = 6.93		

## APPENDIX I: FIRE SPRINKLER CUT SHEETS



## TECHNICAL DATA

### EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-9454495 Email: techsvcs@vikingcorp.com

- System is designed so maximum operating pressures of the system do not exceed 175 PSI (12 bar).
- Refer to technical data pages 47a-c - Automatic Pressure Control System

#### Material Standards:

Refer to Figure 1

#### Ordering Information:

See Table 1 for part numbers and shipping weights

#### 4. INSTALLATION

FOR THE VIKING ESFR COLD STORAGE SYSTEM, REFER TO DATA PAGE 45a-j FOR INSTRUCTIONS ON PLACING THE SYSTEM IN SERVICE.

The Easy Riser® Swing Check Valve must be installed in an area not subject to freezing temperatures or physical damage. When corrosive atmospheres and/or contaminated water supplies are present, it is the owner's responsibility to verify compatibility with the Easy Riser® Swing Check Valve, trim, and associated equipment.

Prior to installing the valve, thoroughly flush the water supply piping to verify that no foreign matter is present.

The Easy Riser® Swing Check Valve may be installed in the vertical position with direction of flow up, or in the horizontal position with the access cover up.

1. Remove all plastic thread protectors from the openings of the Easy Riser® Swing Check Valve.
2. Apply a small amount of pipe-joint compound or tape to the external threads of all pipe connections required. Take care not to allow any compound, tape, or other foreign matter inside any of the nipples or openings of the valve or trim components.
3. Easy Riser® Swing Check Valve Trim Charts are provided with Trim Packages and in the Viking Engineering and Design Data book.
4. Verify that all system components are rated for the water working pressure of the system.

#### Hydrostatic Test:

The Easy Riser® Swing Check Valve is manufactured and listed for use at a maximum water working pressure of 250 psi (17.2 bar). The valve is factory tested at 500 psi (34.5 bar). Easy Riser® Swing Check Valves may be hydrostatically tested at 300 psi (20.7 bar) and/or 50 psi (3.5 bar) above the normal water working pressure for limited periods of time (two hours) for the purpose of acceptance by the Authority Having Jurisdiction. If air testing is required, do not exceed 40 psi (2.8 bar) air pressure.

#### 5. OPERATION (Refer to Figure 1)

Water flowing through the Viking Easy Riser® Swing Check Valve lifts rubber-gasketed clapper (8 and 9) off the seat (12) and flows into the sprinkler piping. When flow through the valve stops, the clapper (8) closes quickly. Rubber gasket (9) forms a tight seal against brass water seat (12), trapping pressurized water above the clapper and preventing reverse flow from the sprinkler piping.

#### 6. INSPECTIONS, TESTS AND MAINTENANCE

FOR THE VIKING ESFR COLD STORAGE SYSTEM, REFER TO DATA PAGE 45 a-j FOR INSPECTIONS AND TESTS

**NOTICE: THE OWNER IS RESPONSIBLE FOR MAINTAINING THE FIRE-PROTECTION SYSTEM AND DEVICES IN PROPER OPERATING CONDITION.**

The Viking Easy Riser® Swing Check Valve and trim must be kept free of foreign matter, freezing conditions, corrosive atmospheres, contaminated water supplies, and any condition that could impair its operation or damage the device.

It is imperative that the system be inspected and tested on a regular basis. The frequency of the inspections may vary due to contaminated water supplies, corrosive water supplies, and corrosive atmospheres. For minimum maintenance and inspection requirements, refer to NFPA 25. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

**WARNING: ANY SYSTEM MAINTENANCE WHICH INVOLVES PLACING A CONTROL VALVE OR DETECTION SYSTEM OUT OF SERVICE MAY ELIMINATE THE FIRE-PROTECTION CAPABILITIES OF THAT SYSTEM. PRIOR TO PROCEEDING, NOTIFY ALL THE AUTHORITY HAVING JURISDICTION. CONSIDERATION SHOULD BE GIVEN TO EMPLOYMENT OF A FIRE PATROL IN THE AFFECTED AREAS.**

##### 6-A. Five-Year Internal Inspection

Internal inspection of check valves is recommended every five years unless inspections and tests indicate more frequent inspections are required. (Refer to Figure 1)

1. Notify the Authority Having Jurisdiction, remote station alarm monitors, and those in the area affected that the system will be taken out of service. Consideration should be given to employment of a fire patrol in the affected areas.



## TECHNICAL DATA

### EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-9454495 Email: techsvcs@vikingcorp.com

2. Close the water supply main control valve, placing the system out of service.
3. Open the main drain. If necessary, open the system test valve to vent and completely drain the system.
4. Use the appropriate wrench to loosen and remove cover screws (14), and remove cover/clapper assembly (2-11).
5. Inspect water seat (12). Wipe away all contaminants, dirt, and mineral deposits. Do not use solvents or abrasives.
6. Inspect cover/clapper assembly (2-11) and cover gasket (13). Test hinged clapper (8) for freedom of movement. Renew or replace damaged or worn parts as required. CAUTION: NEVER apply any lubricant to seats, gaskets, or any internal operating parts of the valve. Petroleum-based grease or oil will damage rubber components and may prevent proper operation.
7. When internal inspection of the Easy Riser® Swing Check Valve is complete, perform step 6 of paragraph 11. MAINTENANCE to re-install cover/clapper assembly (2-11).

#### 6-B. Maintenance (Refer to Figure 1)

FOR THE VIKING ESFR COLD STORAGE SYSTEM, REFER TO DATA PAGE 45a-j FOR MAINTENANCE INSTRUCTIONS.

1. Perform steps 1 through 5 of paragraph 6-A, FIVE-YEAR INTERNAL INSPECTION.
2. To remove clapper rubber (9):
  - A. Use the appropriate wrenches to loosen and remove button-head socket screw (11), hex nut (6), sealing washer (7), and rubber retainer (10).
  - B. Remove the clapper rubber (9) for inspection. If the clapper rubber shows signs of wear, such as cracking, cuts, or excessively deep grooves where the rubber contacts the water seat, replace the rubber.
3. To re-install clapper rubber (9):
  - A. Place the clapper rubber (9) over the center hub of the rubber retainer (10).
  - B. Position the retainer (10) (with rubber in place) against the clapper (8) as shown in Figure 1.
  - C. Replace and tighten the button-head socket screw (11), sealing washer (7), and hex nut (6). The sealing washer (7) must be located on the top side of the clapper (8) as shown in Figure 1. DO NOT over-tighten.
4. To remove clapper (8), and/or hinge pin (4):
  - A. Remove the hinge pin retaining rings (5) to free the hinge pin (4) for removal. After the hinge pin (4) is removed, the clapper (8) can be removed.
5. To re-install clapper (8) and/or hinge pin (4):
  - A. Verify that the clapper rubber (9) is in good condition and that it is properly installed.
  - B. Position the clapper (8) with the elongated hinge holes aligned between the holes of the hinge bracket welded inside the cover (2). The system (top) side of the clapper (8) must face the direction indicated by the flow arrow stamped inside the cover (2).
  - C. Insert the hinge pin (4) through the holes at one end of the hinge assembly. Continue to push the hinge pin (4) through the holes at the remaining end of the hinge assembly.
  - D. Re-install the hinge pin retaining rings (5).
6. To re-install cover/clapper assembly (2-11):
  - A. Verify that the cover gasket (13) is in position and that it is in good condition.
  - B. Slide the cover/clapper assembly (2-11) into the Easy Riser® Swing Check Valve so the clapper rubber (9) contacts the water seat (12).
  - C. Replace cover screws (14). Use the appropriate wrench to cross-tighten all cover screws to the torque values shown in Table 2 for the valve used. DO NOT over-tighten.

#### 7. AVAILABILITY

The Viking Easy Riser® Swing Check Valve is available through a network of domestic and international distributors. See the Viking Corp. Web site for closest distributor or contact The Viking Corporation.

#### 8. GUARANTEES

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.



**TECHNICAL DATA**

**EASY RISER® SWING  
CHECK VALVE  
MODELS E-1 & F-1**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-9454495 Email: techsvcs@vikingcorp.com

**Table 1 - Valve Part Numbers and Specifications**

Description	Nominal Size	Part Number	Friction Loss*	Shipping Weight
<b>Flange/Flange</b>				
Flange Drilling	<b>Model F-1</b>			
ANSI	3"	08505	10 ft. (3.1m)	35 lbs. (16 kg)
ANSI	4"	08508	13 ft. (4.0 m)	27 lbs. (12 kg)
ANSI	6"	08511	20 ft. (6.0 m)	75 lbs. (34 kg)
ANSI/Japan	DN100	09039	13 ft. (4.0 m)	27 lbs. (12 kg)
ANSI/Japan	DN150	09385	20 ft. (6.0 m)	75 lbs. (34 kg)
ANSI/Japan	DN200	14023	23 ft. (7.0 m)	119 lbs. (54 kg)
PN10/16	DN80	08796	10 ft. (3.1m)	35 lbs. (16 kg)
PN10/16	DN100	08797	13 ft. (4.0 m)	27 lbs. (12 kg)
PN10/16	DN150	08835	20 ft. (6.0 m)	75 lbs. (34 kg)
PN10	DN200	08836	23 ft. (7.0 m)	119 lbs. (54 kg)
PN16	DN200	12355	23 ft. (7.0 m)	119 lbs. (54 kg)
<b>Flange/Groove</b>				
Flange Drilling / Pipe O.D.	<b>Model F-1</b>			
ANSI / 89mm	3"	08506	10 ft. (3.1m)	27 lbs. (12 kg)
ANSI / 114mm	4"	08509	13 ft. (4.0 m)	37 lbs. (17 kg)
ANSI / 168mm	6"	08512	20 ft. (6.0 m)	64 lbs. (29 kg)
ANSI / 219mm	8"	08516	23 ft. (7.0 m)	119 lbs. (54 kg)
PN10/16 / 89mm	DN80	12648	10 ft. (3.1m)	27 lbs. (12 kg)
PN10/16 / 114mm	DN100	12649	13 ft. (4.0 m)	37 lbs. (17 kg)
PN10/16 / 165mm	DN150	12652	20 ft. (6.0 m)	64 lbs. (29 kg)
PN10/16 / 168mm	DN150	08512	20 ft. (6.0 m)	64 lbs. (29 kg)
PN10 / 219mm	DN200	12651	23 ft. (7.0 m)	119 lbs. (54 kg)
PN16 / 219mm	DN200	12650	23 ft. (7.0 m)	119 lbs. (54 kg)
<b>Groove/Groove</b>				
Pipe O.D.	<b>Model E-1</b>			
73mm	2 1/2" / DN65	07929	6 ft. (1.8m)	16 lbs. (7kg)
	<b>Model F-1</b>			
89mm	3" / DN80	08507	10 ft. (3.1m)	20 lbs. (9 kg)
114mm	4" / DN100	08510	13 ft. (4.0 m)	27 lbs. (12 kg)
165mm	DN150	12356	20 ft. (6.0 m)	51 lbs. (23 kg)
168mm	6" / DN150	08513	20 ft. (6.0 m)	51 lbs. (23 kg)
219mm	8" / DN200	08516	23 ft. (7.0 m)	106 lbs. (48 kg)

\*Expressed in equivalent length of Schedule 40 pipe based on Hazen & Williams formula: C = 120.

**Table 2 - Torque Values for Easy Riser Swing Check Valve Cover Screws**

Valve Size	Screw Size	Torque Value
2-1/2" (DN65)	3/8"-16 H.H.C.	19 ft-lb (2.63 kg-m)
3" (DN80)	3/8"-16 H.H.C.	19 ft-lb (2.63 kg-m)
4" (DN100)	3/8"-16 H.H.C.	19 ft-lb (2.63 kg-m)
6" (DN150)	1/2"-13 H.H.C.	45 ft-lb (6.23 kg-m)
8" (DN200)	5/8"-11 H.H.C.	93 ft-lb (12.9 kg-m)

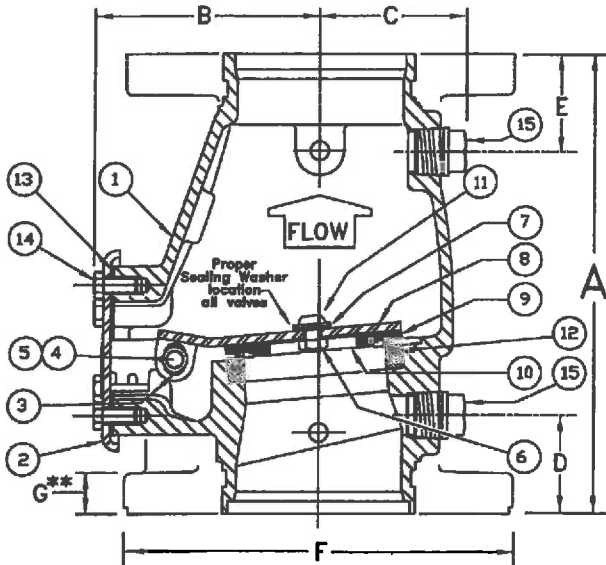


TECHNICAL DATA

EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-9454495 Email: techsvcs@vikingcorp.com



SIZE	A	B	C	D	E	F	G**
2-1/2" (65mm)	9" (228,6)	4-1/2" (114,3)	2-5/8" (66,7)	2" (50,8)	2" (50,8)	Flg/Flg & Flg/Grv Not Available	
3" (80mm)	10-3/16" (259)	4-3/4" (120,7)	2-3/4" (69,9)	2" (50,8)	2" (50,8)	7-1/2" (190,5)	3/4" (19,05)
4" (100mm)	10-5/8" (268,9)	5-3/16" (131,8)	3-3/8" (85,7)	2-1/8" (54,0)	2-1/4" (57,2)	9" (228,6)	15/16" (23,81)
6" (150mm)	13-3/8" (346,1)	6-3/4" (171,5)	4-3/8" (111,1)	2-1/4" (57,2)	2-1/4" (57,2)	11" (279,4)	1" (25,4)
8" (200mm)	17" (431,8)	8-3/4" (222,3)	5-3/8" (136,5)	2-1/2" (63,5)	2-7/8" (73,0)	13-1/2" (342,9)	1-1/8" (28,58)

Dimensions shown in parentheses are millimeter.

\* For availability of Flg X Flg, Flg X Grv, or Grv X Grv options refer to Table 1.

\*\* 4", 6", and 8" valves are manufactured with sculptured flanges. Dimension indicates thickness of flange at bolt holes.

Figure 1 - Replacement Parts

ITEM NO.	PART NUMBER					DESCRIPTION	MATERIAL	NO. REQ'D				
	E-1 2-1/2" (DN65)	F-1 3" (DN80)	F-1 4" (DN100)	F-1 6" (DN150)	F-1 8" (DN200)			2-1/2"	3"	4"	6"	8"
1	-	-	-	-	-	Body	Ductile Iron, ASTM A536 (65-45-12)	1	1	1	1	1
2	-	-	-	-	-	Cover Assembly	E-Coated HSLA Steel, A715 and Stainless Steel, UNS-S30400	1	1	1	1	1
3	07576	07576	07576	07576	None	Bushing	Lubricomp 189 Ryton	2	2	2	2	0
4	05355A	05355A	04900A	04991A	05334A	Clapper Hinge Pin	Stainless Steel, UNS-S30400	1	1	1	1	1
5	05445A	05445A	05445A	05445A	05369A	Hinge Pin Retaining Ring	Stainless Steel, UNS-S15700	2	2	2	2	2
6	01755A					Clapper Hex Jam Nut #10-24 UNC	Stainless Steel, UNS-S30400	1	0	0	0	0
		08159	08159			Clapper Hex Jam Nut 3/8"-24 UNF	Stainless Steel, UNS-S30400	0	1	1	0	0
				08144	08144	Clapper Hex Jam Nut 1/2"-20 UNF	Stainless Steel, UNS-S30400	0	0	0	1	1
7	-	08158	08158	08143	08143	Sealing Washer	EPDM and Stainless Steel	1	1	1	1	1
8	*	*	*	*	*	Clapper	Teflon® Coated HR Steel UNS-G10180	1	1	1	1	1
9	*	*	*	*	*	Clapper Rubber	EPDM, ASTM D2000	1	1	1	1	1
10	*	*	*	*	*	Clapper Rubber Retainer	Stainless Steel, UNS-S30400	1	1	1	1	1
11	06595A					H.H.C. Screw, #10-24 UNC x 1/2" (12.7 mm) lg.	Stainless Steel, UNS-S30400	1	0	0	0	0
		10194	10194			Screw, Button Head, Socket, 3/8" - 24 UNF x 1/2 (12.7 mm) lg.	Stainless Steel, UNS-S30400	0	1	1	0	0
				10308		Screw, Button Head, Socket, 1/2" - 20 UNF x 3/4 (19.1 mm) lg.	Stainless Steel, UNS-S30400	0	0	0	1	0
					10686	Screw, Button Head, Socket, 1/2" - 20 UNF x 7/8 (22.2 mm) lg.	Stainless Steel, UNS-S30400	0	0	0	0	1
12	-	-	-	-	-	Seat	Brass, UNS-C84400	1	1	1	1	1
13	05354B	05354B	04649B	04992B	05339C	Cover Gasket	EPDM, ASTM D2000	1	1	1	1	1
14	01517A	01517A	01517A			Screw, Hex Head Cap, 3/8" - 16 UNC x 3/4 (19.1 mm) lg.	Steel, Zinc Plated	4	4	6	0	0
				04993A		Screw, Hex Head Cap, 1/2" - 13 x 7/8 (22.2 mm) lg.	Steel, Zinc Plated	0	0	0	6	0
					01922A	Screw, Hex Head Cap, 5/8" - 11 UNC x 1-1/4" (31.8 mm) lg.	Steel, Zinc Plated	0	0	0	0	6
15	-	-	-	-	-	1/2" (15 mm) NPT Pipe Plug	Steel	2	2	2	2	2

- Indicates replacement part is not available

\* Indicates replacement part only available in a Sub-Assembly listed below.

Sub-Assemblies

3, 6-11	05499B	08518	08519	08520	08521	Clapper Assembly
6, 7, 9-11, 13	06343A	08522	08523	08524	08525	Replacement Rubber Kit





TECHNICAL DATA

EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-9454495 Email: techsvcs@vikingcorp.com

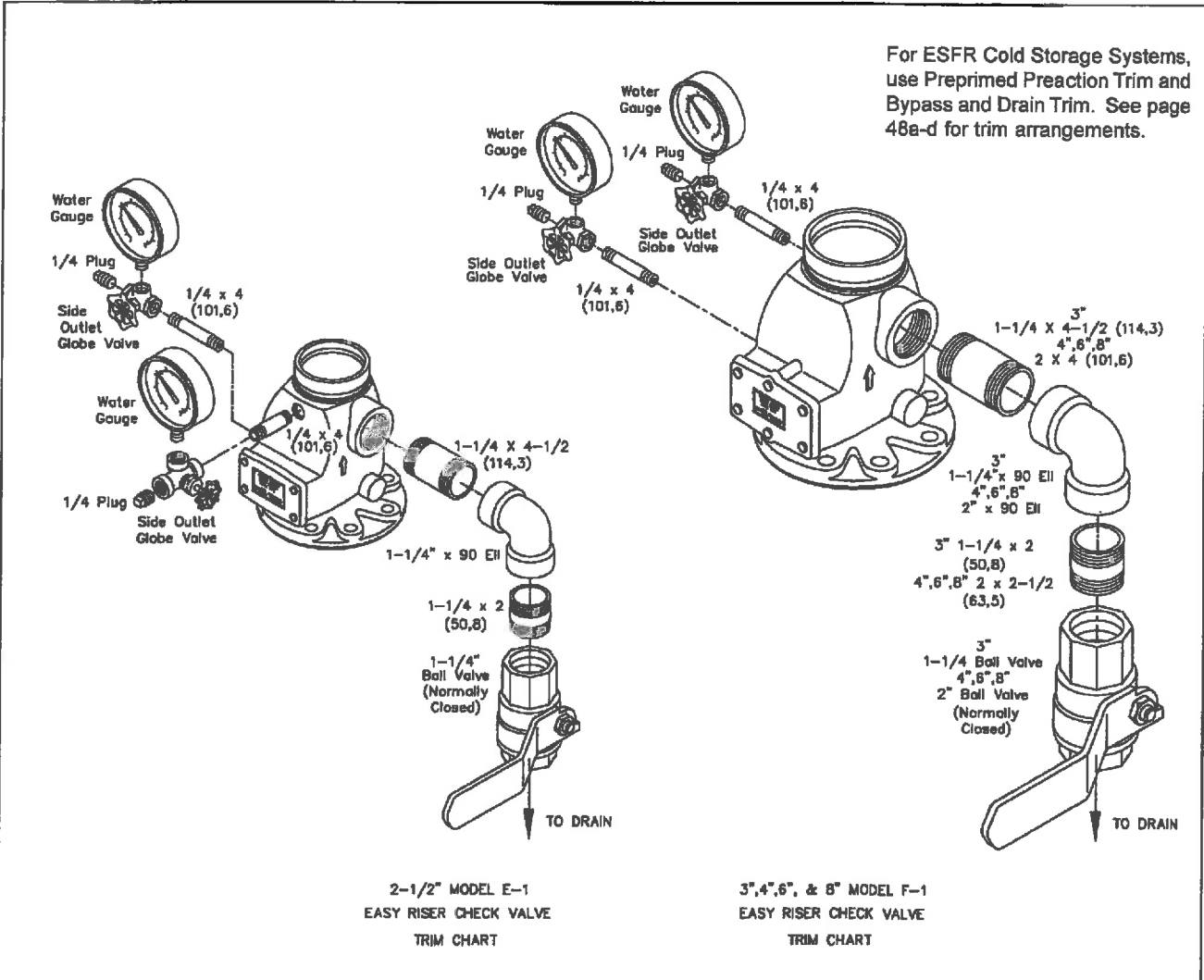


Figure 2

Note 1: 300 psi (20.7 bar) water pressure gauges are provided with trim. 600 psi (41.4 bar) water pressure gauges are available. Order separately when needed\*. Refer to Viking's current price schedule.

\* NFPA 13 requires gauges to have a minimum limit not less than twice the normal water working pressure at the point where the gauges are installed. When normal water working pressure exceeds 150 psi (10.3 bar), order 600 psi (41.4 bar) water pressure gauges separately.

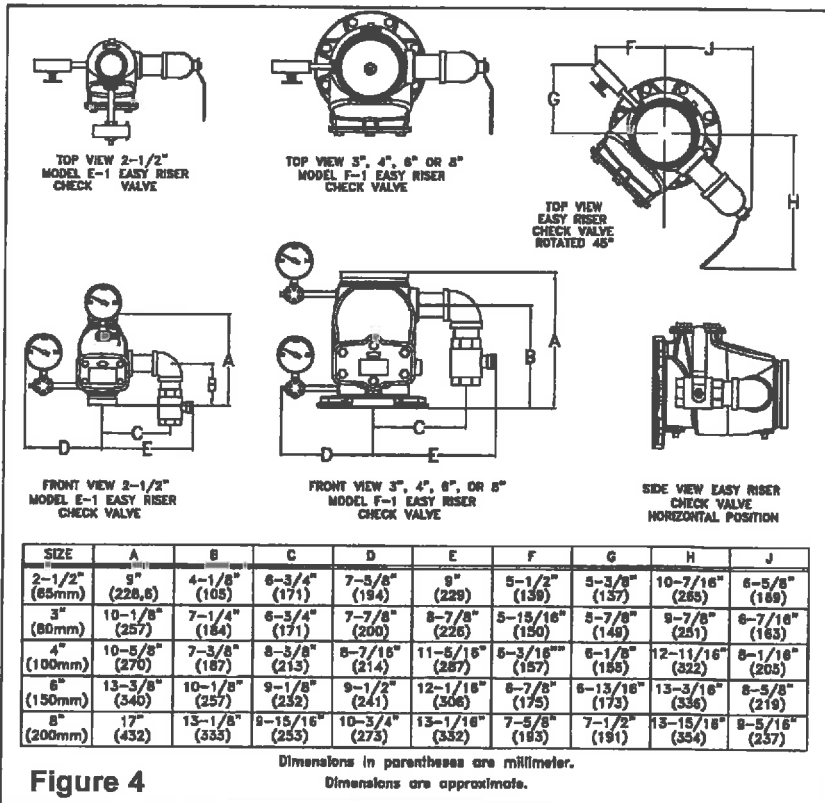
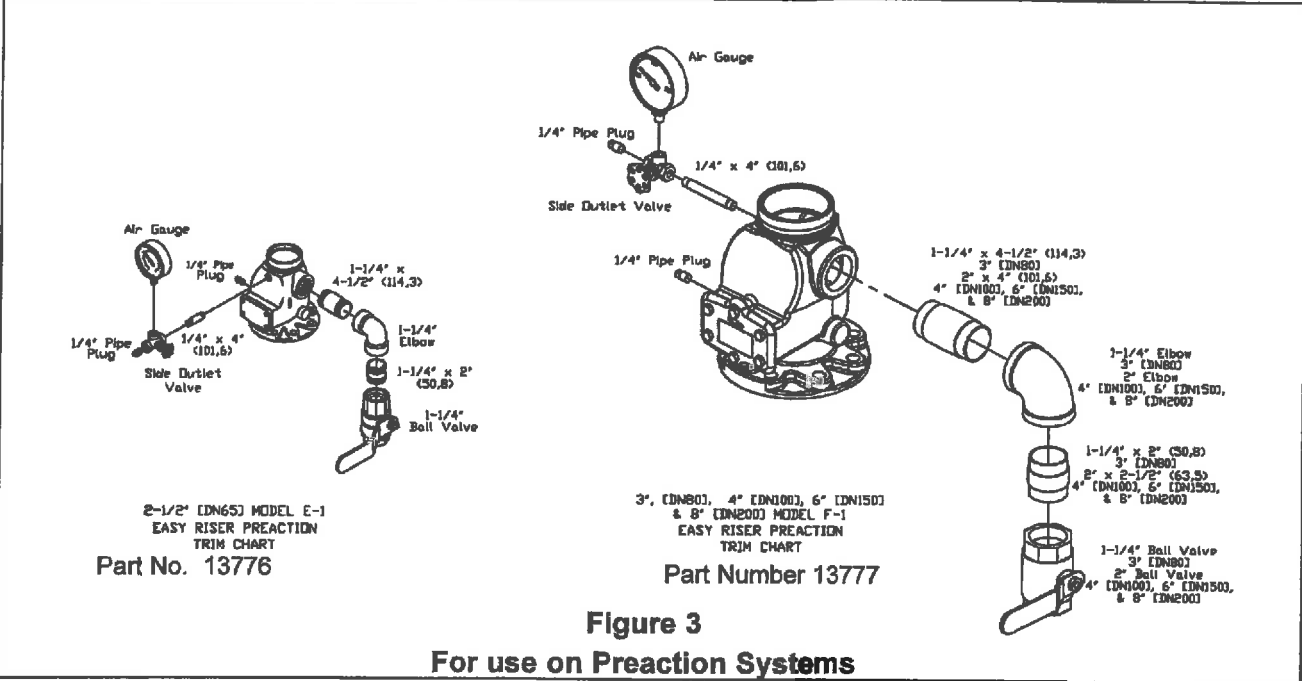
Note 2: System Drain Ball Valve is UL Listed and FM Approved for 250 psi (17.2 bar) water working pressure.



