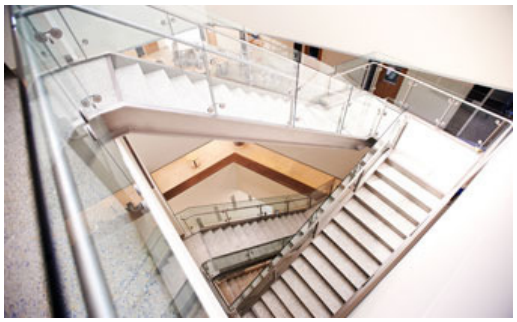
Culminating Project Report

Warren J. Baker Center for Science and Mathematics
San Luis Obispo, California



Prepared by Blake Johnson

FPE 596 Culminating Experience
Spring Quarter 2015

Fredrick W. Mowrer, Ph.D., P.E.
Christopher C. Pascual, Ph.D., P.E.

Statement of Disclaimer

This project report is a result of a class assignment; it has been graded and accepted as fulfillment of course requirements. Acceptance of this report in fulfillment of the course requirements does not imply technical accuracy or reliability. Any use of information in this report is done at the risk of the user. These risks may include, but may not be limited to, catastrophic failure of the device or infringement of patent or copyright laws. California Polytechnic State University at San Luis Obispo and its staff cannot be held liable for any use or misuse of the project.

Keywords (5): Building Fire Protection, Prescriptive Analysis, Performance Based Design, Atrium, Evacuation Time

Table of Contents

Abstract

This report analyzes the fire protection features of the Warren J. Baker Center for Science and Mathematics on the Cal Poly San Luis Obispo campus in San Luis Obispo, CA. The prescriptive analysis of the structural fire protection, egress, fire suppression, and fire alarm, detection, and communication systems shows that the building meets the requirements of current codes and standards. The performance based analysis includes simulating design fire scenarios in the atrium using computer modeling (CFAST, FDS) and the results of these models show that the atrium meets the tenability criterion for the calculated evacuation time of occupants.

Project Information

Purpose

The purpose of this project is to select a building and report on its compliance with current fire codes and standards by analyzing the design of the fire protection features present. The fire protection features analyzed are the building's structural fire protection, egress, fire suppression, and fire detection, alarm, and communication systems. Each system is analyzed using a combination of the codes and standards listed below.

- International Building Code (IBC) 2012
- NFPA 101 Life Safety Code Handbook (LSC) 2012
- NFPA 13 Automatic Sprinkler Systems Handbook 2013
- NFPA 72 National Fire Alarm and Signaling Code 2013
- NFPA Fire Protection Handbook, 20th edition
- SFPE Handbook of Fire Protection Engineering, 4th edition
- NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems 2014

Selected Building

The building selected to be analyzed for this project is the Warren J. Baker Center for Science and Mathematics, located on the Cal Poly campus in San Luis Obispo, CA. The codes and standards, relevant to the analysis in this report, the building was designed to are listed below.

- California Building Code (CBC) 2007
- NFPA 101 Life Safety Code (LSC) 2006
- NFPA 70 National Electric Code 2005
- California Fire Code (CFC) 2007

Building Information

The building is the second largest on campus with a total square footage of 188,372 and a height of 108 feet. It is a six-story, non-high-rise, steel structure located at the center of the Cal Poly campus. There are 64 faculty offices, 44 laboratories, 7 studio classrooms, and 8 lecture halls; these spaces can accommodate about 1650 students. A number of ground level entrances/exits exist on floors 1 through 3, with the main entrances/exits located at the end of the West wing on level 1, East wing on level 3, and the North and South sides of the centrally located atrium on level 2.

Proposed in 2010 and opened in Fall 2013, the building was constructed to replace the adjacent aging science building on campus.

Prescriptive Analysis

The following sections of this report cover the prescriptive, code requirements for this building. These sections analyze the building's structural fire protection, egress, fire suppression, and fire detection, alarm, and communication systems prescriptive requirements based on current codes and standards. Each section summarizes the results of the prescriptive analysis of that particular system and lists any discrepancies found in the design. The prescriptive sections are listed below.

- Structural Fire Protection Analysis
- Egress Analysis
- Fire Suppression System Analysis
- Fire Alarm, Detection, and Communication Systems Analysis

These prescriptive sections use a combination of current codes and standards for the design analysis, which are listed below.

- International Building Code (IBC) 2012
- NFPA 101 Life Safety Code Handbook (LSC) 2012
- NFPA 13 Automatic Sprinkler Systems Handbook 2013
- NFPA 72 National Fire Alarm and Signaling Code 2013
- NFPA Fire Protection Handbook, 20th edition
- SFPE Handbook of Fire Protection Engineering, 4th edition
- NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems 2014

The building may or may not meet the requirements of these current codes and standards because the building was designed using prior editions of some of these codes and standards. The codes and standards, relevant to the analysis in this report, the building was designed to are listed below.

- California Building Code (CBC) 2007
- NFPA 101 Life Safety Code (LSC) 2006
- NFPA 70 National Electric Code 2005
- California Fire Code (CFC) 2007

Structural Fire Protection Analysis

This section covers the analysis of the structural fire protection requirements using the International Building Code (IBC) 2012 and details of this analysis can be found in the sections listed below.

- Building Design
- Structural Fire Protection

Analysis Summary

The elements analyzed in the Center for Science building comply with the IBC requirements for Type I-B fully sprinklered construction, suitable for primarily Group B occupancy. Many of the details in the plans call out a UL Design No. as a basis for fire protection in the design and all UL Design No. meet required fire ratings. The actual thickness of SFRM was never specifically given in the plans for the structural steel, but the UL Design No. was called out.

The design and construction of the Center for Science meets the IBC 2012 requirements for this construction type and occupancy.

Building Design

Occupancy Classifications

The main occupancy for the building is Group B. The classrooms are Group B and account for the majority of the floor area on levels 2 through 6. Group B occupancy is described in IBC Section 304.1. There are other occupancy Groups in this building that are on different levels of the building. The other Groups are A-3, H-3, S, S-1, and S-2.

The seminar rooms (occupant load greater than 50) belong to Group A-3. The seminar rooms account for the majority of the floor area on level 1, but are also present on levels 3 through 6. Group A-3 occupancy is described in IBC Section 303.4.

Storage rooms, mechanical rooms, electrical rooms, and hazardous belong to Groups S, S-1, S-2, and H-3, respectively. These rooms make up a small part of the total area and are present on only a few different levels. Groups S, S-1, S-2, and H-3 occupancy is described in IBC Sections 311.1, 311.2, 311.3, and 307.5, respectively.

There are special requirements for Group H-3 in IBC Section 415.9. These requirements are not related to structural fire protection, but they cover fire requirements of flammable and combustible liquids, gas rooms, floors in storage rooms, and separation of highly toxic solids and liquids. Depending on the actual materials stored in this occupancy Group, it is likely that a minimum of 1-hour fire barriers between all other areas is required. These fire barriers are covered in IBC Sections 707 and 711.

Construction Type

The building plans specify the building as Type I-B construction fully sprinklered. Although the building was designed using the CBC, the IBC can also be used to determine the construction type. Using IBC Table 503, the building height of 108 feet limits the construction type to Type I. IBC Section 504.2 to increase the maximum allowable height of a fully sprinklered building would not be enough to allow for Type II construction.

Both Type I-A and I-B are allowed for this building. Type I-B was selected most likely because it is less expensive than Type I-A.

Structural Fire Protection

Fire Resistance Requirements

IBC Table 601 gives the fire resistance requirements for Type I-B construction. The required fire resistance rating for the structural frame and exterior and interior bearing walls is 2 hours. Floor construction and secondary members must have a fire resistance rating of at least 2 hours. Roof construction and secondary members must have a fire resistance rating of at least 1 hour. Non-load bearing interior walls and partitions are not required to have a fire resistance rating and non-load bearing exterior walls and partitions are not required to have a fire resistance rating if separation distance is over 30 feet, otherwise the exterior walls and partitions must have a fire resistance rating of at least 1 hour per IBC Table 602. The separation distance is over 30 feet because the nearest building is about 36 feet to the east of the Center for Science. Additionally, the fire resistance rating for the structural frame and interior bearing walls may be reduced to 1 hour if these elements support only the roof. These requirements are summarized on Table 1a.

Table 1a – Structural Fire Resistance Requirements

Structural Element		Hourly Rating
Structural Frame		2 or 1
Bearing walls	Exterior	2
	Interior	2 or 1
Non-bearing walls		0
Floor		2
Roof		0 or 1

This building also has more than one type of occupancy so IBC Table 508.4 must be used to determine the required separation of occupancies. The applicable separations for this building are B to all others Groups, S-1 to S-2, and S-2 to H-3. The separation required between the occupancies is 1-hour except between B and S-1 where there is no separation requirement and there is no separation requirement between occupancies of the same Group. These occupancy separation requirements are summarized on Table 1b.

Table 1b – Hourly Separation of Occupancies

	S-1	S-2	H-3
B	0	1	1
S-1	-	1	1
S-2	-	-	1

Structural Frame

The structural frame of the building is typical steel construction with steel wide flange beams used as girders, beams, and columns. The elevator shafts are supported with rectangular hollow steel sections along their heights. The steel structural frame is protected from fire by spray applied fire resistive material (SFRM). W-shaped beams are fireproofed to the UL Design No. 917 specification and W-shaped columns are fireproofed to the UL Design No. X772 specification. For aesthetics and durability of the SFRM, the columns and beams are boxed with steel channels and gypsum wallboard.

Floor and Roof Assemblies

The floor and roof assemblies are 3" thick 20 gauge composite metal decks with 3-1/4" light weight concrete fill. The concrete is reinforced with 6x6-W2.0xW2.0 welded wire fabric with 3/4" clear. The deck is supported by steel wide flanged beams and headed shear studs join the beam and deck compositely. The assemblies are rated for 2 hours by using IBC 721.2.2.1.3 to obtain the equivalent thickness of 3.75" then using IBC Table 721.2.2.1 to meet the required thickness of 3.6" for a lightweight concrete slab.

Exterior Walls

The exterior walls are either load bearing concrete retaining walls or non-load bearing concrete masonry walls. The east sides of level 1 and 2 have 16" thick concrete retaining walls, but all other walls are non-load bearing concrete masonry walls. Using IBC Table 721.1(2), the fire rating for the concrete retaining wall is well beyond the required 2 hours and the masonry walls are required to be between 3.2" and 4.2" thick, depending on the type of fill. The minimum wall thickness specified on the CMU wall reinforcing schedule is 4" so it is possible that the wall is not quite thick enough if the improper fill was used with a 4" thick block. However, since the building is 108 feet tall with 6 stories, the average height per story is 18 feet; allowing about 2 to 3 feet for the floor slab and steel beam, a wall will need to be at least 15 feet high, so a minimum wall thickness of 8" is needed, which satisfies the required fire resistance rating.

Interior Walls and Partitions

The interior walls and partitions are non-load bearing and are either concrete masonry walls or steel stud walls. The different wall details are shown in the appendix on sheet A8.01. Fire ratings and UL Design No. are given for each detail, if applicable. The plans also call out some interior walls to be 2-hour rating fire walls. The walls around the elevator and stair shafts and the walls separating the atrium from control areas 1 and 2, the East and West wings of the building respectively, are designated as 2-hour fire rated wall assemblies.

Egress Analysis

This section covers the analysis of the requirements for egress using the requirements of the Life Safety Code (LSC) 2012 and the International Building Code (IBC) 2012; the details of this analysis can be found in the sections listed below.

- Occupancy
- Means of Egress
- Fire Rating Requirements
- Occupancy/Egress Maps

Standards referenced in this section are NFPA Fire Protection Handbook, 20th edition and SFPE Handbook of Fire Protection Engineering, 4th edition for calculating total evacuation time.

Analysis Summary

The Center for Science has an occupant load of almost 3000 and several exits on each level that meet or exceed the minimum width requirements of the LSC. The estimated total evacuation time of the entire building is about 13 and a half minutes, based on pre-movement time, travel time, and exit queuing. The fire resistance rating for the stairway enclosures is 2-hour, which meets or exceeds the requirements of the LSC. The performance based smoke analysis of the atrium shows that fire barriers are not required at the offices on levels 4, 5, and 6 that exit directly to the atrium, the details of this analysis can be found in the atrium analysis section of this report.

The design of the Center for Science meets the LSC 2012 requirements for occupancy, means of egress, and fire resistance ratings.

Occupancy

Occupancy Classifications

The building has more than one type of occupancy, so it is considered a multiple occupancy building, per LSC Section 6.1.14.2.1. The occupancies, which are discussed below, share common paths of travel, so the building is classified as a mixed occupancy building defined in LSC Section 6.1.14.2.2. Due to the mixed occupancy classification, the building shall comply with the most restrictive requirements of the occupancies involved, per LSC Section 6.1.14.3.

The most common occupancy in the building is Group B. There are many different uses for Group B in this building and it accounts for the majority of the floor area on levels 2 through 6. Group B occupancy is described in IBC Section 304.1. The other occupancy Groups found in this building, on various levels, are A-3, H-3, S, S-1, and S-2.

The seminar rooms (occupant load greater than 50) and terraces belong to Group A-3. The seminar rooms account for the majority of the floor area on level 1 and one room on level 3. The terraces are present on levels 4, 5, and 6. Group A-3 occupancy is described in IBC Section 303.4. Generally, Group A-3 has the most restrictive requirements of the occupancies in this building.

Storage rooms, mechanical rooms, electrical rooms, and hazardous belong to Groups S, S-1, S-2, and H-3, respectively. These rooms make up a small part of the total area and are present on only a few different levels. Groups S, S-1, S-2, and H-3 occupancy is described in IBC Sections 311.1, 311.2, 311.3, and 307.5, respectively.

There are special requirements for Group H-3 in IBC Section 415.9. These requirements are not related to egress, but cover fire requirements of flammable and combustible liquids, gas rooms, floors in storage rooms, and separation of highly toxic solids and liquids.

Occupant Loads

The occupant load for each space is calculated by dividing the net floor area, defined in LSC Section 3.3.21.2.2, by the appropriate occupant load factor in LSC Table 7.3.1.2 for its intended use. The attached plans give the floor area and occupancy group, load factor, and load for each room. The 300 square feet per person factor used in the plans for the mechanical and storage rooms indicate that the plans use IBC Table 1004.1.2 for determining load factors because LSC Table 7.3.1.2 would give 500 square feet per person as a load factor for storage use in this building. For all other occupancies in this building, the IBC and LSC give the same load factor. There are minor discrepancies in the calculations where some storage space occupant loads are 1 occupant lower than they should be due to rounding.

The differences in load factors and rounding are not major issues for the analysis or design of the structure because these occupancies make up a small portion of the total building area and occupancy. The total occupant load for each level is given in Table 2a and it includes subtotals for the West and East wings on either side of the atrium as well as the atrium area itself, labeled as Center.

Table 2a – Total Occupant Load per Level

Level	Occupant Loads (Persons)			
	West	Center	East	Total
1	703	-	-	703
2	262	77	184	523
3	312	155	234	701
4	179	65	221	465
5	-	67	196	263
6	-	68	183	251
Total	**1456**	**432**	**1018**	**2906**

It is worth noting that occupant load factors, and therefore occupant loads, are based on use and not occupancy type. For example, the Business occupancy on level 1 uses a load factor of 15 square feet per person because it is used for assembly. Since the occupant load is below 50 persons and the area is less than 750 square feet, the space is not considered Assembly occupancy due to IBC Section 303.1.2.

Occupant Behavior

The occupants will primarily be adults that are students and professors that come and go at different times of the day. Occupants come and go between classes that usually last an hour, but some classes may last longer and some occupants may stay for a longer period within the building to study or do work. All occupants should be awake and alert.

An occupant's reaction to an alarm, the recognition time, should be almost immediate. Once an occupant hears an alarm, they should stop what they are working on, grab their books and/or backpacks, and begin proceeding to the nearest exit, the time the occupant takes for these actions is the response time.

The sum of the recognition time and the response time is the pre-movement time. The pre-movement time for occupants should be relatively quick and can be estimated using SFPE Handbook Table 3-12.2. Considering this building as a mid-rise office building, the average pre-movement time for occupants on a warm day is 36 seconds. This number is important for calculating the total evacuation time of the building and for the tenability analysis of the atrium.

Means of Egress

Egress Capacity

Egress capacity is based on stairway capacity and doorway capacity, which can be calculated using capacity factors found in LSC Table 7.3.3.1. However, the plans do not use LSC Table 7.3.3.1, but rather IBC Sections 1005.3.1 for stairs and 1005.3.2 for doors. The difference between the requirements of LSC and IBC is the LSC uses factors of 0.3 for stairs and 0.2 for doors while an exception in the IBC allows factors of 0.2 for stairs and 0.15 for doors. The provided width of the doors and stairs still exceed the required width calculated using the LSC, results for each component are shown on Table 2c on the next page. Component labels on Table 2c match those on Figures a-f on pages 16-21.

Number of Exits

The number of exits required from any floor is given in LSC Sections 7.4.1.1 and 7.4.1.2. Levels 1, 2, and 3 all have a total occupant load greater than 500, but less than 1000, so 3 exits are required. Levels 4, 5, and 6 all have a total occupant load less than 500, so 2 exits are required. The total number of exits for each level are listed alongside the required number of exits for each level on Table 2b.

Table 2b – Total Number of Exits per Level

Level	Total Number of Exits	
	Provided	Required
1	3	3
2	7	3
3	4	3
4	3	2
5	2	2
6	2	2

Exit Arrangement

The exits in this building, on each level and for each space, are reasonably remote per LSC Section 7.5.1.3. Since the building is protected by a sprinkler system throughout, LSC Section 7.5.1.3.3 applies to reduce the exit remoteness to one-third the diagonal distance of the area served by an exit. Neither the common path of travel or dead end distance limits is exceeded in any space on any level of this building. Some common path of travel distances are shown on the attached plans. Other locations were also checked to ensure that the distance requirements were satisfied. Maximum common path of travel distances are found in LSC Sections 12.2.5.1.2, 38.2.5.3.1, and 42.2.5 for Assembly, Business, and Storage occupancies, respectively. Dead end corridor distances must comply with LSC Section 7.5.1.5 and permitted dead end distances are found in LSC Sections 12.2.5.1.3, 38.2.5.2, and 42.2.5 for Assembly, Business, and Storage occupancies, respectively.

Table 2c – Egress Capacity per Component

Level	Component	Load (persons)	Factor (in/person)	Width (in)		Meets Required?
				Required	Provided	
1	Door Main	352	0.2	71	216	Yes
1	Door Back	352	0.2	71	96	Yes
1	Door 4	160	0.2	32	36	Yes
2	Stair 5	74	0.2	15	48	Yes
2	Door 5	74	0.3	23	36	Yes
2	Stair 4	74	0.2	15	48	Yes
2	Door 4	74	0.3	23	36	Yes
2	Door West	74	0.2	15	72	Yes
2	Door Main N	74	0.2	15	144	Yes
2	Door Main S	234	0.2	47	144	Yes
2	Door East a	74	0.2	15	72	Yes
2	Door East b	74	0.2	15	72	Yes
3	Stair 5	160	0.3	48	48	Yes
3	Door 5	160	0.2	32	36	Yes
3	Stair 4	160	0.3	48	48	Yes
3	Door 4	160	0.2	32	36	Yes
3	Stair 3	160	0.3	48	48	Yes
3	Door 3	160	0.2	32	36	Yes
3	Door East	160	0.2	32	36	Yes
4	Stair 4	155	0.3	47	48	Yes
4	Door 4	155	0.2	31	36	Yes
4	Stair 3	155	0.3	47	48	Yes
4	Door 3	155	0.2	31	36	Yes
4	Stair 1	155	0.3	47	48	Yes
4	Door 1	155	0.2	31	36	Yes
5	Stair 3	132	0.3	40	48	Yes
5	Door 3	132	0.2	27	36	Yes
5	Stair 1	132	0.3	40	48	Yes
5	Door 1	132	0.2	27	36	Yes
6	Stair 3	126	0.3	38	48	Yes
6	Door 3	126	0.2	26	36	Yes
6	Stair 1	126	0.3	38	48	Yes
6	Door 1	126	0.2	26	36	Yes

Travel Distance

Travel distance to exits is shown on the attached life safety plans for some spaces and travel distance is sufficient for all spaces and occupancies per LSC Section 7.6 and LSC Sections 12.2.6.2 and 38.2.6.3, and 42.2.6 for Assembly, Business, and Storage occupancies, respectively.

Exit Sign Placement

The requirements of exit signs are given in LSC Section 7.10 and illumination requirements are given in LSC Section 7.8. Exit signs and illumination are required by all occupancies present in this building and are listed in the individual occupancy sections of the LSC in Subsection __.2.10 and __.2.8, respectively. The placement of exit signs are shown in the attached life safety plans and the placements meet the requirements of the LSC, there are exit signs placed at every exit and exit signs help to guide occupants to those exits. The number of exit signs in the corridors could be reduced in accordance with LSC Section 7.10.2.1 and recommendations for minimum exit sign placement are shown in the attached occupancy and exit location map.

Estimated Total Evacuation Time

The method to predict egress time for a building is explained in the NFPA Fire Protection Handbook Chapter 4-2. The time to evacuate all levels of the entire building can be estimated by determining the flow of people passing through egress components. The egress component with the lowest flow will control the time taken on sets of components in series, for example a narrow door would control flow even if it leads to a wide stairway with greater capacity. Queuing is assumed to take place so that flow will control the travel time. In this analysis, travel time within a stairway is considered, but the travel time to the stairway is not considered.

To calculate the time taken on the stairs some dimensions are needed. Floor-to-floor height is 16 feet, stair risers are 6.86 inches (7 inches used in calculations), and each landing has about 10 feet of travel distance. The travel distance on the stairs and both landings to one level below is 50 feet. Assuming an optimal density of 0.175 persons per square foot due to queuing and using Equation 1 in NFPA Section 4-2, the travel speed down the stairs is 105 feet per minute (see calculation on next page). The travel time for an occupant moving with the flow is 0.48 minutes per floor. The calculated flow for stairways 1 and 5, stairways 3 and 4, and the stairway doors is 59.35, 55.5, and 48 persons per minute, respectively. Stairways 3 and 4 are enclosed stairways that have their flow limited to 48 persons per minute by the exit door at the bottom of the stairways. Stairways 1 and 5 are outside stairways with no exit door so the flow is limited by the stairs to 59.35 persons per minute since flow from all the entrance doors is cumulative. The total occupant load from each level on each stairway must also be considered when estimating total evacuation time. Table 2d on the next page summarizes the flow, occupant load, travel time, and total evacuation time, including the pre-movement time of 36 seconds, for each stairway.

Calculation of travel speed down the stairs:
S = k - akD
S = (212) - ((2.86)(212)(0.175))
S = 105 ft/min

Table 2d – Limiting Egress Component Flow and Travel Times

Stair #	Limiting Component	Flow (persons/min)	Total Load (persons)	Travel Time (min)	Total Time (min)
1	Stair	59.35	413	0.48	8.04
3	Door	48	573	0.48 + 0.26	13.28
4	Door	48	389	0.48	9.18
5	Stair	59.35	234	0.48	5.02

Stairway 3 exits into the atrium on level 2 so the travel distance from the stairway exit to the nearest exit, Door Main S, must be accounted for. The travel distance from the exit of stairway 3 to Door Main S is about 60 feet. The atrium where stair 3 exits is quite large so speed is assumed to be at its maximum, where density is assumed to be 0.05 persons per square foot; using Equation 1 in NFPA Section 4-2 the travel speed from the exit of stairway 3 to Door Main S is 235 feet per minute (see calculation below). The time taken for an occupant to travel 60 feet is 0.26 minutes. Exit discharge into an atrium is allowed per LSC Section 8.6.7(2).

Calculation of travel speed from stair 3 to south exit in atrium:
S = k - akD
S = (275) - ((2.86)(275)(0.05))
S = 235 ft/min

Travel time to the stairway is ignored in the calculation because the analysis assumes queuing will occur immediately upon completion of pre-movement time. The basis of this assumption is since the estimated pre-movement time is the average of all occupants, half the occupants have already completed their pre-movement time and begun their travel time, and occupants initially closer to the exits may have already reached the exits and started the queue.

The estimated total evacuation time is 13 minutes and 17 seconds, which is based on the time for occupants to travel through stairway 3.

Fire Rating Requirements

Fire Resistance Ratings

Stair enclosures that connect three or fewer stories are required to have a minimum 1-hour fire resistance rating and stair enclosures that connect four or more stories are required to have a minimum 2-hour fire resistance rating, per LSC Section 7.1.3.2.1. Table 2e shows which levels are connected by each stairway, the total number of levels each stairway connects, the minimum fire resistance rating, and the fire resistance rating on the plans. Stairways 1 and 5 require a minimum 1-hour fire resistance rating and stairways 3 and 4 require a minimum 2-hour fire resistance rating. The plans specify that stairways 1, 3, 4, and 5 are protected with a 2-hour fire resistance rating, so the LSC requirements are satisfied.

Table 2e – Stairway Fire Resistance Ratings

Stair #	Level						Total	Fire Resistance Rating	
	1	2	3	4	5	6		Required	Provided
1				x	x	x	3	1-hour	2-hour
3		x	x	x	x	x	5	2-hour	2-hour
4	x	x	x	x			4	2-hour	2-hour
5		x	x				2	1-hour	2-hour

The requirements for the atrium located at the center of the building are listed in LSC Section 8.6.7. The atrium meets these requirements, except the offices connected to the atrium on levels 4 through 6 must be protected by a 1-hour fire barrier per LSC Section 8.6.7(1) or the results of an engineering analysis must show that enclosure is not required per LSC Section 8.6.7(1)(b). To meet code requirements, an engineering analysis must be performed per LSC Section 8.6.7(5) to eliminate the need for the 1-hour fire barrier. The engineering analysis performed for the atrium is discussed in the atrium analysis section of this report.