# TECHNICAL DATA

## EASY RISER® SWING CHECK VALVE MODELS E-1 & F-1

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-9454495 Email: techsvcs@vikingcorp.com



**Figure 4**

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## TECHNICAL DATA

### MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE PENDENT SPRINKLERS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

#### 1. DESCRIPTION

Viking Microfast® EC/QREC Pendent Sprinklers are small thermosensitive spray sprinklers available in several different finishes and temperature ratings to meet varying design requirements. These sprinklers have both standard response and quick response listings. The fast response type glass bulb and special deflector combine speed of operation and area of coverage to meet quick response extended coverage standards.

The special Polyester coating can be used in decorative applications where colors are desired.



For Light Hazard Occupancies Only

#### 2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Class 2020

NYC Approved: City of New York Board of Standards and Appeals, Calendar No. 219-76-SA

Refer to Approval Chart 1 and Design Criteria on pages 81c-d for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 81e for FM Approval requirements that must be followed.

#### 3. TECHNICAL DATA

##### Specifications:

Available since 1988.

Minimum Operating Pressure: Refer to the Approval Charts.

Maximum Working Pressure: 175 psi (12 Bar). Factory tested hydrostatically to 500 psi (34.5 bar).

Factory tested hydrostatically to 500 psi (34.5 bar).

Testing: U.S.A. Patent No. 4,831,870

Thread sizes: Part No. 06778B: 1/2" (15 mm) NPT

Part No. 07077: 3/4" (20 mm) NPT

Nominal K-Factors: 06778B: 5.6 U.S. (80.6 metric)†

07077: 8.0 U.S. (115.2 metric)†

†Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)

Overall Length: Part No. 06778B: 2-5/16 (59 mm)

Part No. 07077: 2-3/8" (61 mm)

##### Material Standards:

Sprinkler Frame: Brass UNS-C84400 or QM Brass for Sprinkler 06778B. Brass UNS-C84400 for all other sprinklers.

Deflector: Brass UNS-C26000

Bulb: Glass, nominal 3 mm diameter

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape

Screw: Brass UNS-C36000

Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400

For Polyester Coated Sprinklers: Belleville Spring-Exposed

##### Ordering Information: (Also refer to the current Viking price list.)

Order Microfast® EC/QREC Pendent Sprinklers by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.

Finish Suffix: Brass = A, Chrome-Enloy® = F, White Polyester = M-/W, and Black Polyester M-/B

Temperature Suffix (°F/°C): 135°/57° = A, 155°/68° = B, 175°/79° = D

For example, sprinkler VK600 with a Brass finish and a 155 °F/68 °C temperature rating = Part No. 06778BAB

Available Finishes And Temperature Ratings: Refer to Table 1

Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking data book.)

Viking Technical Data may be found on  
The Viking Corporation's Web site at  
<http://www.vikinggroupinc.com>.  
The Web site may include a more recent  
edition of this Technical Data Page.

	<b>TECHNICAL DATA</b>	<b>MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE PENDENT SPRINKLERS</b>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

**Sprinkler Wrenches:**

- A. Standard Wrench: Part No. 10896W/B (available since 2000)
  - B. Wrench for recessed pendent sprinklers: Part No. 13577W/B\*\* (available since 2006)
- \*\*A 1/2" ratchet is required (not available from Viking).

**Sprinkler Cabinets:**

- A. Six-head capacity: Part No. 01724A (available since 1971)
- B. Twelve-head capacity: Part No. 01725A (available since 1971)

**4. INSTALLATION**

Refer to appropriate NFPA Installation Standards.

**5. OPERATION**

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

**6. INSPECTIONS, TESTS AND MAINTENANCE**

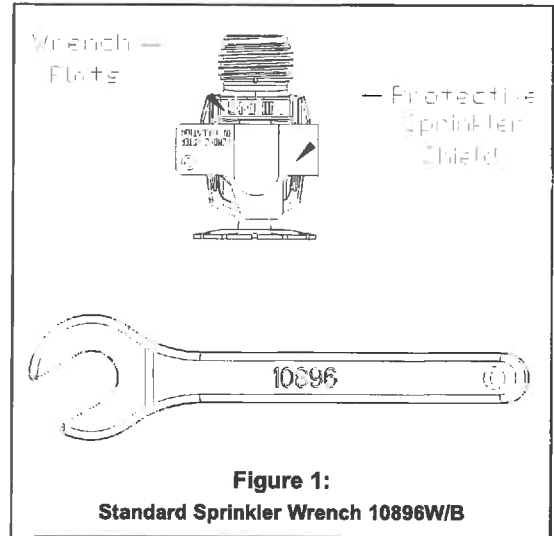
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

**7. AVAILABILITY**

Viking Microfast® EC/QREC Pendent Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

**8. GUARANTEE**

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.



**Figure 1:**  
Standard Sprinkler Wrench 10896W/B

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES			
Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating <sup>1</sup>	Maximum Ambient Ceiling Temperature <sup>2</sup>	Bulb Color
Ordinary	135 °F (57 °C)	100 °F (38 °C)	Orange
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
<b>Sprinkler Finishes:</b> Brass, Chrome-Enloy®, White Polyester <sup>3</sup> , and Black Polyester <sup>3</sup>			
<b>Footnotes</b>			
<sup>1</sup> The sprinkler temperature rating is stamped on the deflector. <sup>2</sup> Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards. <sup>3</sup> For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester coatings.			



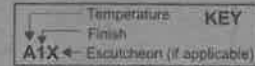
TECHNICAL DATA

**MICROFAST® STANDARD/  
QUICK RESPONSE  
EXTENDED COVERAGE  
PENDENT SPRINKLERS**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

**Approval Chart 1 (UL)**  
Microfast® Standard/Quick Response Extended Coverage Pendent Sprinklers  
For Light Hazard Occupancies Only.  
Maximum 175 PSI (12 Bar) WWP



Sprinkler Base Part No. <sup>1</sup>	SIN	NPT Thread Size		Nominal K-Factor		Maximum Areas of Coverage <sup>4</sup> (Length x Width)	Minimum Water Supply Requirements <sup>4</sup> Flow/Pressure	Listings and Approvals <sup>3</sup> (Refer also to Design Criteria on page 81d.)		
		Inches	mm	U.S.	metric <sup>2</sup>			cULus <sup>5</sup>	NYC <sup>7</sup>	
<b>Standard Response Applications<sup>6</sup></b>										
07077	VK602	3/4	20	8.0	115.2	20' x 20' (6.1 m x 6.1 m)	40 gpm @ 25.0 psi (151.4 L/min @ 1.72 Bar)	B1Z	B1Y	
06778B	VK600	1/2	15	5.6	80.6	20' x 20' (6.1 m x 6.1 m)	40 gpm @ 51.0 psi (151.4 L/min @ 3.52 Bar)	B1Z	B1Y	
<b>Quick Response Applications</b>										
07077	VK602	3/4	20	8.0	115.2	16' x 16' (4.9 m x 4.9 m)	26 gpm @ 10.6 psi (98.4 L/min @ 0.73 Bar)	E1Z	E1Z	
06778B	VK600	1/2	15	5.6	80.6	16' x 16' (4.9 m x 4.9 m)	26 gpm @ 21.6 psi (98.4 L/min @ 1.49 Bar)	E1Z	E1Z	
07077	VK602	3/4	20	8.0	115.2	18' x 18' (5.5 m x 5.5 m)	33 gpm @ 17.0 psi (124.9 L/min @ 1.17 Bar)	E1Z	E1Z	
06778B	VK600	1/2	15	5.6	80.6	18' x 18' (5.5 m x 5.5 m)	33 gpm @ 34.7 psi (124.9 L/min @ 2.39 Bar)	E1Z	E1Z	
07077	VK602	3/4	20	8.0	115.2	20' x 20' (6.1 m x 6.1 m)	40 gpm @ 25.0 psi (151.4 L/min @ 1.72 Bar)	D1Y	D1Z	
06778B	VK600	1/2	15	5.6	80.6	20' x 20' (6.1 m x 6.1 m)	40 gpm @ 51.0 psi (151.4 L/min @ 3.52 Bar)	D1Y	D1Z	
<b>Sprinkler Temperature Ratings</b>				<b>Approved Finishes</b>			<b>Approved Escutcheons</b>			
A - 135 °F (57 °C) and 155 °F (68 °C) B - 155 °F (68 °C) and 175 °F (79 °C) C - 175 °F (79 °C) D - 135 °F (57 °C) E - 135 °F (57 °C), 155 °F (68 °C), and 175 °F (79 °C)				1 - Brass, Chrome-Enloy®, White Polyester, and Black Polyester			Y - Standard surface-mounted escutcheons or the Viking Microfast® Model F-1 Adjustable Escutcheon® Z - Standard surface-mounted escutcheons or the Viking Microfast® Model F-1 Adjustable Escutcheon®, or recessed with the Micromatic® Model E-1 or E-2 Recessed Escutcheon			

**Footnotes**

<sup>1</sup> Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.

<sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

<sup>3</sup> This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.

<sup>4</sup> For areas of coverage smaller than shown, use the "Minimum Water Supply Requirement" for the next larger area listed with sprinklers of similar K-factor. Flows and pressures listed are per sprinkler.

<sup>5</sup> Listed by Underwriter's Laboratories, Inc. for use in the U.S. and Canada for Light Hazard occupancies with smooth, flat, horizontal ceilings only.

<sup>6</sup> cULus Listings are limited to Light Hazard occupancies, where allowed by the installation standards being applied.

<sup>7</sup> Accepted for use, City of New York Board of Standards and Appeals, Calendar Number 219-76-SA.



TECHNICAL DATA

**MICROFAST® STANDARD/  
QUICK RESPONSE  
EXTENDED COVERAGE  
PENDENT SPRINKLERS**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

**DESIGN CRITERIA - UL**

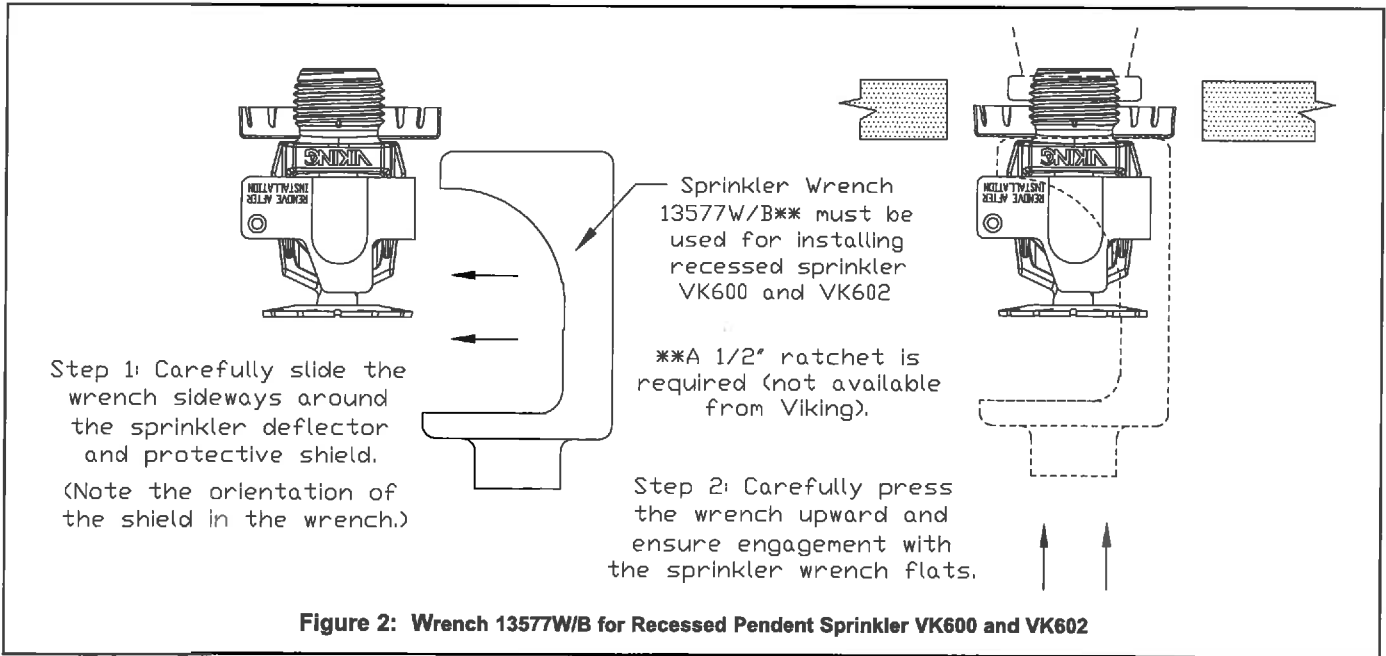
(Also refer to Approval Chart 1 on page 81c.)

**cULus Listing Requirements:**

Standard/Quick Response Extended Coverage Pendent Sprinklers SIN VK600 and VK602 are cULus Listed as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13 for extended coverage pendent spray sprinklers:

- Limited to Light Hazard occupancies, where allowed by the installation standards being applied, with smooth, flat, horizontal ceilings only.
- Minimum spacing allowed is 8 ft. (2.4 m) unless baffles are installed in accordance with NFPA 13.
- Minimum distance from walls is 4 in. (102 mm).
- Maximum distance from walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for extended coverage pendent spray sprinklers must be followed.

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to pages EC1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.**



	<b>TECHNICAL DATA</b>	<b>MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE PENDENT SPRINKLERS</b>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Approval Chart 2 (FM)								
Microfast® Quick Response Extended Coverage Pendent Sprinklers								
Maximum 175 PSI (12 Bar) WWP								
Sprinkler Base Part Number <sup>1</sup>	SIN	NPT Thread Size		Nominal K-Factor		Maximum Areas of Coverage <sup>4</sup> (Length x Width)	Minimum Water Supply Requirements <sup>4</sup> Flow/Pressure	FM Approvals <sup>3</sup> (Refer also to Design Criteria below.)
		Inches	mm	U.S.	metric <sup>2</sup>			
07077	VK602	3/4	20	8.0	115.2	16' x 16' (4.9 m x 4.9 m)	26 gpm @ 10.6 psi (98.4 L/min @ 0.73 Bar)	A1Z
06778B	VK600	1/2	15	5.6	80.6	16' x 16' (4.9 m x 4.9 m)	26 gpm @ 21.6 psi (98.4 L/min @ 1.49 Bar)	A1Z
07077	VK602	3/4	20	8.0	115.2	18' x 18' (5.5 m x 5.5 m)	33 gpm @ 17.0 psi (124.9 L/min @ 1.17 Bar)	A1Z
06778B	VK600	1/2	15	5.6	80.6	18' x 18' (5.5 m x 5.5 m)	33 gpm @ 34.7 psi (124.9 L/min @ 2.39 Bar)	A1Z
07077	VK602	3/4	20	8.0	115.2	20' x 20' (6.1 m x 6.1 m)	40 gpm @ 25.0 psi (151.4 L/min @ 1.72 Bar)	A1Z
06778B	VK600	1/2	15	5.6	80.6	20' x 20' (6.1 m x 6.1 m)	40 gpm @ 51.0 psi (151.4 L/min @ 3.52 Bar)	A1Z
<b>Sprinkler Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C), and 175 °F (79 °C)		<b>Approved Finishes</b> 1 - Brass, Chrome-Enloy®, White Polyester, and Black Polyester				<b>Approved Escutcheons</b> Z - Standard surface-mounted escutcheons or the Viking Microfast® Model F-1 Adjustable Escutcheon, or recessed with the Micro-matic® Model E-1 or E-2 Recessed Escutcheon		
<b>Footnotes</b>								
<sup>1</sup> Part number shown is the base part number. For complete part number, refer to current Viking price list schedule. <sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0. <sup>3</sup> This chart shows the FM Approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. <sup>4</sup> For areas of coverage smaller than shown, use the "Minimum Water Supply Requirement" for the next larger area listed with sprinklers of similar K-factor. Flows and pressures listed are per sprinkler.								

**DESIGN CRITERIA - FM**  
(Also refer to Approval Chart 2 above.)

**FM Approval Requirements:**  
 Quick Response Extended Coverage Pendent Sprinklers VK600 and VK602 are FM Approved as quick response **Non-Storage** extended coverage pendent sprinklers as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

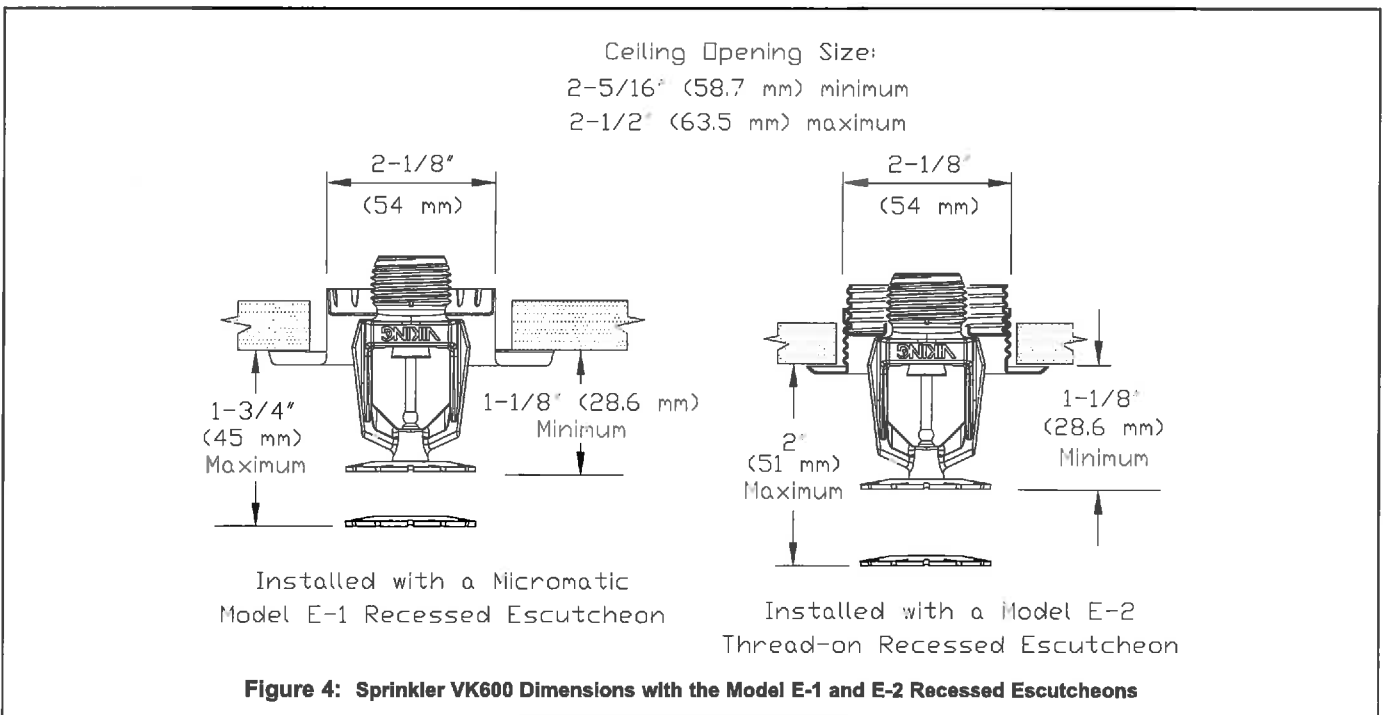
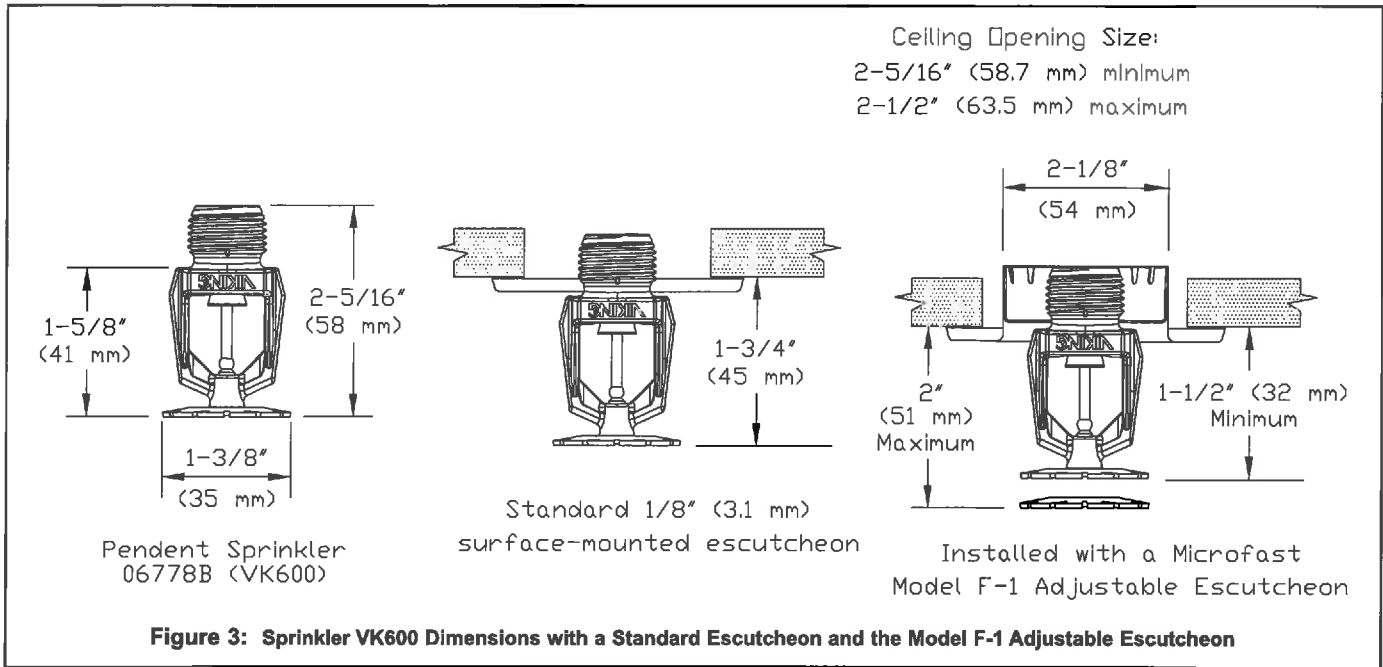
**NOTE: The FM installation guidelines may differ from cULus and/or NFPA criteria.**

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to pages EC1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.**



	<p><b>TECHNICAL DATA</b></p>	<p><b>MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE PENDENT SPRINKLERS</b></p>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

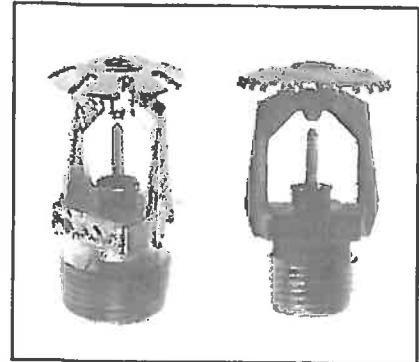




The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5484 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

### 1. DESCRIPTION

Viking Microfast® and MicrofastHP® Quick Response Upright and Conventional (Old Style) Sprinklers are small, thermosensitive, glass-bulb spray sprinklers available in several different finishes, temperature ratings, and K-Factors to meet design requirements. The special Polyester and Teflon® coatings can be used in decorative applications where colors are desired. In addition, these coatings have been investigated for installation in corrosive atmospheres and are cULus listed as corrosion resistant as indicated in Approval Chart 1. (Note: FM Global has no approval classification for Teflon® and Polyester coatings as corrosion resistant.)