Interior Finish

Interior finish requirements for Assembly, Business, and Storage are provided in LSC Sections 12.3.3, 38.3.3, and 40.3.3, respectively. Since the building is protected throughout by an automatic sprinkler system, the interior finish requirements may be reduced by one step per LSC Sections 10.2.8.1 and 10.2.8.2. The most restrictive requirements are for the Assembly occupancy present in this building so the finish requirements should be based on that occupancy.

Using LSC Sections 12.3.3, 10.2.8.1, and 10.2.8.2, the interior wall and ceiling finishes for the corridors, lobbies, and assembly areas must be Class A, Class B, or Class C and the enclosed stairways must be Class A or Class B. Interior floor finishes in all areas must be Class I or Class II or must comply with LSC Section 10.2.7.2.

Occupancy Maps

Figures a, b, c, d, e, and f are on the following 6 pages. Each figure is a color-coded map of the occupancy and usage for each space on a particular level of the building. Primary exit locations and suggested minimum exit sign placement are also shown on the maps. There are more uses for the occupancies than could be labeled in the maps so only the most common uses were labeled. The uses for each space were labeled based on the title of each space and some spaces did not fit well with any defined use and were left labeled as the occupancy, for example the woodshop was left as Business occupancy. The occupancy titles for each space can be found on the plans in the appendix of this report.

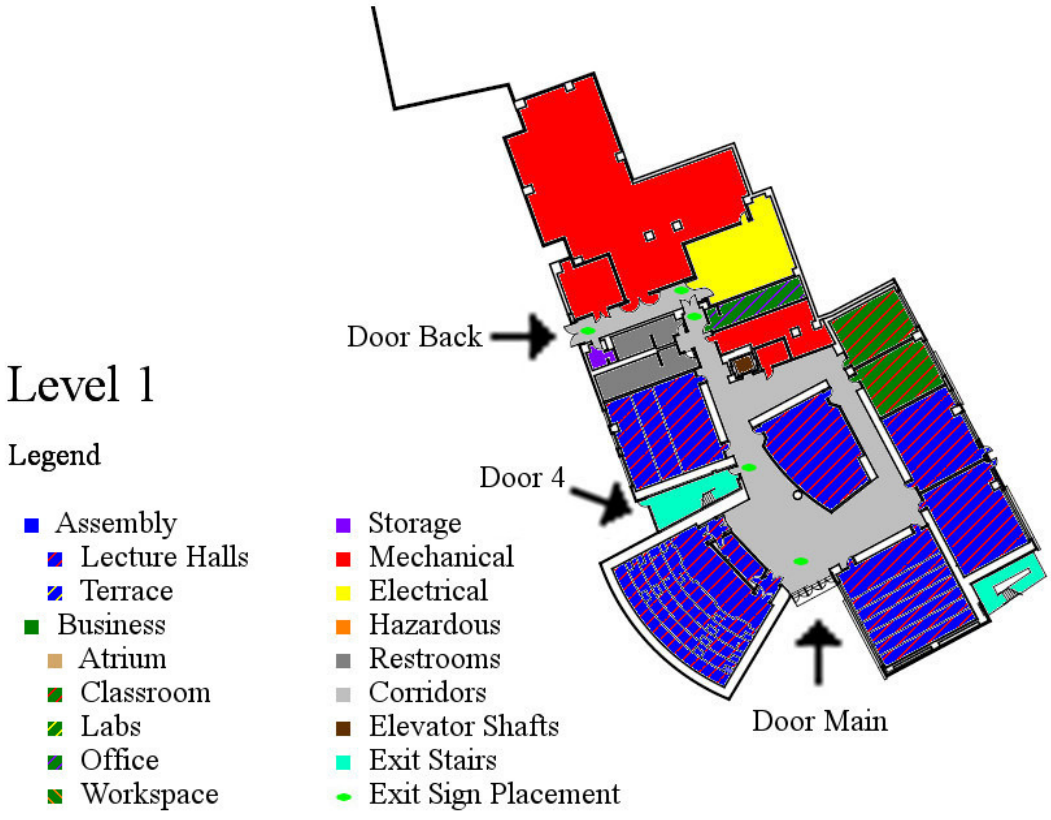


Figure a – Level 1 Occupancy Map

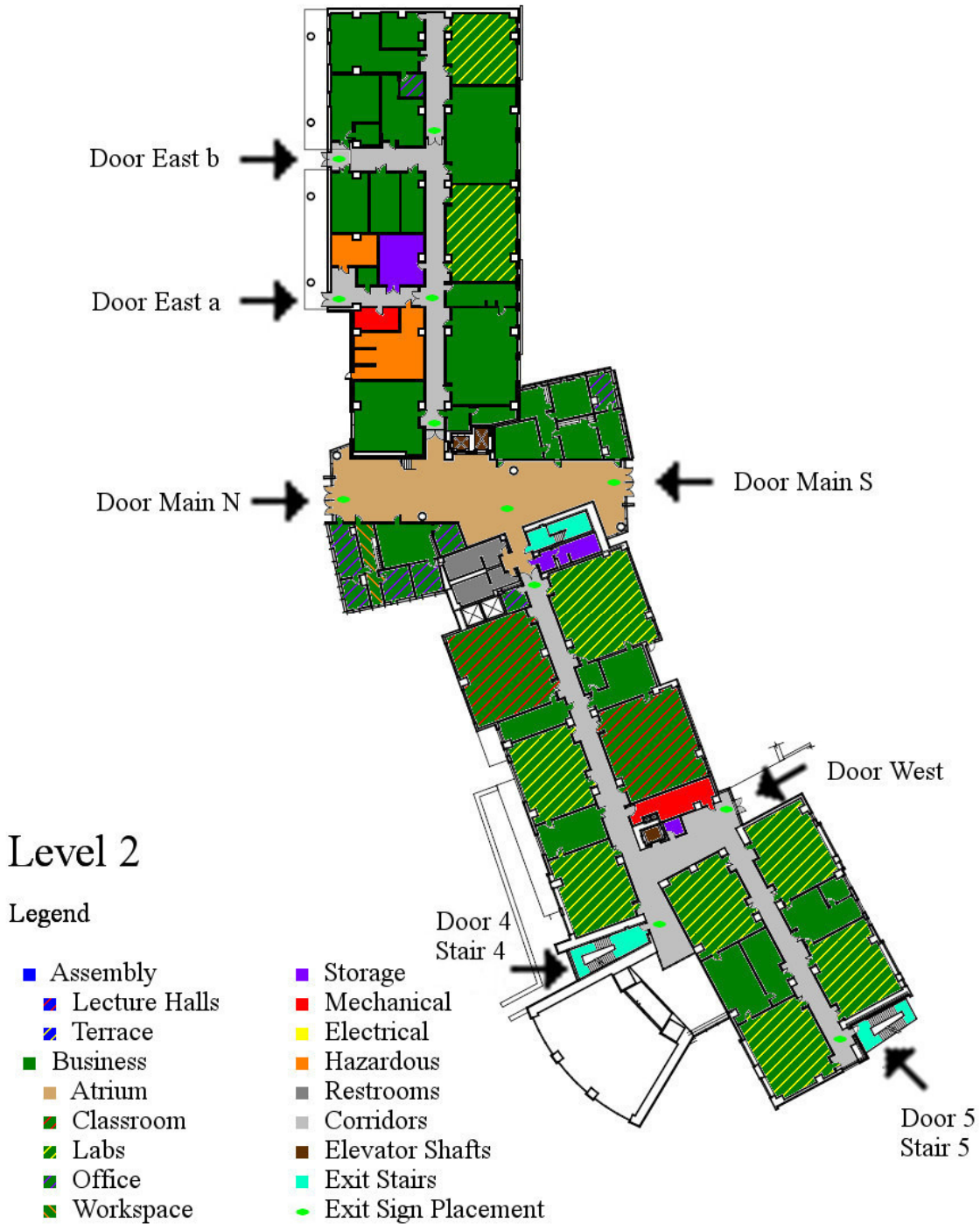


Figure b – Level 2 Occupancy Map

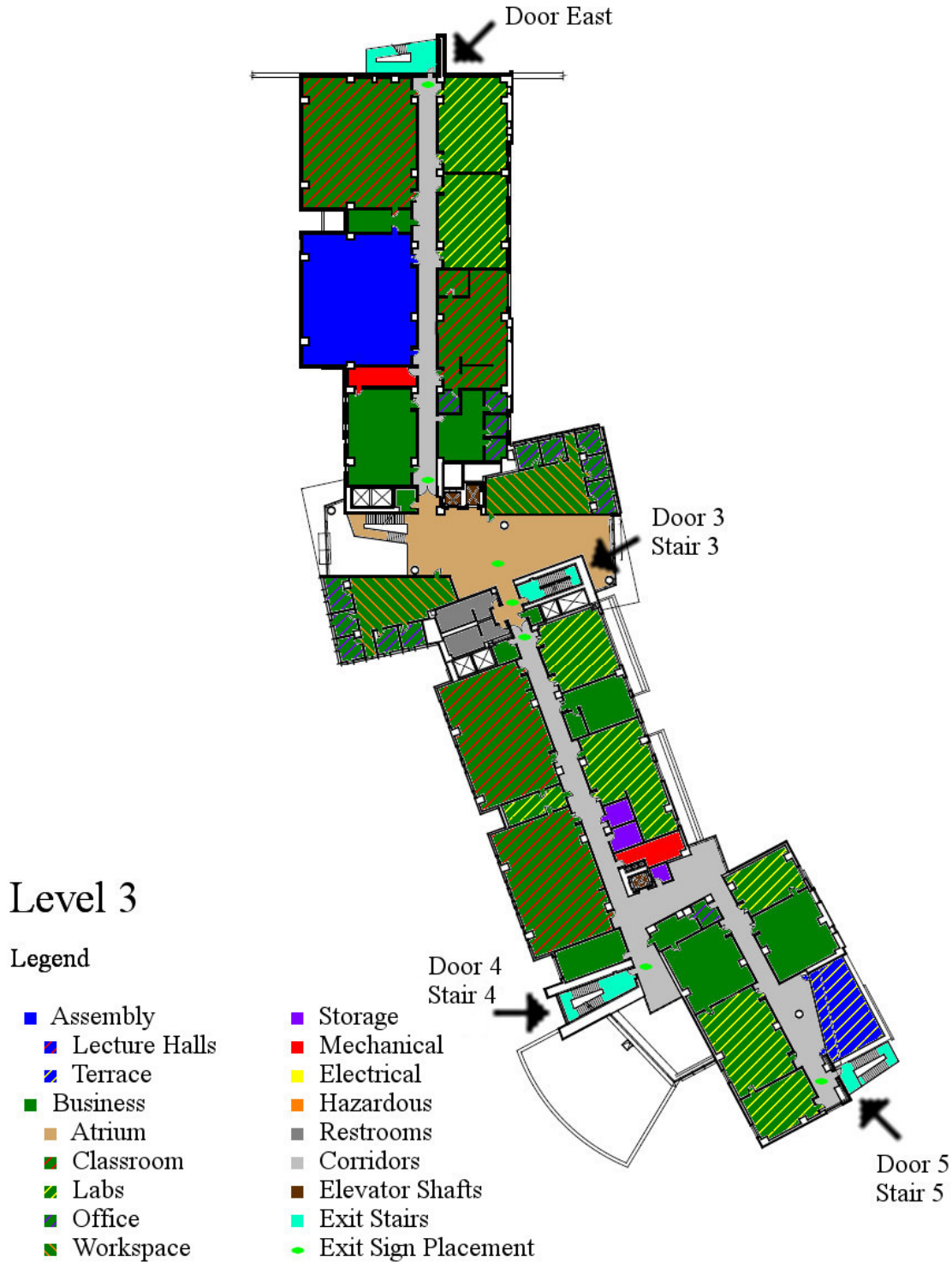


Figure c – Level 3 Occupancy Map

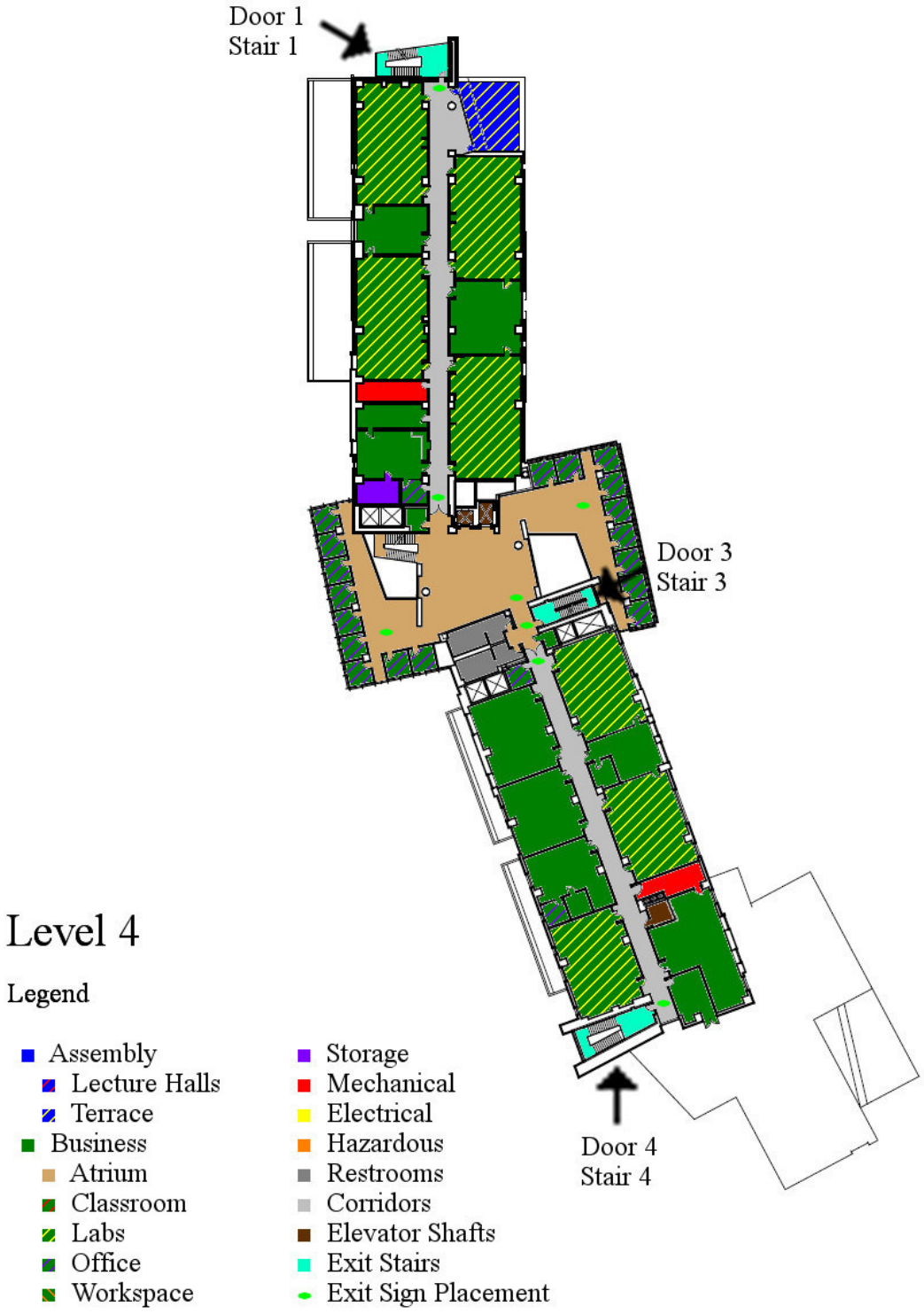


Figure d – Level 4 Occupancy Map

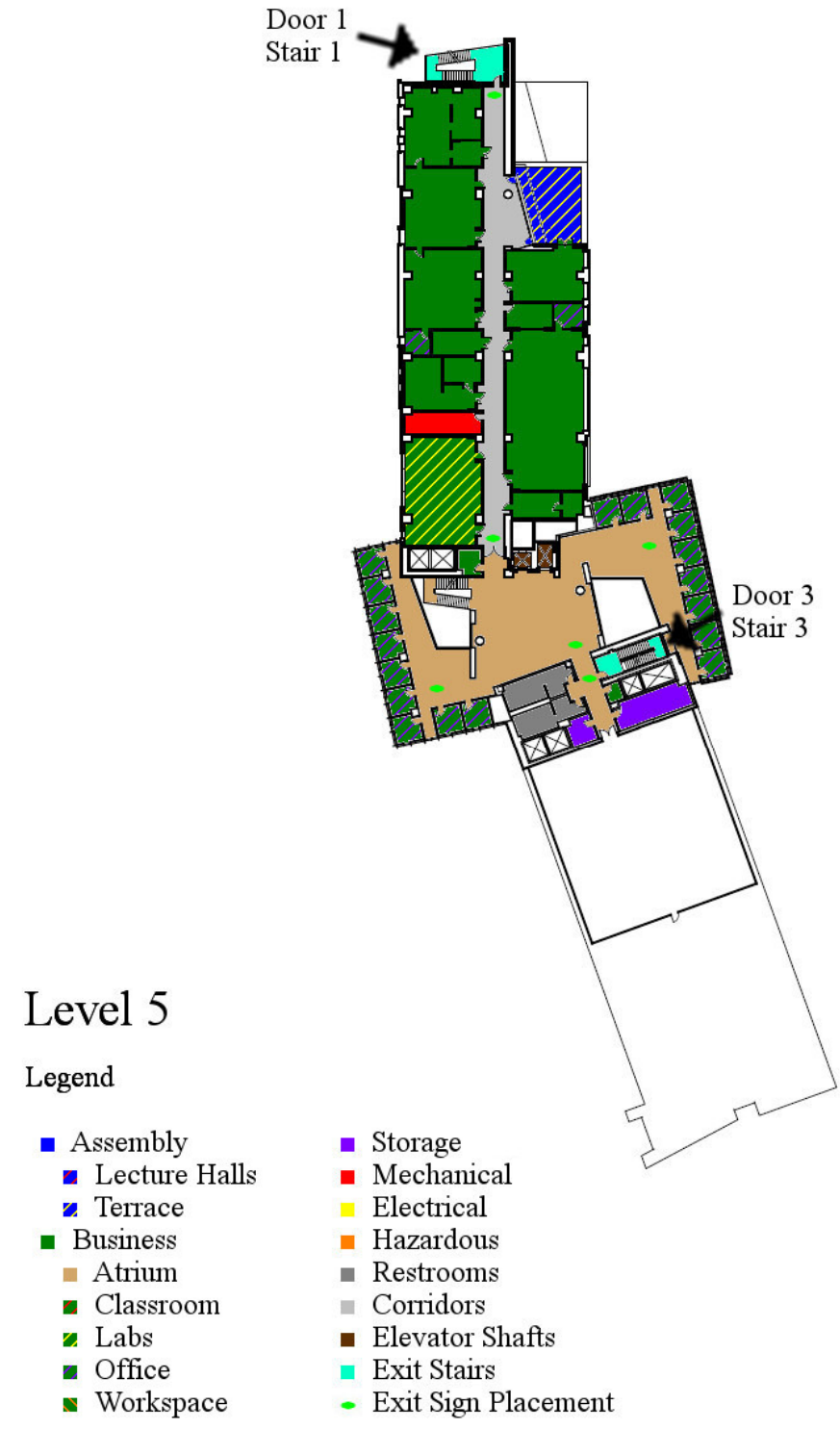


Figure e – Level 5 Occupancy Map

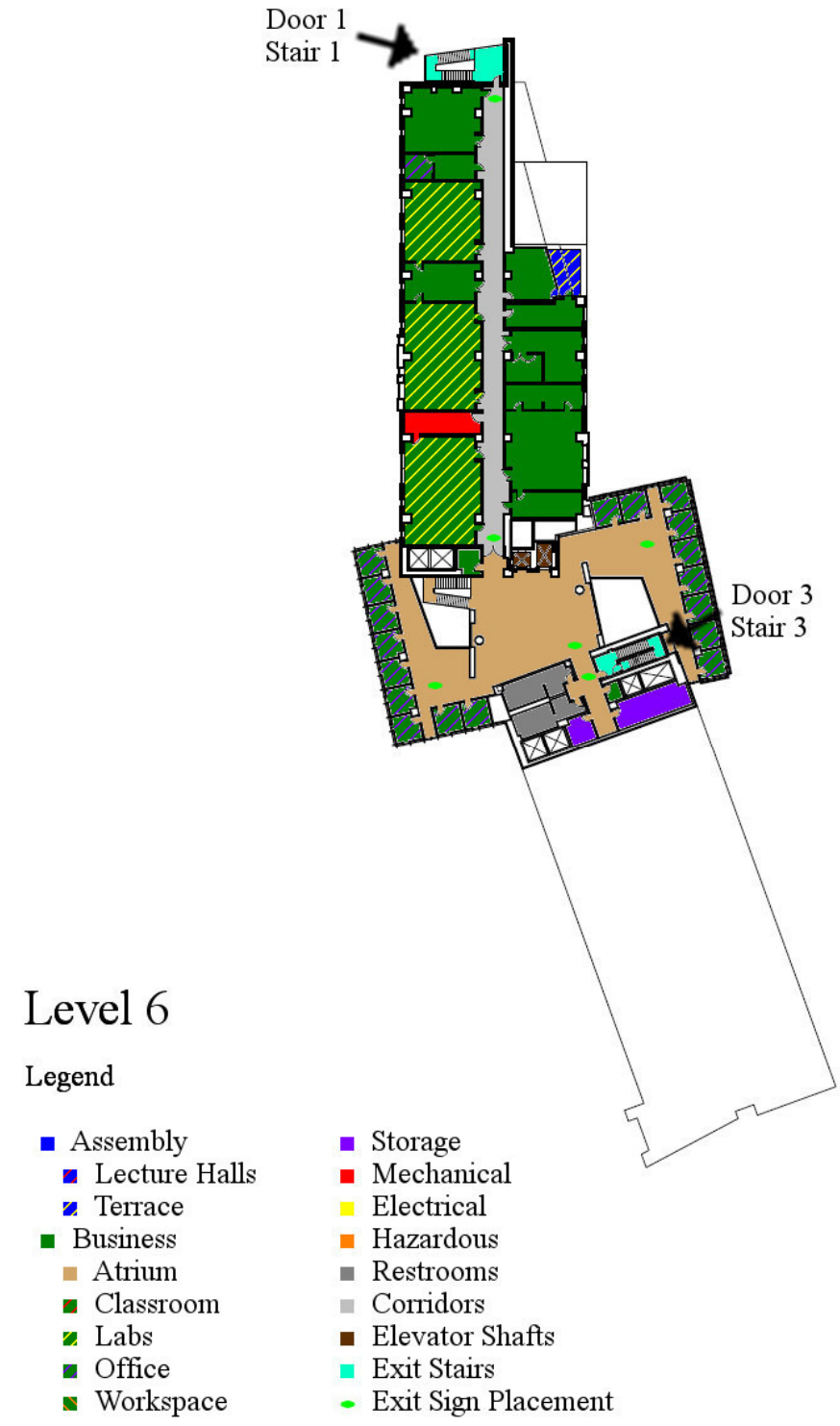


Figure f – Level 6 Occupancy Map

Fire Suppression System Analysis

This section covers the analysis of the fire suppression system requirements using NFPA 13 Automatic Sprinkler Systems Handbook 2013 and NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems 2014; the details of this analysis can be found in the sections listed below.

- System Design Criteria
- Water Supply
- Occupancy
- System Specification
- Hydraulic Calculations
- Inspection, Testing, and Maintenance

Analysis Summary

The Center for Science is protected with a wet pipe sprinkler system throughout, designed to NFPA 13 2007. The occupancy classification of the building is primarily light hazard with a sprinkler density of 0.10 gpm/ft^2, but labs and utility spaces are ordinary hazard group 1 with a sprinkler density of 0.15 gpm/ft^2. The water supplied to the system is 914 gpm at a residual pressure of 55 psi, 60 psi static. The highest pressure demand at the base of the riser is 168 psi so a pump is required to meet the pressure demand. The fire pump is an in-line pump rated at 750 gpm, 113 psi, 58.1 HP, and has an efficiency of 85.3%; a pressure reducer is required for level 1. Water enters the system on each level through the riser located in the central portion of the building in stairway 3. The sprinklers are quick-response with a K-factor of 5.6 and are mostly pendant type with some upright type sprinklers in utility spaces. The sprinkler system is supported by hangers and braced against seismic motion using TOLCO braces. The system should be inspected, tested, and maintained following the procedures of NFPA 25 to ensure proper operation of the system.

The design of the fire suppression system in the Center for Science meets the NFPA 13 2013 requirements for a wet pipe sprinkler system to protect the types of occupancies present, light hazard and ordinary hazard group 1.

System Design Criteria

System Type

The fire suppression system installed in this building is a water-based sprinkler system. The system is a wet pipe sprinkler system where most of the system is concealed with a finished ceiling, but some portions are exposed. The requirements for wet pipe systems are covered in NFPA 13 Chapter 7.1.

Design Criteria

Several design criteria must be met for the proper operation of a sprinkler system. The design criteria include the water supply and water demand, sprinkler spacing, location, and placement, system components and materials, and the support and bracing of the system. The sprinkler system was designed to NFPA 13 2007 standards, but it is analyzed in this report using NFPA 13 2013.

The water supply must be adequate for the sprinkler system. The flow rate and pressure of the water supply must meet or exceed the water demand of the system, fire pumps may be required to increase the pressure of the water supply. The water supply must also always be available in the event of a fire. On-site water storage, such as a water tank, may be required if the water supply lacks sufficient flow rate. Water supply information can be found in NFPA 13 Chapter 23.2 and water demand must be calculated for an individual system.

Sprinklers must be spaced properly so as not to exceed their maximum protection area. Sprinklers must be positioned so they are activated and water is distributed properly, obstructions may affect sprinkler activation and water distribution. Installation requirements for sprinklers are covered in NFPA 13 Chapter 8.

Proper materials must be used in the installation of a sprinkler system. Every component of a sprinkler system must be approved by a testing agency, such as ANSI, UL, or FM. Requirements of the components of a sprinkler system are listed in NFPA 13 Chapter 6.

A sprinkler system must be supported with restraints and braces. Support of the system is to prevent structural collapse of the piping and to increase the survivability of the system when there is building movement, such as in the event of an earthquake. The support of sprinkler systems is covered in NFPA 13 Chapter 9.

Water Supply

The sprinkler system in this building is supplied by city water. Pressure was found at a nearby existing fire hydrant and flow was found at a different nearby fire hydrant. The static pressure was found to be 60 psi, the residual pressure was 55 psi, and the flow was 914 gpm (2270 gpm at 20 psi). The water supply has adequate flow rate, but the pressure is too low, so a fire pump is required. See appendix for locations of hydrants. The flow test summary is shown in Figure g.

FLOW TEST SUMMARY

STATIC PSI	60
RESIDUAL PSI	55
PITOT PSI	35
ORIFICE DIAMETER	2 1/2
COEFFICIENT OF DISCHARGE	0.9
GPM	914
DATE	8-19-2011
LOCATION	N. POLY VIEW DRIVE
BY WHO	FLUID RESOURCE MANAGEMENT, INC.

ADJUSTED FLOW
10 % REDUCTION

STATIC PSI	54
RESIDUAL PSI	49
GPM	914

STATIC & RESIDUAL TAKEN FROM HYD. # 63
FLOW TAKEN FROM HYD. # 64

Figure g – Flow Test Summary

Occupancy

Classifications

Most areas of the building are considered light hazard occupancy as defined in NFPA 13 Chapter 5.2. The labs, storage, and utility rooms are considered ordinary hazard group 1 as defined in NFPA 13 Chapter 5.3. The storage occupancies on each floor are incidental and are therefore considered miscellaneous storage as defined in NFPA 13 Chapter 3.9.1.18. The actual commodity classifications for the storage occupancies are unclear in the plans, but if the system was designed properly the commodities could be Classes I or II from NFPA 13 Table 13.2.1 because the design curve used is ordinary hazard group 1.

Sprinkler Design Criteria

The sprinkler density for the light and ordinary hazard is 0.10 and 0.15 gpm/ft^2, respectively, with a design area of 1500 square feet. The chosen sprinkler area and density satisfies the design curves in NFPA 13 Figure 11.2.3.1.1. The hose stream allowance of 100 gpm for light hazard and 100 gpm inside and 150 gpm outside for ordinary hazard meet the requirements of NFPA 13 Table 11.2.3.1.2.

System Specifications

All components of the system are shown in the sprinkler drawings in the appendix.

Fire Pump

A fire pump is required in this building to meet the hydraulic demand of the sprinkler system, see Hydraulic Calculations. The fire pump is an in-line pump with a rated flow of 750 gpm, rated head of 113 psi, rated power of 58.1 hp, and rated efficiency of 85.3%. Due to the high pressure from the fire pump, a pressure reducer is required for level 1.

Stand Pipes and Risers

There are a total of three stand pipes and one riser in this building. The standpipes are in stairways 1, 4, and 5 and the riser is in stairway 3, all of these pipes are concealed inside a wall. Stand pipe 1 and the riser are 6" Schedule 10 and standpipes 4 and 5 are 4" Schedule 10.

Cross Mains and Branch Lines

The cross mains in this building are generally found above corridors that run along the building's center with branch lines running perpendicular to the corridors, passing into rooms to pass water to the sprinklers. This pattern allows for simple layout of branch lines and easy access for maintenance of the cross mains should the need arise. The cross mains are 2½" Schedule 10, but one section of the cross main on level 1 is 3" Schedule 10 as it leaves the pump room and splits into two cross mains. The branch lines range between 1" and 1¼" Schedule 10, depending on hydraulic demand.

Sprinklers

In the areas of this building with a finished ceiling the sprinklers are pendant type and most utility spaces and some labs have upright type sprinklers. All sprinklers are quick response and have a K-factor of 5.6.

Hangers and Seismic Bracing

The sprinkler system is supported by hangers and braced using TOLCO seismic braces. The seismic design category for this building is D and the site has a soil profile of type B, the spectral response accelerations are S_s of 1.26 and S_1 of 0.481, and the seismic coefficient C_p is 0.61.

Hydraulic Calculations

The hydraulic calculations performed for this building are nearly 200 pages long so only some of these calculations are in the appendix. Calculations for the fire pump, pressure reducers, and, for brevity, only the remote area with the highest hydraulic demand are in the appendix. Blank pages and pages that were not used for final design values, such as pages with only crossed out graphs for the pressure reducer, are omitted from the calculations.

The water demand at the base of the riser depends on which remote area is chosen. The system should be designed to meet the highest pressure demand, which is 168 psi. Table 3a summarizes the results of the remote area hydraulic calculations and highlights the maximum demand.

Table 3a – Remote Area Pressure Calculation Summary

Remote Area		Pressure (psi)		
Level	No.	Demand	Safety	Outlet
1	1	130.2	45.8	176.0
	2	**167.6**	**7.2**	**174.8**
3	1	122.0	53.2	175.2
	2	126.6	48.8	175.4
6	1	135.3	40.1	175.4
	2	71.6	105.1	176.7
	3	149.5	25.5	175.0
	4	160.6	13.6	174.2

No significant errors were found in the hydraulic calculations for any remote area of the sprinkler system in this building. Figure h on the next page shows the water supply curve for remote area 2 on level 1, the remote area with the highest pressure demand. The pressure of the water supply curve does not exceed the highest pressure demand of the water demand curve, but the pressure of the combined water supply curve, which includes the pressure rise from the fire pump, does exceed the highest pressure demand of the water demand curve for this remote area so the system meets the highest pressure demand.

Water Supply Curve (C)

Aero Automatic Sprinkler Co.
Cal Poly Center for Science LVL 1 [R/A=2]

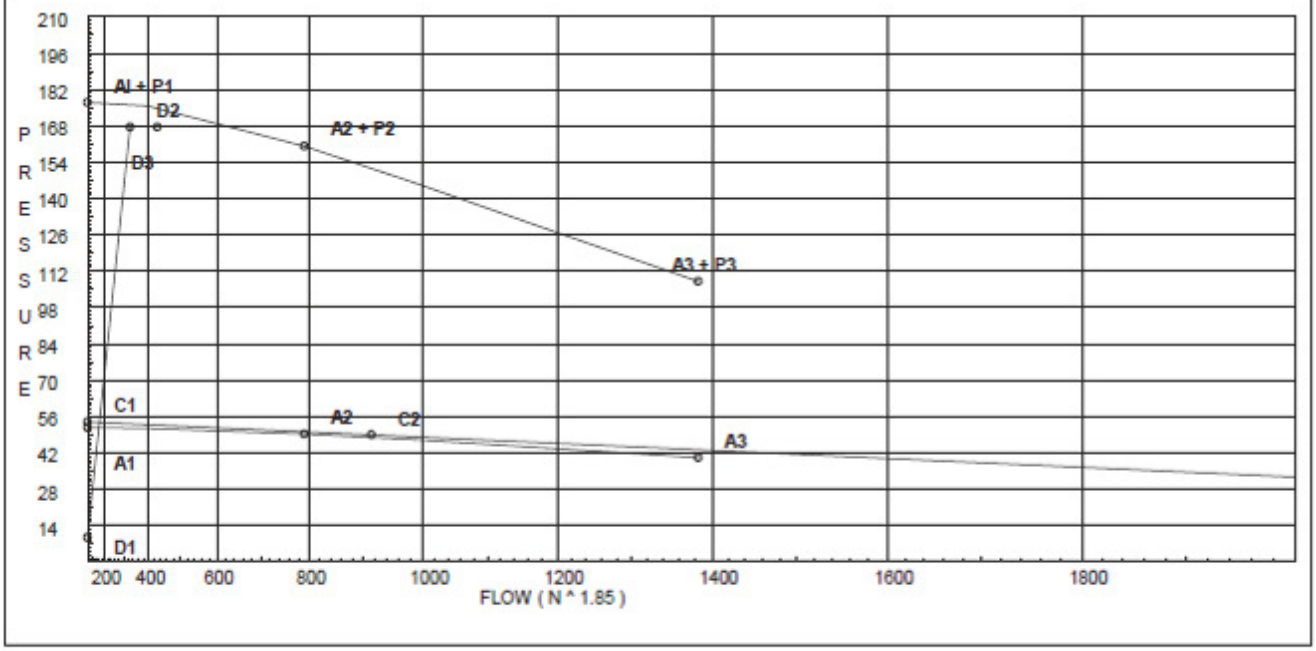
Page 2
Date 9-25-11

City Water Supply:
C1 - Static Pressure : 54
C2 - Residual Pressure: 49
C2 - Residual Flow : 914

City Water Adjusted to Pump Inlet
for Pf - Elev - Hose Flow
A1 - Adjusted Static: 51.872
A2 - Adj Resid : 49.314 @ 790.2
A3 - Adj Resid : 40.224 @ 1382.9

Pump Data:
P1 - Pump Churn Pressure : 125.2
P2 - Pump Rated Pressure : 110.9
P2 - Pump Rated Flow : 790.2
P3 - Pump Pressure @ Max Flow : 67.9
P3 - Pump Max Flow : 1382.9
City Residual Flow @ 0 = 3307.91
City Residual Flow @ 20 = 2576.03
City Water @ 150% of Pump = 43.24

Demand:
D1 - Elevation : 9.420
D2 - System Flow : 328.401
D2 - System Pressure : 167.582
Hose (Adj City) :
Hose (Demand) : 100
D3 - System Demand : 428.401
Safety Margin : 7.179



Computer Programs by Hydratec Inc. Route 111 Windham N.H. USA 03087

Figure h – Water Supply Curve of Remote Area with Highest Pressure Demand

Inspection, Testing, and Maintenance

NFPA 25 Chapter 5 covers the inspection, testing, and maintenance requirements for sprinkler systems. Table 3b summarizes the requirements of NFPA 25 Table 5.1.1.2 for the wet pipe sprinkler system present in this building. The requirements for control valves and fire department connections found in NFPA 25 Table 13.1.1.2 are also included. All chapters referenced are the applicable chapters from NFPA 25.

Table 3b – ITM Requirements

Component	Activity	Frequency	Reference
Control Valves	Inspection	Monthly (tamper switch)	13.3.2.1.1
	Testing	Annually (position and operation)	13.3.3.1
	Maintenance	Annually	13.3.4
Check Valves	Inspection	5 years (interior)	13.4.2.1
Pressure-Reducing Valves	Inspection	Quarterly (sprinkler systems)	13.5.1.1
	Testing	5 years (sprinkler systems)	13.5.1.2
Gauges	Inspection	Quarterly	5.2.4.1
	Testing	5 years	13.2.7.2
Hydraulic Nameplate	Inspection	Quarterly	5.2.6
Hanger / Seismic Bracing	Inspection	Annually	5.2.3
Pipe and Fittings	Inspection	Annually	5.2.2
Sprinklers (Fast Response)	Inspection	Annually	5.2.1
	Testing	At 20 years and every 10 years thereafter	5.3.1.1.1.3
Spare Sprinklers	Inspection	Annually	5.2.1.4
Information Sign	Inspection	Annually	5.2.8
Fire Department Connections	Inspection	Quarterly	13.7.1
Obstruction, internal inspection of piping	Inspection	5 years	14.2
Main Drains	Testing	Annually/Quarterly	13.2.5 13.2.5.1 13.3.3.4
Obstruction	Investigation	Per Chapter 14.3	14.3

Fire Alarm, Detection, and Communication Systems Analysis

This section covers the analysis of the fire alarm, detection, and communication systems requirements using NFPA 72 National Fire Alarm and Signaling Code 2013 and the International Building Code (IBC) 2012; the details of this analysis can be found in the sections listed below.

- Fire Alarm System
- Fire Detection System
- Inspection, Testing, and Maintenance

The NFPA Fire Protection Handbook, 20th edition is also referenced in this section concerning audible signaling.

Analysis Summary

The Center for Science has a fire alarm system with in-building EVACS and a smoke detection system. The alarm system covers all spaces in the building and consists of audible and visual alarm devices. Initiation devices for the alarm system include manual pull stations, waterflow alarm devices, and the smoke detection system. The smoke detection system relies on duct smoke detection for most spaces of the building and the sprinkler system, present throughout the building, will trigger a waterflow alarm independent of smoke detection. Batteries for secondary power ensure the system will continue to function for 24 hours in standby and 15 minutes in alarm if there is a power loss. A fire scenario was selected using the probabilistic approach by using statistical data on fires that occurred in similar buildings. Regular inspection, testing, and maintenance schedules should be followed to ensure the proper operation of the system.

The design of the fire detection, alarm, and communication systems in the Center for Science meets the NFPA 72 2013 requirements for a fire alarm system and smoke detection system.

Fire Alarm System

System Type

The fire alarm system installed in this building is a fire alarm with in-building fire emergency voice alarm communication system (EVACS). There is no mass notification system (MNS) present in this building.

Device Design Criteria

In a fire scenario, occupants must be able to hear or see alarm indicating devices over ambient audible or visual noise in a space. The audible/visual devices in this building are wall mounted speakers and strobes. The EVACS should be designed to alert all occupants during an emergency situation and inform them of necessary actions.

Audibility requirements found in NFPA 72 Section 18.4.3 state that the audible devices must have a sound level at least 15 dB above the average ambient sound level. Average ambient sound levels by occupancy are found in NFPA 72 Table A.18.4 and for this building, which is primarily Assembly and Business occupancies, it is 55 dBA. Using these two references, the minimum sound level for speakers in this building is 70 dBA.

Audible device location criteria is found in NFPA 72 Section 18.4.8 and states that wall-mounted appliances must be 90 inches or more above the finished floor and 6 inches or more below the finished ceiling. Mounting details for the speakers (without strobes) in this building are not shown in the plans.

Visible signaling requirements are found in NFPA 72 Section 18.5. Visible devices must have a minimum light output based on the room size per NFPA 72 Table 18.5.5.4.1(a) for wall-mounted devices.

Visual device location criteria is found in NFPA 72 Section 18.5.5 and states that wall-mounted appliances must not be less than 80 inches and not greater than 96 inches above the finished floor. This location criterion is properly shown in the details for the wall strobe and wall speaker strobe installations.

The EVACS requirements are found in NFPA 72 Section 24.4.2. The location of the paging microphone station at the FACU seems to be adequate for the requirements of NFPA 72 Section 24.4.2.5. No other information about the EVACS is given in the plans so it may or may not meet all NFPA 72 requirements for an EVACS.

System Devices

The fire alarm control panel (FACP) is located in the main electrical / transformer room on the first level (room 122) and there are fire alarm terminal cabinets (FATC) on floors 2, 3, 4, and 5 located in utility spaces (electrical or telecommunication rooms). The FACP manufacturer is Honeywell Notifier and its model number is NFS2-640.

The fire alarm system devices consist of 73 strobes, 13 speakers (7 of which are weather proof), 165 speaker/strobes, 29 trouble monitors (non-alarm points), and 7 waterflow alarm devices. There is at least one fire alarm device located in each space in this building. Voltage drop calculations for each circuit and secondary power (battery) calculations from the plans are shown in the appendix.

The EVACS has 1 voice alarm channel, 172 speakers, and 9 speaker circuits with amplification and sound-processing equipment located in the electrical rooms at the FAPS locations and the location of the paging microphone station is at the fire alarm control unit (FACU) in room 122.

For each strobe, the number of candelas in each space is known so NFPA 72 Table 18.5.5.4.1(a) can be used to determine the maximum room size. The square footage of each room can be found on the life safety plans in the appendix so the light output of each strobe can be verified based off of square footage assuming a square-shaped room, which most rooms in this building are nearly square in shape. All strobes meet or exceed the required light output for each room based on square footage.

For each speaker, the wattage is known, but the sound level must be determined from manufacturer specifications for the given model number. The speaker and speaker/strobe model numbers are SPW and SPWS, respectively. The 2 W speaker/strobe has a sound level of 85 dBA and the 1 W speaker/strobe has a sound level of 82 dBA. These sound levels are rated at 10 feet from the device, but it is important that the sound level be at least 70 dBA at every point in a room. Using the 6 dBA rule in the NFPA Fire Protection Handbook, both devices can meet 70 dBA at 40 feet. Since every point in each room is within 40 feet of an audible device, the audible signaling requirements are met for the speaker/strobes. The speakers have a higher dBA rating than the speaker/strobes so they also meet the audible signaling requirements.

Alarm Signals and Secondary Power

Signal disposition information for supervisory, trouble, and alarm conditions is found in the sequence of operations matrix on the plans (See FA-0). Each signal is indicated at the fire alarm control unit (FACU) during certain events. The signaling pathways in this building are class B, survivability level 1.

The signaling pathway system as described in the plans must meet the requirements of NFPA 72 Section 12.3.2 to be a class B system. The survivability of the system is level 1 as defined in NFPA 72 Section 12.4.2 because the building is fully protected by an automatic sprinkler system.

Secondary power supply requirements are found in NFPA 72 Section 10.6.7. The battery calculations on the plans meet the requirements of NFPA 72 in that the calculations satisfy NFPA 72 Sections 10.6.7.2.1(1) for a 20 percent safety factor to the calculated amp-hour rating and 10.6.7.2.1(2) for the system is capable of operating in standby for 24 hours and in alarm for 15 minutes.

Fire Detection System

System Type

The building has an automatic fire detection system using smoke detection and sprinklers, which essentially operate as heat detectors which trigger a waterflow alarm upon activation. Smoke detection is limited to ducts, which connect to every space as part of the HVAC system, the atrium, elevator lobbies, and some utility spaces, such as at the FACP. There are no heat detectors, flame detectors, or gas detectors as part of the detection system.

Design Criteria

NFPA 72 does not specify which spaces initiating devices are required in, but refers to other governing laws, codes, or standards in NFPA 72 Section 17.4.5 to give those requirements. Initiating device placement requirements for this building can be found in IBC Section 907.4.

A single smoke detector is required at the FACU per IBC Section 907.4.1. Manual pull station location requirements are in IBC Section 907.4.2.1 and must be placed within 5 feet of any exit and travel distance to any manual pull station must be less than 200 feet. The height requirement of the manual pull stations is in IBC Section 907.4.2.2 and must be at a height between 42 and 48 inches.

The requirements for smoke-sensing fire detectors are found in NFPA 72 Section 17.7. As with other initiating devices, NFPA 72 refers to other governing laws, codes, or standards for the required placement of smoke detectors in NFPA 72 Section 17.7.1.6. Spot-type smoke detector, duct smoke detector, and beam smoke detector requirements are given in NFPA 72 Sections 17.7.3.2, 17.7.5, and 17.7.3.7 respectively.

Spot-type smoke detectors are only installed in certain areas so the spacing requirements in NFPA 72 do not apply. The installation location requirement of NFPA 72 Section 17.7.3.2.1 states smoke detectors must be installed on ceilings or 12 inches from the ceiling if installed on a sidewall. Duct smoke detectors for the control of smoke spread have requirements listed in NFPA 72 Section 17.7.5. Requirements for beam smoke detectors are listed in NFPA 72 Section 17.7.3.7.

System Devices

The initiating devices for the detection system for this building consist of 31 manual pull stations, 18 photoelectric smoke detectors, 62 photoelectric duct smoke detectors, and beam smoke detectors (23 transmitters and 15 receivers).

The manual pull stations are located within 5 feet of each exit door in this building, including the exit doors for each stairway, and at stairway 2 on levels 3 through 6. Travel distances to each exit are less than 200 feet so manual pull stations need only be placed at exits, no intermediate placements are required. Manual pull stations are at a height of 48 inches from the floor. The manual pull stations present in this building meet the requirements of the IBC.

Smoke detectors are not evenly spaced throughout this building. Photoelectric spot-type smoke detectors are located on the ceiling at each elevator lobby, at the FACP in room 122, and in some mechanical/electrical utility spaces. Photoelectric duct smoke detectors are installed within HVAC ducts and their placements correlate with the HVAC system to detect smoke from any duct and close dampers to prevent the spread of smoke.

Beam smoke detectors are located in the atrium on multiple floors; from the placements of beam transmitters and receivers, the beams do not appear to go between floors. No mirrors are used for the beams and maximum beam lengths are not exceeded.

Inspection, Testing, and Maintenance

NFPA 72 Chapter 14 covers the inspection, testing, and maintenance requirements for fire alarm systems. The visual inspection requirements are covered in NFPA 72 Section 14.3 and summarized in Table 4a on the next page, which is based on NFPA 72 Table 14.3.1. Sections referenced are the applicable sections from NFPA 72.

Testing requirements are found in NFPA 72 Section 14.4. Testing methods are located in NFPA 72 Table 14.4.3.2, which indicates the frequency and methods for testing all equipment and devices. NFPA 72 Table 14.4.3.2 is too lengthy to be summarized here.

Maintenance requirements are located in NFPA 72 Section 14.5 and are much more general than the inspection and testing requirements. NFPA 72 Sections 14.5.1 through 14.5.3 state that maintenance should be in accordance with the manufacturer's published instructions and the frequency of maintenance and cleaning of system equipment depends on the type of equipment and the local ambient conditions.

Table 4a – Visual Inspection Summary

Component	Frequency	Method	Reference
All equipment	Annually	Ensure there are no changes that affect equipment performance. Inspect for building modifications, occupancy changes, changes in environmental conditions, device location, physical obstructions, device orientation, physical damage, and degree of cleanliness.	14.3.4
Control Equipment		Verify system normal condition	
Fuses	Annually		
Interface equipment	Annually		
Lamps and LEDs	Annually		
Primary (main) power supply	Annually		
Trouble signals	Semiannually		
Supervising station alarm systems - transmitters		Verify location, physical condition, and a system normal condition	
Digital alarm communicator transmitter (DACT)	Annually		
In-building fire emergency voice / alarm communications equipment	Semiannually	Verify location and condition	
Batteries		Inspect for corrosion or leakage. Verify tightness of connections. Verify marking of the month/year of manufacture.	10.6.10
Sealed lead-acid (SLA)	Semiannually		
Remote annunciators	Semiannually	Verify location and condition	
Notification appliance circuit power extenders	Annually	Verify proper fuse ratings, if any. Verify that lamps and LEDs indicate normal operating status of the equipment.	10.6
Initiating devices			
Duct detectors	Semiannually	Verify detector is rigidly mounted. Confirm that no penetrations in a return air duct exist in the vicinity of the detector. Confirm the detector is installed so as to sample the airstream at the proper location in the duct.	17.7.5.5
Manual fire alarm boxes	Semiannually		
Smoke detectors	Semiannually	Verify beam path is unobstructed	
Projected beam smoke detectors	Semiannually		
Supervisory signal devices	Quarterly		
Waterflow devices	Quarterly		
Notification appliances			
Audible appliances	Semiannually		
Visible appliances	Semiannually	Verify that the candela rating marking agrees with the approved drawings	18.5.5
Supervising station alarm systems - receivers			
Signal receipt	Daily	Verify receipt of signal	
Receivers	Annually	Verify location and normal condition	

Performance Based Analysis

The following sections of this report cover the performance based analysis. These sections analyze a typical fire scenario and cover the engineering analysis of the atrium. Each section summarizes the results and assumptions of the performance based analysis. The performance based sections are listed below.

- Typical Fire Scenario Selection
- Atrium Analysis

These performance based sections use a combination of current codes and standards for the design analysis, which are listed below.

- International Building Code (IBC) 2012
- NFPA 101 Life Safety Code Handbook (LSC) 2012
- NFPA 72 National Fire Alarm and Signaling Code 2013
- NFPA Fire Protection Handbook, 20th edition
- SFPE Handbook of Fire Protection Engineering, 4th edition

Typical Fire Scenario Selection

Design Methodology

Design methods for establishing fire scenarios are found in NFPA 72 Annex B. NFPA 72 Section B.2.3.2.1.1 gives some examples of analysis techniques used to identify fire scenarios and classifies fire scenarios as either probabilistic or deterministic. Probabilistic approaches can be based on fire statistics, past history, hazard/failure analysis, etc. and deterministic approaches use analysis or engineering judgment based on chemistry, physics, or correlations based on experimental data.

The probabilistic approach is used here to determine likely fire scenarios based on statistical data of fires in buildings of similar use. For this statistical data, the NFPA report "Structure Fire in Educational Properties" (Richard Campbell, 2013) concerning structure fires in college classroom buildings and adult education centers. The data uses an estimated 700 fires involving college classroom buildings and adult education centers per year in 2007-2011.

Fire Risk

Using Table 4C in the NFPA report, Table 5a was generated and shows the leading causes of fire in college classroom buildings and adult education centers, their contribution to the total percentage of fires and damage, and a risk factor, which is the product of those percentages.

Table 5a – Leading Fire Causes in College Classroom Buildings and Risk Factors

Cause	Fires (%)	Damage (%)	Risk Factor
Cooking equipment	51	2	102
Intentional	10	10	100
Heating equipment	8	8	64
Smoking materials	5	0	0
Electrical distribution and lighting equipment	5	18	90

The risk factor is an attempt to quantify the risk of a fire, which is explained in NFPA 72 B.2.3.1.1.2 by multiplying the probability of occurrence by the consequences (damages) of a fire. Using this simple method, the risk factor can be used to select fire scenarios, where higher risk factors indicate a higher risk fire that should be considered more seriously in the analysis; no fire scenario should necessarily be ruled out by this risk factor, but more attention should be given to higher risk fire scenarios.

A fire could be caused by any of the listed causes or one not included on the chart, but, from the risk factor, the fire scenarios that should be given greater attention are cooking, intentional, and electrical fires. Although a fire caused by heating equipment or smoking materials could occur, their risk factors are lower; further thought about these fire causes can support not selecting them as fire scenarios.