### 2. LISTINGS AND APPROVALS

cULus Listed: Category VNIIV

FM Approved: Classes 2002 and 2020

NYC Approved: Calendar Number 219-76-SA and MEA 89-92-E, Volume 16

ABS Certified: Certificate 04-HS407984B-PDA

VdS Approved: Certificates G4060054, G4060056, G4880046, G4930039, and G4980020

LPC Approved: Ref. No. 096e/03, TE30401, and TE30872

CE Certified: Standard EN 12259-1, EC-certificate of conformity 0832-CPD-2001, 0832-CPD-2003, 0786-CPD-40131, and 0786-CPD-40171

MED Certified: Standard EN 12259-1, EC-certificate of conformity 0832-MED-1003 and 0832-MED-1008

NOTE: Other International approval certificates are available upon request.

Refer to Approval Chart 1 and Design Criteria on pages 51c-d for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 51e for FM Approval requirements that must be followed.

### 3. TECHNICAL DATA

#### Specifications:

Available since 1987.

Minimum Operating Pressure: 7 psi (0.5 bar)\*

Maximum Working Pressure: Sprinklers VK315 and VK340 are rated for use with water working pressures ranging from the minimum 7 psi (0.5 bar) up to 250 psi (17 bar) for high-pressure systems. High-pressure (HP) sprinklers can be identified by locating "250" stamped on the deflector. All other Part Nos. not mentioned above are rated to a maximum 175 psi (12 bar) wwp.

Factory tested hydrostatically to 500 psi (34.5 bar)

Testing: U.S.A. Patent No. 4,831,870

Thread size: Refer to the Approval Charts

Nominal K-Factor: Refer to the Approval Charts

Glass-bulb fluid temperature rated to -65 °F (-55 °C)

Overall Length: Refer to the Approval Charts

\*cULus Listing, FM Approval, and NFPA 13 installs require a minimum of 7 psi (0.5 bar). The minimum operating pressure for LPCB and CE Approvals ONLY is 5 psi (0.35 bar).

#### Material Standards:

Frame Casting: Brass UNS-C84400 or QM Brass for Sprinklers 06661B, 06766B, 07060, and 12281. Brass UNS-C84400 for all other sprinklers.

Deflector: Brass UNS-C23000 or Copper UNS-C19500 for Sprinklers 06661B and 12281. Copper UNS-C19500 for Sprinklers 06665B, 06764B, 07060, and 14817. Brass UNS-C26000 for all other Sprinklers.

Bushing (for Sprinklers 06719B, 06717B, and 12286): Brass UNS-C36000

Bulb: Glass, nominal 3 mm diameter

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape

Screw: Brass UNS-C36000

Viking Technical Data may be found on  
 The Viking Corporation's Web site at  
<http://www.vikinggroupinc.com>.  
 The Web site may include a more recent  
 addition of this Technical Data Page.

Form No. F\_080488 Replaces page 51a-e, dated April 25, 2008. (Updated for Sprinkler 14817. Added VdS to Sprinklers 06665B, 06764B, and 14817. Updated FM Approvals and split the Approval Charts to separate UL Listing requirements from FM Approval requirements. Changed the metric K-factor for K4.2 sprinklers to 57.)



The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400

For Teflon® Coated Sprinklers: Belleville Spring-Exposed, Screw-Nickel Plated, Pip Cap-Teflon® Coated

For Polyester Coated Sprinklers: Belleville Spring-Exposed

Ordering Information: (Also refer to the current Viking price list.)

Order Microfast® and MicrofastHP® Quick Response Upright and Conventional Sprinklers by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.

Finish Suffix: Brass = A, Chrome-Enloy® = F, White Polyester = M-W, Black Polyester = M-B, and Black Teflon® = N

Temperature Suffix (°F/°C): 135°/57° = A, 155°/68° = B, 175°/79° = D, 200°/93° = E, and 286°/141° = G

For example, sprinkler VK300 with a 1/2" thread, Brass finish and a 155 °F/68 °C temperature rating = Part No. 06661BAB

Available Finishes And Temperature Ratings: Refer to Table 1.

Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking data book.)

Sprinkler Wrench: Standard Wrench: Part No. 10896W/B (available since 2000)

Sprinkler Cabinets:

A. Six-head capacity: Part No. 01724A (available since 1971)

B. Twelve-head capacity: Part No. 01725A (available since 1971)

**4. INSTALLATION**

Refer to appropriate NFPA Installation Standards.

**5. OPERATION**

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

**6. INSPECTIONS, TESTS AND MAINTENANCE**

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

**7. AVAILABILITY**

The Viking Microfast® and MicrofastHP® Quick Response Upright and Conventional Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

**8. GUARANTEE**

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating	Maximum Ambient Calling Temperature	Bulb Color
Ordinary	135 °F (57 °C)	100 °F (38 °C)	Orange
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	Green
High	286 °F (141 °C)	225 °F (107 °C)	Blue

Sprinkler Finishes: Brass, Chrome-Enloy®, White Polyester, Black Polyester, and Black Teflon®

Corrosion-Resistant Coatings<sup>4</sup>: White Polyester, Black Polyester, and Black Teflon®

**Footnotes**

<sup>1</sup> The sprinkler temperature rating is stamped on the deflector.

<sup>2</sup> Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

<sup>3</sup> The corrosion-resistant coatings have passed the standard corrosion test required by the approving agencies indicated on pages 51c-e. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and Teflon® coatings.

	<b>TECHNICAL DATA</b>	<b>MICROFAST® AND MicrofastHP® QUICK RESPONSE UPRIGHT AND CONVENTIONAL SPRINKLERS</b>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

<b>Approval Chart 1 (UL)</b> Microfast® and MicrofastHP® Quick Response Upright and Conventional Sprinklers Maximum 175 PSI (12 bar) WWP	<table border="1" style="border-collapse: collapse;"> <tr> <td style="font-size: small;">Temperature</td> <td style="font-size: small;">KEY</td> </tr> <tr> <td style="font-size: x-small;">Vt</td> <td style="font-size: x-small;">Finish</td> </tr> <tr> <td style="font-size: x-small;">A1X</td> <td style="font-size: x-small;">Exception (if applicable)</td> </tr> </table>	Temperature	KEY	Vt	Finish	A1X	Exception (if applicable)
Temperature	KEY						
Vt	Finish						
A1X	Exception (if applicable)						

Base Part Number <sup>1</sup>	SIN	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals <sup>3</sup> (Refer also to Design Criteria on page 51d.)						
		NPT	BSP	U.S.	metric <sup>2</sup>	Inches	mm	cULus <sup>4</sup>	NYC <sup>7</sup>	VdS	LPCB	CE	⊕	
<b>Upright-Standard Orifice</b>														
06661B	VK300	1/2"	15 mm	5.6	80.6	2-3/16	56	A2	A2	-	-	-	-	-
07060	VK345	-	15 mm	5.6	80.6	2-3/16	56	-	-	A3	A3	B3 <sup>11</sup>	B3 <sup>10</sup>	-
<b>Conventional-Standard Orifice</b>														
06768B	VK310	1/2"	15 mm	5.6	80.6	2-3/16	56	A3	A3	-	A3	B3 <sup>11</sup>	B3 <sup>10</sup>	-
<b>Upright-Large Orifice</b>														
06665B	VK350	3/4"	-	8.0	115.2	2-5/16	59	A2	A2	A3	A3	B3 <sup>11</sup>	-	-
14817	VK350	-	20 mm	8.0	115.2	2-5/16	59	A2	A2	A3	A3	B3 <sup>11</sup>	-	-
06764B	VK350	1/2"	15 mm	8.0	115.2	2-5/16	59	A2	A2	A3	-	-	-	-
<b>Conventional-Large Orifice</b>														
06768B	VK354	3/4"	20 mm	8.0	115.2	2-5/16	59	A2	A3	-	A3	B3 <sup>11</sup>	-	-
<b>Upright-Small Orifice<sup>10</sup></b>														
06717B <sup>10</sup>	VK325	1/2"	15 mm	2.8	40.3	2-3/16	56	A2	A2	-	-	-	-	-
06719B <sup>10</sup>	VK327	1/2"	15 mm	4.2	57	2-3/16	58	A2	A2	-	-	-	-	-
06931B <sup>10</sup>	VK327	-	10 mm	4.2	57	2-3/16	56	-	-	A3	-	C1 <sup>12</sup>	-	-

<b>Maximum 250 PSI (17 bar) WWP</b> <b>Upright-Standard Orifice</b>													
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Base Part Number <sup>1</sup>	SIN	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals <sup>3</sup> (Refer also to Design Criteria on page 51d.)						
		NPT	BSP	U.S.	metric <sup>2</sup>	Inches	mm	cULus <sup>4</sup>	NYC <sup>7</sup>	VdS	LPCB	CE	⊕	
12281	VK315	1/2"	15 mm	5.6	80.6	2-3/16	56	A2	A2	-	-	-	-	-
<b>Upright-Small Orifice<sup>9</sup></b>														
12286 <sup>10</sup>	VK340	1/2"	15 mm	2.8	40.3	2-3/16	56	A2	A2	-	-	-	-	-

<b>Approved Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C) B - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C) C - 155 °F (68 °C)	<b>Approved Finishes</b> 1 - Brass and Chrome-Enloy® 2 - Brass, Chrome-Enloy®, White Polyester <sup>5A</sup> , Black Polyester <sup>5A</sup> , and Black Teflon <sup>5B</sup> 3 - Brass, Chrome-Enloy®, White Polyester <sup>5A</sup> , and Black Polyester <sup>5B</sup>
---	--

**Footnotes**

<sup>1</sup> Base part number is shown. For complete part number, refer to Viking's current price schedule.

<sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

<sup>3</sup> This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals.

<sup>4</sup> Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada.

<sup>5</sup> cULus Listed as corrosion resistant.

<sup>6</sup> Other colors are available on request with the same Listings and Approvals as the standard colors.

<sup>7</sup> Accepted for use, City of New York Board of Standards and Appeals, Calendar Number 219-76-SA.

<sup>8</sup> Accepted for use, City of New York Department of Buildings, MEA 89-92-E, Vol. 16.

<sup>9</sup> Listings and Approvals limited to Light Hazard Occupancies where allowed by the installation standards being applied, with hydraulically calculated wet systems only. Exception: 4.2K sprinklers may be installed on hydraulically calculated dry pipe systems where piping is corrosion resistant or internally galvanized.

<sup>10</sup> The sprinkler orifice is bushed.

<sup>11</sup> CE Certified, Standard EN 12259-1, EC-certificate of conformity 0832-CPD-2001 and 0832-CPD-2003.

<sup>12</sup> CE Certified, Standard EN 12259-1, EC-certificate of conformity 0786-CPD-40131.

<sup>13</sup> ⊕ MED Certified, Standard EN 12259-1, EC-certificate of conformity 0832-MED-1003 and 0832-MED-1008.

	<p>TECHNICAL DATA</p>	<p><b>MICROFAST® AND MicrofastHP® QUICK RESPONSE UPRIGHT AND CONVENTIONAL SPRINKLERS</b></p>
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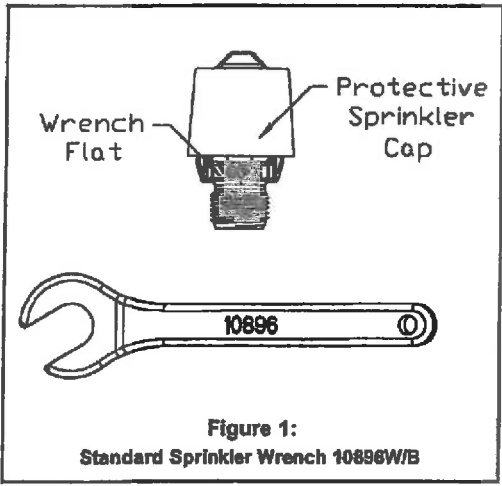
The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
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**DESIGN CRITERIA - UL**  
(Also refer to Approval Chart 1 on page 51c)

**cULus Listing Requirements:**  
 Microfast® and MicrofastHP® Quick Response Upright and Conventional Sprinklers are cULus Listed as indicated in Approval Chart 1 for installation in accordance with the latest edition of NFPA 13 for standard spray sprinklers, or old style (conventional) sprinklers.

- Designed for use in Light and Ordinary Hazard occupancies (*exception: small orifice sprinklers are limited to Light Hazard where allowed by the installation standards being applied, with hydraulically calculated wet systems only*).
- The sprinkler installation rules contained in NFPA 13 for standard spray upright sprinklers must be followed. For conventional sprinklers, refer to the installation guidelines for old style (conventional) sprinklers.

**IMPORTANT:** Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.



	<b>TECHNICAL DATA</b>	<b>MICROFAST® AND MicrofastHP® QUICK RESPONSE UPRIGHT AND CONVENTIONAL SPRINKLERS</b>
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<b>Approval Chart 2 (FM)</b> Microfast Quick Response Upright Sprinklers Maximum 175 PSI (12 bar) WWP								
Base Part Number <sup>1</sup>	SIN	Thread Size		Nominal K-Factor		Overall Length		FM Approvals <sup>2</sup> (Refer also to Design Criteria below.)
		NPT	BSP	U.S.	metric <sup>3</sup>	Inches	mm	
<b>Standard Orifice</b>								
06661B	VK300	1/2"	15 mm	5.6	80.6	2-3/16	56	A2
07060	VK345	--	15 mm	5.6	80.6	2-3/16	56	A2
<b>Large Orifice</b>								
06665B	VK350	3/4"	--	8.0	115.2	2-5/16	59	A2
14817	VK350	--	20 mm	8.0	115.2	2-5/16	59	A2
<b>Small Orifice<sup>4</sup></b>								
06717B <sup>5</sup>	VK325	1/2"	15 mm	2.8	40.3	2-3/16	56	A1
<b>Approved Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C)							<b>Approved Finishes</b> 1 - Brass and Chrome-Enloy <sup>6</sup> 2 - Brass, Chrome-Enloy <sup>6</sup> , White Polyester <sup>6</sup> , and Black Polyester <sup>6</sup>	
<b>Footnotes</b>								
<sup>1</sup> Base part number is shown. For complete part number, refer to Viking's current price schedule. <sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0. <sup>3</sup> This table shows the FM Approvals available at the time of printing. Check with the manufacturer for any additional approvals. <sup>4</sup> FM Approved as quick response Non-Storage pendent sprinklers. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (Including Data Sheet 2-0). <sup>5</sup> Other colors are available on request with the same Approvals as the standard colors. <sup>6</sup> The sprinkler orifice is bushed.								

**DESIGN CRITERIA - FM**  
 (Also refer to Approval Chart 2 above.)

**FM Approval Requirements:**  
 The sprinklers indicated in Approval Chart 2 are FM Approved as quick response Non-Storage upright sprinklers as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (Including Data Sheet 2-0). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.  
**NOTE:** The FM installation guidelines may differ from cULus and/or NFPA criteria.

**IMPORTANT:** Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

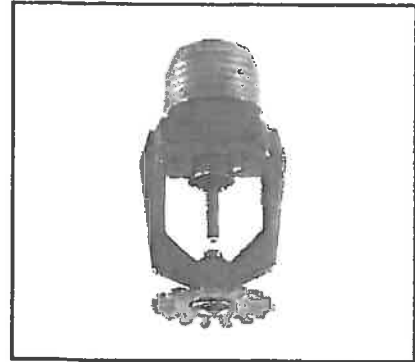
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### 1. DESCRIPTION

Viking Microfast® and MicrofastHP® Quick Response Pendent Sprinklers are small, thermosensitive, glass-bulb-spray sprinklers available in several different finishes and temperature ratings and K-Factors to meet design requirements. The special Polyester and Teflon® coatings can be used in decorative applications where colors are desired. In addition, these coatings have been investigated for installation in corrosive atmospheres and are cULus listed as corrosion resistant as indicated in the Approval Chart. (Note: FM Global has no approval classification for Teflon® and Polyester coatings as corrosion resistant.)



### 2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Class 2020

NYC Approved: Calendar Number 219-76-SA and MEA 89-92-E, Volume 16

ABS Certified: Certificate 04-HS407984C-PDA

VdS Approved: Certificates G4040095, G4040097, G4060056, G4060057, G4880045, G4930038, and G4980021

LPC Approved: Ref. Nos. 096e/03 and 096e/04

CE Certified: Standard EN 12259-1, EC-certificate of conformity 0832-CPD-2001, 0832-CPD-2003, 0786-CPD-40130, and 0786-CPD-40170

MED Certified: Standard EN 12259-1, EC-certificate of conformity 0832-MED-1003 and 0832-MED-1008

NOTE: Other international approval certificates are available upon request.

Refer to Approval Chart 1 and Design Criteria on page 41d for cULus Listing requirements and refer to Approval Chart 2 and Design Criteria on page 41e for FM Approval requirements that must be followed.

### 3. TECHNICAL DATA

#### Specifications:

Available since 1987.

Minimum Operating Pressure: 7 psi (0.5 bar)\*

Maximum Working Pressure: Sprinklers 12282 and 12290 are rated for use with water working pressures ranging from the minimum 7 psi (0.5 bar) up to 250 psi (17 bar) for high-pressure systems. High-pressure (HP) sprinklers can be identified by locating "250" stamped on the deflector. All other Part Nos. not mentioned above are rated to a maximum 175 psi (12 bar) wwp.

Factory tested hydrostatically to 500 psi (34.5 bar)

Testing: U.S.A. Patent No. 4,831,870

Thread size: Refer to the Approval Charts

Nominal K-Factor: Refer to the Approval Charts

Glass-bulb fluid temperature rated to -65 °F (-55 °C)

Overall Length: Refer to the Approval Charts

\*cULus Listing, FM Approval, and NFPA 13 installs require a minimum of 7 psi (0.5 bar). The minimum operating pressure for LPCB and CE Approvals ONLY is 5 psi (0.35 bar).

#### Material Standards:

Frame Casting: Brass UNS-C84400 or QM Brass for Sprinklers 06662B and 12282. Brass UNS-C84400 for all other sprinklers.

Deflector: Phosphor Bronze UNS-C51000 or Copper UNS-C19500 for Sprinklers 06662B, 06666B, and 06765B. Copper UNS-C19500 for Sprinkler 12282. Brass UNS-C26000 for all other Sprinklers.

Bushing (for Sprinklers 06718B, 06720B, and 12290): Brass UNS-C36000

Bulb: Glass, nominal 3 mm diameter

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape

Screw: Brass UNS-C36000

Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400

Viking Technical Data may be found on  
 The Viking Corporation's Web site at  
<http://www.vikinggroupinc.com>.  
 The Web site may include a more recent  
 edition of this Technical Data Page.





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For Teflon® Coated Sprinklers: Belleville Spring-Exposed, Screw-Nickel Plated, Pip Cap-Teflon® Coated

For Polyester Coated Sprinklers: Belleville Spring-Exposed

**Ordering Information:** (Also refer to the current Viking price list.)

Order Microfast® and MicrofastHP® Quick Response Pendent Sprinklers by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.

Finish Suffix: Brass = A, Chrome-Enloy® = F, White Polyester = M-W, Black Polyester = M-B, and Black Teflon® = N

Temperature Suffix (°F/°C): 135°/57° = A, 155°/68° = B, 175°/79° = D, 200°/93° = E, and 286°/141° = G

For example, sprinkler VK302 with a 1/2" thread, Brass finish and a 155 °F/68 °C temperature rating = Part No. 08662BAB

**Available Finishes And Temperature Ratings:**

Refer to Table 1.

**Accessories:** (Also refer to the "Sprinkler Accessories" section of the Viking data book.)

**Sprinkler Wrenches:**

A. Standard Wrench: Part No. 10896W/B (available since 2000).

B. Wrench for Coated and/or Recessed Sprinklers: Part No. 12144W/B\* (available since 2003)

C. Optional Protective Sprinkler Cap Remover/Escutcheon Installer Tool\*\* Part No. 15915 (available since 2010.)

**NOTE: RECESSED PENDENT SPRINKLERS WITH PROTECTIVE CAPS MUST USE WRENCH 12144W/B.**

\*A 1/2" ratchet is required (not available from Viking).

\*\*Allows use from the floor by attaching a length of 1" diameter CPVC tubing to the tool. Ideal for sprinkler cabinets. Refer to Bulletin F\_051808.

**Sprinkler Cabinets:**

A. Six-head capacity: Part No. 01724A (available since 1971)

B. Twelve-head capacity: Part No. 01725A (available since 1971)

#### 4. INSTALLATION

Refer to appropriate NFPA Installation Standards.

#### 5. OPERATION

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

#### 6. INSPECTIONS, TESTS AND MAINTENANCE

Refer to NFPA 25 for inspection, Testing and Maintenance requirements.

#### 7. AVAILABILITY

The Viking Microfast® and MicrofastHP® Quick Response Pendent Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

#### 8. GUARANTEE

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

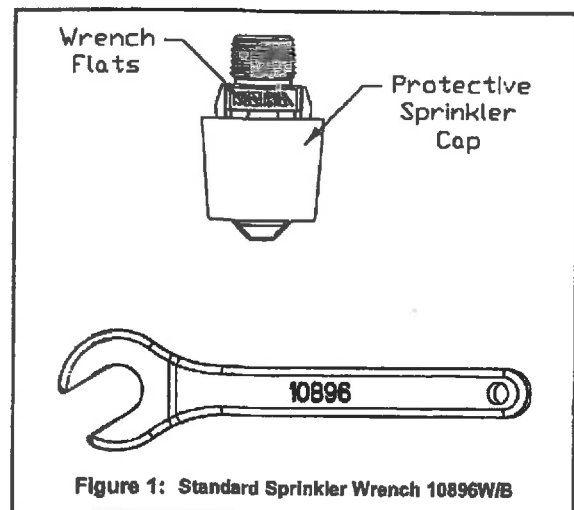


Figure 1: Standard Sprinkler Wrench 10896W/B

	<b>TECHNICAL DATA</b>	<b>MICROFAST® AND MicrofastHP® QUICK RESPONSE PENDENT SPRINKLERS</b>
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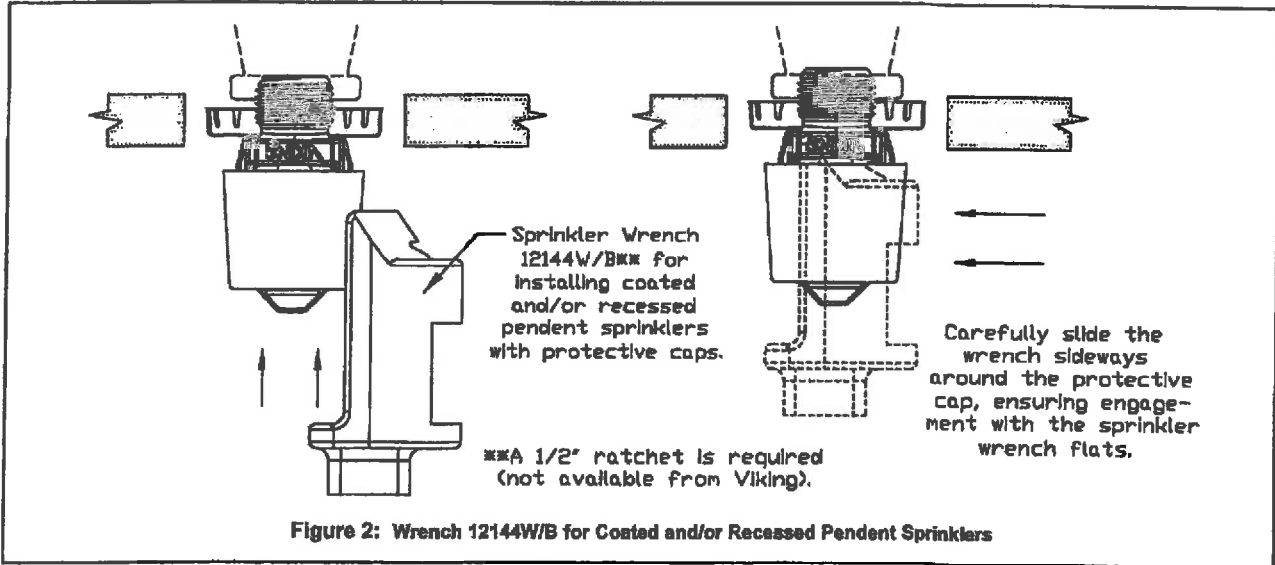
**TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES**

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating <sup>1</sup>	Maximum Ambient Ceiling Temperature <sup>2</sup>	Bulb Color
Ordinary	135 °F (57 °C)	100 °F (38 °C)	Orange
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	Green
High	286 °F (141 °C)	225 °F (107 °C)	Blue

**Sprinkler Finishes:** Brass, Chrome-Enloy®, White Polyester, Black Polyester, and Black Teflon®  
**Corrosion-Resistant Coatings<sup>3</sup>:** White Polyester, Black Polyester, and Black Teflon®

**Footnotes**

- <sup>1</sup> The sprinkler temperature rating is stamped on the deflector.
- <sup>2</sup> Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
- <sup>3</sup> The corrosion-resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Charts. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and Teflon® coatings.