Heating equipment, such as a space heater, is unlikely to be present considering that San Luis Obispo does not get that cold in the winter. There is a risk of smoking materials lighting a fire anywhere in nearly any occupancy, but the statistics indicate that property damage is not high in comparison to the other fire causes, which means these fires do not tend to spread far before being extinguished.

Location of a fire is also important in determining fire scenarios. Using Table 8C in the NFPA report, Table 5b was generated and shows the areas of origin of non-confined fires in college classroom buildings and adult education centers for areas present in this building; their contribution to the total percentage of fires, injuries, and damage; and a risk factor, which is the product of fires percentage and the greater of injuries or damage percentage.

Table 5b – Fire Area of Origin in College Classroom Buildings and Risk Factors

Area of Origin	Fires (%)	Injuries (%)	Damage (%)	Risk Factor
Cooking area	2	16	2	32
Bathroom	2	0	1	2
Laboratory	3	44	18	54
Hallway or corridor	1	0	0	0
Office	2	0	8	16
Duct for HVAC	1	0	0	0
Machinery room	2	0	1	2
Small assembly area (< 100 persons)	1	0	1	1
Terrace	0	0	0	0

The risk factor includes injuries, if applicable, as a way to further quantify the risk of a fire. Although the injuries in the statistics may only be caused by the ignition of a fire, they may also indicate that a fire is more severe, spreading quickly before occupants can escape.

A fire can occur in any area of the building, but the areas at the greatest risk of having a fire that may cause more harm or damage than in other areas are laboratories, cooking areas, and offices.

Fire Scenario Selection

Combining the likely causes of fires with the likely areas of origin of fires considerably reduces the number of choices for fire scenarios. However, a selection of a fire scenario still must be made. Considering the causes and locations of higher risk fires, two different reasonable fire scenarios that have a high fire risk are a cooking appliance fire in a cooking area and a laboratory equipment fire.

Although this building does not have a kitchen or other designated cooking area, it is possible that a study room, club room, or faculty office may have a small cooking appliance, such as a microwave, toaster, or coffee maker. This building has labs with various types of laboratory equipment, such as oscilloscopes and spectrometers.

Unfortunately, there is no test data for microwaves or other small kitchen appliances nor is there any fire test data for laboratory equipment. The most similar appliance found, for which test data exists, was a television; while not exactly like a microwave or an oscilloscope, it has electronic components encased in a plastic shell.

For the data, the study titled "Burning of Electrical Household Appliances: An Experimental Study" (J. Hietaniemi, J. Mangs, and T. Hakkarainen, 2001) was used. The study generated curves for each of 3 television sets, TV3 was the smallest so its data is used. Assuming the fire is a t-squared curve and using Excel to find a curve to fit the data for the TV3 curve in the study, the fire growth time to reach 1055 kW, defined in NFPA 72 Section B.2.3.2.3.2, is about 3.2 minutes (this time assumes the fire becomes a t-squared fire at 2.5 minutes into the test). TV3 never reached a heat release rate (HRR) of 1055 kW, but it is assumed that the fire would spread to other nearby devices or other objects, continuing to grow until being suppressed.

Using the value of fire growth time with the approximate ceiling height of 10 feet 6 inches and assuming the sprinklers act as heat detectors, since there are no smoke detectors in the labs, spaced at 10 feet with a calculated RTI of 266 $m^{1/2}s^{1/2}$ based on their activation temperature of 155 °F (68.3 °C), the fire will be detected when the waterflow alarm is triggered by sprinkler activation. Using the DETACT model, the calculated time of detection is about 210 seconds and the fire will be about 1300 kW at detection. DETACT results are shown on Table 5c and Figure i on the next page. The DETACT model shows that the gas temperature in the space is 151 °C, which is not approaching flashover temperatures, when the fire is detected so the fire protection in this space is acceptable for this fire scenario.

Table 5c – DETACT Equipment Fire Detection Time

Calculation time (s)	HRR	Gas temp	Det. temp
0	0	20	20
30	26	30	20
60	106	45	22
90	238	62	26
120	423	82	32
150	660	104	41
180	951	127	52
210	**1294**	**151**	**66**
240	1690	176	82
270	2139	203	101
300	2641	231	122
330	3196	259	145
360	3803	288	169
390	4464	319	196
420	5177	350	224
450	5943	381	253
480	6762	414	283

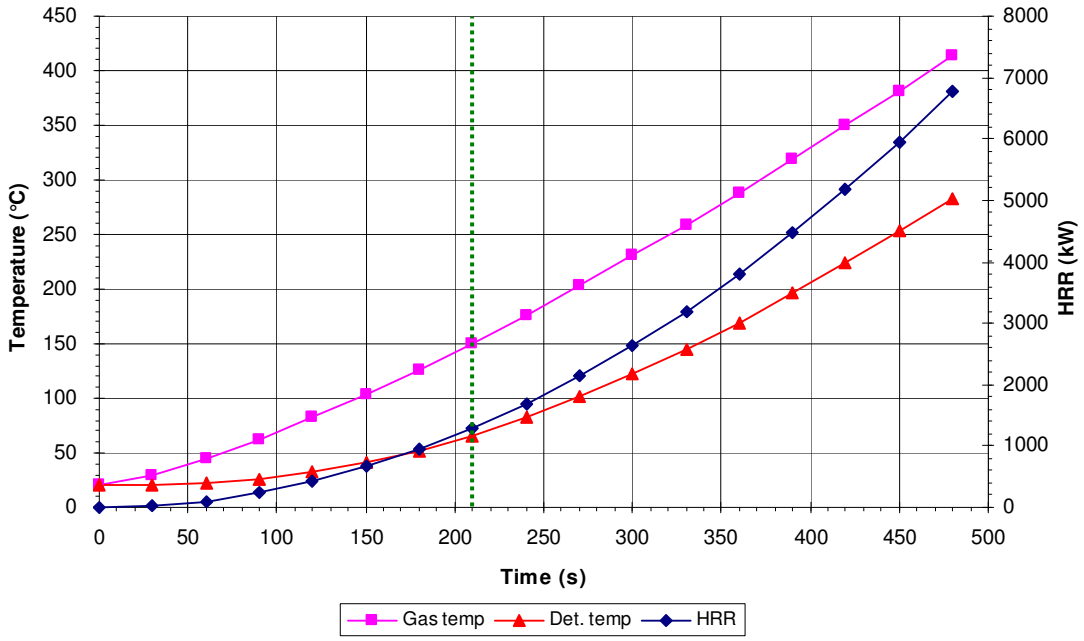


Figure i – DETACT Equipment Fire Room Conditions at Detection

Another important fire scenario for the laboratory, although it is not reflected in the statistical data, is a chemical fire that may be caused intentionally or accidentally from an experiment or demonstration gone awry. There are numerous flammable chemicals that could possibly be in the laboratory and many different fuel configurations so the fire is modeled generally as a t-squared ultrafast developing fire. No maximum is placed on the HRR because the fuel configuration is unknown and would only be assumed to be limited when the sprinklers activate.

Using the DETACT model, with the same spatial parameters as the laboratory equipment fire, the calculated time of detection for the chemical fire is about 115 seconds and the fire will be about 2500 kW at detection. DETACT results are shown on Table 5d and Figure j on the next page. The DETACT model shows that the gas temperature in the space is 222 °C, which is not approaching flashover temperatures, when the fire is detected so the fire protection in this space is acceptable for this fire scenario.

Table 5d – DETACT Chemical Fire Detection Time

Calculation time (s)	HRR	Gas temp	Det. temp
0	0	20	20.0
10	19	28	20.1
20	75	40	20.6
30	169	54	21.6
40	300	69	23.4
50	469	86	26.0
60	675	105	29.6
70	919	124	34.2
80	1200	144	39.8
90	1519	166	46.6
100	1876	188	54.5
110	2269	210	63.6
115	**2480**	**222**	**68.5**
125	2931	246	79.4
135	3418	270	91.3
145	3943	295	104.5
155	4506	321	118.8

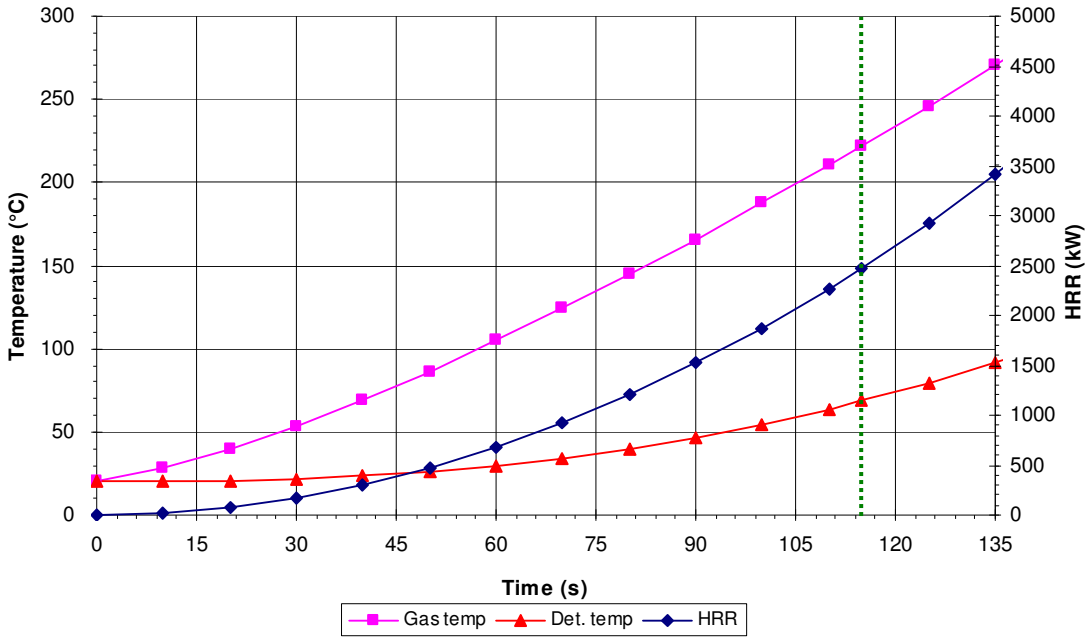


Figure j – DETACT Chemical Fire Room Conditions at Detection

Atrium Analysis

An engineering analysis of the atrium must be performed to meet LSC Section 8.6.7. The goal of this analysis is to show that a tenable environment is maintained for the duration required by the LSC. To accomplish this goal, the Consolidated Model of Fire and Smoke Transport (CFAST) and Fire Dynamics Simulator (FDS) were used to model a fire that impacts the tenability of the atrium. The details of the atrium analysis are covered in the sections listed below.

- Tenability
- CFAST
- FDS

Analysis Summary

The tenability criterion for the atrium is to keep the smoke layer 6 feet above the floor. The atrium is naturally ventilated from roof vents and exterior doors. There are two likely paths occupants can take to exit the building with a required safe egress time for any occupant between 76 and 206 seconds. Two fire scenarios were modeled in CFAST and one in FDS. A t-squared ultrafast 3500 kW office fire was modeled using CFAST and a t-squared medium 700 kW chair fire in the atrium was modeled using both models. A fire in an adjacent office that spills smoke into the atrium will cause a tenability failure earliest at 180 seconds, but occupants of all floors have sufficient available time to safely egress because the EVACS can be used to inform certain occupants to take alternative paths. The chair fire in the atrium is not well modeled in CFAST because a two-zone model does not adequately account for the physics of connected compartments that form a single large open space. The FDS model of the chair fire in the atrium should be considered more accurate than the CFAST model for this chair fire. The FDS model for the chair fire in the atrium shows this fire scenario meets tenability requirements. FDS could give a more detailed analysis of the office fire, but the results from CFAST are adequate for the atrium analysis.

Based on the results of the CFAST and FDS models, the atrium meets the tenability requirements of LSC 2012.

Tenability

Smoke Control

The most general tenability criterion is stated in LSC Section 5.2.2 that any occupant not intimate with ignition shall not be exposed to untenable conditions. For the atrium, the primary tenability concern is to keep the smoke layer interface at least 6 feet above the floor long enough to allow occupants to egress.

The smoke control system in the atrium is a passive natural ventilation system. There are four 120"x60" roof vents and, when a fire is detected, interior hallway doors to the atrium close and the exterior entrance/exit doors to the atrium open.

Egress Time

Occupants must not be exposed to untenable conditions so sufficient time must be allowed for them to exit the building. The available safe egress time (ASET) is the time occupants have before they are likely exposed to untenable conditions and this time must exceed the required safe egress time (RSET), which is how long occupants take to exit the building. ASET is determined in the fire models and RSET can be calculated as the sum of the pre-movement (delay) time and travel time. RSET varies based on where the occupant is in the building and to which exit the occupant travels. A margin of safety should also be applied when comparing ASET and RSET because of the uncertainty in the models and in calculating how people are likely to react in an emergency scenario. Based on values found in the LSC, the margin of safety is taken to be 1.5 in this report.

Using the method in the egress section of this repot for calculating total evacuation time, RSET can be calculated. In this calculation, the number of occupants should be limited to only those in and adjacent to the atrium by using the EVACS to route other building occupants away from stair 3 in the atrium. Queuing is assumed to not occur because of the limited number of occupants. The evacuation time for the offices can be determined if the path taken by occupants is known. For the offices above level 2 in the atrium, there are two primary paths occupants could take. Path 1 is from the offices to stair 3, to level 2, then to the exit in the atrium. Path 2 is from the offices to the East or West wings of the building through the hallway doors in the atrium, through which occupants are assumed to have exited the building for the purpose of calculating RSET. The RSET calculations for paths 1 and 2 are summarized in Tables 6a and 6b, respectively, on the next page and do not include the safety factor.

Table 6a – Path 1 Evacuation Time

RSET Action		Time (s)
Delay		36
Travel	to exit stair 3	40
	from level 6 to level G2	114
	to exit door	16
	Total	**206**

Table 6b – Path 2 Evacuation Time

RSET Action		Time (s)
Delay		36
Travel to atrium exit door		40
	Total	**76**

CFAST

Model Details

CFAST is a two-zone model that assumes a hot upper gas layer and a cooler lower gas layer in every compartment; the hot upper gas layer is assumed to be the smoke layer. It is not possible to model complex geometries or ventilation conditions in CFAST.

The atrium was modeled in CFAST as 25 individual compartments connected by horizontal and vertical vents. Each level is defined with a single large 12 foot tall rectangular compartment of equal area to that level of the atrium, two smaller 9.5 foot tall compartments to represent the East and West hallways that connect the atrium to the rest of the building, and two 4 foot tall compartments to represent the North and South vertical openings that define the atrium.

Smoke detectors were placed at approximate locations in the atrium of each duct on levels 2 and 3 and in the vertical openings to represent beam smoke detectors, which CFAST. The smoke-temperature correlation is used in the model as the smoke detection basis where a 13 °C rise in temperature activates the detector.

The atrium is naturally ventilated with interior doors to the hallways initially open and exterior doors on level 2 initially closed. When the fire is detected, the interior doors close and exterior doors open, the ducts to the atrium also close.

Two fire scenarios were modeled in CFAST: an office fire on level 6 with the door forced open that spills smoke into the atrium and an upholstered chair fire on the level 2 (ground level) of the atrium.

The office is modeled as another compartment and has a single sprinkler and a duct that is monitored by a duct detector. The fire selected for the office is a 3-panel workstation, which is represented by a t-squared ultrafast developing fire with a maximum heat release rate (HRR) of 3500 kW. The fire is placed on the far wall away from the sprinkler and duct.

The furniture present in the atrium consists of chairs, couches, and tables. From pictures of the space, the chairs and couches appear to have minimal upholstery and the tables appear to be non-combustible. From fire test data similar to the kind of chairs present, the fire selected is a t-squared medium growth rate fire with a maximum HRR of 700 kW. It is assumed that the couches have similar flammability characteristics to the chairs. The fire is placed at a wall where furniture is seem in pictures of the atrium, equal distance from sprinklers, and a significant distance from smoke detectors.

Results

The office fire was detected after 30 seconds by a duct smoke detector. Figure k on the next page shows a Smokeview rendering of the model at the time of detection. Table 7a below summarizes the results of the office fire simulation at each level and differentiates RSET between paths 1 and 2.

Table 7a – Office Fire Smoke Layer & Tenability

Level	Smoke Layer Height at Detection (ft)	Time at Tenability Failure (s)	ASET (s)	RSET (1) (s)	ASET / RSET (1)	RSET (2) (s)	ASET / RSET (2)
G2	11.3	260	230	52	4.42	52	4.42
3	10.3	180	150	121	1.90	76	1.97
4	10.6	320	290	149	1.54	76	3.82
5	10.5	370	340	178	**1.29**	76	4.47
6	10.5	600+	570+	206	**1.12**	76	7.5+

ASET exceeds RSET for all levels so the tenability criterion is met for this office fire simulation. The safety factor for each level should be greater than 1.5, but it is not for levels 5 and 6 when the occupants use path 1. The EVACS should be used to tell the occupants to use path 2 by informing the occupants on levels 5 and 6 to exit the atrium to the East or West wings of the building and then proceed to an exit.

The chair fire was detected after 130 seconds by a beam smoke detector. Figure l on the next page shows a Smokeview rendering of the model at the time of detection. Table 7b below summarizes the results of the chair fire simulation at each level and differentiates RSET between paths 1 and 2.

Table 7b – Atrium Chair Fire Smoke Layer & Tenability

Level	Smoke Layer Height at Detection (ft)	Time at Tenability Failure (s)	ASET (s)	RSET (1) (s)	ASET / RSET (1)	RSET (2) (s)	ASET / RSET (2)
G2	7.1	600+	470+	52	9.0+	52	9.0+
3	**2.3**	90	**n/a**	**121**	**< 1.0**	76	**< 1.0**
4	6.2	140	10	**149**	**< 1.0**	76	**< 1.0**
5	7.2	200	70	**178**	**< 1.0**	76	**< 1.0**
6	7.5	250	120	**206**	**< 1.0**	76	1.58

The tenability criterion is not met for either path on levels 3 through 5 and failures are noted in red text. Varying the chair fire in CFAST by changing its maximum HRR and growth rate did not solve the tenability failure. The result of this model is that the furniture should not be allowed because it presents a smoke hazard to the entire atrium that cannot be mitigated without changing the space. However, this same fire is modeled in FDS for confirmation, but a different result was achieved, which indicates this fire scenario is not well modeled in a two-zone model like CFAST.

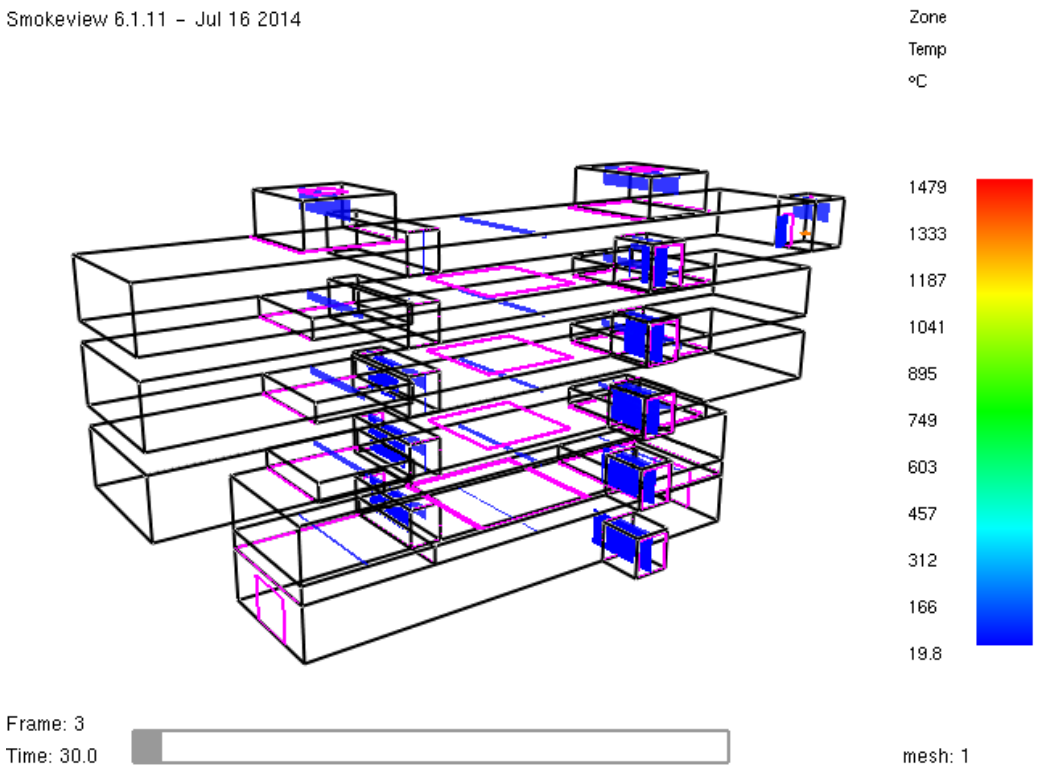


Figure k – CFAST Office Fire Smoke Layer Height at Detection

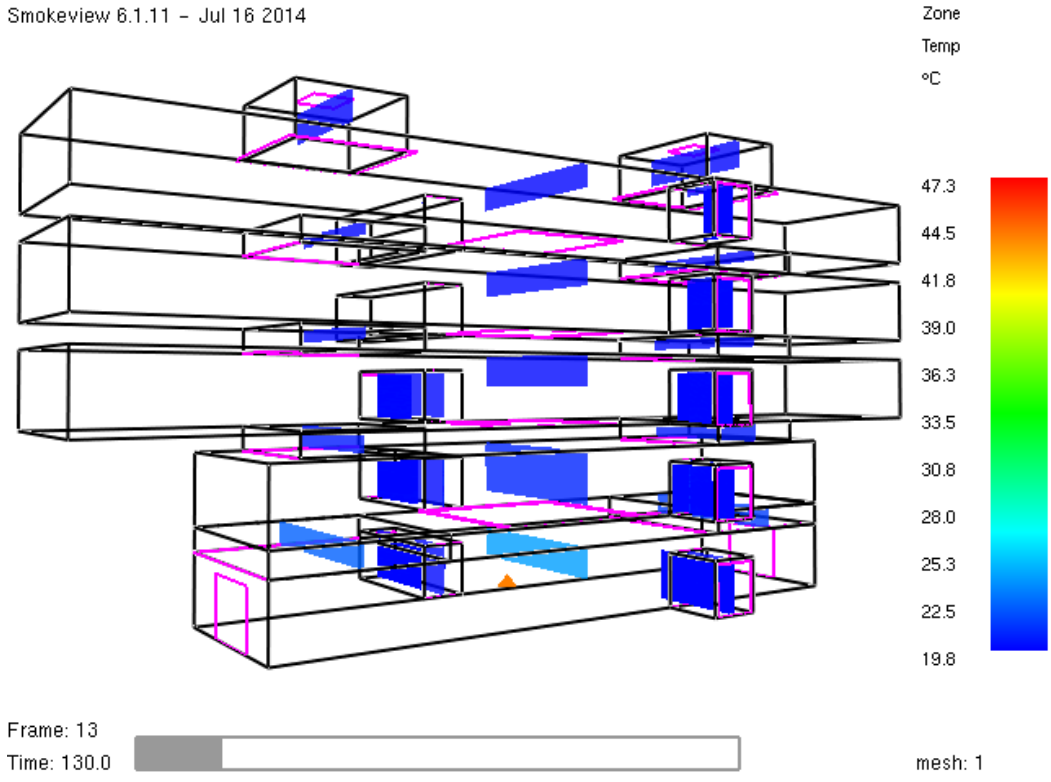


Figure l – CFAST Atrium Chair Fire Smoke Layer Height at Detection

FDS

Model Details

Unlike CFAST, FDS is not a two-zone model, it is a computational fluid dynamic model (CFD). In general, FDS should give a fairly realistic assessment of the conditions of a space during a fire, given the proper inputs. Due to the complexity of the atrium, a CFD model would be expected to give a better result than a two-zone model.

The atrium was modeled in FDS similarly to CFAST by using 25 rectangular meshes. Wall angles were not input to the model because angled walls are not expected to significantly affect the smoke layer height. A coarse mesh resolution of 0.3 m (about 1 foot) was chosen to balance computational time and accuracy for the large open space of the atrium; with this mesh resolution, there are about 260,000 cells in the model

Smoke detectors were placed at the location of the elevator on all levels and at the vents, to represent duct smoke detectors, on levels 2 and 3. Beam smoke detectors were placed at the locations indicated on the plans. Two sprinklers are placed equal distance from the fire source.

The atrium is naturally ventilated with interior doors to the hallways initially open and exterior doors on level 2 initially closed. When any detection device activates, the interior doors close and exterior doors open, the ducts to the atrium also close.

The same chair fire from the CFAST simulation is modeled in FDS as a t-squared ultrafast growth rate 700 kW maximum HRR. Figure m below shows the actual heat release rate curve FDS generated for this fire.

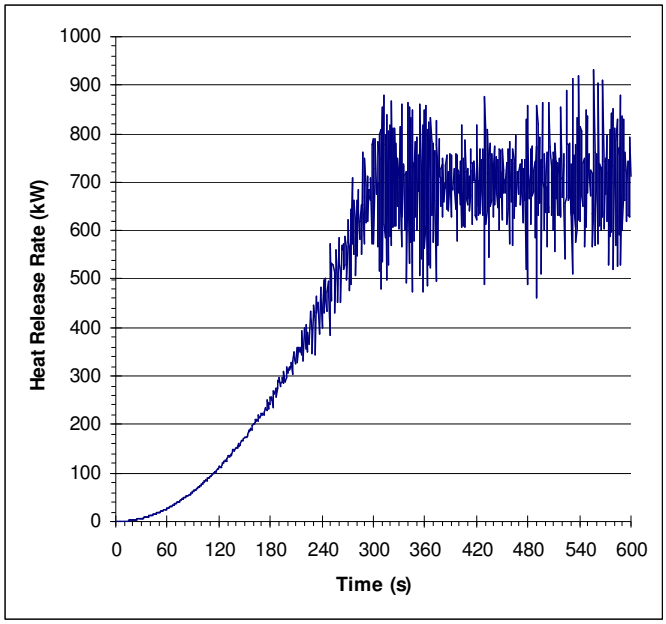


Figure m – FDS t-squared Ultrafast 700 kW HRR Curve

Results

The fire was detected after 85 seconds by the smoke detector by the elevator on level 2. Figure n at the bottom of this page shows a Smokeview rendering at the time of detection. Table 8a below summarizes the results of the simulation for levels 2 and 3; levels 4 through 6 are not included because a smoke layer does not form on these levels.

Table 8a – Atrium Chair Fire Smoke Layer & Tenability

Level	Smoke Layer Height at Detection (ft)	Time at Tenability Failure (s)	ASET (s)	RSET (1) (s)	ASET / RSET (1)	RSET (2) (s)	ASET / RSET (2)
G2	10.5	n/a	-	52	-	52	-
3	n/a	293	208	121	2.74	76	2.74

ASET exceeds RSET for all levels so the tenability criterion is met for this chair fire simulation and the safety factor is greater than 1.5 for both paths for all levels. A smoke layer forms on level 2, but does not fail the tenability criterion for the duration of the simulation. A smoke layer forms on level 3 sometime after detection and the smoke layer on level 3 eventually descends below 6 feet from the floor. Figure o on the next page shows a Smokeview rendering at the time of tenability failure, note that multiple detection devices have activated prior to tenability failure.

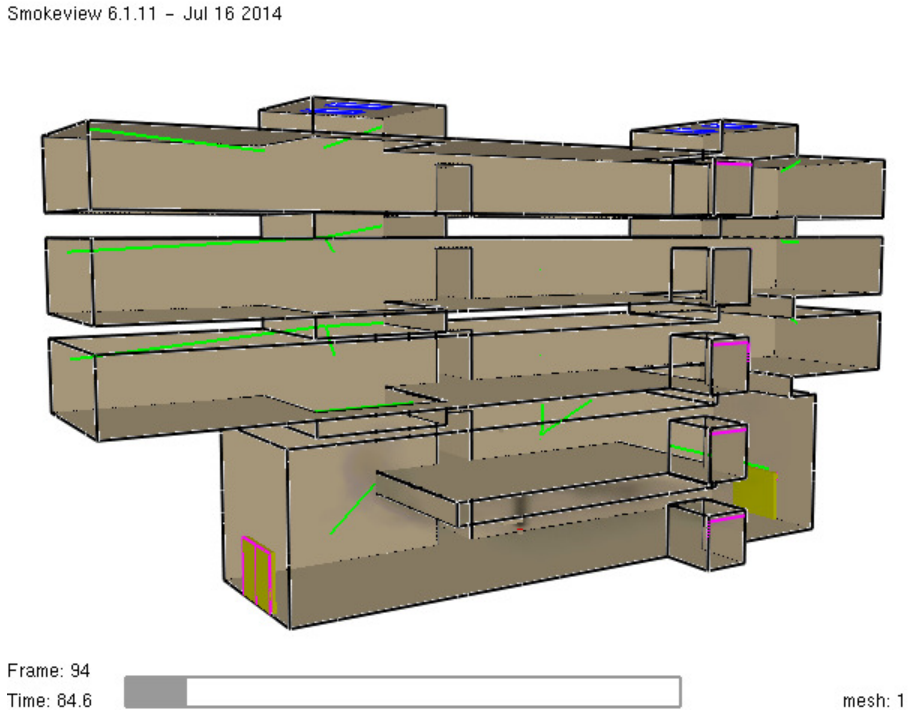


Figure n – FDS Atrium Chair Fire 3D Smoke at Detection

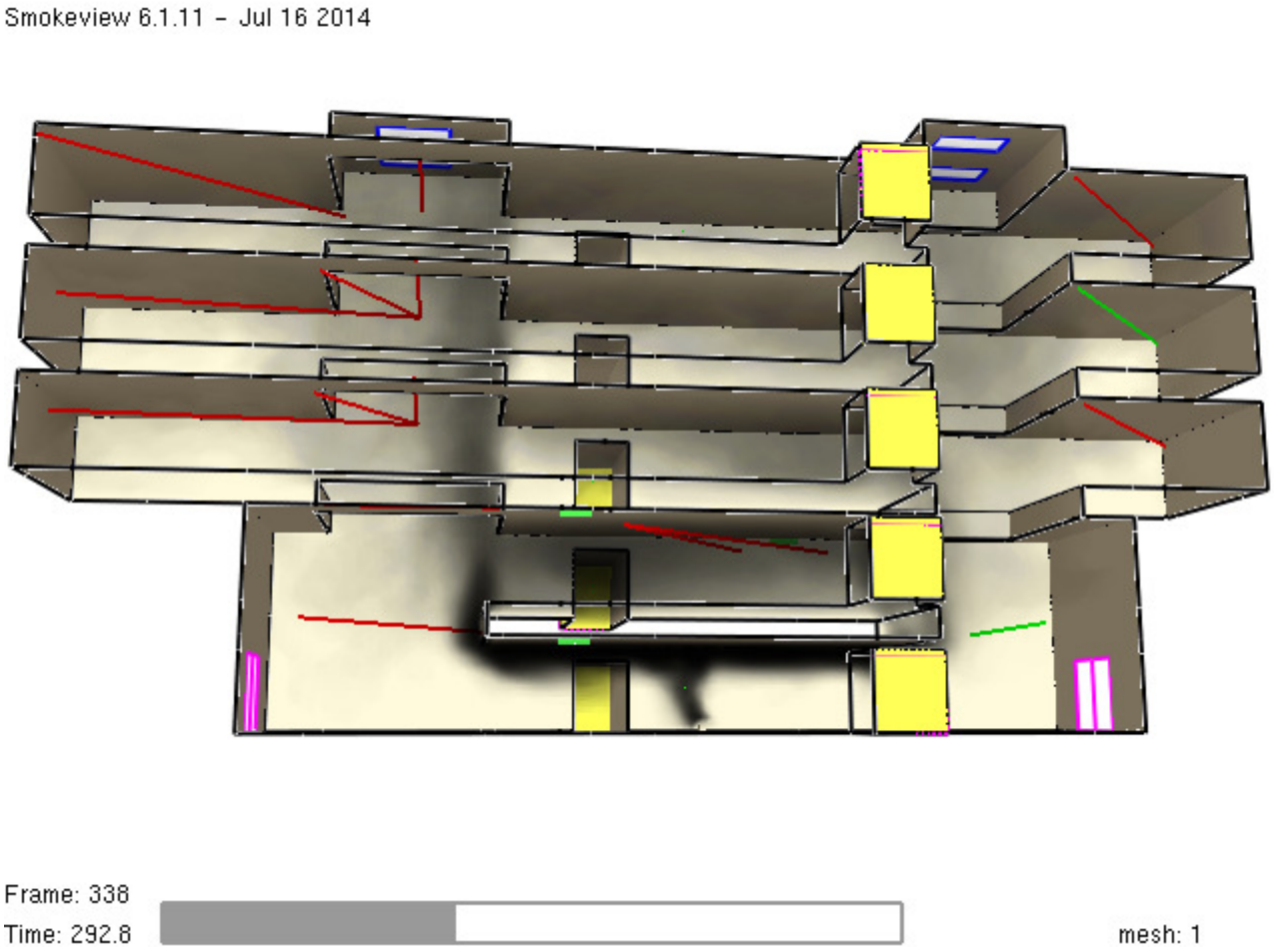


Figure o – FDS Atrium Chair Fire 3D Smoke at Tenability Failure

Conclusions and Recommendations

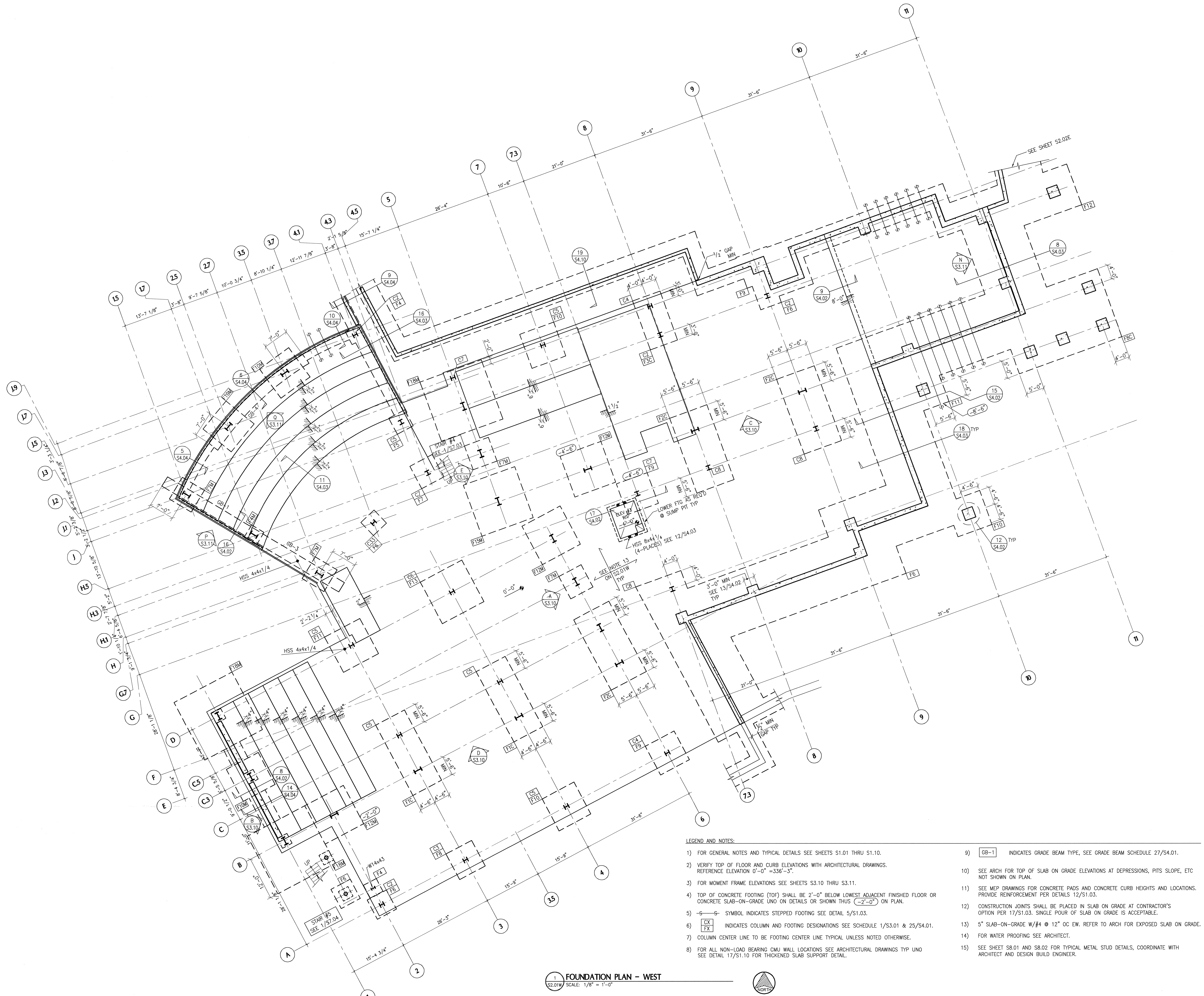
The analysis of the Center for Science in this report shows that the building meets prescriptive code requirements and meets the performance based analysis of the atrium using CFAST and FDS for tenability based on smoke layer height in the atrium. The prescriptive requirements met are for structural fire protection, egress, the fire suppression system, and the fire alarm, detection, and communication systems. The performance based analysis is met for a typical fire scenario using the DETACT model and the atrium by using CFAST and FDS. The DETACT model shows that a typical occupancy fire will not reach flashover before the sprinkler system activates to control the fire. The fire models of the atrium in CFAST and FDS show that the tenability criterion is met, which is to keep the smoke layer height 6 feet above the floor long enough to allow occupants to safely egress, where safe egress is based on ASET and RSET.

It is the recommendation of this report that the fuel load in the atrium be kept to a minimum, allowing only for chairs and other furniture with no more than a 700 kW maximum HRR that would grow no faster than a t-squared medium fire, based on the results of the fire models in this report. This recommendation can be accomplished by using furniture that exhibits similar flammability characteristics to the design fire used in the fire models; this furniture should have minimal cushioning and use traditional materials in its construction, such as cotton instead of foam. If furniture with a higher maximum HRR or a faster growth rate is to be placed in the atrium, new fire models should be run to ensure that tenability is maintained long enough to allow occupants to safely egress.

Appendix

Selected portions of the building plans and other design plans are attached to the end of this report. The order of attached documents is as follows:

- Foundation and Framing Plans
- Typical Details (Structural)
- Life Safety Plans
- Hydraulic Calculations and Sprinkler Shop Drawings
- As-Built Fire Alarm Plans



1 / S2.01W — FOUNDATION PLAN - WEST
SCALE: 1/8" = 1'-0"

LEGEND AND NOTES:

1) FOR GENERAL NOTES AND TYPICAL DETAILS SEE SHEETS S1.01 THRU S1.10.
2) VERIFY TOP OF FLOOR AND CURB ELEVATIONS WITH ARCHITECTURAL DRAWINGS. REFERENCE ELEVATION 0'-0" =336'-3".
3) FOR MOMENT FRAME ELEVATIONS SEE SHEETS S3.10 THRU S3.11.
4) TOP OF CONCRETE FOOTING (TOF) SHALL BE 2'-0" BELOW LOWEST ADJACENT FINISHED FLOOR OR CONCRETE SLAB-ON-GRADE UNO ON DETAILS OR SHOWN THUS (-2'-0") ON PLAN.
5) -S—S- SYMBOL INDICATES STEPPED FOOTING SEE DETAIL 5/S1.03.
6) CX / FX INDICATES COLUMN AND FOOTING DESIGNATIONS SEE SCHEDULE 1/S3.01 & 25/S4.01.
7) COLUMN CENTER LINE TO BE FOOTING CENTER LINE TYPICAL UNLESS NOTED OTHERWISE.
8) FOR ALL NON-LOAD BEARING CMU WALL LOCATIONS SEE ARCHITECTURAL DRAWINGS TYP UNO SEE DETAIL 17/S1.10 FOR THICKENED SLAB SUPPORT DETAIL.
9) GB-1 INDICATES GRADE BEAM TYPE, SEE GRADE BEAM SCHEDULE 27/S4.01.
10) SEE ARCH FOR TOP OF SLAB ON GRADE ELEVATIONS AT DEPRESSIONS, PITS SLOPE, ETC NOT SHOWN ON PLAN.
11) SEE MEP DRAWINGS FOR CONCRETE PADS AND CONCRETE CURB HEIGHTS AND LOCATIONS. PROVIDE REINFORCEMENT PER DETAILS 12/S1.03.
12) CONSTRUCTION JOINTS SHALL BE PLACED IN SLAB ON GRADE AT CONTRACTOR'S OPTION PER 17/S1.03. SINGLE POUR OF SLAB ON GRADE IS ACCEPTABLE.
13) 5" SLAB-ON-GRADE W/#4 @ 12" OC EW. REFER TO ARCH FOR EXPOSED SLAB ON GRADE.
14) FOR WATER PROOFING SEE ARCHITECT.
15) SEE SHEET S8.01 AND S8.02 FOR TYPICAL METAL STUD DETAILS, COORDINATE WITH ARCHITECT AND DESIGN BUILD ENGINEER.

NORTH

ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ___ FLS ___ SS ___
DATE SEP 0 3 2009

Revisions

BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title

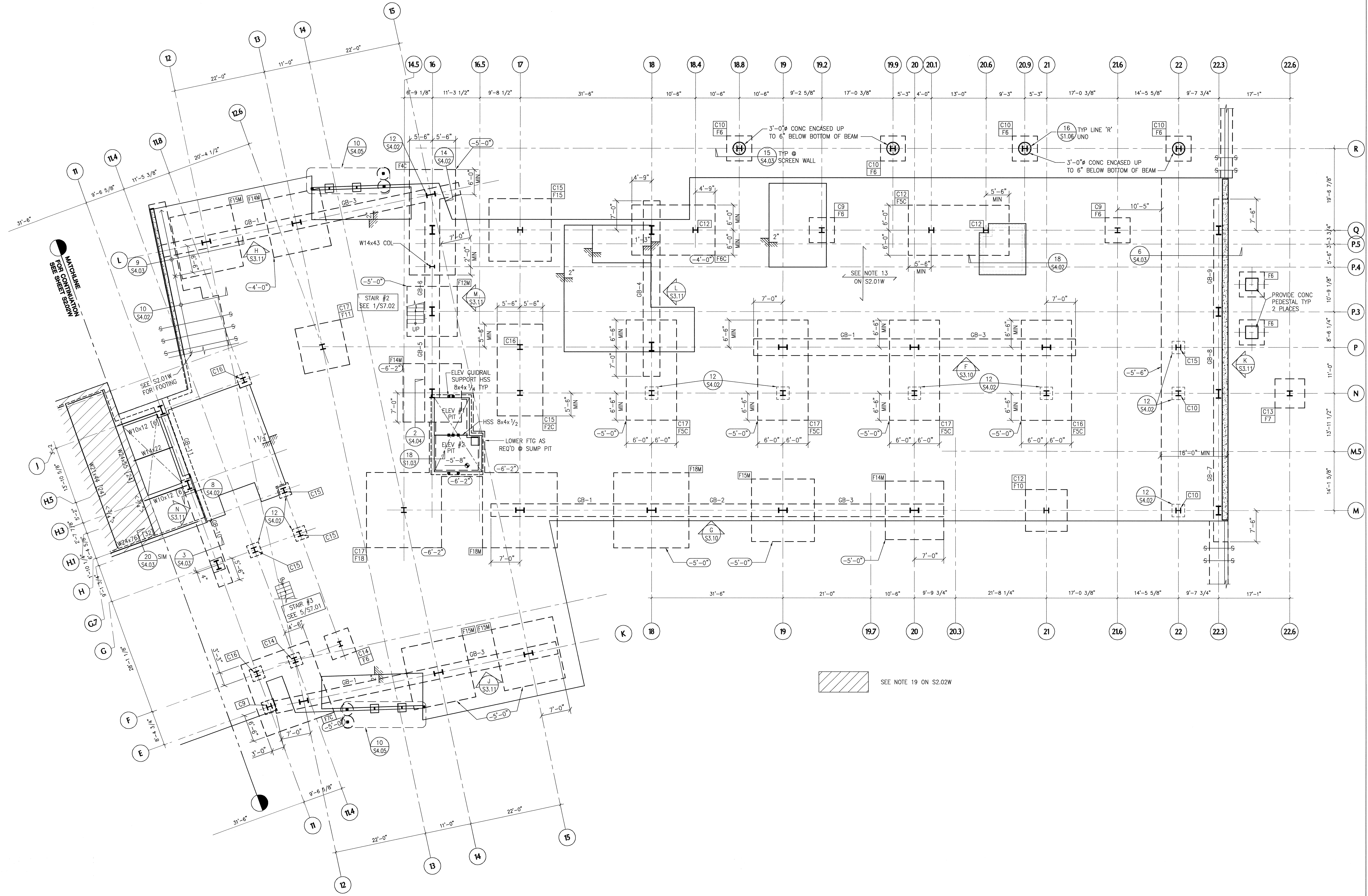
FIRST LEVEL FOUNDATION PLAN - WEST

REGISTERED PROFESSIONAL ENGINEER
KURTIS J. CLANDENING
No. S 3926
Exp. 6/30/11
STRUCTURAL
STATE OF CALIFORNIA
10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.

S2.01W



1 SECOND LEVEL FRAMING PLAN - EAST
S2.02E SCALE: 1/8" = 1'-0"

NORTH

NOTE:

1. SEE NOTES ON SHEET S2.01W.

ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP ZGF

Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York

515 South Flower Street, Suite 3700
Los Angeles, California 90071

(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ___ FLS ___ SS ___
DATE SEP 0 3 2009

Revisions

BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE

SAN LUIS OBISPO, CA

Drawing Title

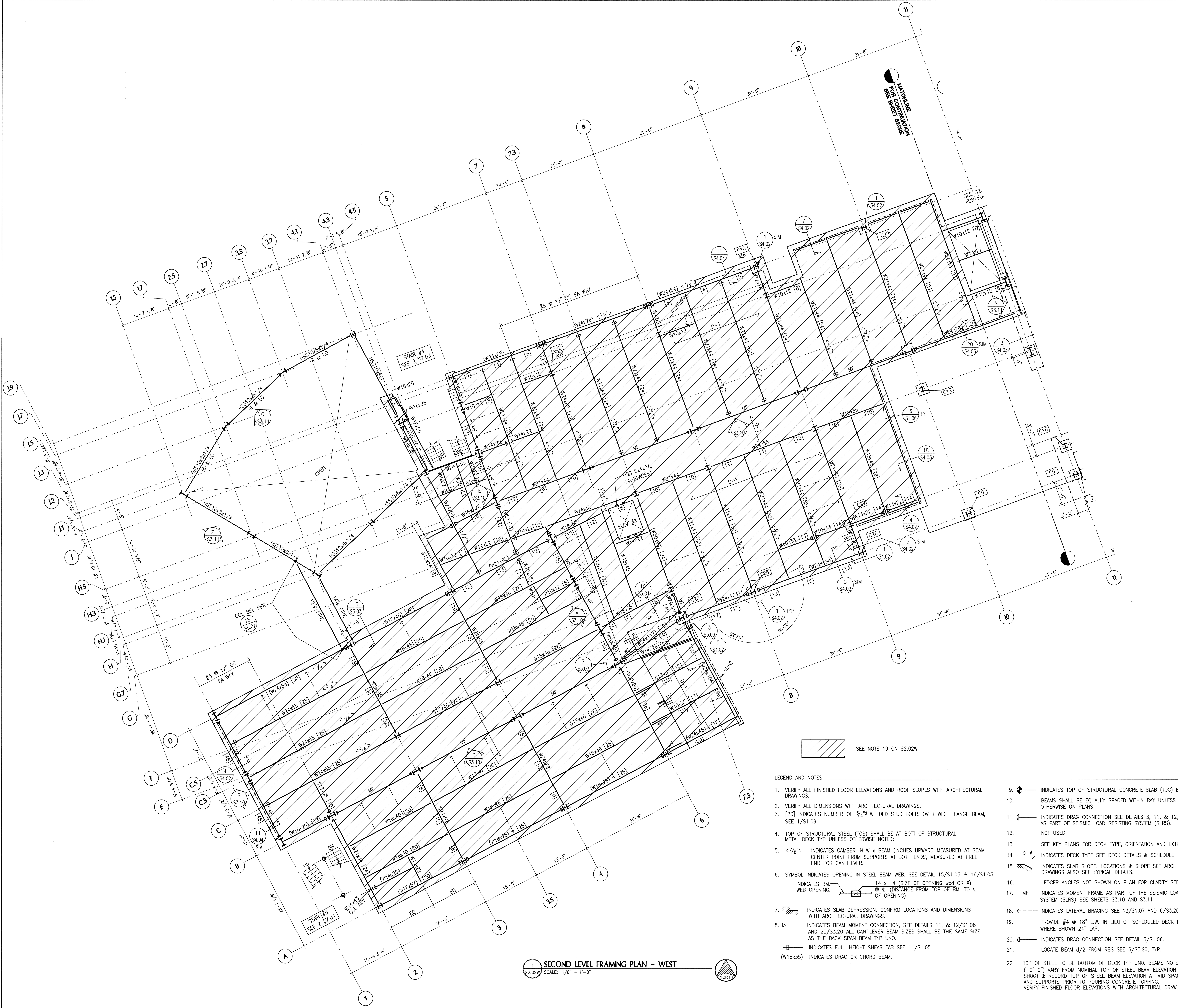
SECOND LEVEL FRAMING PLAN - EAST

REGISTERED PROFESSIONAL ENGINEER KURTIS J. CLANDENING No. S 3926 EXP. 6/30/11 STRUCTURAL STATE OF CALIFORNIA 10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.