	<b>TECHNICAL DATA</b>	<b>MICROFAST® AND MicrofastHP® QUICK RESPONSE PENDENT SPRINKLERS</b>
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<b>Approval Chart 1 (UL)</b> Microfast® and MicrofastHP® Quick Response Pendent Sprinklers Maximum 175 PSI (12 bar) WWP													
Sprinkler Base Part No. <sup>1</sup>	SIN	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals <sup>3</sup> (Refer also to Design Criteria on page 41e.)					
		NPT	BSP	U.S.	metric <sup>2</sup>	Inches	mm	cULus <sup>4</sup>	NYC <sup>5</sup>	VdS	LPCB	CE	⊗
<b>Standard Orifice</b>													
06662B	VK302	1/2"	15 mm	5.6	80.6	2-1/4"	58	A1X, B1Y	A1X, B1Y	A3	A3X, B3Y	C3X, E3Y <sup>11</sup>	C3X, E3Y <sup>13</sup>
<b>Large Orifice</b>													
06666B	VK352	3/4"	20 mm	8.0	115.2	2-3/8"	60	A1X, B1Y	A1X, B1Y	A3	A3X	C3 <sup>11</sup>	-
06765B	VK352	1/2"	15 mm	8.0	115.2	2-3/8"	60	A1X, B1Y	A1X, B1Y	A3	-	-	-
<b>Small Orifice<sup>6</sup></b>													
06718B <sup>6</sup>	VK329	1/2"	15 mm	2.8	40.3	2-3/16"	56	A1X, B1Y	A1X, B1Y	-	-	-	-
06720B <sup>6</sup>	VK331	1/2"	15 mm	4.2	57	2-1/4"	58	A1X, B1Y	A1X, B1Y	-	-	-	-
06932B	VK331	-	10 mm	4.2	57	2-3/8"	60	-	-	A3	-	G2 <sup>12</sup>	-
<b>Maximum 250 PSI (17 bar) WWP Standard Orifice</b>													
Sprinkler Base Part No. <sup>1</sup>	SIN	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals <sup>3</sup> (Refer also to Design Criteria on page 41e.)					
		NPT	BSP	U.S.	metric <sup>2</sup>	Inches	mm	cULus <sup>4</sup>	NYC <sup>10</sup>	VdS	LPCB	CE	⊗
12282	VK317	1/2"	15 mm	5.6	80.6	2-1/4"	58	A1X, B1Y	A1X	-	-	-	-
<b>Maximum 250 PSI (17 bar) WWP Small Orifice<sup>6</sup></b>													
12290 <sup>10</sup>	VK342	1/2"	15 mm	2.8	40.3	2-3/16"	56	A1X, B1Y	A1X	-	-	-	-
<b>Approved Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C) B - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C) C - 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C) D - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 286 °F (141 °C) E - 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C) F - 155 °F (68 °C), 175 °F (79 °C), and 286 °F (141 °C) G - 155 °F (68 °C)				<b>Approved Finishes</b> 1 - Brass, Chrome-Enloy <sup>6</sup> , White Polyester <sup>7</sup> , Black Polyester <sup>7</sup> , and Black Teflon <sup>7</sup> 2 - Brass and Chrome-Enloy <sup>6</sup> 3 - Brass, Chrome-Enloy <sup>6</sup> , White Polyester <sup>7</sup> , and Black Polyester <sup>7</sup>				<b>Approved Escutcheons</b> X - Standard surface-mounted escutcheon or the Viking Microfast® Model F-1 Adjustable Escutcheon Y - Standard surface-mounted escutcheon or the Viking Microfast® Model F-1 Adjustable Escutcheon or recessed with the Viking Micromatic® Model E-1 or E-2 Recessed Escutcheon					
<b>Footnotes</b>													
<sup>1</sup> Base part number is shown. For complete part number, refer to Viking's current price schedule. <sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0. <sup>3</sup> This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals. <sup>4</sup> Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada. <sup>5</sup> Accepted for use, City of New York Board of Standards and Appeals, Calendar Number 219-78-SA. <sup>6</sup> cULus Listed as corrosion resistant. <sup>7</sup> Other colors are available on request with the same Listings and Approvals as the standard colors. <sup>8</sup> Listings and Approvals limited to Light Hazard Occupancies where allowed by the installation standards being applied, with hydraulically calculated wet systems only. Exception: 4.2K sprinklers may be installed on hydraulically calculated dry pipe systems where piping is corrosion resistant or internally galvanized. <sup>9</sup> The sprinkler orifice is bushed. <sup>10</sup> Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 16. <sup>11</sup> CE Certified, Standard EN 12259-1, EC-certificate of conformity 0832-CPD-2001 and 0832-CPD-2003. <sup>12</sup> CE Certified, Standard EN 12259-1, EC-certificate of conformity 0786-CPD-40130 and 0786-CPD-40170. <sup>13</sup> ⊗ MED Certified, Standard EN 12259-1, EC-certificate of conformity 0832-MED-1003 and 0832-MED-1008.													

	<p><b>TECHNICAL DATA</b></p>	<p><b>MICROFAST® AND MicrofastHP® QUICK RESPONSE PENDENT SPRINKLERS</b></p>
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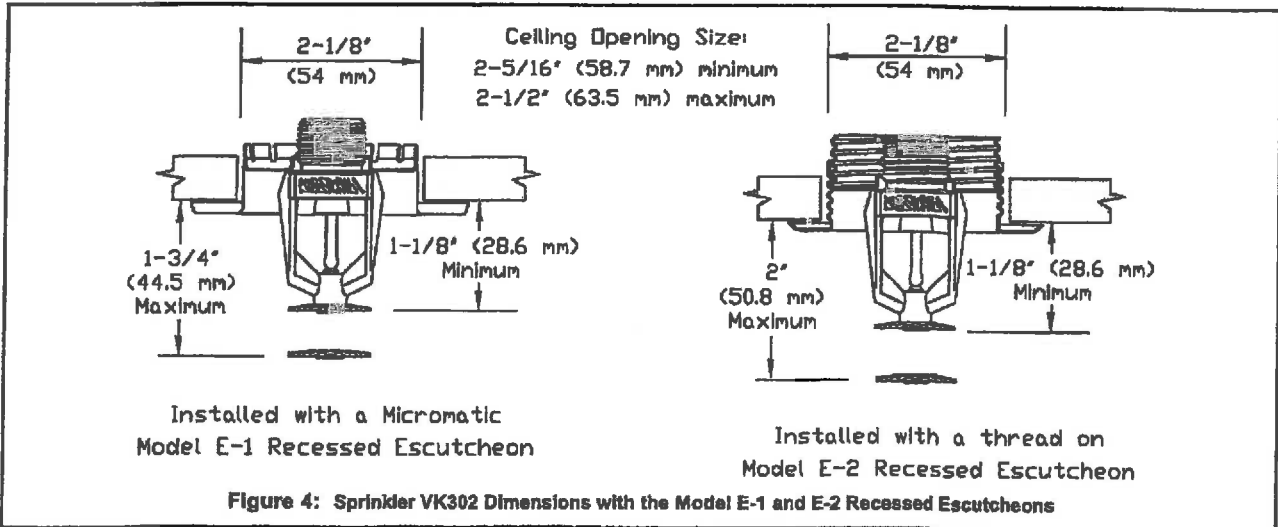
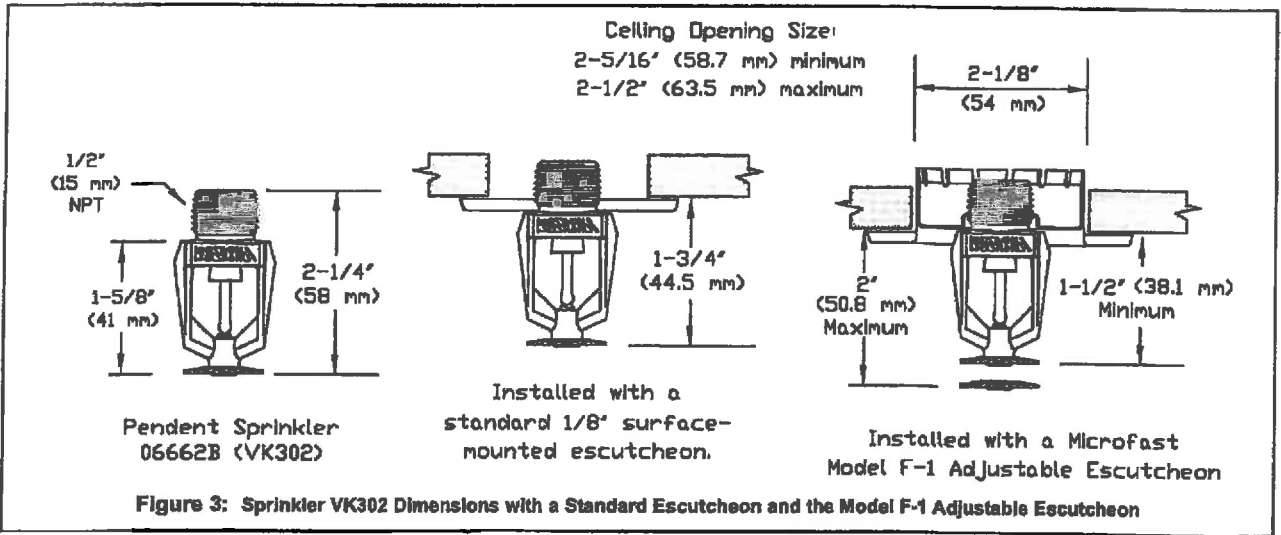
The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

**DESIGN CRITERIA - UL**  
(Also refer to Approval Chart 1 on page 41d)

**cULus Listing Requirements:**  
 Microfast® and Microfast-HP® Quick Response Pendent Sprinklers are cULus Listed as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13 for standard spray sprinklers.

- Designed for use in Light and Ordinary Hazard occupancies (*exception: small orifice sprinklers are limited to Light Hazard where allowed by the installation standards being applied, with hydraulically calculated wet systems only.*)
- The sprinkler installation rules contained in NFPA 13 for standard spray pendent sprinklers must be followed.

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.**



	<b>TECHNICAL DATA</b>	<b>MICROFAST® AND MicrofastHP® QUICK RESPONSE PENDENT SPRINKLERS</b>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Approval Chart 2 (FM) Microfast® Quick Response Pendent Sprinklers Maximum: 175 PSI (12 bar) FMV									
Sprinkler Base Part No. <sup>1</sup>	SIN	Thread Size		Nominal K-Factor		Overall Length		FM Approvals <sup>3</sup> (Refer also to Design Criteria below.)	
		NPT	BSP	U.S.	metric <sup>2</sup>	Inches	mm		
<b>Standard Orifice</b>									
06662B	VK302	1/2"	15 mm	5.6	80.6	2-1/4"	58	A2X, B2Y	
<b>Large Orifice</b>									
06666B	VK352	3/4"	20 mm	8.0	115.2	2-3/8"	60	A1X, B1Y	
<b>Small Orifice<sup>7</sup></b>									
06718B <sup>7</sup>	VK329	1/2"	15 mm	2.8	40.3	2-3/16"	56	A1X	
<b>Approved Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 288 °F (141 °C) B - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)				<b>Approved Finishes</b> 1 - Brass and Chrome-Enloy® 2 - Brass, Chrome-Enloy®, White Polyester®, and Black Polyester®			<b>Approved Escutcheons</b> X - Standard surface-mounted escutcheon or the Viking Microfast® Model F-1 Adjustable Escutcheon Y - Standard surface-mounted escutcheon or the Viking Microfast® Model F-1 Adjustable Escutcheon or recessed with the Viking Micromatic® Model E-1 or E-2 Recessed Escutcheon		
<b>Footnotes</b>									
<sup>1</sup> Base part number is shown. For complete part number, refer to Viking's current price schedule. <sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0. <sup>3</sup> This table shows the listings and approvals available at the time of printing. Check with the manufacturer for any additional approvals. <sup>4</sup> FM Approved as standard response control mode standard spray Non-storage sprinklers. For specific application and installation requirements, refer- ence the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0). <sup>5</sup> Other colors are available on request with the same Listings and Approvals as the standard colors. <sup>6</sup> The sprinkler orifice is bushed.									

**DESIGN CRITERIA - FM**  
(Also refer to Approval Chart 2 above.)

**FM Approval Requirements:**  
 The sprinklers indicated in Approval Chart 2 are FM Approved as standard response Non-storage standard spray pendent sprinklers as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.  
**NOTE:** The FM installation guidelines may differ from cULus and/or NFPA criteria.

**IMPORTANT:** Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.



## TECHNICAL DATA

### MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE HSW SPRINKLER VK606

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

#### 1. DESCRIPTION

Viking Microfast® Standard/Quick Response Extended Coverage Horizontal Sidewall Sprinkler VK606 is a thermosensitive spray sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The small glass bulb operating element and special deflector combine speed of operation and area of coverage to meet quick response extended coverage standards.

The special Polyester and Teflon® coatings can be used in decorative applications where colors are desired.

#### 2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Class 2022

NYC Approval: City of New York Board of Standards and Appeals, Calendar No. 219-76-SA

Refer to Approval Chart 1 and Design Criteria on page 82c for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 82d for FM Approval requirements that must be followed.

#### 3. TECHNICAL DATA

##### Specifications:

Available since 1996.

Minimum Operating Pressure: Refer to the Approval Chart.

Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).

Testing: U.S.A. Patent No. 4,831,870

Thread size: 3/4" (20 mm) NPT

Nominal K-Factor: 8.0 U.S. (115.2 metric\*)

\*Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)

Overall Length: 3-1/8" (80 mm)

##### Material Standards:

Sprinkler Frame: Brass UNS-C84400

Deflector: Phosphor Bronze UNS-C51000

Bulb: Glass, nominal 3 mm diameter

Pip Cap: Brass UNS-C31400 or UNS-C31600

Compression Screw: Brass UNS-C36000

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape

For Teflon® Coated Sprinklers: Belleville Spring-Exposed, Screw-Nickel Plated, Pip Cap-Teflon® Coated

For Polyester Coated Sprinklers: Belleville Spring-Exposed

##### Ordering Information: (Also refer to the current Viking price list.)

Order Sprinkler VK606 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.

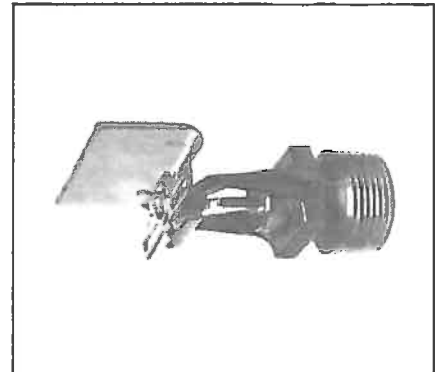
Finish Suffix: Brass = A, Chrome-Enloy® = F, White Polyester = M-W, Black Polyester = M-B, and Black Teflon = N

Temperature Suffix (°F/°C): 135°/57° = A, 155°/68° = B, 175°/79° = D

For example, sprinkler VK606 with a Brass finish and a 155 °F/68 °C temperature rating = Part No. 13005AB.

**Available Finishes And Temperature Ratings:** Refer to Table 1.

**Accessories:** (Also refer to the "Sprinkler Accessories" section of the Viking data book.)



For Light Hazard Occupancies Only

Viking Technical Data may be found on  
The Viking Corporation's Web site at  
<http://www.vikinggroupinc.com>.  
The Web site may include a more recent  
edition of this Technical Data Page.

	<b>TECHNICAL DATA</b>	<b>MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE HSW SPRINKLER VK606</b>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

**Sprinkler Wrenches:**

- A. Standard Wrench: Part No. 10896W/B (available since 2000)
- B. Wrench for coated and/or recessed sprinklers: Part No. 13655W/B\*\* (available since 2006)
- \*\*A 1/2" ratchet is required (not available from Viking).

**Sprinkler Cabinets:**

- A. Six-head capacity: Part No. 01724A (available since 1971)
- B. Twelve-head capacity: Part No. 01725A (available since 1971)

**4. INSTALLATION**

Refer to appropriate NFPA Installation Standards.

**5. OPERATION**

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the bulb to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

**6. INSPECTIONS, TESTS AND MAINTENANCE**

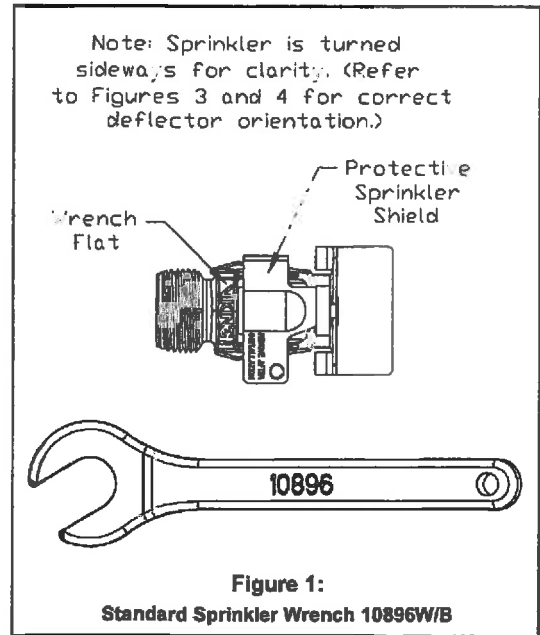
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

**7. AVAILABILITY**

The Viking Model VK606 Sprinkler is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

**8. GUARANTEE**

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.



**TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES**

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating <sup>1</sup>	Maximum Ambient Ceiling Temperature <sup>1</sup>	Bulb Color
Ordinary	135 °F (57 °C)	100 °F (38 °C)	Orange
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow

**Available Sprinkler Finishes:** Brass, Chrome-Enjoy® (patents pending), White Polyester<sup>2</sup>, Black Polyester<sup>2</sup>, and Black Teflon<sup>3</sup>

**Footnotes**

- <sup>1</sup> The sprinkler temperature rating is stamped on the deflector.
- <sup>2</sup> Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.
- <sup>3</sup> The coatings indicated are applied to the exposed exterior surfaces only. For Teflon® coated open sprinklers only, the waterway is coated. Note that the spring is exposed on sprinklers with Teflon® and Polyester coatings.

	<b>TECHNICAL DATA</b>	<b>MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE HSW SPRINKLER VK606</b>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

Sprinkler Base Part Number <sup>1</sup>	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length	
	Inches	mm	U.S.	metric <sup>2</sup>		Inches	mm
13005	3/4	20	8.0	115.2	175 psi (12 Bar)	3-1/8	80

**Approval Chart 1 (UL)**  
 Microfast® QREC Horizontal Sidewall Sprinkler VK606  
 For Light Hazard Occupancies Only.  
 For installation below smooth, flat, horizontal ceilings only.

—	Temperature	KEY
—	Finish	
A1X	Escutcheon (if applicable)	

Maximum Areas of Coverage <sup>3</sup> (Width x Throw)	Minimum Water Supply Requirements <sup>3</sup>	Deflector-to-Ceiling Distance	Listings and Approvals <sup>4</sup> (Refer also to Design Criteria below.)	
			cULus <sup>5</sup>	NYC <sup>6</sup>
16' x 16' (4.9 m x 4.9 m)	26 gpm @ 10.6 psi (98.4 L/min @ 0.73 Bar)	4 to 12" (102 to 305 mm)	A1W	A1X
16' x 18' (4.9 m x 5.5 m)	29 gpm @ 13.1 psi (109.8 L/min @ 0.90 Bar)	4 to 12" (102 to 305 mm)	A1W	A1X
16' x 20' (4.9 m x 6.2 m)	32 gpm @ 16.0 psi (121.1 L/min @ 1.10 Bar)	4 to 12" (102 to 305 mm)	A1W	A1Y
16' x 22' (4.9 m x 6.7 m)	36 gpm @ 20.3 psi (136.3 L/min @ 1.4 Bar)	4 to 6" (102 to 152 mm)	A1W	See Footnote 7.
16' x 22' (4.9 m x 6.7 m)	38 gpm @ 22.6 psi (143.8 L/min @ 1.56 Bar)	6 to 12" (152 to 305 mm)	A1W	See Footnote 7.

<b>Approved Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C), and 175 °F (79 °C)	<b>Approved Finishes</b> 1 - Brass, Chrome-Enloy®, White Polyester, Black Polyester, and Black Teflon®	<b>Approved Escutcheons</b> W - Standard surface-mounted escutcheons or the Microfast® Model F-1 Adjustable Escutcheon, or recessed with the Micromatic® Model E-1 or E-2 Recessed Escutcheon, or the Model G-1 Adjustable Escutcheon. X - Standard surface-mounted escutcheons or the Microfast® Model F-1 Adjustable Escutcheon, or recessed with the Micromatic® Model E-1 or E-2 Recessed Escutcheon Y - Standard surface-mounted escutcheons or the Microfast® Model F-1 Adjustable Escutcheon
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**Footnotes**

<sup>1</sup> Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.  
<sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.  
<sup>3</sup> For areas of coverage smaller than shown, use the "Minimum Water Supply Requirement" for the next larger area listed. Flows and pressures listed are per sprinkler.  
<sup>4</sup> This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.  
<sup>5</sup> Listed by Underwriter's Laboratories, Inc. for use in the U.S. and Canada for Light-Hazard occupancies with smooth, flat, horizontal ceilings only.  
<sup>6</sup> Accepted for use, City of New York Board of Standards and Appeals, Calendar Number 219-76-SA for Light Hazard occupancies only.  
<sup>7</sup> Meets New York City requirements, effective July 1, 2008.  
**NOTE:** Horizontal sidewall sprinklers must be installed with deflectors located between 4" and 6" (102 mm and 152 mm) from walls. *Exception:* Horizontal sidewall sprinklers may be located less than 4" (102 mm) from the wall in which they are installed. Always install horizontal sidewall sprinklers with the top of the deflector aligned parallel with the ceiling or roof.

**DESIGN CRITERIA - UL**  
 (Also refer to Approval Chart 1 above.)

**cULus Listing Requirements:**  
 Microfast® Extended Coverage Horizontal Sidewall Sprinkler VK606 is cULus Listed as a quick response sprinkler as indicated in Approval Chart 1 for installation in accordance with the latest edition of NFPA 13 for extended coverage sidewall spray sprinklers:

- Limited to Light Hazard occupancies with smooth, flat, horizontal ceilings only.
- Refer to Approval Chart 1 for required deflector distance below the ceiling. Install with the leading edge of the deflector and sprinkler frame arms oriented parallel to the ceiling (see Figure 3). **THE TOP SURFACE OF THE DEFLECTOR IS MARKED "TOP"**. The sprinkler must be oriented as shown in Figure 3.
- Minimum distance from end walls is 4 in. (102 mm).
- Maximum distance from the end wall shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for extended coverage sidewall spray sprinklers must be followed.

**IMPORTANT:** Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to pages EC1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.



	<b>TECHNICAL DATA</b>	<b>MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE HSW SPRINKLER VK606</b>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

**Approval Chart 2 (FM)**  
 Microfast® Quick Response Extended Coverage HSW Sprinkler VK606  
 Maximum 175 PSI (12 Bar) WWP

Temperature	KEY
F	F
A1X	Escutcheon if applicable

Sprinkler Base Part Number <sup>1</sup>	SIN	NPT Thread Size		Nominal K-Factor		Maximum Areas of Coverage <sup>2</sup> (Width x Throw)	Minimum Water Supply Requirements <sup>3</sup> Flow/Pressure	FM Approvals <sup>4</sup> (Refer also to Design Criteria below.)
		Inches	mm	U.S.	metric <sup>2</sup>			
13005	VK606	3/4	20	8.0	115.2	16' x 16' (4.9 m x 4.9 m)	32 gpm @ 16.0 psi (121.1 L/min @ 1.10 Bar)	A1Y, B1Z
13005	VK606	3/4	20	8.0	115.2	16' x 18' (4.9 m x 5.5 m)	36 gpm @ 20.3 psi (136.3 L/min @ 1.4 Bar)	A1Y, B1Z
13005	VK606	3/4	20	8.0	115.2	16' x 20' (4.9 m x 6.1 m)	40 gpm @ 25.0 psi (151.4 L/min @ 1.72 Bar)	A1Y, B1Z
13005	VK606	3/4	15	8.0	115.2	16' x 22' (4.9 m x 6.7 m)	44 gpm @ 30.3 psi (166.6 L/min @ 2.09 Bar)	A1Y, B1Z
13005	VK606	3/4	15	8.0	115.2	16' x 24' (4.9 m x 7.3 m)	48 gpm @ 36.0 psi (181.7 L/min @ 2.48 Bar)	A1Y, B1Z

<b>Sprinkler Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C) and 175°F (79 °C) B - 135 °F (57 °C), 155 °F (68 °C)	<b>Approved Finishes</b> 1 - Brass, Chrome-Enloy®, White Polyester, and Black Polyester	<b>Approved Escutcheons</b> Y - Recessed with the Micromatic® Model E-1 or E-2 Recessed Escutcheon, or the Model G-1 Adjustable Escutcheon. Z - Standard surface-mounted escutcheons or the Microfast® Model F-1 Adjustable Escutcheon, or recessed with the Micromatic® Model E-1 or E-2 Recessed Escutcheon, or the Model G-1 Adjustable Escutcheon.
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**Footnotes**

- <sup>1</sup> Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.
- <sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.
- <sup>3</sup> This chart shows the FM Approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.
- <sup>4</sup> For areas of coverage smaller than shown, use the "Minimum Water Supply Requirement" for the next larger area listed. Flows and pressures listed are per sprinkler.