S2.02E



1 / S2.02W — SECOND LEVEL FRAMING PLAN - WEST
SCALE: 1/8" = 1'-0"

SEE NOTE 19 ON S2.02W

LEGEND AND NOTES:

1. VERIFY ALL FINISHED FLOOR ELEVATIONS AND ROOF SLOPES WITH ARCHITECTURAL DRAWINGS.
2. VERIFY ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS.
3. [20] INDICATES NUMBER OF 3/4"Ø WELDED STUD BOLTS OVER WIDE FLANGE BEAM, SEE 1/S1.09.
4. TOP OF STRUCTURAL STEEL (TOS) SHALL BE AT BOTT OF STRUCTURAL METAL DECK TYP UNLESS OTHERWISE NOTED:
5. <7/8"> INDICATES CAMBER IN W x BEAM (INCHES UPWARD MEASURED AT BEAM CENTER POINT FROM SUPPORTS AT BOTH ENDS, MEASURED AT FREE END FOR CANTILEVER.
6. SYMBOL INDICATES OPENING IN STEEL BEAM WEB, SEE DETAIL 15/S1.05 & 16/S1.05.
   INDICATES BM. WEB OPENING. — 14 x 14 (SIZE OF OPENING wxd OR Ø) @ ℄. (DISTANCE FROM TOP OF BM. TO ℄. OF OPENING)
7. INDICATES SLAB DEPRESSION. CONFIRM LOCATIONS AND DIMENSIONS WITH ARCHITECTURAL DRAWINGS.
8. INDICATES BEAM MOMENT CONNECTION, SEE DETAILS 11, & 12/S1.06 AND 25/S3.20 ALL CANTILEVER BEAM SIZES SHALL BE THE SAME SIZE AS THE BACK SPAN BEAM TYP UNO.
   INDICATES FULL HEIGHT SHEAR TAB SEE 11/S1.05.
   (W18x35) INDICATES DRAG OR CHORD BEAM.
9. INDICATES TOP OF STRUCTURAL CONCRETE SLAB (TOC) ELEVATION.
10. BEAMS SHALL BE EQUALLY SPACED WITHIN BAY UNLESS SHOWN OTHERWISE ON PLANS.
11. INDICATES DRAG CONNECTION SEE DETAILS 3, 11, & 12/S1.06. AS PART OF SEISMIC LOAD RESISTING SYSTEM (SLRS).
12. NOT USED.
13. SEE KEY PLANS FOR DECK TYPE, ORIENTATION AND EXTENTS.
14. D-# INDICATES DECK TYPE SEE DECK DETAILS & SCHEDULE 6/S1.08.
15. INDICATES SLAB SLOPE. LOCATIONS & SLOPE SEE ARCHITECTURAL DRAWINGS ALSO SEE TYPICAL DETAILS.
16. LEDGER ANGLES NOT SHOWN ON PLAN FOR CLARITY SEE 16/S1.08.
17. MF INDICATES MOMENT FRAME AS PART OF THE SEISMIC LOAD RESISTING SYSTEM (SLRS) SEE SHEETS S3.10 AND S3.11.
18. INDICATES LATERAL BRACING SEE 13/S1.07 AND 6/S3.20.
19. PROVIDE #4 @ 18" E.W. IN LIEU OF SCHEDULED DECK REINF. WHERE SHOWN 24" LAP.
20. INDICATES DRAG CONNECTION SEE DETAIL 3/S1.06.
21. LOCATE BEAM d/2 FROM RBS SEE 6/S3.20, TYP.
22. TOP OF STEEL TO BE BOTTOM OF DECK TYP UNO. BEAMS NOTED THUS (-0'-0") VARY FROM NOMINAL TOP OF STEEL BEAM ELEVATION. SHOOT & RECORD TOP OF STEEL BEAM ELEVATION AT MID SPAN AND SUPPORTS PRIOR TO POURING CONCRETE TOPPING. VERIFY FINISHED FLOOR ELEVATIONS WITH ARCHITECTURAL DRAWINGS.

ZIMMER · GUNSUL · FRASCA ARCHITECTS · LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 0 3 2009

Revisions

BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title

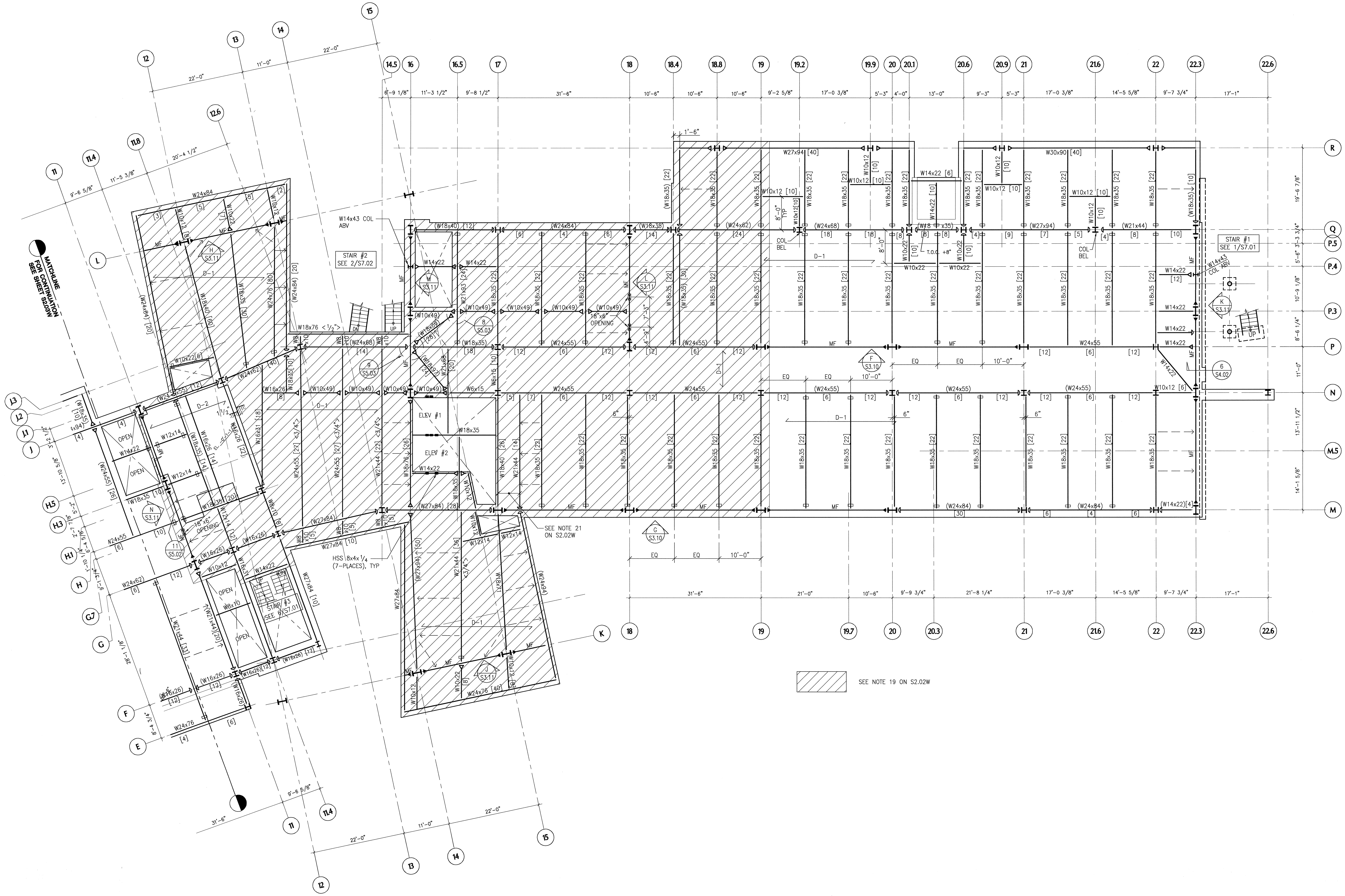
SECOND LEVEL FRAMING PLAN - WEST

REGISTERED PROFESSIONAL ENGINEER — KURTIS J. CLANDENING — No. S 3926 — EXP. 6/30/11 — STRUCTURAL — STATE OF CALIFORNIA — 10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.

S2.02W



1 THIRD LEVEL FRAMING PLAN - EAST
S2.03E SCALE: 1/8" = 1'-0"

NOTE:
1. SEE NOTES ON SHEET S2.02W.

ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 03 2009

Revisions

BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title

THIRD LEVEL
FRAMING PLAN - EAST

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.

S2.03E

1/S2.03W THIRD LEVEL FRAMING PLAN - WEST
SCALE: 1/8" = 1'-0"

NORTH

NOTE:

1. SEE NOTES ON SHEET S2.02W.

ZIMMER GUNSUL FRASCA ARCHITECTS LLP
ZGF

Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York

515 South Flower Street, Suite 3700
Los Angeles, California 90071

(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC FLS SS
DATE SEP 0 3 2009

Revisions

BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title

THIRD LEVEL FRAMING PLAN - WEST

No. S 3926
10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.

S2.03W

ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

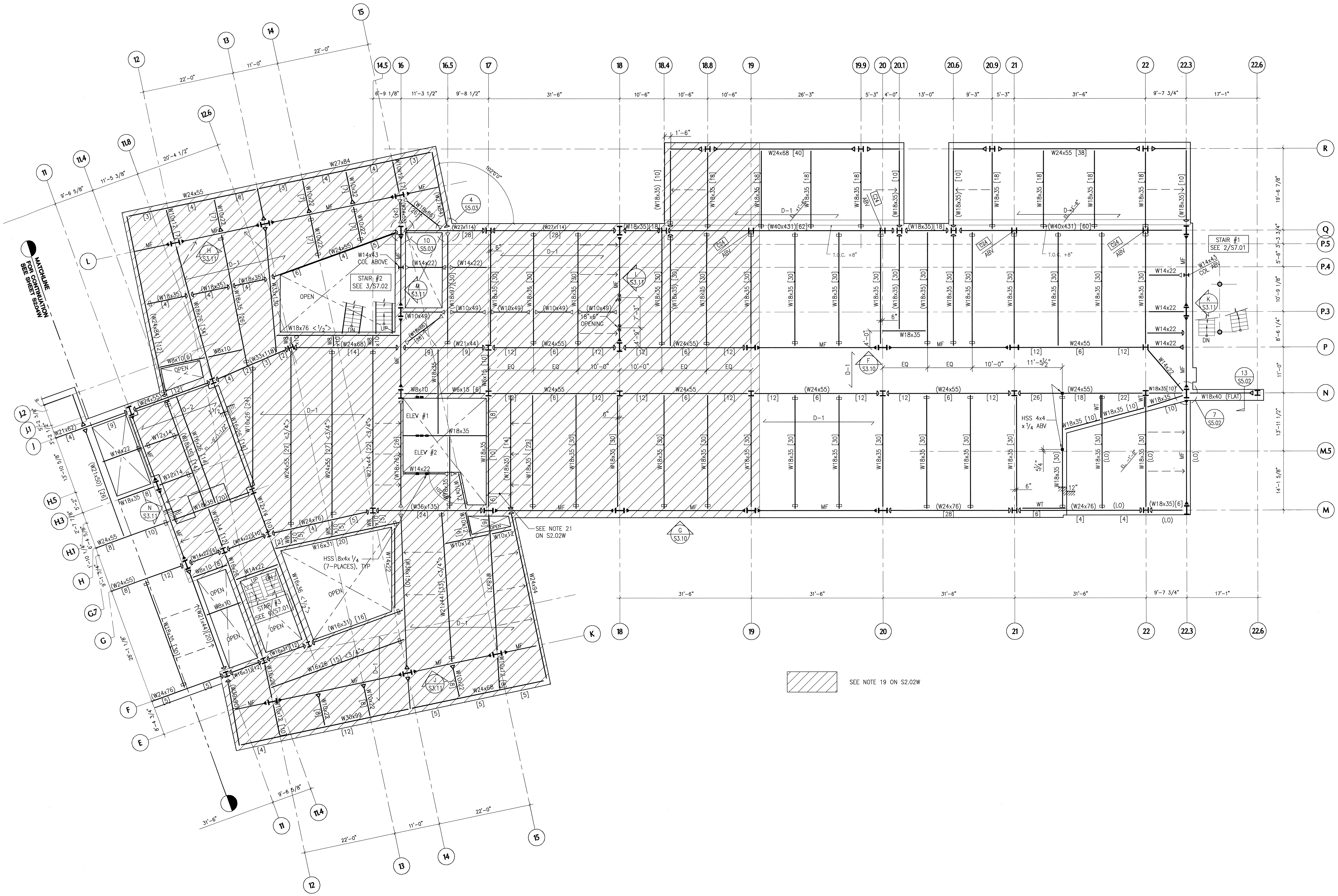
ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127



SEE NOTE 19 ON S2.02W

1 / S2.04E — FOURTH LEVEL FRAMING PLAN - EAST
SCALE: 1/8" = 1'-0"

NOTE:
1. SEE NOTES ON SHEET S2.02W.

IDENTIFICATION STAMP — DIV. OF THE STATE ARCHITECT — OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 03 2009

Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
FOURTH LEVEL FRAMING PLAN - EAST

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S2.04E

1 / S2.04W **FOURTH LEVEL FRAMING PLAN – WEST**
SCALE: 1/8" = 1'–0"

NOTE:
1. SEE NOTES ON SHEET S2.02W.

ZIMMER GUNSUL FRASCA ARCHITECTS LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York

515 South Flower Street, Suite 3700
Los Angeles, California 90071

(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 0 3 2009

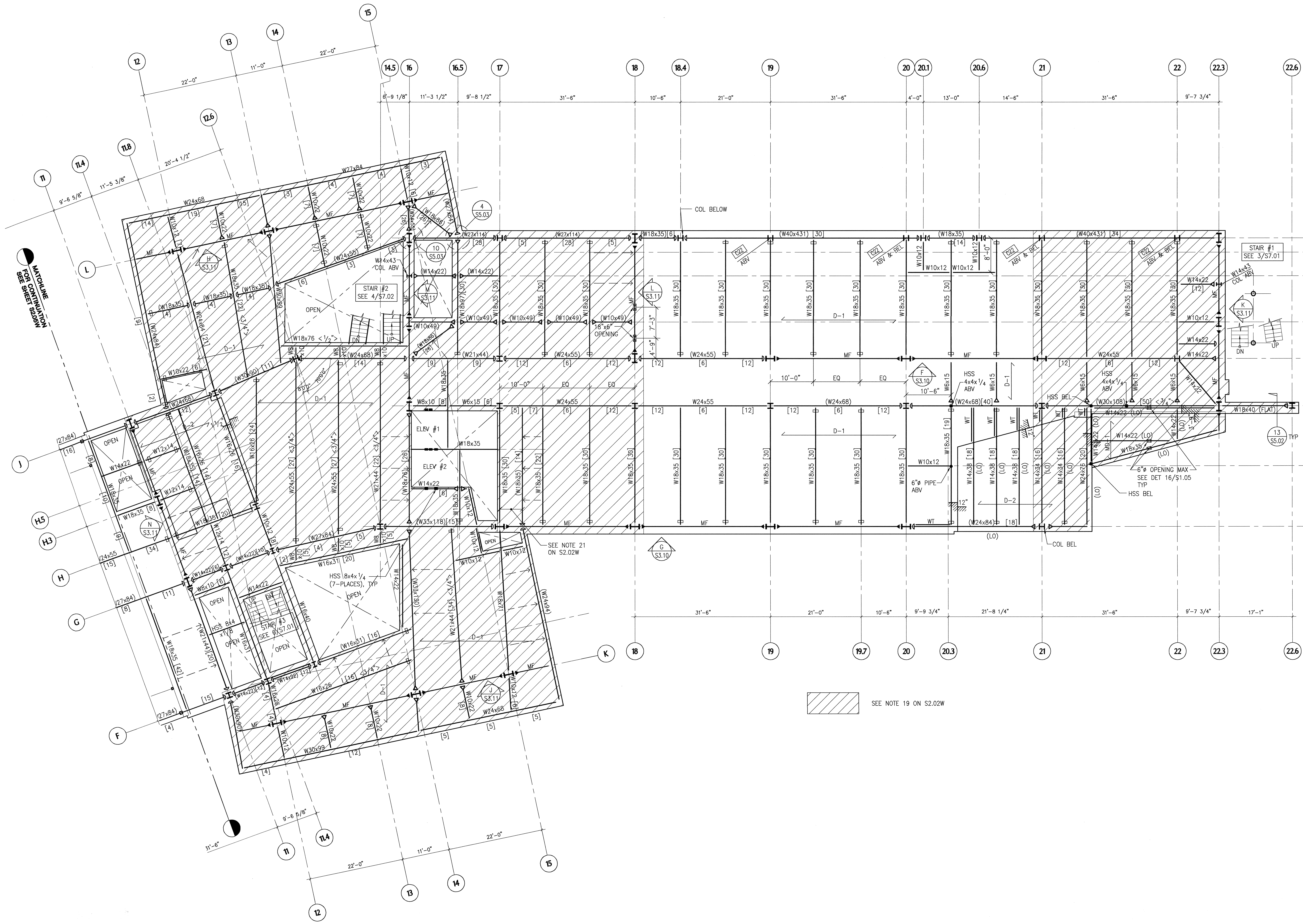
Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
FOURTH LEVEL FRAMING PLAN – WEST

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S2.04W



1 S2.05E FIFTH LEVEL FRAMING PLAN - EAST
SCALE: 1/8" = 1'-0"

NOTE:
1. SEE NOTES ON SHEET S2.02W.

ZIMMER GUNSUL FRASCA ARCHITECTS LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ___ FLS ___ SS ___
DATE SEP 0 3 2009

Revisions

BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

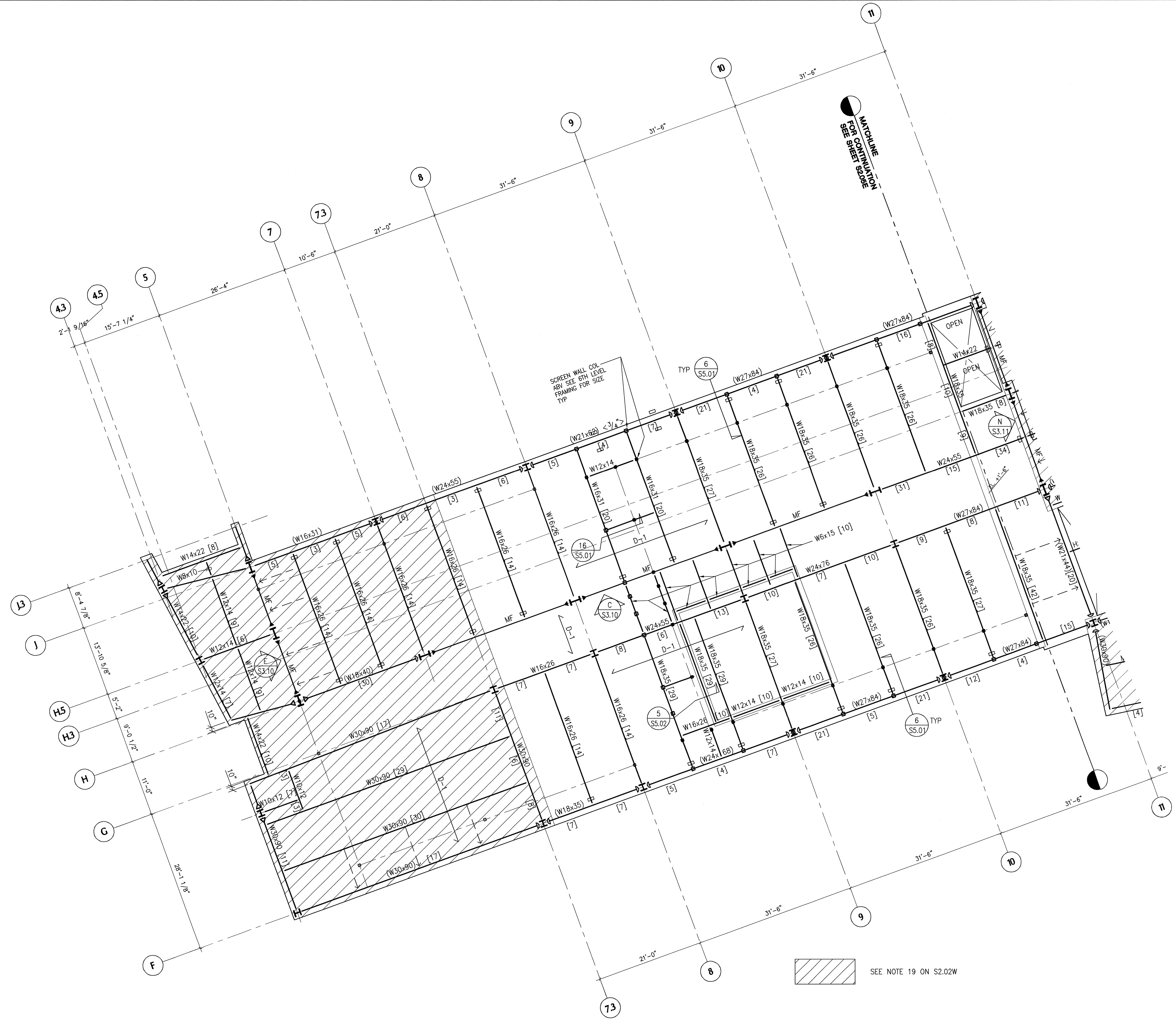
Drawing Title
FIFTH LEVEL FRAMING PLAN - EAST

REGISTERED PROFESSIONAL ENGINEER
KURTIS J. CLANNING
No. S 3926
EXP. 6/30/11
STRUCTURAL
STATE OF CALIFORNIA
10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S2.05E

File: G:\Job11000\J11717 Cal Poly\Drafting\Structural\S2-05E_11717.dwg
Plotted: 10/23/09 at 9:56am By: salem
XREFs: tblk-36x48.dwg XS_5th_11717.dwg fp-5.dwg gr-5.dwg S_gr-5.dwg



1 S2.05W FIFTH LEVEL FRAMING PLAN - WEST
SCALE: 1/8" = 1'-0"

NORTH

NOTE:
1. SEE NOTES ON SHEET S2.02W.

ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP· ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 0 3 2009

Revisions
BID DOCUMENTS 10/23/09

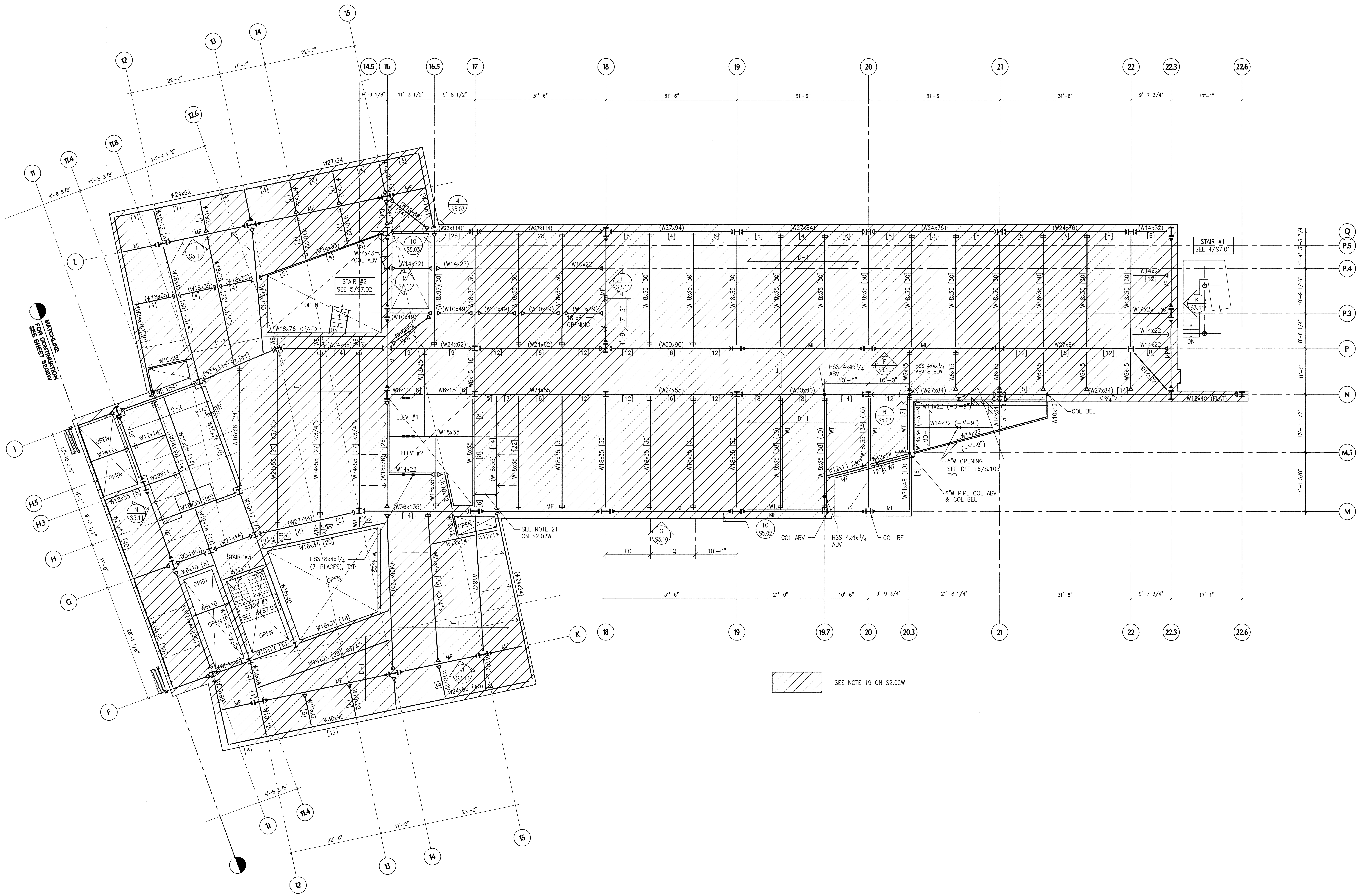
CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
FIFTH LEVEL FRAMING PLAN - WEST

REGISTERED PROFESSIONAL ENGINEER
KURTIS J. CLANDENING
No. S 3926
EXP. 6/30/11
STRUCTURAL
STATE OF CALIFORNIA
10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S2.05W



1 SIXTH LEVEL FRAMING PLAN - EAST
S2.06E SCALE: 1/8" = 1'-0"

NORTH

NOTE:

1. SEE NOTES ON SHEET S2.02W.

ZIMMER·GUNSUL·FRASCA·ARCHITECTS·LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ___ FLS ___ SS ___
DATE SEP 0 3 2009

Revisions

BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE

SAN LUIS OBISPO, CA

Drawing Title

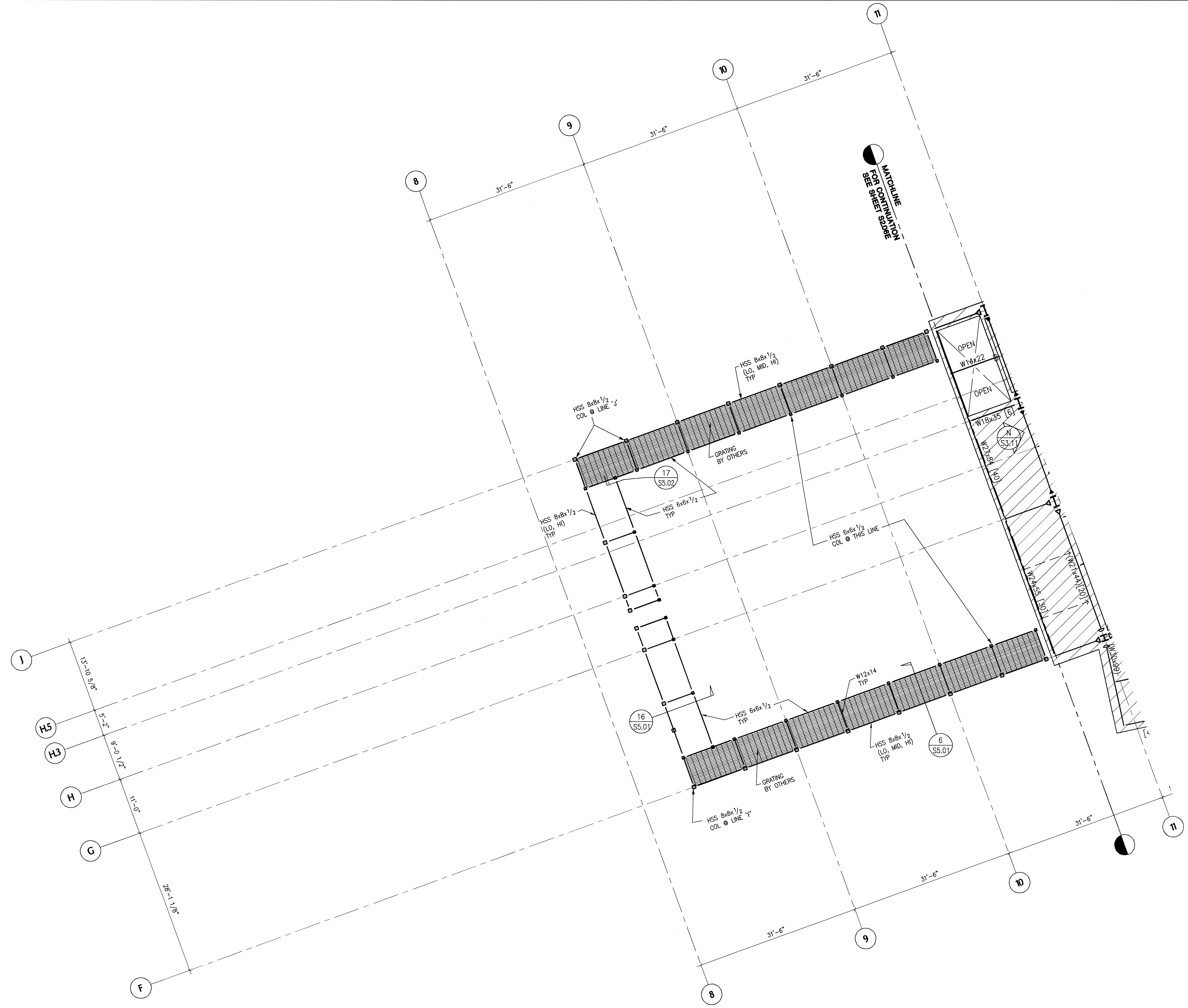
SIXTH LEVEL FRAMING PLAN - EAST

REGISTERED PROFESSIONAL ENGINEER
KURTIS J. CLANDENING
No. S 3926
EXP. 6/30/11
STRUCTURAL
STATE OF CALIFORNIA
10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.

S2.06E



1
S2.06W

SIXTH LEVEL FRAMING PLAN - WEST

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

NORTH

NOTE:

1. SEE NOTES ON SHEET S2.02W.

ZIMMER·GUNSUL·FRASCA·ARCHITECTS·LLP·
ZGF

Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York

515 South Flower Street, Suite 3700
Los Angeles, California 90071

(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ____ FLS ____ SS ____
DATE SEP 0 3 2009

Revisions

BID DOCUMENTS	10/23/09

CENTER FOR SCIENCE

SAN LUIS OBISPO, CA

Drawing Title

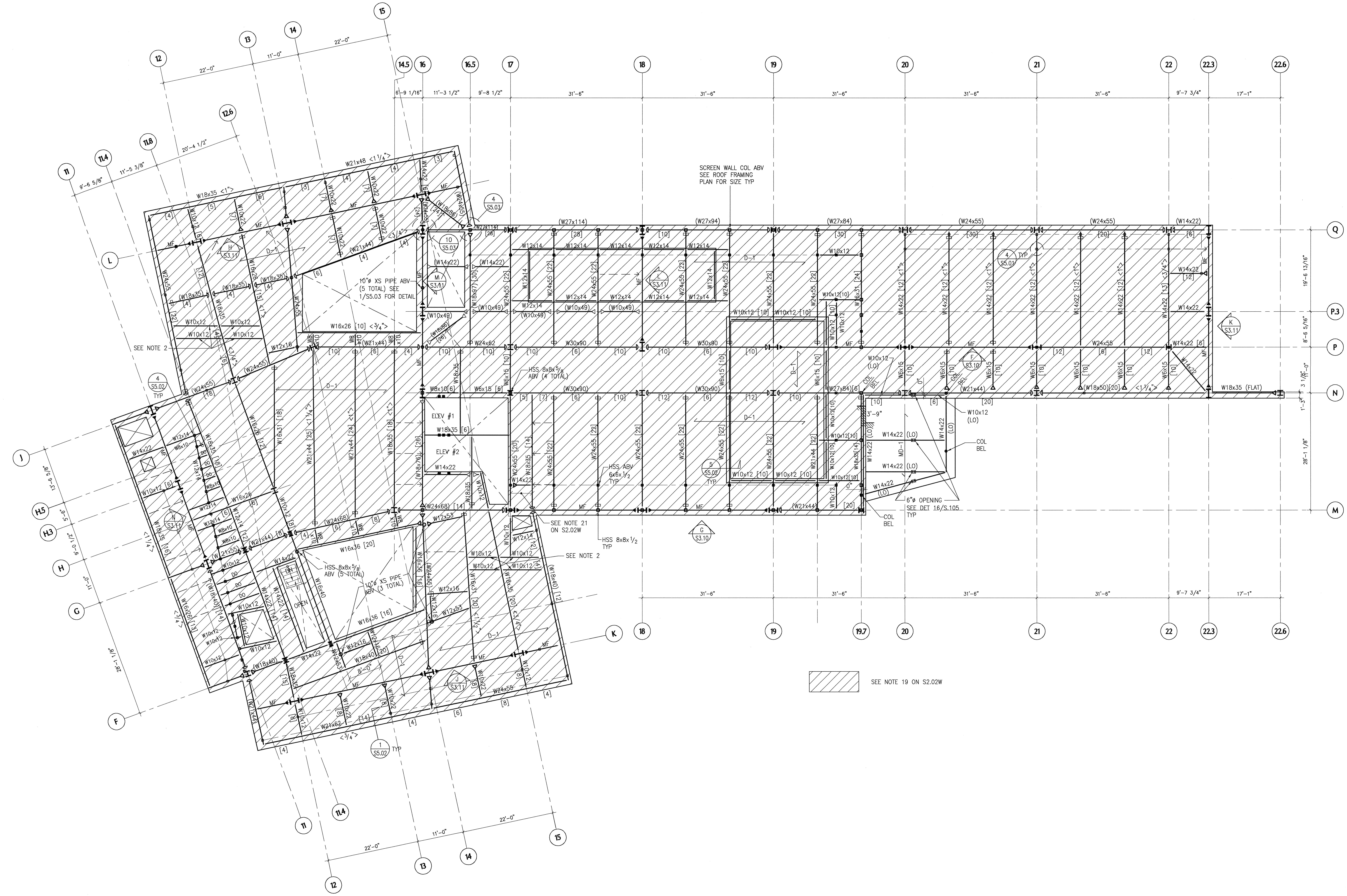
SIXTH LEVEL FRAMING PLAN - WEST

REGISTERED PROFESSIONAL ENGINEER
KURTIS J. CLANDENING
No. S 3926
EXP. 6/30/11
STRUCTURAL
STATE OF CALIFORNIA
10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.

S2.06W



ROOF LEVEL FRAMING PLAN - EAST
1/S2.07E SCALE: 1/8" = 1'-0"

NORTH

NOTE:
1. SEE NOTES ON SHEET S2.02W.
2. COORDINATE LOCATION WITH LADDER SUPPORTS.

ZGF ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 03 2009

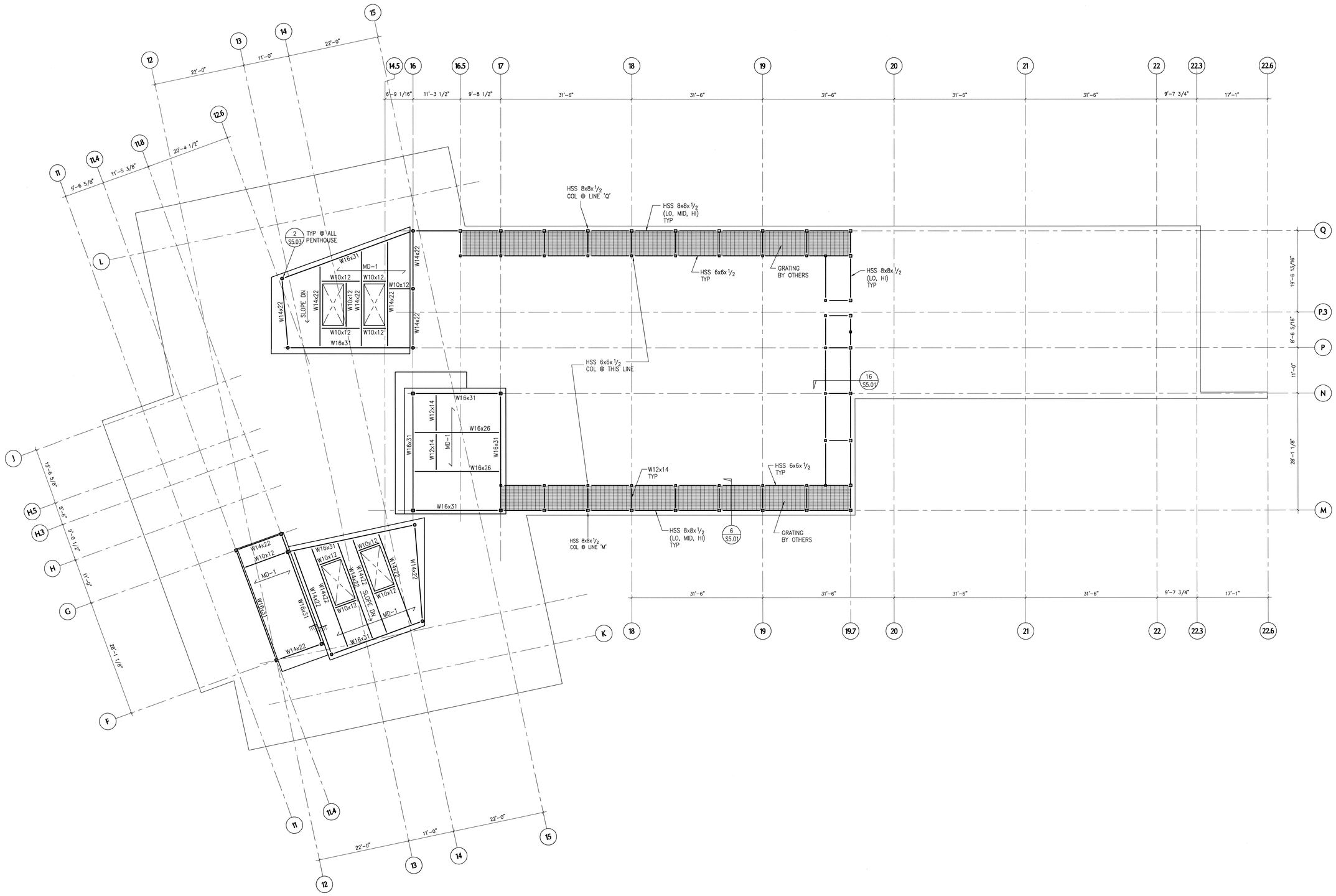
Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
ROOF LEVEL
FRAMING PLAN - EAST

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S2.07E



1 S2.08E UPPER ROOF LEVEL FRAMING PLAN – EAST
SCALE: 1/8" = 1'-0"

NOTE:

1. SEE NOTES ON SHEET S2.02W.

ZGF ARCHITECTS LLP

Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York

515 South Flower Street, Suite 3700
Los Angeles, California 90071

(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

Revisions

BID DOCUMENTS	10/23/09

CENTER FOR SCIENCE

SAN LUIS OBISPO, CA

Drawing Title

UPPER ROOF LEVEL FRAMING PLAN – EAST

Date:	OCTOBER 23, 2009
Job No:	L40302.05
Drawn By:	
Checked By:	

Drawing No.

S2.08E

File: G:\Job11000\J11717 Cal Poly\Drafting\Structure\S2-08E_11717.dwg
Plotted: 10/23/09 at 5:57pm By: adam
XREFs: tbar_36x48.dwg s_gr---upper.dwg XS_UPR RF_11717.dwg fp---upper.dwg

STEEL DECKING

1. THE STEEL DECKING SHALL BE OF TYPE AND GAUGE AS CALLED FOR ON DRAWINGS. DECKING AND ALL ACCESSORIES SHALL BE FORMED FROM STEEL SHEETS HAVING A MINIMUM YIELD STRENGTH OF 38,000 PSI AND CONFORMING TO A-653. THE STEEL SHALL BE ZINC-COATED CONFORMING TO A-653, CLASS G60. DECK UNITS SHALL BE CONTINUOUS OVER THREE OR MORE SPANS WHERE POSSIBLE.

2. MINIMUM BEARING OF DECKING ON SUPPORTS SHALL BE 2 INCHES. SHEETS SHALL BE ATTACHED TO ALL SUPPORTING STEEL MEMBERS BY WELDING AS INDICATED ON DRAWINGS AND IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. UPON COMPLETION OF ERECTION, ALL WELDS IN EXPOSED DECK AREAS SHALL HAVE TOUCH-UP, DE-SLAG, CLEAN AND PRIME WITH A ZINC RICH PRIMER. DECK WELDING SHALL BE AS NOTED ON PLANS. WHERE NO WELDING IS NOTED, THE SIDE LAP OF EACH PANEL SHALL BE FASTENED BY 1 INCH LONG FILLET WELDS OR APPROVED FUSION WELDS AT 24" ON CENTER MAXIMUM, OR BUTTON PUNCHED AT 18 INCHES ON CENTER.

3. SEE DRAWINGS FOR DETAIL OF REINFORCING OF DECK OPENINGS. SEE ARCHITECTURAL, MECHANICAL, ELECTRICAL DRAWINGS, ETC., FOR SIZE AND LOCATION OF REQUIRED OPENINGS.

4. SHEAR CONNECTORS SHALL BE NELSON GRANULAR FLUX-FILLED HEADED ANCHOR STUDS OR AN APPROVED EQUAL, SHALL BE MADE FROM COLD FINISHED LOW CARBON STEEL, AND SHALL CONFORM TO ASTM A-108, GRADES 1015-1020 WITH A MINIMUM TENSILE STRENGTH OF 60,000 PSI. STUD WELDING INSPECTING AND TESTING SHALL CONFORM TO AWS D1.1.

5. DEFORMED BAR ANCHOR STUDS SHALL BE NELSON D2L GRANULAR FLUX-FILLED REBAR STUDS OR APPROVED EQUAL, AND SHALL BE MADE OF LOW CARBON COLD ROLLED STEEL WITH A MINIMUM TENSILE STRENGTH OF 80,000 PSI. STUD WELDING INSPECTING AND TESTING SHALL CONFORM TO AWS D1.1.

6. HANGERS SUPPORTED BY METAL DECK WITH STRUCTURAL CONCRETE FILL SHALL BE INSTALLED USING ICBO APPROVED ANCHORAGE SYSTEMS. SUCH HANGERS SHALL BE USED TO SUPPORT DUCTWORK (54" X 16" MAX.), PIPING (4" ROUND MAX.), OR CEILINGS, HANGERS MUST BE AT LEAST TWO FLUTES APART ON SAME DECK SPAN. LARGER DUCTWORK AND PIPING SHALL BE SUPPORTED BY STRUCTURAL BEAMS OR COLUMNS. COORDINATE WITH TYPICAL DETAILS.

STRUCTURAL STEEL & MISCELANEOUS METAL

1. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS (LATEST EDITION AND SUPPLEMENTS).

2. ALL STRUCTURAL STEEL SHALL CONFORM TO ASTM A572, GRADE 50 U.N.O. ALL ROLLED STEEL WF SHAPES TO BE ASTM A992 GR 50. STRUCTURAL STEEL, CHANNELS, AND ANGLES SHALL CONFORM TO ASTM A36 UNO.

3. PIPE COLUMNS - ASTM A53, GRADE 'B'.

4. STEEL TUBES - ASTM A500, GRADE 'B' (FY = 46000 PSI).

5. BOLTS - ALL BOLTS SHALL BE A325SC BOLTS TYP. U.N.O.

6. ANCHOR STUDS SHALL BE NELSON GRANULAR FLUX-FILLED HEADED ANCHOR STUDS OR AN APPROVED EQUAL AND BE MADE FROM C-1015 COLD ROLLED STEEL AND SHALL CONFORM TO A.S.T.M. SPECIFICATION A-108, GRADES 1015-1020 WITH A MINIMUM TENSILE STRENGTH OF 60,000 P.S.I. STUD WELDING INSPECTING AND TESTING SHALL CONFORM TO A.W.S. D1.1:2004.

7. ANCHOR BOLTS - F1554 GRADE 55 S1

8. THE STRUCTURAL STEEL FABRICATOR SHALL FURNISH SHOP DRAWINGS FOR ARCHITECT'S AND STRUCTURAL ENGINEER'S REVIEW BEFORE FABRICATION.

9. BOLT HOLES IN STEEL SHALL BE 1/16 INCH LARGER IN DIAMETER THAN NOMINAL SIZE OF BOLT USED, UNLESS NOTED OTHERWISE.

10. ALL WELDS SHALL BE PREQUALIFIED IN CONFORMITY WITH THE CODE FOR WELDING IN BUILDING CONSTRUCTION (AWS D1.1) OF THE AMERICAN WELDING SOCIETY. ELECTRODES TO BE E70 SERIES UNLESS NOTED OTHERWISE.

11. BUTT WELDS, COMPLETE JOINT PENETRATION OR PARTIAL JOINT PENETRATION ARE INDICATED AS C.J.P. OR P.J.P. RESPECTIVELY.

12. WELDING OF SHEET METAL AND METAL STUDS SHALL BE IN ACCORDANCE WITH AWS D1.3-98.

13. WELD LENGTHS CALLED FOR ON PLANS ARE THE NET EFFECTIVE LENGTH REQUIRED. WELD SIZE SHALL BE AISC MINIMUM UNLESS A LARGER SIZE IS NOTED.

14. WELDING TESTS AND INSPECTIONS - SEE SPECIFICATION.

15. CAMBER -

    A. PROVIDE UPWARD CAMBER TO ALL MEMBERS SHOWN TO HAVE CAMBER. AMOUNT MEASURED IN THE FIELD PRIOR TO ERECTION SHALL NOT DEVIATE BY MORE THAN ALLOWED BY THE AISC SPECIFICATIONS. DO NOT CAMBER MEMBERS BELOW ELEVATOR ENTRANCE DOORS.

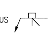
    B. BEAMS DETAILED WITHOUT SPECIFIED CAMBER SHALL BE FABRICATED SO THAT AFTER ERECTION ANY MINOR CAMBER DUE TO ROLLING OR SHOP ASSEMBLY SHALL BE UPWARD. TOP OF ALL MEMBERS SHALL BE CLEARLY IDENTIFIED.

16. COMPOSITE STRUCTURAL STEEL BEAMS ARE DESIGNED IN ACCORDANCE WITH "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" OF THE AISC, NOT TO REQUIRE SHORING.

17. ALL STRUCTURAL STEEL SURFACES TO BE WELDED OR HIGH-STRENGTH BOLTED, TO BE ENCASED IN CONCRETE, TO RECEIVE SPRAY-APPLIED FIREPROOFING, OR TO BE ENCLOSED BY FINISH MATERIALS SHALL BE LEFT UNPAINTED.

18. ALL STRUCTURAL STEEL AND MISCELLANEOUS METAL EXPOSED TO WEATHER IN FINAL STRUCTURE SHALL BE HOT DIP GALVANIZED AFTER FABRICATION.

19. THE CONTRACTOR SHALL REVIEW ALL WELDING DETAILS FOR ACCESSIBILITY. ANY WELD INDICATED AS A SHOP WELD MAY BE WELDED IN THE FIELD WITH APPROVED WELD PROCEDURES AND INSPECTION. ANY WELD INDICATED AS A FIELD WELD MAY BE SHOP WELDED WITH APPROVED WELD PROCEDURES AND INSPECTION.

20. ALL GROOVE WELDS INDICATED THUS  ARE C.J.P., UNLESS NOTED OTHERWISE.

21. PROVIDE A QUALITY ASSURANCE PLAN PER AISC 341 CHAPTER 18 REFER TO AISC 341 APPENDIX Q FOR QUALITY ASSURANCE PLAN REQUIREMENTS.

REINFORCING STEEL

1. ALL REINFORCING STEEL SHALL BE DETAILED AND PLACED IN CONFORMANCE WITH THE CBC 2007 'BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE' (ACI-318), AND THE 'MANUAL OF STANDARD PRACTICE FOR REINFORCED CONCRETE CONSTRUCTION' BY THE C.R.S.I. AND THE W.C.R.S.I., OR AS MODIFIED BY THE CONSTRUCTION DOCUMENTS.

2. REINFORCING BARS - A-615 GRADE 60 OR A-706 GRADE 60 UNLESS NOTED OTHERWISE.

3. WELDING OF REINFORCEMENT SHALL BE WITH LOW HYDROGEN ELECTRODES IN CONFORMANCE WITH 'RECOMMENDED PRACTICES FOR WELDING REINFORCING STEEL, ETC.,' AMERICAN WELDING SOCIETY, AWS-D1.4. ALL REINFORCING TO BE WELDED SHALL BE ASTM A-706, GRADE 60. WELDING OF REINFORCEMENT SHALL BE WITH LOW HYDROGEN ELECTRODES IN CONFORMANCE WITH 'RECOMMENDED PRACTICES FOR WELDING REINFORCING STEEL, ETC.,' AMERICAN WELDING SOCIETY, AWS-D1.4-98. ALL WELDS SHALL DEVELOP THE FULL STRENGTH OF THE REBAR, UNO.

4. ALL REINFORCING BAR BENDS SHALL BE MADE COLD. REINFORCING SHALL NOT BENT MORE THAN TWICE AT THE SAME LOCATION.

5. WELDED WIRE FABRIC - A-185.

6. MINIMUM LAP OF WELDED WIRE FABRIC SHALL BE 6 INCHES, OR ONE FULL MESH PLUS TWO INCHES, WHICHEVER IS GREATER.

7. REINFORCING SPLICES SHALL BE MADE AS INDICATED ON THE DRAWINGS.

8. DOWELS BETWEEN FOOTINGS AND WALLS OR COLUMNS SHALL BE THE SAME GRADE, SIZE AND SPACING AS THE VERTICAL REINFORCING, RESPECTIVELY, UNLESS NOTED OTHERWISE.

9. ALL BARS SHALL BE MARKED SO THEIR IDENTIFICATION CAN BE MADE WHEN THE FINAL IN-PLACE INSPECTION IS MADE.

FOUNDATION

1. FOUNDATION DESIGN BASED ON GEOTECHINCAL REPORT BY EARTH SYSTEMS PACIFIC DATED OCTOBER 27, 2000 & UPDATED DATE JUNE 29, 2007. COMPANY: COPIES ARE AVAILABLE FOR REVIEW AT THE ARCHITECT'S OFFICE.

2. FOOTING DESIGN BASED ON ALLOWABLE SOIL PRESSURE OF 4,500 PSF WHERE BEARING A MINIMUM 1'-0" INTO SOUND ROCK.

3. CONTRACTOR TO PROVIDE FOR DE-WATERING OF EXCAVATIONS FROM EITHER SURFACE WATER, GROUND WATER OR SEEPAGE.

4. CONTRACTOR SHALL PROVIDE FOR DESIGN AND INSTALLATION OF ALL CRIBBING, SHEATHING AND SHORING REQUIRED TO SAFELY RETAIN THE EARTH BANKS.

5. EXCAVATION AND COMPACTING IF REQUIRED, SHALL BE APPROVED BY THE GOVERNING AGENCY AND THE FOUNDATION ENGINEER PRIOR TO PLACING THE CONCRETE AND REINFORCING. FOUNDATION ENGINEER TO SUBMIT LETTER OF COMPLIANCE TO OWNER. COMPACT FILL IN LAYERS TO A MINIMUM OF 95% RELATIVE COMPACTION AT BUILDING FOOTPRINT PER GEOTECH REPORT.

6. ALL EXCAVATIONS SHALL BE PROPERLY BACKFILLED. DO NOT PLACE BACKFILL BEHIND RETAINING WALLS BEFORE WALLS HAVE ATTAINED FULL DESIGN STRENGTH. CONTRACTOR SHALL BRACE OR PROTECT ALL BUILDING AND PIT WALLS BELOW GRADE FROM LATERAL LOADS UNTIL ATTACHING FLOORS ARE COMPLETELY IN PLACE AND HAVE ATTAINED FULL STRENGTH. CONTRACTOR SHALL PROVIDE FOR DESIGN, PERMITS AND INSTALLATION OF SUCH BRACING.

7. FOOTINGS SHALL BE PLACED AND ESTIMATED ACCORDING TO DEPTHS SHOWN ON DRAWINGS. SHOULD SOIL ENCOUNTERED AT THESE DEPTHS NOT BE APPROVED BY THE FOUNDATION ENGINEER, FOOTING ELEVATIONS WILL BE ALTERED AS REQUIRED.

8. FOOTING BACKFILL AND UTILITY TRENCH BACKFILL WITHIN BUILDING AREA SHALL BE MECHANICALLY COMPACTED IN LAYERS, IN ACCORDANCE WITH SOIL REPORT. FLOODING WILL NOT BE PERMITTED.