**DESIGN CRITERIA - FM**  
 (Also refer to Approval Chart 2 above.)

**FM Approval Requirements:**

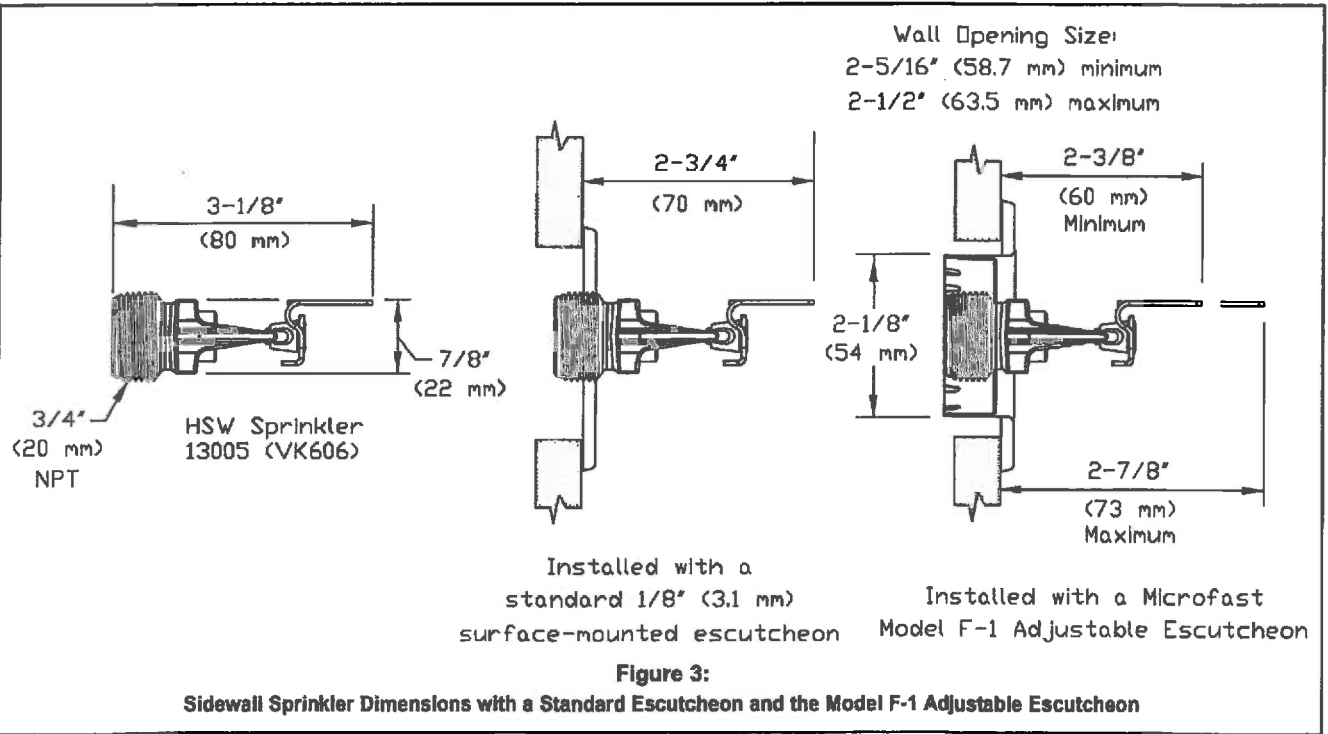
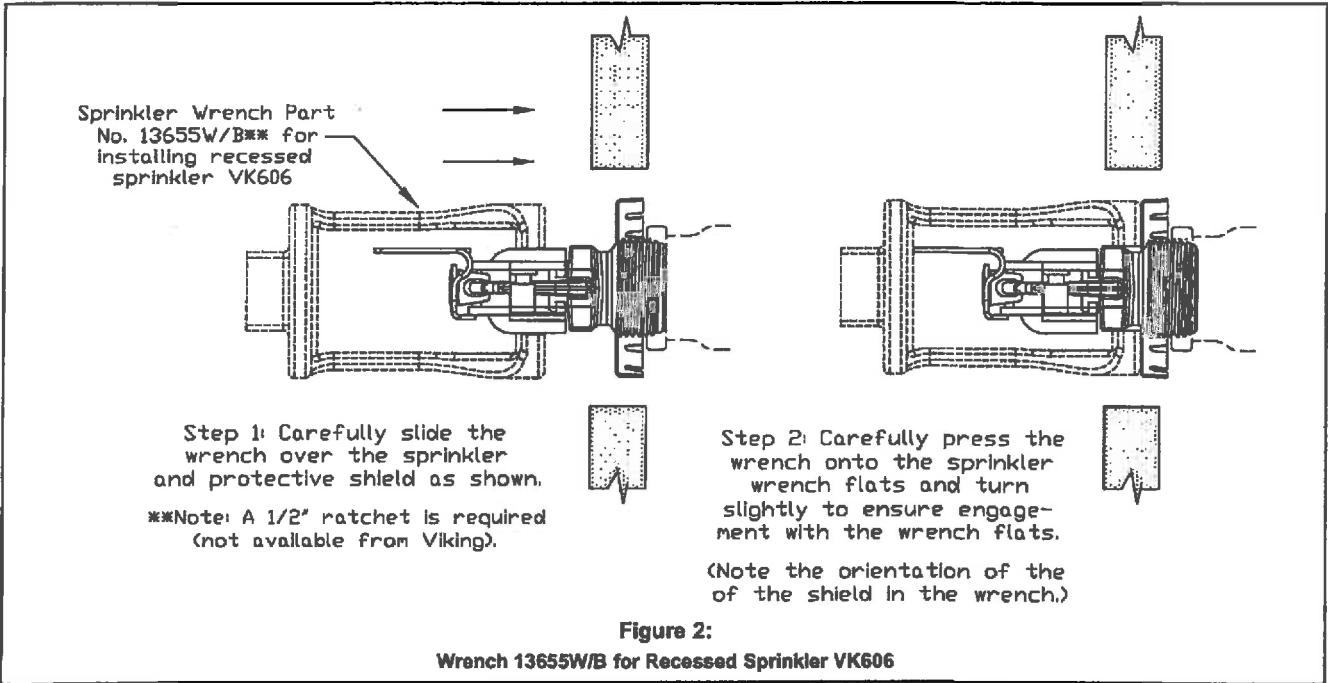
Microfast® Quick Response Extended Coverage Horizontal Sidewall Sprinkler VK606 is FM Approved as a quick response sidewall Non-Storage sprinkler as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including 2-0) and Technical Advisory Bulletins. FM Global Loss Prevention Data Sheets and Technical Advisory Bulletins contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

**NOTE:** The FM installation guidelines may differ from cULus and/or NFPA criteria.

**IMPORTANT:** Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to pages EC1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.

	<b>TECHNICAL DATA</b>	<b>MICROFAST® STANDARD/ QUICK RESPONSE EXTENDED COVERAGE HSW SPRINKLER VK606</b>
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The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

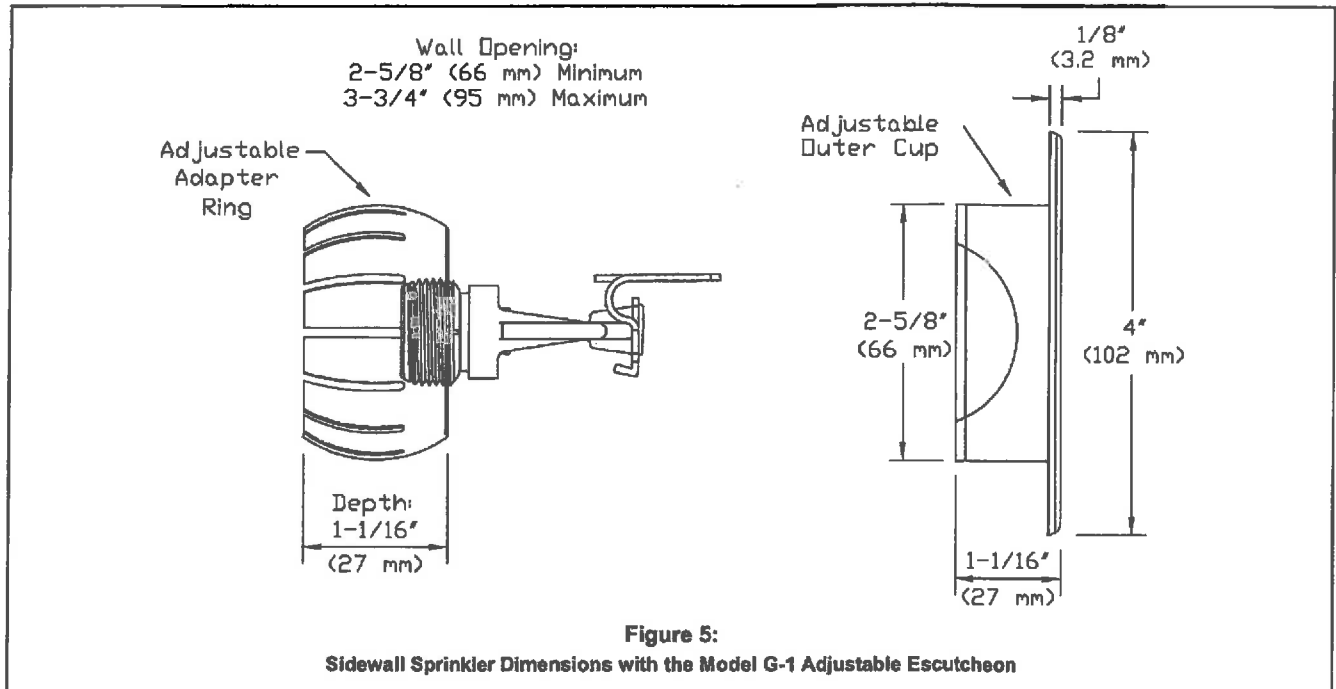
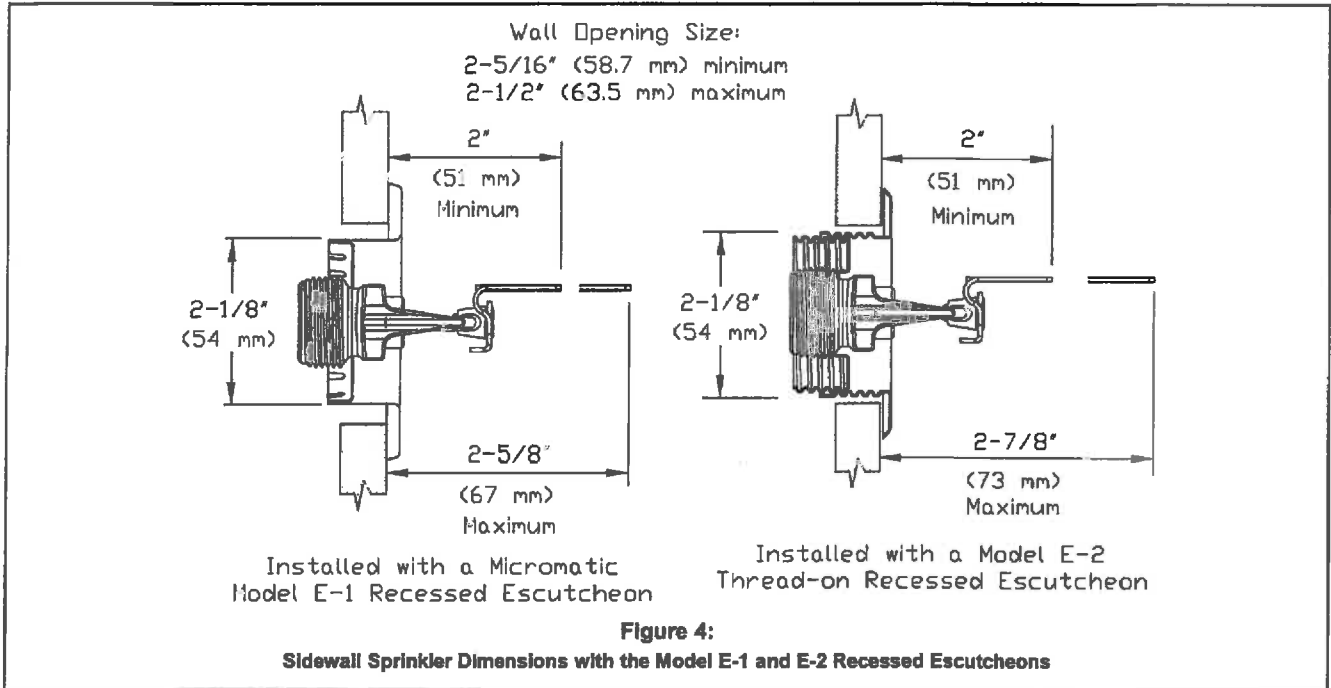




TECHNICAL DATA

**MICROFAST® STANDARD/  
QUICK RESPONSE  
EXTENDED COVERAGE  
HSW SPRINKLER VK606**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com





## TECHNICAL DATA

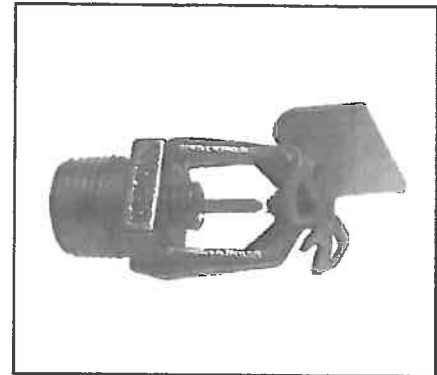
**MICROFAST® AND MICRO-FASTHP® QUICK RESPONSE HORIZONTAL SIDEWALL SPRINKLERS (VK305 & VK319)**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058

Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

### 1. DESCRIPTION

Viking Microfast® and MicrofastHP® Quick Response Horizontal Sidewall Sprinklers are small thermosensitive glass bulb spray sprinklers available with various finishes and temperature ratings to meet design requirements. The special Polyester and Teflon® coatings can be used in decorative applications where colors are desired. In addition, these coatings have been investigated for installation in corrosive atmospheres and are cULus listed as corrosion resistant as indicated in the Approval Chart. (Note: FM Global has no approval classification for Teflon® and Polyester coatings as corrosion resistant.)



### 2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV

FM Approved: Class 2020

NYC Approved: MEA 89-92-E, Volume 16

Refer to Approval Chart 1 and Design Criteria on page 43d for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 43f for FM Approval requirements that must be followed.

### 3. TECHNICAL DATA

#### Specifications:

Available since 2003.

Minimum Operating Pressure: 7 psi (0.5 bar)

**Maximum Working Pressure:** Sprinkler VK319 is rated for use with water working pressures ranging from the minimum 7 psi (0.5 bar) up to 250 psi (17 bar) for high-pressure systems. High-pressure (HP) sprinklers can be identified by locating "250" stamped on the deflector.

Sprinkler VK305 is rated to a maximum 175 psi (12 bar) wwp.

Factory tested hydrostatically to 500 psi (34.5 bar)

Testing: U.S.A. Patent No. 4,831,870

Nominal K-Factor: 5.6 U.S. (80.6 metric\*)

\*Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)

Overall Length: 2-11/16" (68 mm)

#### Material Standards:

Frame Casting: Brass UNS-C84400

Deflector: Copper UNS-C19500

Bulb: Glass, nominal 3 mm diameter

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape

Screw: Brass UNS-C36000

Pip Cap: Copper UNS-C11000 and Stainless Steel UNS-S30400

Pip Cap Attachment (for Sprinkler VK319): Brass UNS-C36000

For Teflon® Coated Sprinklers: Belleville Spring-Exposed, Screw-Nickel Plated, Pip Cap-Teflon® Coated

For Polyester Coated Sprinklers: Belleville Spring-Exposed

#### Ordering Information: (Also refer to the current Viking price list.)

Order Quick Response Horizontal Sidewall Sprinklers by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.

Finish Suffix: Brass = A, Chrome-Enloy® = F, White Polyester = M-W, Black Polyester = M-B, and Black Teflon® = N

Temperature Suffix (°F/°C): 135°/68° = A, 155°/68° = B, 175°/79° = D, 200°/93° = E, and 286°/141° = G

For example, sprinkler VK305 with a Brass finish and a 155 °F/68 °C temperature rating = Part No. 12121AB

Viking Technical Data may be found on  
The Viking Corporation's Web site at  
<http://www.vikinggroupinc.com>.  
The Web site may include a more recent  
edition of this Technical Data Page.

	<p>TECHNICAL DATA</p>	<p><b>MICROFAST® AND MICRO-FASTHP® QUICK RESPONSE HORIZONTAL SIDEWALL SPRINKLERS (VK305 &amp; VK319)</b></p>
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**Available Finishes And Temperature Ratings:**

Refer to Table 1

**Accessories:** (Also refer to the "Sprinkler Accessories" section of the Viking data book.)

**Sprinkler Wrenches:**

A. Standard Wrench: Part No. 10896W/B (available since 2000).

B. Wrench for recessed sprinklers with protective shields: Part No. 13655W/B\*\* (available since 2003)

\*\*A ½" ratchet is required (not available from Viking).

**Sprinkler Cabinets:**

A. Six-head capacity: Part No. 01724A (available since 1971)

B. Twelve-head capacity: Part No. 01725A (available since 1971)

**4. INSTALLATION**

Refer to appropriate NFPA Installation Standards.

**5. OPERATION**

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

**6. INSPECTIONS, TESTS AND MAINTENANCE**

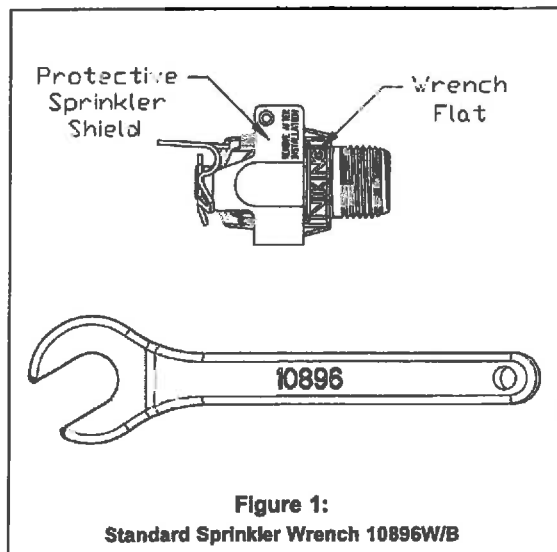
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

**7. AVAILABILITY**

Viking Quick Response Horizontal Sidewall Sprinklers are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

**8. GUARANTEE**

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.



	<b>TECHNICAL DATA</b>	<b>MICROFAST® AND MICRO-FASTHP® QUICK RESPONSE HORIZONTAL SIDEWALL SPRINKLERS (VK305 &amp; VK319)</b>
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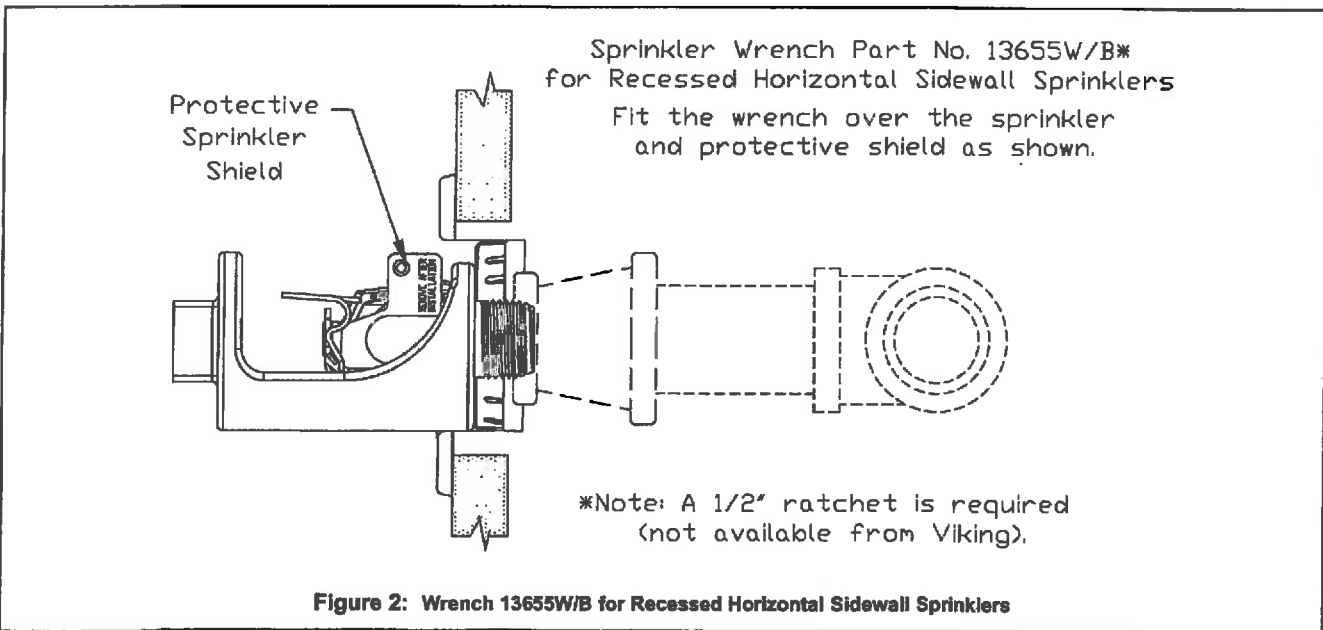
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TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES			
Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating <sup>1</sup>	Maximum Ambient Ceiling Temperature <sup>1</sup>	Bulb Color
Ordinary	135 °F (57 °C)	100 °F (38 °C)	Orange
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow
Intermediate	200 °F (93 °C)	150 °F (65 °C)	Green
High	286 °F (141 °C)	225 °F (107 °C)	Blue

**Sprinkler Finishes:** Brass, Chrome-Enloy®, White Polyester, Black Polyester, and Black Teflon®  
**Corrosion-Resistant Coatings<sup>2</sup>:** White Polyester, Black Polyester, and Black Teflon®

**Footnotes**

<sup>1</sup> The sprinkler temperature rating is stamped on the deflector.  
<sup>2</sup> Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.  
<sup>3</sup> The corrosion-resistant coatings have passed the standard corrosion test required by the approving agencies indicated in the Approval Chart. These tests cannot and do not represent all possible corrosive environments. Prior to installation, verify through the end-user that the coatings are compatible with or suitable for the proposed environment. For automatic sprinklers, the coatings indicated are applied to the exposed exterior surfaces only. Note that the spring is exposed on sprinklers with Polyester and Teflon® coatings.



	<b>TECHNICAL DATA</b>	<b>MICROFAST® AND MICRO-FASTHP® QUICK RESPONSE HORIZONTAL SIDEWALL SPRINKLERS (VK305 &amp; VK319)</b>
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Approval Chart 1 (UL)													
Microfast® and MicrofastHP® Quick Response Horizontal Sidewall Sprinklers													
Base Part Number <sup>1</sup>	SIN	Maximum Pressure	Thread Size		Nominal K-Factor		Overall Length		Listings and Approvals <sup>2</sup> (Refer also to Design Criteria below.)				
			NPT	BSP	U.S.	metric <sup>2</sup>	Inches	mm	cULus <sup>4</sup>	NYC <sup>5</sup>	LPCB	CE	⚙️
Maximum 175 PSI (12 Bar) WWP For Light or Ordinary Hazard Occupancies. Deflector must be located 4" to 12" (102 mm to 305 mm) below the ceiling.													
12121	VK305	175 psi	1/2"	15 mm	5.6	80.6	2-11/16	68	A1Y, B1X	A1Y	--	--	--
Maximum 175 PSI WWP For Light Hazard Occupancies Only. Deflector must be located 4" to 6" (102 mm to 152 mm) below the ceiling.													
12121	VK305	175 psi	1/2"	15 mm	5.6	80.6	2-11/16	68	cULus A1Y, B1X	NYC See Footnote 6.	LPCB	CE	⚙️
Maximum 250 PSI WWP For Light or Ordinary Hazard Occupancies. Deflector must be located 4" to 12" (102 mm to 305 mm) below the ceiling.													
12285	VK319	250 psi	1/2"	15 mm	5.6	80.6	2-11/16	68	cULus <sup>4</sup> A1Y, B1X	NYC <sup>5</sup> A1Y	LPCB	CE	⚙️
<b>Approved Temperature Ratings</b> A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C) B - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)					<b>Approved Finishes</b> 1 - Brass, Chrome-Enloy®, White Polyester <sup>7</sup> , Black Polyester <sup>7</sup> , and Black Teflon <sup>7</sup>			<b>Approved Escutcheons</b> X - Installed with standard surface-mounted escutcheons or the Viking Microfast® Model F-1 Adjustable Escutcheon®, or recessed with the Viking Micromatic® Model E-1, E-2 or G-1 Recessed Escutcheon Y - Installed with standard surface-mounted escutcheons or the Viking Microfast® Model F-1 Adjustable Escutcheon®					
<b>Footnotes</b>													
<sup>1</sup> Base part number shown. For complete part number, refer to Viking's current price schedule. <sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0. <sup>3</sup> This table shows the listings and approvals available at the time of printing. Other approvals may be in process. <sup>4</sup> Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada. <sup>5</sup> Accepted for use, City of New York Department of Buildings, MEA 89-92-E, Vol. 16. <sup>6</sup> Meets New York City requirements, effective July 1, 2008. <sup>7</sup> cULus Listed as corrosion-resistant. Other colors are available on request with the same Listings and Approvals as the standard colors.													

**DESIGN CRITERIA - UL**  
(Also refer to Approval Chart 1 above.)

**cULus Listing Requirements:**  
 Quick Response Horizontal Sprinklers VK305 and VK319 are cULus Listed as indicated in the Approval Chart for installation in accordance with the latest edition of NFPA 13 for sidewall standard spray sprinklers.

- Designed for use in Light and Ordinary Hazard occupancies.
- Locate the deflector 4" to 12" (102 mm to 305 mm) below the ceiling.
- Protection areas and maximum spacing shall be in accordance with the tables provided in NFPA 13.
- Minimum spacing allowed is 6 ft. (1.8 m).
- Align the top of the deflector parallel with the ceiling.
- Locate no less than 4" (102 mm) from end walls.
- Maximum distance from end walls shall be no more than one-half of the allowable distance between sprinklers. The distance shall be measured perpendicular to the wall.
- The sprinkler installation and obstruction rules contained in NFPA 13 for sidewall standard spray sprinklers must be followed.

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.**

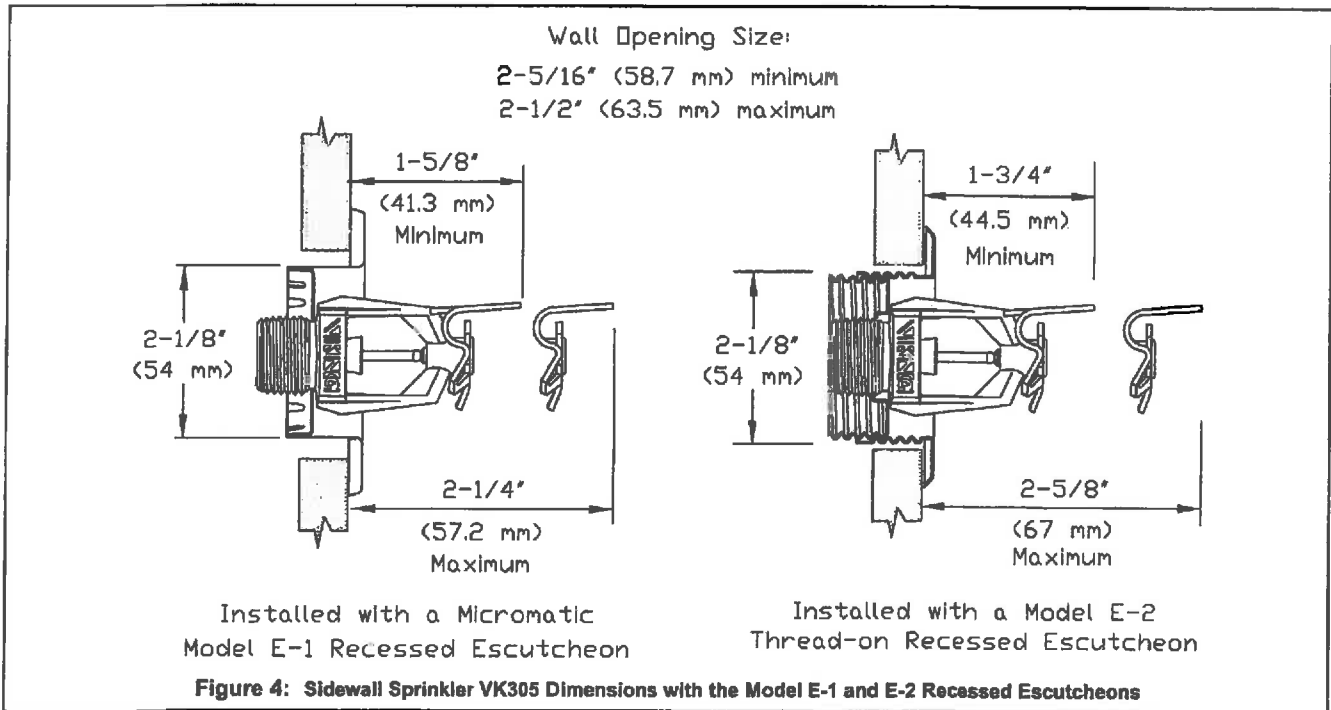
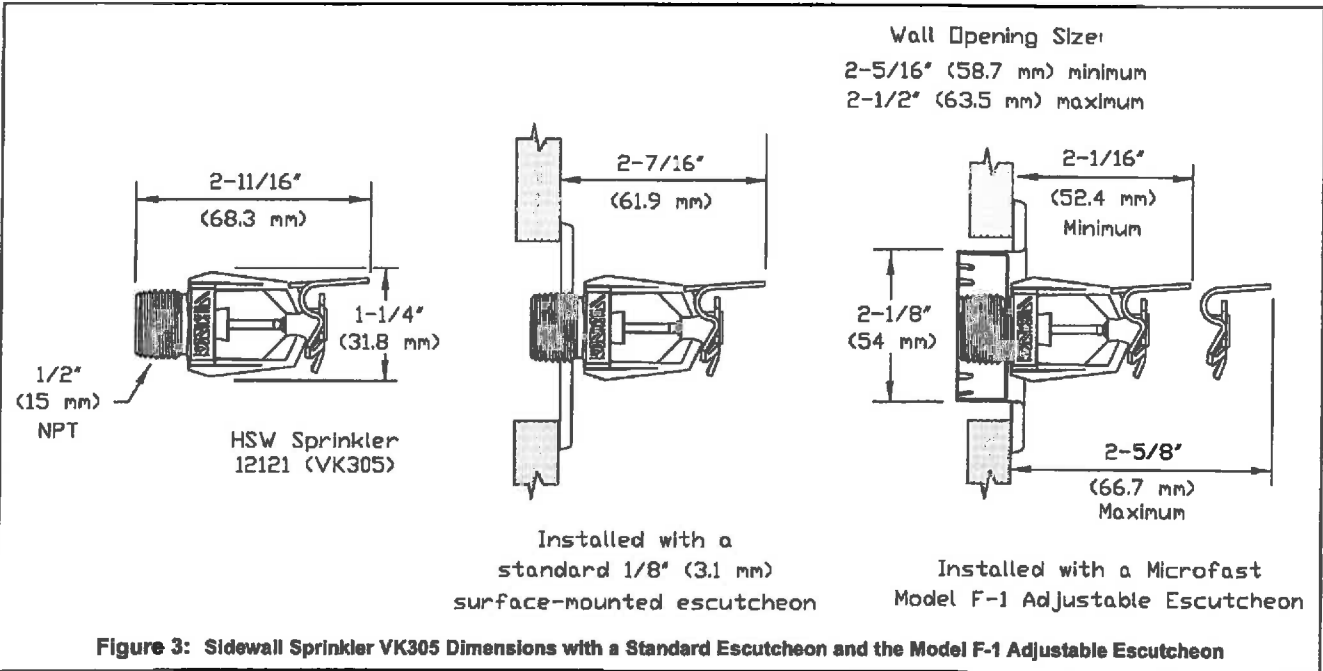


TECHNICAL DATA

**MICROFAST® AND MICRO-FASTHP® QUICK RESPONSE HORIZONTAL SIDEWALL SPRINKLERS (VK305 & VK319)**

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	<h2 style="margin: 0;">TECHNICAL DATA</h2>	<h3 style="margin: 0;">MICROFAST® AND MICRO-FASTHP® QUICK RESPONSE HORIZONTAL SIDEWALL SPRINKLERS (VK305 &amp; VK319)</h3>
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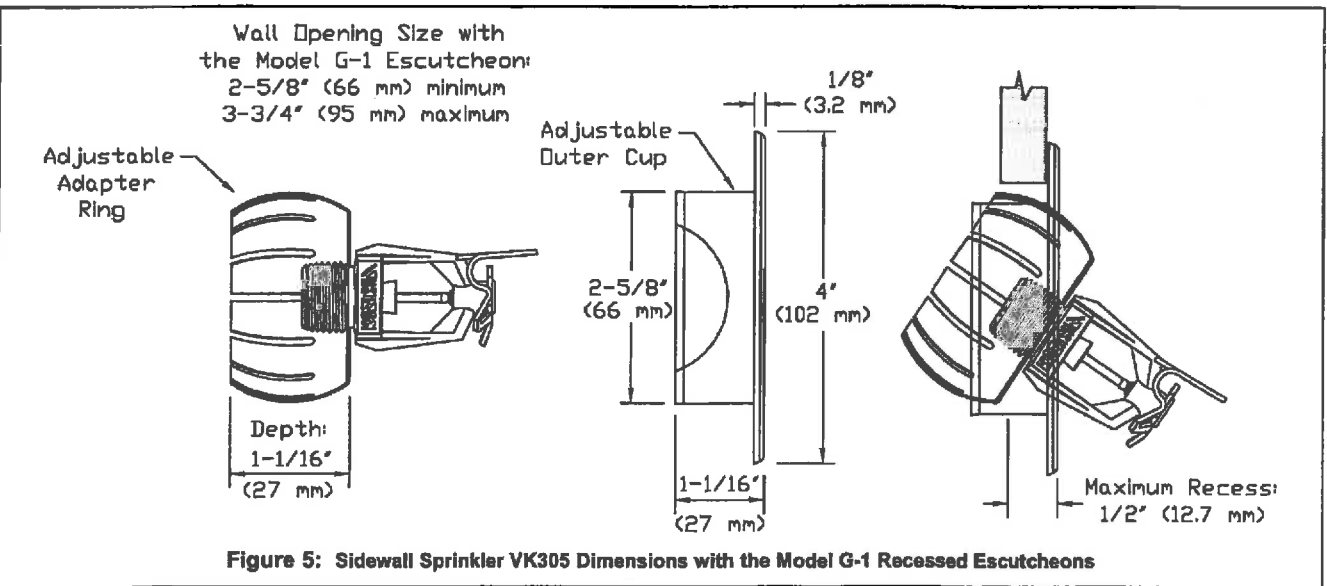
Approval Chart 2 (FM)									
Microfast® Quick Response Horizontal Sidewall Sprinklers Maximum 175 PSI WWP									
Base Part Number <sup>1</sup>	SIN	Maximum Pressure	Thread Size		Nominal K-Factor		Overall Length		FM Approvals <sup>2</sup> (Refer also to Design Criteria below.)
			NPT	BSP	U.S.	metric <sup>2</sup>	Inches	mm	
12121	VK305	175 psi	1/2"	15 mm	5.6	80.6	2-11/16	68	A1Y, B1X
<b>Approved Temperature Ratings</b>			<b>Approved Finish</b>			<b>Approved Escutcheons</b>			
A - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), 200 °F (93 °C), and 286 °F (141 °C) B - 135 °F (57 °C), 155 °F (68 °C), 175 °F (79 °C), and 200 °F (93 °C)			1 - Brass			X - Installed with standard surface-mounted escutcheons or the Viking Microfast® Model F-1 Adjustable Escutcheon, or recessed with the Viking Micromatic® Model E-1, E-2 or G-1 Recessed Escutcheon Y - Installed with standard surface-mounted escutcheons or the Viking Microfast® Model F-1 Adjustable Escutcheon			
<b>Footnotes</b>									
<sup>1</sup> Base part number shown. For complete part number, refer to Viking's current price schedule. <sup>2</sup> Metric K-factor measurement shown is when pressure is measured in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0. <sup>3</sup> This table shows the FM Approvals available at the time of printing. Other approvals may be in process.									

### DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 above.)

**FM Approval Requirements:**  
 Horizontal Sidewall Sprinkler VK305 is FM Approved as a quick response Non-Storage sidewall sprinkler as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0). FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.  
**NOTE: The FM installation guidelines may differ from cULus and/or NFPA criteria.**

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to page QR1-3 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.**



**Figure 5: Sidewall Sprinkler VK305 Dimensions with the Model G-1 Recessed Escutcheons**



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**1. DESCRIPTION**

**A. Sprinkler Cabinets**

Viking sprinkler cabinets are metal enclosures constructed to store an emergency supply of spare sprinklers and a sprinkler installation wrench.

NFPA 13 requires a representative number of each type and temperature rating of sprinkler head to be kept in a cabinet on the premises. NFPA 13 also requires a special sprinkler wrench to be provided in the cabinet. This allows for immediate removal and replacement of sprinklers that have operated or that have become damaged.

Stock of spare sprinklers should include sprinklers of all the types and temperature ratings as are installed in the sprinkler system, in the following quantities:

Number of Sprinklers in System	Minimum Number of Spare Sprinklers Required
Under 300	6
300-1,000	12
Over 1,000	24

**B. Sprinkler Wrenches**

Viking sprinkler wrenches are special installation tools specifically designed for use with the various Viking sprinklers and spray nozzles. The appropriate wrenches must be used with the indicated sprinklers and nozzles to provide the proper leverage when tightening sprinklers or nozzles and to minimize slippage during installation.

Using wrenches other than the ones designated for installation may damage the sprinkler. Refer to Table 2 and the appropriate sprinkler or spray nozzle data page for the correct installation wrenches that must be used.

Wrenches 10896W/B, 07297W/B, 05118CW/B, and 13635W/B provide the amount of leverage needed to tighten sprinklers and spray nozzles into pipe fittings while preventing sprinkler damage. No additional tools are necessary with these wrenches.

The following wrenches require a separate 1/2" ratchet (not available from Viking) to provide the correct amount of leverage: 08336W/B, 10366W/B, 07565W/B, 11683W/B, 12144W/B, 13032W/B, 13577W/B, 13619, 15466, 13623W/B, 15467W/B, 15209W/R, 13655W/B, 14031, 14047W/B, 16208W/R, and 16267.

The internal diameters of sprinkler wrenches 08336W/B, 10366W/B, 15209W/R, 12144W/B, 16208W/R, and 16267 are designed for use with the sprinkler contained in the protective shell. (A protective shell should be retained in the spare sprinkler cabinet.)

Wrench part number 10551W/B is required for threading institutional escutcheon plates onto institutional sprinklers. Wrench part number 10729 is a 2-1/2" (63.5 mm) C-C face spanner wrench used for removing institutional escutcheon plates from institutional sprinklers (refer to the DISASSEMBLY section of institutional sprinkler technical data pages).

Wrench part number 15915 is optional for removing protective sprinkler caps and for installing E-1 and F-1 Escutcheons on frame style pendent sprinklers from the floor by attaching a length of 1" diameter CPVC tubing to the tool. Refer to Technical Bulletin Form No. 051808.

**2. LISTINGS AND APPROVALS**

Refer to the specific sprinkler or spray nozzle technical data pages for sprinkler listings and approvals.

**3. TECHNICAL DATA**

**Specifications:**

**Sprinkler Cabinets:** Designed with four 3/16" diameter holes in back. Spacing of mounting holes: 3-1/2" (88.9 mm) length, 3-1/2" (88.9 mm) height. The sprinkler cabinet should be located adjacent to the main system riser.

**Material Standards:**

**Sprinkler Cabinets:** Cold Rolled Steel. Finish: Painted high-gloss red enamel interior and exterior, chrome plated door knob.

**Wrenches:** Ductile Iron, Steel, Acetal, or 50% glass filled nylon (for head cabinet wrenches)

Viking Technical Data may be found on The Viking Corporation's Web site at <http://www.vikinggroupinc.com>. The Web site may include a more recent edition of this Technical Data Page.



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**Ordering Information:** (Also refer to the current Viking price list.)

**A. Sprinkler Cabinets**

1. Determine appropriate cabinet from Table 1 on this page for use with the specific model/number of sprinklers to be contained in the cabinet.
2. Specify cabinet part number and quantity needed.

**B. Sprinkler Wrenches**

1. Determine the appropriate wrench for use with the given sprinkler or spray nozzle model from Table 2.
2. Specify the wrench part number and quantity needed.

NOTE: Sprinklers and sprinkler wrenches are not supplied with the cabinets; they must be ordered separately.

**4. INSTALLATION**

Refer to the appropriate sprinkler or spray nozzle technical data page.

**5. OPERATION**

Refer to the sprinkler or spray nozzle technical data page for the particular model used.

**6. INSPECTIONS, TESTS AND MAINTENANCE**

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

**7. AVAILABILITY**

The Viking sprinkler wrenches and cabinets are available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

**8. GUARANTEE**

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

For Sprinkler Models:	Cabinet Capacity	Cabinet Part No.	Size		
			Length	Height	Depth
Viking frame style sprinklers	6 sprinklers	01724A Available since 1971.	10-3/16" (259 mm)	4-11/16" (103 mm)	2-9/16" (65 mm)
Viking frame style and ESFR K14 and K16.8 pendent sprinklers	12 sprinklers	01725A Available since 1971.	10-3/16" (259 mm)	8-9/16" (217 mm)	2-9/16 (65 mm)
Viking concealed and flush style sprinklers, ESFR K25.2 pendent sprinklers, and K19.6 CMSA sprinklers	6-6 sprinklers	01731A Available since 1971.	13-13/16" (351 mm)	5-11/16" (144 mm)	3" 76 mm)
High Challenge® Sprinklers, upright ESFR sprinklers, and Intermediate Level Sprinklers	6 sprinklers	03985A Available since 1977	12-5/8" (321 mm)	9-1/8" (232 mm)	4-1/8" (105 mm)

Table 1: Sprinkler Cabinets

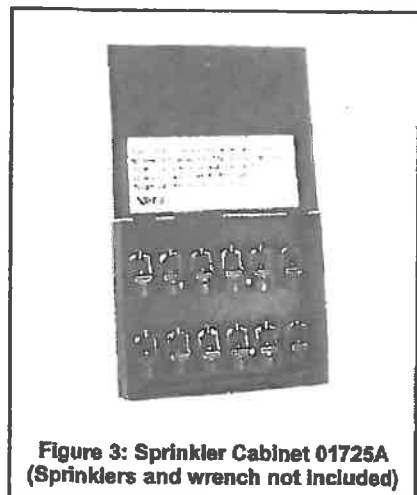
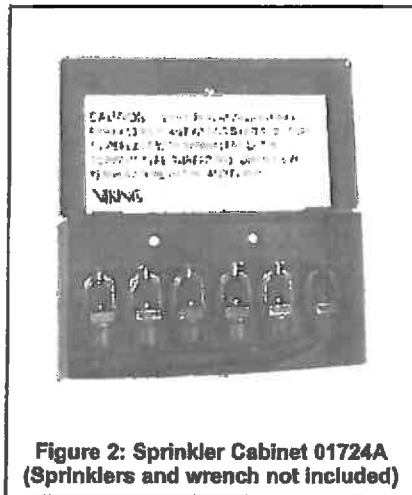
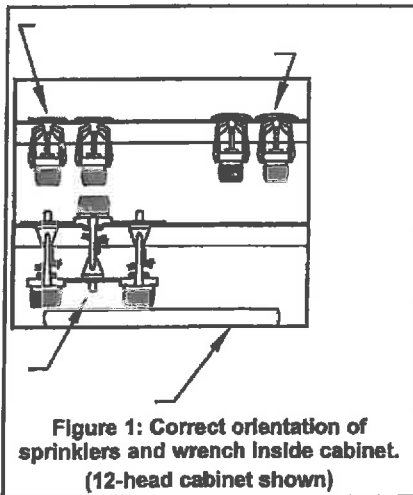
	<b>TECHNICAL DATA</b>	<b>SPRINKLER WRENCHES AND CABINETS</b>
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**IMPORTANT NOTES**

- The sprinkler cabinet should be easily accessible.
- The sprinkler cabinet must not be exposed to corrosive atmospheres or temperatures above 100 °F (38 °C).
- The stock of spare sprinklers should include an adequate number of sprinklers of each type and temperature rating.
- The stock of sprinklers must be in good condition.
- A sprinkler wrench of the appropriate type must be included in the cabinet.
- Orient sprinklers and sprinkler wrench as indicated in Figure 1 below.
- CAUTION:** When replacing automatic sprinklers in an existing system, be sure to replace with sprinklers of the correct type, thread size, orifice size, temperature rating, and finish.

**IMPORTANT:** Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to the appropriate sprinkler data page. Viking sprinklers and spray nozzles are designed to be installed in accordance with the latest edition of Viking technical data, the latest standards of NFPA, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards whenever applicable. The use of certain types of sprinklers may be limited due to occupancy and hazard. Refer to the Authority Having Jurisdiction prior to installation.





**TECHNICAL DATA**

**SPRINKLER WRENCHES  
AND CABINETS**

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058  
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For Sprinkler Models:	Use Wrench:
Frame-style sprinklers and spray nozzles	10896W/B Available since 2000 or 05000CW/B*
Recessed pendent sprinklers with protective shields, wax coated sprinklers, and domed concealed pendent sprinklers	13577W/B Available since 2006 replaces 07398W*
Recessed pendent sprinklers with protective caps	12144W/B Available since 2003
Recessed horizontal sidewall sprinklers with protective shields and domed concealed horizontal sidewall sprinklers	13655W/B Available since 2006
Coated and recessed ECOH K14 sprinkler	13032W/B Available since 2004
Standard adjustable and plain barrel dry sprinklers, K16.8 and ECOH K14 sprinklers	07297W/B Available since 1991
Recessed and domed concealed dry sprinklers	07565W/B Available since 1991
High Challenge® sprinklers, upright ESFR sprinklers, and ELO sprinklers**	05118CW/B Available since 1981
Coated, recessed, and domed concealed ELO sprinklers	11883W/B Available since 2001
Pendent K14 and K16.8 ESFR sprinklers	13635W/B double ended (use Side A) Available since 2006, or 10285W/B*
Pendent K25.2 ESFR sprinklers and K18.6 CMSA Sprinkler VK582	13635W/B double ended (use Side B) Available since 2006, or 12143W/B*
QR and EC Concealed Sprinklers VK481, VK482, VK463, VK464, VK465, VK632, and VK634 (also optional for cap removal)	14031† Available since 2006
QR and EC Concealed Sprinklers VK481, VK462, VK463, VK464, VK465, VK632, and VK634	14047W/B (heavy duty) Available since 2006
Residential Concealed Sprinklers VK456, VK457, and VK474 (also optional for removal of protective caps)	13619† (red) Available since 2006
Residential Concealed Sprinklers VK456, VK457, and VK474	13623W/B (heavy duty) Available since 2006
Residential Concealed HSW Sprinkler VK480	16267† or 16208W/R (heavy duty) Available since 2010
Mirage® QR ELO Concealed Sprinkler VK469 (also optional for removal of protective caps)	15466† Available since 2009
Mirage® QR ELO Concealed Sprinkler VK469	15467W/B (heavy duty) Available since 2009
Mirage® Concealed and flush style sprinklers	08336W/B (heavy duty) Available since 1993
Mirage® Concealed and flush style sprinklers	10366W/B† Available since 1998
Residential Flush Pendent Sprinkler VK476	15209W/R (heavy duty) Available since 2008
Mirage® and Freedom® Concealed Sprinklers VK481, VK482, VK463, VK464, VK465, VK469, VK474, VK632, and VK634 (optional concealed cover installer tool)	14412†, or 14867 for the large diameter cover, Available since 2007
Shipping Cap Remover/Escutcheon Installer (optional***)	15915† Available since 2010.
Institutional style flush sprinklers (for installation of the escutcheon plate)	10551W/B Available since 1999
Institutional style flush sprinklers (spanner wrench for escutcheon plate removal)	10729 Available since 1999

\*Wrench no longer available. May still be used until wrench replacement is necessary.  
 \*\*ELO sprinklers manufactured before Dec. 2001 use wrench part number 07297W/B (07565W/B for coated and recessed).  
 \*\*\*Allows removal of sprinkler caps and installation of E-1 and F-1 escutcheons on frame style pendent sprinklers from the floor.  
 †Ideal for sprinkler cabinets.

Table 2: Sprinkler Wrenches

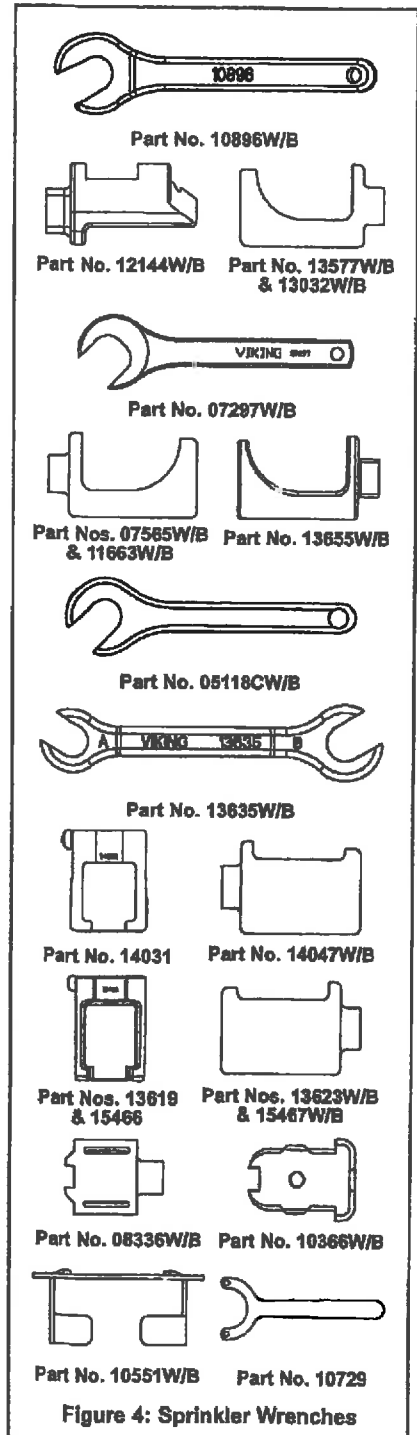
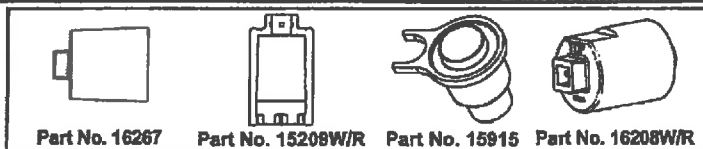


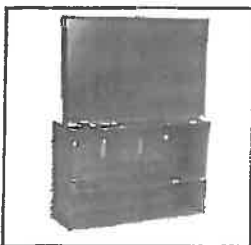
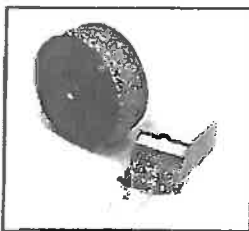
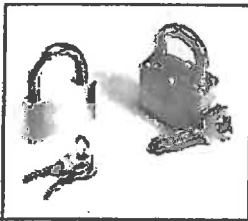
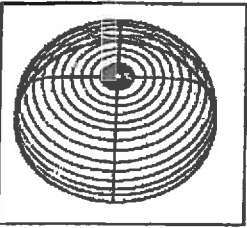
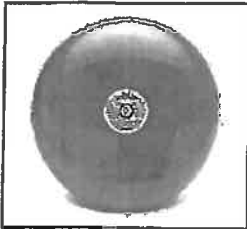
Figure 4: Sprinkler Wrenches



## Fire Sprinkler Accessories

Fire Sprinkler Accessories

1 800 344-1822 • www.fppi.com



### Alarm Bells and Bell Accessories

Part No.	Description	Box Qty.
02-450	Alarm Bell, 10" 120VAC	10
02-452	Alarm Bell, 6" 120VAC	20
02-455	Alarm Bell Back Box	48
02-457	Bell Guard	20

### Break Shackle Locks

F.P.P.I. offers break shackle locks to prevent tampering with controlled valves. Locks are keyed alike to allow easy access to secured valves by authorized personnel.

Part No.	Description	Box Qty.
02-410	Break Shackle Lock #764-40	250
02-411	Master Break Lock #500KABRK197	72

### Sign Chain

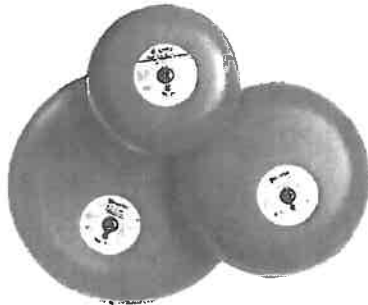
Zinc plated for corrosion resistance. Suitable for use in exposed areas.

Part No.	Description	Box Qty.
02-200	#16 Sign Chain, 100' Box	20
02-201	#16 Sign Chain, 250' Reel	1

### Spare Sprinkler Head Cabinets

All Spare Sprinkler Head Cabinets are equipped with "knockouts" to accommodate 1/2" or 3/4" sprinkler heads. ESFR head box will accommodate 3/4" or 1" IPS sprinklers. Finish: Red Enamel

Part No.	Description	Box Qty.
02-400	Spare Head Box, 12 Head	20
02-401	Spare Head Box, 6 Head	25
02-402	Spare Head Box, 3 Head	20
02-403	ESFR Spare Head Box, 6 Head	20



UL, ULC, and FM Approved  
Sizes Available: 6" (150mm), 8" (200mm) and 10" (250mm)

Voltages Available: 24VAC  
120VAC  
12VDC (10.2 to 15.6) Polarized  
24VDC (20.4 to 31.2) Polarized

Service Use: Fire Alarm  
General Signaling  
Burglar Alarm

Environment: Indoor or outdoor use (See Note 1)  
-40° to 150°F (-40° to 66°C)  
(Outdoor use requires weatherproof backbox.)

Termination: AC Bells - 4 No. 18 AWG stranded wires  
DC Bells - Terminal strip

Finish: Red powder coating

Optional: Model BBK-1 weatherproof backbox  
Model BBX-1 deep weatherproof backbox

These vibrating type bells are designed for use as fire, burglar or general signaling devices. They have low power consumption and high decibel ratings. The unit mounts on a standard 4" (101mm) square electrical box for indoor use or on a model BBK-1 weatherproof backbox or BBX-1 deep weatherproof backbox for outdoor applications. Weatherproof backbox model BBK-1. Stock No. 1500001.

**Notes:**

1. Minimum dB ratings are calculated from integrated sound pressure measurements made at Underwriters Laboratories as specified in UL Standard 464. UL temperature range is -30° to 150°F (-34° to 66°C).
2. Typical dB ratings are calculated from measurements made with a conventional sound level meter and are indicative of output levels in an actual installation.
3. ULC only applies to MBA DC bells.

Size inches (mm)	Voltage	Model Number	Stock Number	Current (Max.)	Typical dB at 10 ft. (3m) (2)	Minimum dB at 10 ft. (3m) (1)
6 (150)	12VDC	MBA126	1750070	.12A	85	76
8 (200)	12VDC	MBA128	1750080	.12A	90	77
10 (250)	12VDC	MBA1210	1750060	.12A	92	78
6 (150)	24VDC	MBA246	1750100	.06A	87	77
8 (200)	24VDC	MBA248	1750110	.06A	91	79
10 (250)	24VDC	MBA2410	1750090	.06A	94	80
6 (150)	24VAC	PBA246	1806024*	.17A	91	78
8 (200)	24VAC	PBA248	1808024*	.17A	94	77
10 (250)	24VAC	PBA2410	1810024*	.17A	94	78
6 (150)	120VAC	PBA1206	1806120*	.05A	92	83
8 (200)	120VAC	PBA1208	1808120*	.05A	99	84
10 (250)	120VAC	PBA12010	1810120*	.05A	99	86

All DC bells are polarized and have built-in transient protection.

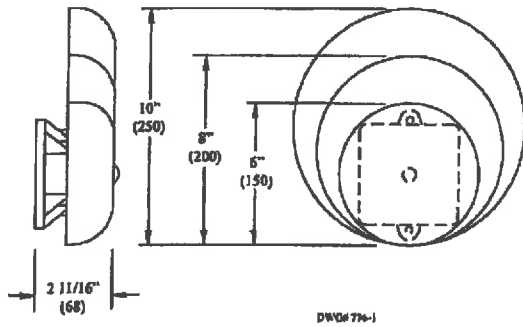
\* Does not have ULC listing.

**WARNING**

In outdoor or wet installations, bell must be mounted with weatherproof backbox, BBK-1 or BBX-1. Standard electrical boxes will not provide a weatherproof enclosure. If the bell and/or assembly is exposed to moisture, it may fail or create an electrical hazard.

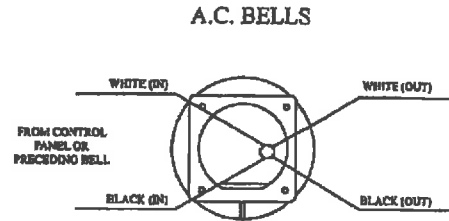
**Bells Dimensions Inches (mm)**

Fig. 1



**Wiring (rear view)**

Fig. 3



**CAUTION:**  
WHEN ELECTRICAL SUPERVISION IS REQUIRED USE IN AND OUT LEADS AS SHOWN

**NOTES:**

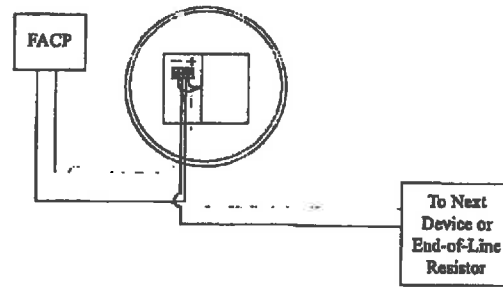
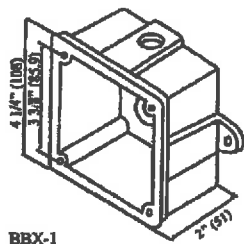
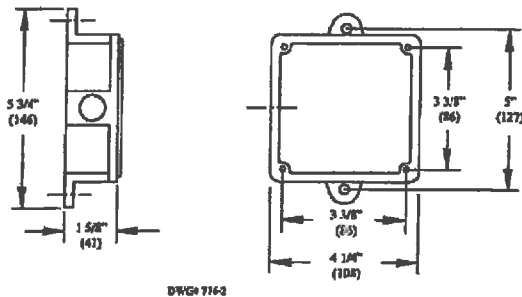
1. WHEN USING AC BELLS, TERMINATE EACH EXTRA WIRE SEPARATELY AFTER LAST BELL.
2. END-OF-LINE RESISTOR IS NOT REQUIRED ON AC BELLS.

DWG 776-3

**Weatherproof Backbox Dimensions Inches (mm)**

Fig. 2

Box has one threaded 1/2" conduit entrance



**Installation**

1. The bell shall be installed in accordance with NFPA 13, 72, or local AHJ. The top of the device shall be no less than 90" AFF and not less than 6" below the ceiling.
2. Remove the gong.
3. Connect wiring (see Fig. 3).
4. Mount bell mechanism to backbox (bell mechanism must be mounted with the striker pointing down).
5. Reinstall the gong (be sure that the gong positioning pin, in the mechanism housing, is in the hole in the gong).
6. Test all bells for proper operation and observe that they can be heard where required (bells must be heard in all areas as designated by the authority having jurisdiction).

**WARNING**

Failure to install striker down will prevent bell from operating.





Stock number - 1010080

**CAUTION**  
This device is not intended for applications in explosive environments.

UL, cUL and CSFM Listed, FM Approved and NYMEA Accepted, CE Marked, VdS Approved  
 Dimensions: 5 9/16"H x 3 1/2"W x 5 7/8"D  
 (14,1cm H x 8,9cm W x 14,9cm D)  
 Weight: 1.5 lbs. (3,3 kg.)  
 Enclosure: Cover - Die-cast with textured red powdercoat finish  
 Base - Die-cast aluminum  
 Pressure Connection: 1/2" Male NPT  
 Pressure Adjustments: Factory adjusted to operate between 5 and 8 PSI (0,35 and 0,55 BAR) on rising pressure  
 Maximum system pressure: 175 PSI (12,1 BAR)  
 Contact Ratings: Two Sets of SPDT (Form C)  
 15.0 Amps at 125/250VAC  
 2.0 Amps at 30VDC Resistive  
 Conduit Entrances: Two knockouts provided for 1/2" conduit  
 Environmental Specifications: 40°F to 120°F (4,5°C to 49°C)  
 NEMA 4 Enclosure - when used with proper conduit fittings  
 Service Use: Automatic Sprinkler NFFA-13  
 One or two family dwelling NFFA-13D  
 Residential occupancy up to four stories NFFA-13R  
 National Fire Alarm Code NFFA-72  
 Tamper: Cover incorporates tamper resistant fasteners that require a special key for removal. One key is supplied with each device. For optional cover tamper switch kit, order Stock No. 0090018.

**Waterflow Alarm Switch With Retard For Supervision Of Wet Alarm Check Valve**

The Model WFSR-F is a pressure operated switch with an adjustable, instantly recycling pneumatic retard to prevent false alarms due to water pressure variation. The WFSR-F is connected into the alarm port of a wet sprinkler system alarm check valve (see "WARNING", page 2).

**Installation**

A male 1/4" NPT pipe fitting is provided for connection to the alarm port of the alarm check valve. No additional mounting or support is required.

Allow 5" (12,7cm) to the front of the unit for removal of the cover. Install with the pressure connection down.

**Testing**

Operation of the unit is checked by opening the by-pass test valve or inspector's test valve. The frequency of the inspection and testing for the Model WFSR-F and its associated protective monitoring system should be in accordance with applicable NFPA Codes and Standards and/or authority having jurisdiction (manufacturer recommends quarterly or more frequently).

Fig. 1 WFSR-F

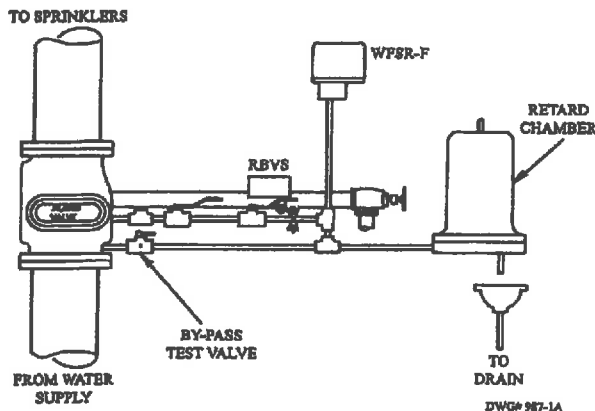
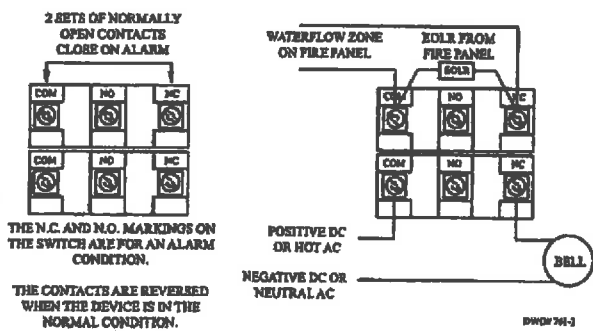


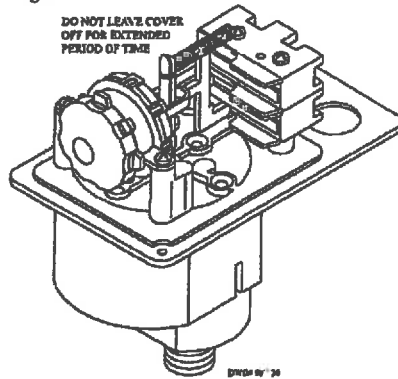
Fig. 2 Typical Electrical Connections



Note: For supervised circuits see "Switch Terminal Connections" drawing and caution note (Fig. 4).

**WFSR-F  
WATERFLOW ALARM SWITCH  
WITH RETARD**

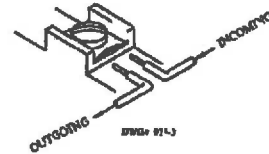
Fig. 3



**Retard Adjustment:**  
To change time turn knob (either direction) for desired time delay. Use the minimum amount of retard necessary to prevent false alarms, a "B" setting is usually adequate for this. Factory set at "B".

APPROX. RETARD SETTINGS (IN SEC.)					
0	A	B	C	D	E
0	10-25	20-40	35-55	50-70	60-90

Fig. 4 Switch Terminal Connections Clamping Plate Terminal



**CAUTION**

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire becomes dislodged from under the terminal.

Fig. 5 Typical Wet System

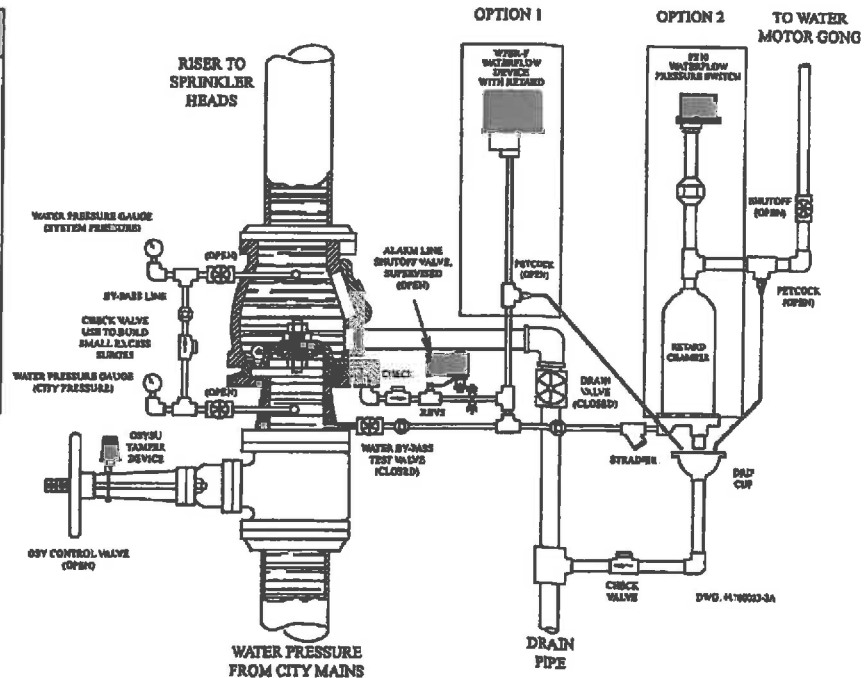
**WARNING**

Use teflon tape sealant only. Apply only to male threads of connectors.

Use of pipe cement voids warranty as this material may obstruct pressure aperture resulting in loss of alarm signal.

Device must be installed before any shut off valve on alarm port line unless it is supervised by a supervisory switch such as Potter Model RBVS.

The system should be tested on a quarterly basis or more frequently to insure proper operation.



**CAUTION**

Due to the possibility of unintended discharges caused by pressure surges, trapped air, or short retard times, waterflow switches that are monitoring wet pipe sprinkler systems shall not be used as the sole initiating device to discharge AFFF, deluge, or chemical suppression systems.



**Conduit Entrances:** Two knockouts for 1/2" conduit provided.

**Service Use:**

Automatic Sprinkler	NFPA-13
One or two family dwelling	NFPA-13D
Residential occupancy up to four stories	NFPA-13R
National Fire Alarm Code	NFPA-72

UL, ULC, and CSFM Listed, FM Approved, NYMEA Accepted, CE Marked

**Dimensions:** 4.75"L x 2.25"W x 8.2"H (stem extended)  
12,1cm L x 5,7cm W x 18,3cm H

**Weight:** 1.35 lb. (0,61 kg.)

**Enclosure:** Cover - Die-cast

Finish - Red Spatter Enamel

Base - Die Cast Zinc

All parts have corrosion resistant finishes.

**Cover Tamper:** Tamper Resistant Screws,

Optional cover tamper switch kit available

**Mounting:** 1/2" NPT

**Contact Rating:** PCVS-1: One set of SPDT (Form C)

PCVS-2: Two sets of SPDT (Form C)

15 Amps at 125/250VAC

2.5 Amps at 30VDC resistive

**Environmental Limitations:** -40°F to +140°F (-40°C to 60°C)

NEMA 4 and NEMA 6P Enclosure (IP67) when used with appropriate watertight conduit fittings.

Indoor or Outdoor Use (Not for use in hazardous locations. See bulletin no. 5400694 PIVS-U-EX for hazardous locations.)

The Model PCVS is a weather proof and tamper resistant switch for monitoring the open position of fire sprinkler control valves of the post indicator, butterfly and other types. Depending on the model, one or two SPDT (Form C) contacts are provided which will operate when the valve position is altered from an open state.

The unit mounts in a 1/2" NPT tapped hole in the post indicator or butterfly valve housing. The device is engaged by the indicating assembly of the post indicator or the operating mechanism of the butterfly valve, actuating switch(es) when the valve is fully open. The unit should be installed where it is accessible for service.

The cover is held in place by two tamper resistant screws that require a special tool to remove. The tool is furnished with each device and

should be left with the building owner or responsible party. Replacement or additional cover screws and hex keys are available. See ordering information.

**Optional Cover Tamper Switch**

A field installable cover tamper switch is available as an option which may be used to indicate removal of the cover. See ordering information.

**Testing**

The PCVS and its associated protective monitoring system should be tested in accordance with applicable NFPA codes and standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

**Ordering Information**

Model	Description	Stock No.
PCVS-1	Potter Control Valve Switch (single switch)	1010107
PCVS-2	Potter Control Valve Switch (double switch)	1010207
--	Cover Screw	5490424
--	Hex Key for Cover Screws and Installation Adjustments	5250062
PBK-S	Pratt Butterfly Valve Kit - Up to 12" (300mm)	0090133
PBK-L	Pratt Butterfly Valve Kit - 14" (355mm) and Up	0090132
FVK	Pratt Valve Kit	1000060
--	Optional Cover Tamper Switch Kit	0090131
KBK	Kennedy Butterfly Valve Kit	0090143

For pressure reducer type valve installation kits (if required) contact valve manufacturer.

Fig. 1 Dimensions

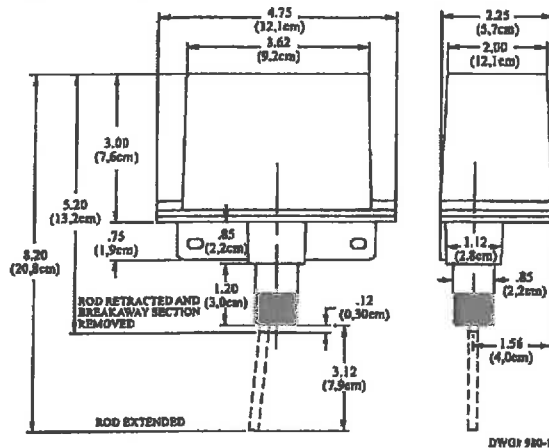
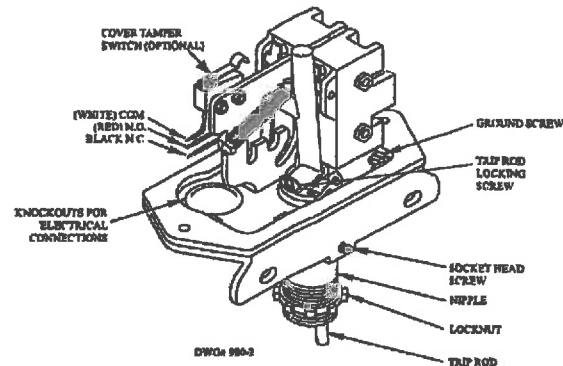


Fig. 2 Parts



**Typical Installations On Post Indicator Valve Housings (See Figs. 3 Thru 6)**

Refer to Fig. 2 for the location of parts described in the following instructions.

Note: If the sprinkler system is in service the owner or authorized representative should be notified, before any work is done on the system, that the valve controlling the water supply to the system may be closed for periods of time during the installation and testing of this device, resulting in all or portions of the system being inoperative during these periods.

If the system is not in service and valve is closed, be sure that opening the valve will not allow any unwanted water flow due to openings in the system, such as heads off, broken or incomplete piping, etc.

1. Position the valve to fully open ("OPEN" should appear in the window of the housing). Partially close the valve while observing the direction that the target assembly moves. Reopen the valve.

If the valve housing is predrilled with a 1/2" NPT for installation of a monitoring switch, remove the 1/2" plug and fully open the valve. Make sure that "OPEN" appears in the window of the housing. GO TO STEP NO. 6.

2. Remove the head and target assembly (consultation with valve manufacturer is recommended).
3. If the target assembly moved up as the valve was closed, measure the distance from the bottom of the head to the lower part of the target assembly that will contact the trip rod of the PCVS (see Fig. 3). This is usually a plate or bar on the target assembly, on a side adjacent to the "OPEN/SHUT" plates. Subtract 1/8" from the measurement.

If the target moved down as the valve was closed, measure the distance from the bottom of the head to the upper portion of the target assembly that will contact the trip rod of the PCVS (see Fig. 4). Add 1/8" (3.2mm) to this measurement.

4. Mark the housing at the proper location. Using a 23/32" (18.2mm) drill bit, drill and then tap a 1/2" NPT in the housing on the side that coincides with the portion of the target assembly that will engage the trip rod of the PCVS.
5. Replace the head and target assembly.
6. Loosen the socket head screw that holds the nipple in the PCVS and remove the nipple.
7. Screw the locknut that is provided onto the nipple.
8. Screw the nipple into the 1/2" NPT hole in the valve housing - hand tighten. Tighten the locknut against the valve housing to secure the nipple firmly in place.
9. Insert a scale or probe thru the nipple to measure the distance from the

open end of the nipple to the target assembly. Subtract 1/2" (12.5mm) from this measurement.

NOTE: In some cases, it may be necessary to attach an angle bracket to the target assembly to engage the PCVS trip rod.

10. Using the special tool provided, loosen the two cover screws and remove the cover from the PCVS.
11. Loosen the locking screw that holds the trip rod in place and adjust the rod length, from the end of the collar to the end of the rod, using the dimension determined in Step 9. Tighten the locking screw to hold the rod in place.  
NOTE: If trip rod length is excessive, loosen the locking screw and remove the trip rod from the trip lever. Using pliers, break off the one (1) inch long notched section (see Fig. 7). Reinstall trip rod and repeat Step 11 procedure.
12. Partially close the valve (3 to 4 revolutions of the handle/hand wheel).
13. Slide the PCVS unit as far as possible onto the nipple, observing which direction the rod will move when the valve is closed. Orient the device to actuate the switches when the valve is open. Tighten the socket head screw in the collar.
14. Carefully open the valve to the fully open position. As the target moves to the open position it should engage the trip rod and actuate the switch(es). There should be a minimum overtravel of 1/2 revolution of the handle/hand wheel after the switch(es) actuate (a continuity meter connected to each set of contacts is one method that could be used to determine this).
15. Slowly close the valve. The switch must operate during the first two revolutions of the handle/hand wheel or during 1/5 of the travel distance of the valve control apparatus from its normal condition.  
NOTE: Small adjustments of the target position may be necessary (consultation with valve manufacturer is recommended).
16. Complete the required electrical wiring, connections and tests. The valve should be operated through the entire cycle of fully closed and fully open to determine the integrity of the PCVS installation and the signaling system. Check that all electrical and mechanical connections are secure.
17. When the installation and testing are complete, return valve to its proper position.
18. Alternative installation for other post indicator valve housing shown in Fig. 5 and 6.

Fig. 3

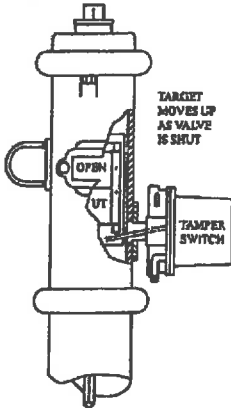


Fig. 4

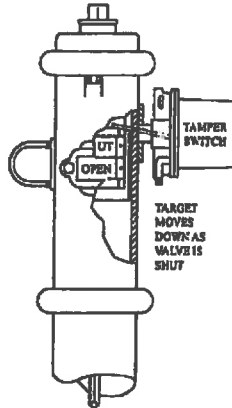


Fig. 5

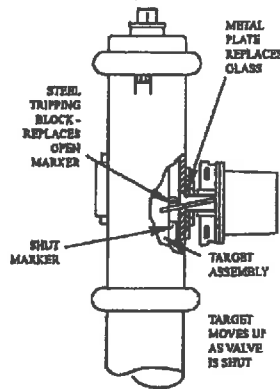
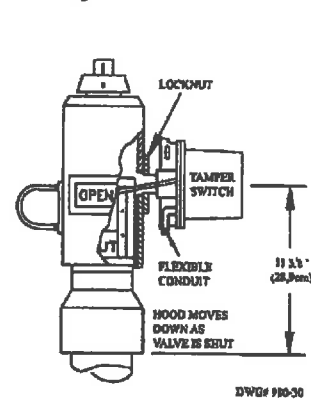


Fig. 6



**Notes:**

- Subject to the approval of the "authority having jurisdiction" the alternate method of installation shown in Fig. 5 may be used. In this method, one of the glass windows of the housing is replaced with a 1/4" thick metal plate that is cut to fit in place of the glass and drilled and tapped to receive the 1/2" NPT pipe nipple. In some cases it may be necessary to attach an angle bracket to the target assembly to engage the PCVS trip rod.
- If the target is stationary and a hood arrangement is used, such as is shown in Fig. 6, the hood must be drilled with a 23/32" drill and tapped with a 1/2" NPT. The center line of this hole should be 1/8" below the portion of target assembly that strikes the PCVS trip rod. The 1 3/8" dimension shown is for a Clow Valve. Flexible conduit must be used for this type of installation.

**Typical Installation On A Butterfly Valve (See Figs. 9 And 10)**

Refer to Fig. 2 for location of parts described in the following instructions:

- B1. Remove the 1/2" NPT plug from the gear operator case.
- B2. Loosen the set screw that holds the nipple in the PCVS and remove the nipple.
- B3. Screw the locknut that is provided onto the nipple.
- B4. Screw the nipple into the 1/2" NPT hole in the gear operator - hand tighten. Tighten the locknut against the case, to secure the nipple firmly in place.
- B5. Partially close the valve (3 or 4 revolutions of the hand wheel or crank).
- B6. Using the special tool provided, loosen the two cover screws and remove the cover from the PCVS.
- B7. Loosen the locking screw that holds the trip rod in place. Estimate trip rod length required and extend slightly past that point. Slide the PCVS unit as far as possible onto the nipple, observing which direction the rod will move when the valve is closed. Orient the device to actuate switches when valve is open.  
Note: If trip rod length is excessive, loosen the locking screw and remove the trip rod from the trip lever. Using pliers, break off the one (1) inch long notched section (see Fig. 7). Reinstall trip rod and repeat Step B7 procedure.
- B8. Remove device from nipple and withdraw trip rod 1/32" (0.80mm) (this dimension is important). Tighten the locking screw to hold the

rod in place. Re-install the device on the nipple. Tighten the screw in the collar against the nipple.

Note: In some cases it may be necessary to remove the gear box cover to ensure correct operation (consultation with the valve manufacturer is recommended).

- B9. Carefully open the valve to its full open position, as the boss on the gear hub moves to the open position it must engage the PCVS trip rod and actuate the switch(es). There should be a minimum overtravel or revolution of the crank or hand wheel after the switch(es) actuate (a continuity meter connected to each set of contacts is one method that could be used to determine this).  
Note: Slight adjustment of gear stops may be necessary to prevent overtravel of the trip rod (consultation with valve manufacture is recommended).
- B10. Carefully close the valve. The switch(es) must operate during the first two revolutions of the crank or hand wheel or during 1/5 of the travel distance of the valve control apparatus from its normal condition.
- B11. Complete the required electrical wiring, connections and tests. The valve should be operated through the entire cycle of fully closed and fully open to determine the integrity of the PCVS installation and signaling system.  
Check that all electrical and mechanical connections are secure.
- B12. When the installation and testing are complete, return valve to its proper position.

Fig. 7 Breaking Excessive Rod Length

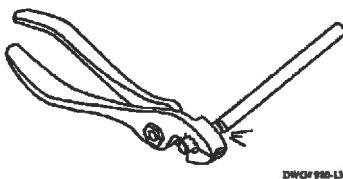
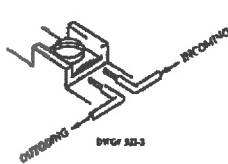


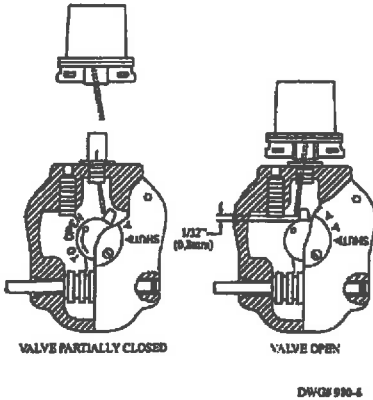
Fig. 8 Switch Terminal Connections Clamping Plate Terminal



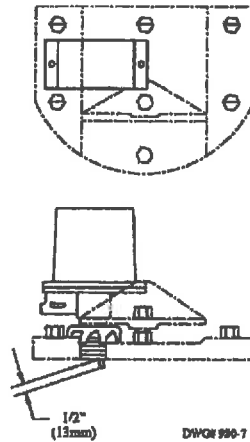
**CAUTION**

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire becomes dislodged from under the terminal.

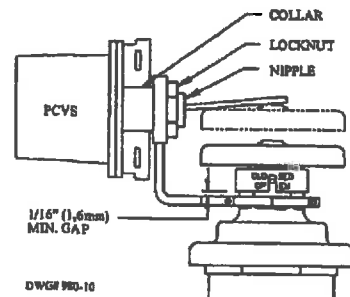
**ITT Grinnell/Kennedy Indicating Butterfly Valve**  
Fig. 9



**Dresser Indicating Butterfly Valve**  
Fig. 10

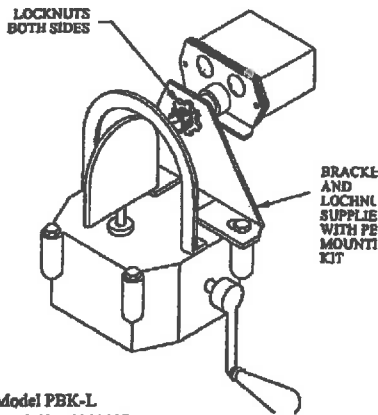


**Typical Pressure Reducer Type Valve Installation**  
Fig. 11



This figure shows the Model PCVS mounted on the valve yoke, with a bracket supplied by the valve manufacturer, to supervise a pressure reducer type valve.  
Note: This application is subject to the approval of the authority having jurisdiction.

**PBK - Pratt IBV Butterfly Valve Kit**  
Fig. 12



Model PBK-L  
Stock No. 0090132  
(MDT-4S Actuator)

Model PBK-M  
Stock No. 0090146  
(MDT-3S Actuator)

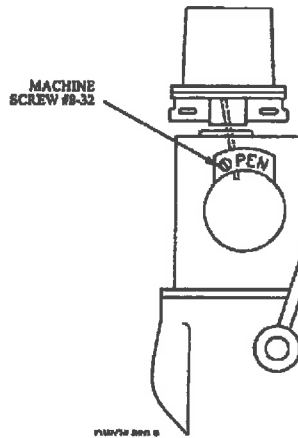
Model PBK-S  
Stock No. 0090133  
(MDT-2S Actuator)

Pratt Butterfly Valve Kit as used to mount a PCVS on a Pratt Model IBV Valve.

Kits contain: Bracket, nuts and instructions

Note: This application is subject to the approval of the authority having jurisdiction.

**PVK - Pratt PIVA Post Indicator Valve Kit**  
(Stock No. 1000060)  
Fig. 13



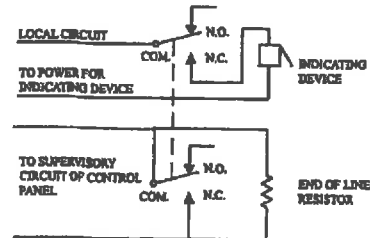
Pratt Valve Kit as used to mount a PCVS on a Pratt Model PIVA Valve.

Kit contains: Instructions, template, screw and nut.

Note: This application is subject to the approval of the authority having jurisdiction.

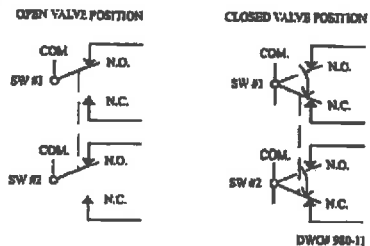
**Typical Electrical Connections**

Please Note: This device should be wired in accordance with the applicable parts of the National Electrical Code, all state and local codes, applicable NFPA Standards and the requirements of the authority having jurisdiction.  
Fig. 14



Contacts shown in normal (valve open) condition.

**Typical Switch Action**



Switches Shown in Valve Open Position

CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION  
OFFICE OF THE STATE FIRE MARSHAL  
FIRE ENGINEERING - BUILDING MATERIALS LISTING PROGRAM



# LISTING SERVICE

**LISTING No.** 7770-0328:0001

Page 1 of 1

**CATEGORY:** 7770 – VALVES/SWITCHES

**LISTEE:** Potter Electric Signal Co, 1609 Park 370 Place, Hazelwood, MO 63042  
Contact: Bill Witherspoon (314) 595-6731 Fax (314) 595-8797  
Email: billw@pottersignal.com

**DESIGN:** Vane and pressure type water flow alarm switches listed below. Refer to listee's data sheet for detailed product description and operational considerations.

Vane Types:

VSR-CF	VSR-D	VSR-F	VSR-SF
VSR-FE-2	VS-SP	VS-F	VSR-SFG
VSR-SFT	VSG	VSR	VSR-S
VSR-C	VSR-ST	VSR-SG	

Pressure Type:

WFS-B	WFSR-C	WFSPD-B	PS10
PS-10A	PS-100A	WFSR-F	PS100

**INSTALLATION:** In accordance with listee's printed installation instructions, applicable codes and ordinances and in a manner acceptable to the authority having jurisdiction.

**MARKING:** Listee's name, model number and UL or FM label.

**APPROVAL:** Listed as waterflow alarm switches for use with fire sprinkler systems. Vane models may be used in wet pipe systems; pressure models may be used in wet or dry systems. Model VSR-CF is for use on K, L or M copper pipe (2", 2-1/2", 3", 4") and listed CPVC pipe (2", 2-1/2", 3"). Model VSR-SF for use on 1", 1-1/4", 1-1/2" and 2" steel, copper or listed plastic pipe. Model VSG is for low flow rate. Model VSR-SFG and VSR-SFT are for use on 1", 1-1/4", 1-1/2" and 2" plastic pipe. Models VS-F, VSR-F, VSR-FE and VSR-FE-2 is for use on 2", 2-1/2", 3", 3-1/2", 4", 5", 6", 8" and 10" pipe. \*Model VSR is for use on steel pipe sizes from 2" through 8". Vane type switches may be used outdoors when the outdoor temperature never falls below 40oF.

Rev\*5-17-2007 jw



This listing is based upon technical data submitted by the applicant. CSFM Fire Engineering staff has reviewed the test results and/or other data but does not make an independent verification of any claims. This listing is not an endorsement or recommendation of the item listed. This listing should not be used to verify correct operational requirements or installation criteria. Refer to listee's data sheet, installation instructions and/or other suitable information sources.

**Date Issued:** July 01, 2010

**Listing Expires** June 30, 2011

**Authorized By:** FRANCIS MATEO, Program Coordinator  
Fire Engineering Division

CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION  
OFFICE OF THE STATE FIRE MARSHAL  
FIRE ENGINEERING - BUILDING MATERIALS LISTING PROGRAM



# LISTING SERVICE

**LISTING No.** 7770-0328:0010

Page 1 of 1

**CATEGORY:** 7770 – VALVES/SWITCHES

**LISTEE:** Potter Electric Signal Co, 1609 Park 370 Place, Hazelwood, MO 63042  
Contact: Bill Witherspoon (314) 595-6731 Fax (314) 595-6797  
Email: billw@pottersignal.com

**DESIGN:** Supervisory switches listed below to monitor pressure, OS&Y, gate, globe/gate, PIV, tank temperature or water level valves. Refer to listee's data sheet for detailed product description and operational considerations.

HLS-B	WLS-W	WLS-S	PS-40A
PS-120A	OSYSU-2	OSYS-B	PMS
PTS-B	OSYSU-1	GVS	PCVS-1
PIVS-B	TTS-S	TTS-W	PCVS-2
WLS	PTS-C	PS40	PS120
*RBVS			

**RATING:**

**INSTALLATION:** n accordance with listee's printed instructions, applicable codes and ordinances and in a manner acceptable to the authority having jurisdiction.

**MARKING:** Listee's name, model designation and FM or UL label.

**APPROVAL:** Listed as sprinkler system supervisory switches.

**NOTE:** Formerly 7738-0328:010

\*Rev 5-17-2007 jw



This listing is based upon technical data submitted by the applicant. CSFM Fire Engineering staff has reviewed the test results and/or other data but does not make an independent verification of any claims. This listing is not an endorsement or recommendation of the item listed. This listing should not be used to verify correct operational requirements or installation criteria. Refer to listee's data sheet, installation instructions and/or other suitable information sources.

**Date Issued:** July 01, 2010

**Listing Expires** June 30, 2011

**Authorized By:** FRANCIS MATEO, Program Coordinator

*Fire Engineering Division*



CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION  
OFFICE OF THE STATE FIRE MARSHAL  
FIRE ENGINEERING - BUILDING MATERIALS LISTING PROGRAM



# LISTING SERVICE

**LISTING No.** 7135-0328:0119

Page 1 of 1

**CATEGORY:** 7135 – AUDIBLE DEVICES

**LISTEE:** Potter Electric Signal Co, 1609 Park 370 Place, Hazelwood, MO 63042  
Contact: Bill Witherspoon (314) 595-6731 Fax (314) 595-6797  
Email: billw@pottersignal.com

**DESIGN:** Models\*SB624-153075, \*SB624-75110, PBA246, PBA248, PBA2410, PBA1206, PBA1208 and PBA12010 vibrating bells. Suitable for outdoor use when used with Model BBK-1 backbox. Models are AC or DC powered and available in 6", 8" and 10". Models MBA-6, -8 and -10 bells, suitable for outdoor use when used with Model BBX-1 backbox. Refer to listee's data sheet for detailed product description and operational considerations.

**RATING:** PBA-246, -248, -2410: 24 VAC  
PBA-1206, -1208, -12010: 120 VAC  
MBA-6, -8, -10: 12 or 24 VDC

**INSTALLATION:** In accordance with listee's printed installation instruction, applicable codes & ordinances, and in a manner acceptable to the authority having jurisdiction.

**MARKING:** Listee's name, model number and UL label.

**APPROVAL:** Listed as audible devices for use with separately listed compatible fire alarm control units. If this appliance is required to produce a distinctive three-pulse Temporal Pattern Fire Alarm Evacuation Signal (for total evacuation) in accordance with NFPA 72, 2002 Edition, the appliance must be used with a fire alarm control unit that can generate the temporal pattern signal. Refer to manufacturer's Installation Manual for details.

**NOTE:**

\*Rev 5-17-2007 jw



This listing is based upon technical data submitted by the applicant. CSFM Fire Engineering staff has reviewed the test results and/or other data but does not make an independent verification of any claims. This listing is not an endorsement or recommendation of the item listed. This listing should not be used to verify correct operational requirements or installation criteria. Refer to listee's data sheet, installation instructions and/or other suitable information sources.

**Date Issued:** July 01, 2010

*Listing Expires* June 30, 2011

**Authorized By:** FRANCIS MATEO, Program Coordinator  
Fire Engineering Division

## APPENDIX J: FIRE EVACUATION AND SAFETY PLAN

## Fire Evacuation and Fire Safety Plans

### Fire Evacuation Plan

The fire evacuation plan for this elementary school shall comply with the requirements of the 2012 International Fire Code, Section 404.3.1 Fire Evacuation Plans and the district requirements. The school principal is in charge of the overall plan and implementation of the plan at the campus. The fire evacuation plan shall contain the following:

1. During a fire event the building shall be completely evacuated upon activation of fire alarm system. Evacuation shall be by use of emergency egress or escape routes. The plans and routes shall clearly be posted in the main corridors, classrooms, multi-use, administration office and other areas as noted by the fire code. Occupants shall evacuate to predefined assembly points outside of the building. Teachers are responsible for students in their charge and shall direct evacuation of students in their charge to pre determined assembly areas.
2. No equipment in the building is deemed critical where it needs to remain in operation during evacuation.
3. Staff as pre directed by the school district fire safety coordinator shall follow district procedures for the evacuation of any employees or students unable to use general means of egress.
4. After evacuation administered staff and teaching staff shall follow the district procedures for accounting for students and staff after evacuation has been completed. Principal shall be in overall charge and teachers shall account for their classes. Teachers shall immediately report any missing students in their charge to the principal or their designee.
5. Identification and assignment of personnel responsible for rescue or emergency medical aid shall be pre determined by the district fire safety coordinator. Per district standards the school nurse will administer first aid, supervise the administration of first aid and organize first aid and medical supplies. Teachers shall send students in need of first aid to the nurse or make nurse aware of need for aid.
6. Notification of a fire or emergency event shall be by the activation of the fire alarm system. If the fire alarm system fails a manual bell will be used for signals.
7. Fire and emergency events shall be monitored by the central station service. The central service shall notify emergency services as required.
8. The school district office shall maintain a full current contact and assignment list for the site and for administration of the district standards. Contact information shall be readily available in the campus administration office of the school and at the district office. The

site principal shall be the main contact for information regarding the fire evacuation plan for the site.

9. Emergency alarm communication system description and instructions shall be provided to all staff and shall be readily available in the campus administration office. Instructions and on alarm codes shall be clearly posted as required by the fire code.

### **Fire Evacuation Drills**

The fire evacuation drills for this elementary school shall comply with the requirements of the 2012 International Fire Code, Section 405 Fire Evacuation Drills and the district requirements. The school principal is in charge of coordination of the drills and compliance with the code. Drills will occur monthly for all occupants per the provisions of the International Fire Code section 405.2. The leadership of the drills and the time of the drills shall be per sections 405.3 and 405.4. Recorded keeping of the drills shall be per section 405.5 and shall include the following minimum information:

1. Identity of the person conducting the drill.
2. Date and time of the drill.
3. Notification method used.
4. Staff members on duty and participating.
5. Number of occupants evacuated.
6. Special conditions simulated.
7. Problems encountered.

Notification of drills shall be given to the local responding fire department prior to running of the drill.

The drill will begin with the activation of the fire alarm system.

Building occupants shall be accounted for as they arrive at the assembly points.

A separate and distinct signal from the alarm drill shall be used to recall occupants after the evacuation.

### **Fire Safety Plan**

The fire safety plan for this elementary school shall comply with the requirements of the 2012 International Fire Code, Section 404.3.2 Fire Safety Plans and the district requirements. The school principal is in charge of the overall plan and implementation of the plan at the campus. The fire safety plan shall contain the following:

1. The procedure for reporting a fire. The procedure shall be as defined by the district fire safety coordinator and the site principal.
2. A life safety strategy and procedures for notifying, relocating or evacuating occupants, including occupants who need assistance shall be implemented by the site principal and shall be approved by the district fire safety coordinator.
3. Site plans shall be included which show occupancy points, locations of fire hydrants and the show the normal routes of the fire department vehicle access.
4. Floor plans shall include exits, primary evacuations routes, secondary evacuation routes, accessible egress routes, areas of refuge, exterior areas for assisted rescue, manual fire alarm boxes, portable fire extinguishers, occupant-use hose stations and fire alarm annunciations and controls.
5. A list of any major fire hazards associated with normal use and occupancy of the premises shall be kept. A list of maintenance and housekeeping procedures shall be kept.
6. The plan shall identify personnel responsible for the maintenance of systems and equipment installed to prevent or control fire.
7. The plan shall identify personnel responsible for the maintenance, housekeeping and controlling of fuel hazard sources.

### **Employee Training**

Employees shall be trained in the fire emergency procedures as described in the fire evacuation plan and the fire safety plan. Employees shall be trained upon being hired and shall receive training annually thereafter. Records shall be maintained and shall be made available to the fire code official if requested. Employee training shall follow the guidelines of the International Fire Code section 406.3 and shall include fire prevention training and evacuation training.

## **APPENDIX K: FIRE SPRINKLER INSPECTION, TESTING AND MAINTENANCE REQUIREMENTS**

## Fire Sprinkler Inspection, Testing and Maintenance Requirements

System maintenance and inspections are the responsibility of the school district. General observations by the district maintenance staff are done as they perform routine maintenance on the site, but a service contract with a sprinkler contractor is in place to perform routine maintenance and testing. Routine inspections, maintenance and test that are done quarterly and annually are by the sprinkler contractor. Any weekly or monthly observations and tests are done by the district staff. All inspection, testing and maintenance should be done according to the guidelines of NFPA 25. Additionally any time the building or spaces are modified the maintenance staff or design team doing the work should schedule or provide additional inspection and testing for modified areas.

Additional Requirements and Frequency data should follow NFPA 25

Table 5.1.1.2, Table 6.1.1.2 and Table 13.1.1.2.

<b>Sprinkler Components</b>	<b>Standard Care and Maintenance Requirements</b>
<b>City Water Main</b>	Maintained by city. Water should be available at all times.  Visual review of connection should be done as part of quarterly testing by the contractor performing the maintenance contract.
<b>Above Ground Piping/Supports</b>  The above ground piping includes the riser, the feed main, cross mains and branch lines.	Annual inspection should be done by the contractor performing the maintenance contract. This inspection should cover the review of piping and supports to verify that no hangers are loose or that objects are not being hung from any exposed piping.  Additional inspections should be done any time occupancy changes or modifications to the building are done.

<p><b>Control Valves and Gauges</b></p> <p>Includes check valves, backflow preventer and drain and test valves.</p>	<p>Valves should all be kept readily accessible and unobstructed so that they can be operated promptly and examined to see that they are open and in good operative condition, turn easily and do not leak.</p> <p>The post indicator valve outside the building by the riser should be open at all times. Periodic inspection is done by the local fire department. District staff should visually inspect monthly.</p> <p>Quarterly inspection and testing should be part of the quarterly testing by the contractor performing the maintenance contract. These quarterly inspections and tests should be timed to include the spring and fall tests noted below.</p> <p>A spring inspection should be done after low temperatures have passed. This should include a flow test and review of valve operation.</p> <p>A fall inspection should be conducted of the building envelope to ensure that cold air will not enter to expose the sprinkler system to freezing.</p> <p>Additional inspections should be done any time occupancy changes or modifications to the building are done.</p>
<p><b>Water Flow Alarm, supervisory and tamper Switches Devices</b></p>	<p>District staff should visually inspect monthly.</p> <p>Water flow alarm devices, supervisory signals should be tested as part of the quarterly testing by the contractor performing the maintenance contract.</p> <p>A spring inspection should be done after low temperatures have passed. This should include a flow test and review of alarm and tamper switch operation. This should be done as part of one of the scheduled quarterly visits by the contractor performing the service contract.</p>
<p><b>Standpipe and Hose System</b></p>	<p>Inspection of the gauges should be done weekly by district staff.</p> <p>Annually inspection and testing should be done by the contractor performing the maintenance contract.</p>



<b>Signs</b>	<p>Sign information should be inspected annually by the contractor performing the maintenance contract.</p> <p>Additional inspections should be done any time occupancy changes or modifications to the building are done.</p>
<b>Sprinklers</b>	<p>The sprinklers installed in the building are fast-response type and should be tested at 20 years and then every 10 years after. When tested 1 percent of the sprinklers should be tested.</p> <p>Annually inspection of the following items should be done by the contractor performing the maintenance contract.</p> <p>Annual sprinkler inspections should review the following items.</p> <ol style="list-style-type: none"> <li>1. Observe and note absence of sprinklers from any rooms.</li> <li>2. Observe location of sprinklers. Are they under shelves, benches racks or platforms.</li> <li>3. Do they have proper clearance. Are they obstructed.</li> <li>4. Deflector distance should conform to NFPA 13.</li> <li>5. The sprinkler installation should be reviewed. The rating, type and condition of the sprinklers should be reviewed. Sprinklers should be reviewed for corrosion, paint coatings and deposits.</li> </ol> <p>Additional inspections should be done any time occupancy changes or modifications to the building are done.</p>