9. ALL ABANDONED FOOTINGS, UTILITIES, ETC., THAT INTERFERE WITH NEW CONSTRUCTION SHALL BE REMOVED.

10. ALL EARTHWORK SHALL BE DONE IN ACCORDANCE WITH GEOTECHINCAL REPORT RECOMMENDATIONS AND CONTINUOUSLY INSPECTED BY THE SOILS ENGINEER OR THEIR REPRESENTATIVE.

11. ALL SUB-SLAB ASSEMBLIES AND COMPOSITIONS SHALL BE PER GEOTECH RECOMMENDATIONS.

CONCRETE (CAST-IN-PLACE)

1. ALL PHASES OF WORK PERTAINING TO THE CONCRETE CONSTRUCTION SHALL CONFORM TO THE CBC 2007.

2. SCHEDULE OF STRUCTURAL CONCRETE 28-DAY STRENGTHS & TYPES:

LOCATION IN STRUCTURE	STRENGTH PSI	TYPE
FOUNDATIONS & GRADE BEAMS	4,000	HARDROCK
COLUMNS AND WALLS	4,000	HARDROCK
SLAB-ON-GRADE	3,000	HARDROCK
PERIMETER BASEMENT WALLS	4,000	HARDROCK
CONCRETE FILL OVER METAL DECK	4,000	LIGHT WEIGHT
ALL OTHER CONCRETE	4,000	HARDROCK

3. PORTLAND CEMENT SHALL CONFORM TO ASTM C-150, TYPE II, LOW ALKALI.

4. AGGREGATE FOR HARDROCK CONCRETE - C-33. EXCEPTIONS MAY BE USED ONLY WITH PERMISSION OF THE STRUCTURAL ENGINEER. MAXIMUM AGGREGATE SIZE=1".

5. FORMS FOR CONCRETE SHALL BE LAID OUT AND CONSTRUCTED TO PROVIDE THE SPECIFIED CAMBERS SHOWN ON THE DRAWINGS.

6. THE CONTRACTOR SHALL MAINTAIN A LOG OF STRUCTURAL SLAB ELEVATIONS BASED ON THE ARCHITECTURAL DRAWINGS PLUS THE ADDITION OF ANY CAMBERS INDICATED ON THE CONSTRUCTION DOCUMENTS. THIS LOG SHALL INDICATE SCREED ELEVATIONS PRIOR TO THE CONCRETE POUR, AND TOP OF CONCRETE SLAB PRIOR TO REMOVAL OF FORMS.

7. THE CONCRETE SLAB THICKNESS SHALL BE MAINTAINED UNLESS OTHERWISE SHOWN.

8. DRY PACK OR NON SHRINK GROUT UNDER BASEPLATES, SILL PLATES, ETC., SEE CONTRACT DOCUMENTS.

9. CONCRETE MIXING OPERATION, ETC., SHALL CONFORM TO C-94.

10. PLACEMENT OF CONCRETE SHALL CONFORM TO ACI 304 AND CONTRACT DOCUMENTS. ROUGHEN ALL CONCRETE SURFACES AGAINST WHICH CONCRETE IS TO BE PLACED TO 1/4" MIN AMPLITUDE.

11. IF COLUMNS AND WALLS ARE PLACED WITH FLOOR, TWO HOURS MUST ELAPSE BETWEEN END OF COLUMN OR WALL POUR AND BEGINNING OF FLOOR POUR.

12. CLEAN AND ROUGHEN THE SURFACE OF ALL HORIZONTAL CONSTRUCTION JOINTS BY REMOVING THE ENTIRE SURFACE AND EXPOSING CLEAN AGGREGATE SOLIDLY EMBEDDED IN MATRIX.

13. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT PLACED IN CAST-IN-PLACE CONCRETE:

	MINIMUM COVER, INCHES
A. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	3
B. FORMED CONCRETE EXPOSED TO EARTH OR WEATHER:	
#6 THROUGH # 18 BARS	2
#5 BAR, W31 OR D31 WIRE, AND SMALLER	1 1/2
C. CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND:	
SLABS, WALLS AND JOISTS:	
#14 AND #18 BARS	1 1/2
#11 BAR AND SMALLER	1
BEAMS, COLUMNS AND WALL JAMBS PRIMARY REINFORCEMENT, TIES, STIRRUPS, AND SPIRALS:	
#3 THROUGH #11	1 1/2
#14 AND #18 BARS	2 1/2

14. ALL REINFORCING BARS, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION PRIOR TO PLACING CONCRETE.

15. PROVIDE SLEEVES FOR PLUMBING AND ELECTRICAL OPENINGS IN CONCRETE BEFORE PLACING. DO NOT CUT ANY REINFORCING WHICH MAY CONFLICT. CORING IN CONCRETE IS NOT PERMITTED EXCEPT AS SHOWN. NOTIFY THE STRUCTURAL ENGINEER IN ADVANCE OF CONDITIONS NOT SHOWN ON THE DRAWINGS.

16. CONDUIT OR PIPE SIZE (O.D.) SHALL NOT EXCEED ONE THIRD OF SLAB THICKNESS AND SHALL BE PLACED BETWEEN THE TOP AND BOTTOM REINFORCING, UNLESS SPECIFICALLY DETAILED OTHERWISE. CONCENTRATIONS OF CONDUITS OR PIPES SHALL BE AVOIDED EXCEPT WHERE DETAILED OPENINGS ARE PROVIDED.

17. PROJECTING CORNERS OF BEAMS, WALLS, COLUMNS, ETC., SHALL BE FORMED WITH A 1/2 IN. CHAMFER, UNLESS OTHERWISE NOTED IN THE DOCUMENTS. PROVIDE 5/8" RADIUSED BULLNOSE CHAMFER AT ALL EXPOSED CORNERS AT BASEMENT.

18. CURING COMPOUNDS USED ON CONCRETE TO RECEIVE A FINISH SHALL BE APPROVED BY THE FINISH APPLICATOR BEFORE USE.

19. THE MAXIMUM SIZE OF A SINGLE POUR FOR ANY DAY FOR ELEVATED SLABS SHALL NOT EXCEED 20,000 SQUARE FEET, AND THE RATIO OF LENGTH TO WIDTH OF THE POUR SHALL NOT EXCEED 2 TO 1 WITHOUT THE APPROVAL OF THE ARCHITECT.

GENERAL

1. THE PROJECT SPECIFICATIONS FORM A PART OF THESE GENERAL NOTES.

2. DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DRAWINGS.

3. ALL WORK SHALL CONFORM TO THE STANDARDS OF THE FOLLOWING CODE:

   CALIFORNIA BUILDING CODE, 2007 EDITION AS APPROVED BY THE STATE OF CALIFORNIA AND ANY OTHER REGULATING AGENCIES WHICH HAVE AUTHORITY OVER ANY PORTION OF THE WORK, INCLUDING THOSE CODES AND STANDARDS LISTED IN THE CONTRACT DOCUMENTS.

4. MANUFACTURED MATERIALS SHALL BE APPROVED BY THE CHECKING AGENCY PRIOR TO THEIR USE. ALL REQUIREMENTS OF THOSE APPROVALS SHALL BE FOLLOWED.

5. SEE ARCHITECTURAL DRAWINGS FOR THE FOLLOWING:

   A. SIZE AND LOCATION OF ALL DOOR AND WINDOW OPENINGS.
   B. SIZE AND LOCATION OF ALL NON-BEARING PARTITIONS.
   C. SIZE AND LOCATION OF ALL CONCRETE CURBS, FLOOR DRAINS, SLOPES, DEPRESSED AREAS, CHANGES IN LEVEL, CHAMFERS, GROOVES, INSERTS, ETC.
   D. EXTERIOR WALL SYSTEM.
   E. SIZE AND LOCATION OF ALL FLOOR AND ROOF OPENINGS.
   F. STAIR FRAMING AND DETAILS.
   G. DIMENSIONS NOT SHOWN ON STRUCTURAL DRAWINGS.

6. SEE MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR THE FOLLOWING:

   A. PIPE RUNS, SLEEVES, HANGERS, TRENCHES, WALL, ROOF AND FLOOR OPENINGS, ETC., NOT SHOWN OR NOTED.
   B. ELECTRICAL CONDUIT RUNS, BOXES, OUTLETS IN WALLS AND SLABS.
   C. ANCHORAGE AND BRACING FOR ELECTRICAL, MECHANICAL OR PLUMBING EQUIPMENT TO THE STRUCTURE.
   D. ANCHOR BOLTS FOR MOTOR MOUNTS.
   E. SIZE, WEIGHT, AND LOCATION OF MACHINES AND EQUIPMENT BASES.

7. SPECIFICATIONS, CODES AND STANDARDS NOTED IN THE CONTRACT DOCUMENTS SHALL BE OF THE LATEST APPROVED ISSUE, INCLUDING SUPPLEMENTS, UNLESS OTHERWISE NOTED. MATERIAL SPECIFICATIONS ARE ASTM LATEST EDITION.

8. CONSTRUCTION MATERIALS SHALL BE SPREAD OUT IF PLACED ON FRAMED FLOORS OR ROOFS. LOAD SHALL NOT EXCEED THE DESIGN LIVE LOAD PER SQUARE FOOT. PROVIDE ADEQUATE SHORING AND/OR BRACING WHERE STRUCTURE HAS NOT ATTAINED DESIGN STRENGTH OR WHERE OVERLOAD IS ANTICIPATED.

9. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION. THE ARCHITECT SHALL BE NOTIFIED OF ANY DISCREPANCIES OR INCONSISTENCIES.

10. NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS. WHERE NOTES AND DETAILS ON DRAWINGS AND THESE GENERAL NOTES AND TYPICAL DETAILS ARE IN CONFLICT WITH THE PROJECT SPECIFICATIONS, THE MOST STRINGENT SHALL APPLY. CONDITIONS NOT SPECIFICALLY SHOWN SHALL BE CONSTRUCTED AS SHOWN FOR SIMILAR WORK.

11. MECHANICAL AND ELECTRICAL LOADS MAY BE SUPPORTED FROM BEAMS. LIGHT MECHANICAL AND ELECTRICAL LOADS ANCHORED INTO METAL DECK ASSEMBLY MUST BE ANCHORED INTO STRUCTURAL CONCRETE ABOVE. SEE STEEL DECKING NOTES AND DETAILS IF NO CONCRETE EXISTS.

12. STAIR FRAMING AND DESIGN-BUILD ELEMENTS, WHEN NOT SPECIFICALLY DETAILED ON THE STRUCTURAL OR ARCHITECTURAL DRAWINGS, SHALL BE THE DESIGN RESPONSIBILITY OF THE CONTRACTOR AND MAY BE SUPPORTED BY THE PRIMARY STRUCTURE. CONTRACTOR SHALL PROVIDE AND INSTALL ALL ANCILLARY MEMBERS INCLUDING BUT NOT LIMITED TO BEAMS, COLUMNS, POSTS, FOOTINGS, STIFFENERS, GUSSETS, KICKERS, BRACES, ETC., AND THE ATTENDANT CONNECTIONS, AS REQUIRED BY THE STRUCTURAL ENGINEER OF RECORD, TO SUPPORT LOADS IMPOSED BY THE STAIR FRAMING AND DESIGN-BUILD ELEMENTS ON THE PRIMARY STRUCTURE. DESIGN & DETAILING OF THESE ELEMENTS SHALL BE DEVELOPED AND STAMPED BY A LICENSED ENGINEER IN THE STATE OF CALIFORNIA. CONTRACTOR SHALL SUBMIT THE DESIGN TO THE STRUCTURAL ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO START FABRICATION. DESIGN-BUILD ELEMENTS & THEIR SUPPORT SHALL BE DESIGNED TO AVOID IMPOSING TORSIONAL AND HORIZONTAL LOADS ONTO THE PRIMARY STRUCTURE. SPECIAL STAIR FRAMING SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE STRICTLY ADHERED TO BY THE CONTRACTOR.

13. THE CONTRACT DOCUMENTS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL NOT INCLUDE INSPECTION OF THE ABOVE ITEMS.

14. OPENINGS, POCKETS, ETC. SHALL NOT BE PLACED IN STRUCTURAL MEMBERS UNLESS SPECIFICALLY DETAILED ON THE STRUCTURAL DRAWINGS. NOTIFY THE STRUCTURAL ENGINEER WHEN DRAWINGS BY OTHERS SHOW OPENINGS, POCKETS, ETC., LARGER THAN 6 INCHES NOT SHOWN ON THE STRUCTURAL DRAWINGS, BUT WHICH ARE LOCATED IN STRUCTURAL MEMBERS.

15. THE CONTRACTOR SHALL INVESTIGATE SITE FOR FILLED EXCAVATIONS OR BURIED STRUCTURES SUCH AS CESSPOOLS, CISTERNS, FOUNDATIONS, ETC. IF ANY SUCH STRUCTURES ARE FOUND, ARCHITECT SHALL BE NOTIFIED IMMEDIATELY.

16. DESIGN LIVE LOADS:

AREA	DESIGN LIVE LOAD	REMARKS
EXTERIOR AT GRADE (PUBLIC PLAZA)	150 PSF	UNREDUCED
TYPICAL OFFICE AND CLASSROOMS	100 PSF (80+20)	REDUCIBLE
STAIRS/CORRIDORS/PUBLIC AREAS (BASEMENT AND LEVEL 1)	150 PSF	UNREDUCED
STAIRS/CORRIDORS/PUBLIC AREAS (LEVELS 2 AND 3)	100 PSF	REDUCED
AUDITORIUM AND LIBRARY	150 PSF	UNREDUCED
MECHANICAL PENTHOUSE	150 PSF +PADS (WHERE OCCURS)	UNREDUCED
MECHANICAL ROOMS	150 PSF +PADS	UNREDUCED
LIGHT STORAGE	150 PSF	UNREDUCED
ROOF	50 PSF	REDUCIBLE

17. CODE LEVEL DESIGN LATERAL LOAD CRITERIA

    OCCUPANCY CATEGORY = III

    WIND: ZONE = 85 MPH
    EXPOSURE = B
    Iw = 1.15
    INTERNAL PRESSURE=0.18 FOR ENCLOSED STRUCTURE
    COMPONENTS & CLADDING WIND PRESSURE= 35 PSF

    SEISMIC:
    SITE SOIL PROFILE TYPE = B
    I = 1.25 S_{DS} = 0.84
    Ss = 1.26 S_{D1} = 0.32
    S_1 = 0.48 OCC CAT=III
    SDC = D
    R = 8 SMRF (ABOVE LEVEL 2)
    R = 5 SPECIAL CONCRETE SHEAR WALL (LEVEL 2 AND BELOW)
    Cs = 0.038
    SEISMIC DESIGN BASE SHEAR= 0.038 BLDG DEAD LOAD
    ANALYSIS PROCEDURE USED= MODAL RESPONSE SPECTRUM ANALYSIS. (ASCE7-05 SECTION 12.9)
    V=7301.5 KIPS

DEFERRED APPROVAL

1. THE CONTRACTOR AT HIS EXPENSE, SHALL PROVIDE DESIGN AND DETAILS OF FRAMING ANCHORAGE PREPARED BY CALIFORNIA REGISTERED CIVIL ENGINEER FOR BUILDING DEPARTMENT. ARCHITECT AND STRUCTURAL ENGINEER'S APPROVAL FOR THE FOLLOWING:

   "EXTERIOR METAL STUDS"
   "ROOF STACKS"

   THE DESIGN SHALL CONFORM TO THE 2007 CALIFORNIA BUILDING CODE. SEE SPECIFICATION, ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL ITEMS NOT COVERED IN THE ABOVE LIST. ANY REQUIRED MODIFICATION TO BUILDING STRUCTURE SHALL BE PAID BY THE CONTRACTOR.

ZIMMER · GUNSUL · FRASCA ARCHITECTS · LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ___ FLS ___ SS ___
DATE SEP 0 3 2009

Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
GENERAL NOTES

REGISTERED PROFESSIONAL ENGINEER
KURTIS J. CLANDENING
No. S 3926
EXP. 6/30/11
STRUCTURAL
STATE OF CALIFORNIA
10/23/09

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S1.01

INSPECTION / TESTING

1. AN INDEPENDENT TESTING AGENCY AND SPECIAL INSPECTORS SHALL BE RETAINED BY THE OWNER TO PERFORM THE TESTS AND INSPECTION AS REQUIRED BY SECTION 1704 OF THE CALIFORNIA BUILDING CODE. THE CONTRACTOR SHALL PROVIDE ACCESS TO THE SPECIAL INSPECTOR TO THE SITE OR FABRICATION SHOPS AND SHALL FURNISH SAMPLES OF MATERIALS FOR TESTING AS REQUESTED BY THE TESTING AGENCY AND THE GOVERNING CODE. CONTRACTOR TO PROVIDE TESTS PER CBC SECTION 1708.

2. IF INITIAL TESTS OR INSPECTIONS MADE BY THE OWNER'S TESTING AGENCY REVEAL THAT ANY PORTION OF THE WORK DOES NOT COMPLY WITH THE CONTRACT DOCUMENTS, ADDITIONAL TESTS, INSPECTIONS, AND NECESSARY REPAIRS WILL BE MADE AT THE CONTRACTOR'S EXPENSE.

3. PROVIDE CONTINUOUS OR PERIODIC SPECIAL INSPECTION FOR ITEMS NOTED IN "TEST AND INSPECTION LIST", AS REQUIRED PER THE CHAPTER 17 OF THE CALIFORNIA BUILDING CODE AND ALL APPLICABLE AMENDMENTS:

4. PROVIDE SPECIAL INSPECTION AT FABRICATION PLANT PER CBC SECTION 1704.2. SPECIAL INSPECTIONS ARE NOT BE REQUIRED WHEN THE WORK IS DONE ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED BY THE BUILDING OFFICIAL OR GOVERNING AGENCY HAVING JURISDICTION OVER THE PROJECT TO PERFORM SUCH WORK WITHOUT SPECIAL INSPECTION PER CBC 1704.2.2.

5. EACH CONTRACTOR RESPONSIBLE FOR THE CONSTRUCTION OF A MAIN WIND OR SEISMIC FORCE RESISTING SYSTEM ELEMENT SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY TO THE BUILDING OFFICIAL AND TO THE OWNER'S REPRESENTATIVE, PRIOR TO THE COMMENCEMENT OF THE WORK ON THE SYSTEM OR COMPONENT. REFER TO CBC SECTIONS 1705.3 AND 1707. FOR SPECIFIC COMPONENTS REQUIRING SPECIAL INSPECTION. THE CONTRACTOR'S STATEMENT OF RESPONSIBILITY SHALL CONTAIN THE FOLLOWING INFORMATION:
   A. ACKNOWLEDGEMENT OF AWARENESS OF THE SPECIAL REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS.
   B. ACKNOWLEDGEMENT THAT CONTROL WILL BE EXERCISED TO OBTAIN CONFORMANCE WITH THE CONSTRUCTION DOCUMENTS APPROVED BY THE BUILDING OFFICIAL.
   C. PROCEDURES FOR EXERCISING CONTROL WITHIN THE CONTRACTOR'S ORGANIZATION, THE METHOD AND FREQUENCY OF REPORTING AND DISTRIBUTION OF THE REPORTS.
   D. IDENTIFICATION AND QUALIFICATIONS OF THE PERSONS EXERCISING SUCH CONTROL AND THEIR POSITIONS IN THE ORGANIZATION.

6. SPECIAL INSPECTIONS FOR THE STRUCTURAL STEEL PORTIONS OF THE LATERAL FORCE RESISTING SYSTEM SHALL ALSO COMPLY WITH THE REQUIREMENTS OF AISC 341.

7. NON-DESTRUCTIVE WELD TESTING: ULTRASONIC TESTING IS REQUIRED FOR ALL (100%) PARTIAL AND COMPLETE PENETRATION WELDS. TESTING SHALL BE PERFORMED 24 HOURS OR MORE AFTER COMPLETION OF WELDING. WELD BACKING REMOVAL AREAS AND FILLET WELDS SHALL BE SUBJECTED TO MAGNETIC PARTICLE EXAMINATION.

8. BASE METAL THICKER THAN 1-1/2", SUBJECTED TO THROUGH THICKNESS WELD SHRINKAGE STRAINS, SHALL BE ULTRASONICALLY TESTED DIRECTLY BEHIND SUCH WELDS 48 HOURS OR MORE AFTER COMPLETION OF WELDING.

9. TEST BY CALIBRATED TORQUE WRENCH A MINIMUM OF ONE (1) HIGH STRENGTH BOLT AT EACH SHEAR CONNECTION. A MINIMUM OF TWO (2) BOLTS PER CONNECTION FOR CONNECTION WITH 8 BOLTS OR MORE AND A MINIMUM OF 2 BOLTS PER FRAME BEAM SHEAR CONNECTION.

10. TEST A MINIMUM OF 10% OF FILLET WELDS BY MAGNETIC PARTICLE (ASTM 109 METHOD). TEST A MINIMUM OF 25% OF CONTINUITY PLATE FILLET WELDS AND BEAM FILLET WELDS (100% IN MOMENT ZONES) BY MAGNETIC PARTICLE.

11. ALL HEAVY SECTION COLUMN FLANGES LOCATED AT WELDED MOMENT CONNECTIONS SHALL BE ULTRASONICALLY EXAMINED, PRIOR TO WELDING, FOR EVIDENCE OF LAMINATIONS, INCLUSIONS OR OTHER DISCONTINUITIES. TESTING SHALL BE IN ACCORDANCE WITH ASTM A435 (STRAIGHT BEAM ULTRASONIC EXAMINATION OF STEEL PLATES), OR ASTM A898 (STRAIGHT BEAM ULTRASONIC EXAMINATION OF ROLLED STEEL STRUCTURAL SHAPES) AS APPLICABLE. THE AREA TO BE TESTED IS A ZONE 6 IN. ABOVE AND BELOW EACH BEAM FLANGE CONNECTION. FOR PLATES, ANY DISCONTINUITY CAUSING A TOTAL LOSS OF BACK REFLECTION THAT CANNOT BE CONTAINED WITHIN A CIRCLE 3 INCHES IN DIAMETER, OR ONE-HALF THE PLATE THICKNESS, WHICHEVER IS GREATER, SHALL BE REJECTED. FOR SHAPES, ASTM 898 LEVEL I CRITERIA IS APPLICABLE.

12. APPROVAL BY THE INSPECTOR OF MATTERS NOT SPECIFICALLY CONSTRUCTED PER THE APPROVED DRAWINGS DOES NOT MEAN THE FAILURE TO COMPLY WITH THE CONSTRUCTION DOCUMENTS HAS BEEN ACCEPTED. ANY DETAIL THAT FAILS TO BE CLEAR OR IS AMBIGUOUS MUST BE REFERRED TO THE STRUCTURAL ENGINEER FOR INTERPRETATION OR CLARIFICATION.

13. INSPECTION AND TESTING REPORTS SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER WITHIN SEVEN DAYS OF WHEN THE INSPECTION WAS MADE OR WHEN THE TESTING WAS PERFORMED.

14. THE STRUCTURAL ENGINEER SHALL BE NOTIFIED IMMEDIATELY OF ANY INSPECTION OR TESTING WHICH DOES NOT COMPLY WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

15. PROVIDE SPECIAL INSPECTIONS AND STATEMENTS OF INSPECTIONS PER CBC SECTIONS 1705, 1707 AND 1708.

TEST AND INSPECTION LIST

STRUCTURAL STEEL					
X	REVIEW MILL CERTIFICATE, TEST REPORTS AND MATERIAL IDENTIFICATION DELIVERED TO THE SITE				
C	REVIEW WELDING PROCEDURE SPECIFICATION & WELDER CERTIFICATION				
P	INSTALLATION OF NON-SLIP CRITICAL HIGH-STRENGTH BOLTS & WASHERS (PROVIDE CONTINUOUS INSPECTION IF INSTALLATION IS PERFORMED WITH CALIBRATED WRENCH)				
C	INSTALLATION OF SLIP CRITICALHIGH-STRENGTH BOLTS & WASHERS				
P	FIELD ERECTION INSPECTION				
X	FABRICATION INSPECTION	P	SHOP	P	FIELD
X	WELDING INSPECTION	C	SHOP	C	FIELD
X	NON-DESTRUCTIVE WELD TEST	X	SHOP	X	FIELD
X	BOLTING INSPECTION	X	SHOP	X	FIELD
P	COMPOSITE STUD INSPECTION & TESTING				
P	STEEL JOIST INSTALLATION INSPECTION				
C	INSTALLATION OF ANCHOR BOLTS BEFORE & DURING CONCRETE POUR				

METAL DECK					
X	REVIEW MILL CERTIFICATES & TEST REPORTS				
P	PLACEMENT INSPECTION				
P	WELDING & FASTENING INSPECTION				

REINFORCING STEEL					
X	REVIEW MILL CERTIFICATES & TEST REPORTS				
X	SAMPLE & TEST	X	REINFORCING BARS	X	WELDED WIRE FABRIC
P	PLACEMENT INSPECTION				
C	WELDING INSPECTION				
P	TEST REINFORCING FOR WELDABILITY OTHER THAN ASTM A706				

CONCRETE, SHOTCRETE, CMU, GROUT & MORTAR

CONCRETE		CMU	GROUT	MORTAR	
X		X	X	X	MIX DESIGN REVIEW
X		X	X	X	VERIFICATION OF CORRECT MIX DESIGN USED DURING POUR
X		C	X		PREPARATION OF SAMPLES FOR TESTING PURPOSES
X					BATCH PLANT INSPECTIONS
C		C	X		CAST, PICK-UP, AND COMPRESSION TEST SAMPLES
C					SLUMP, ENTRAINED AIR, & TEMPERATURE TEST
X					SHRINKAGE TEST
C		C	C	P	PLACEMENT INSPECTION
P		P			CURING TEMPERATURE AND TECHNIQUES
P					FORMWORK INSPECTION

MISCELLANEOUS	
C	MECHANICAL ANCHORS
C	ADHESIVE OR GROUTED ANCHORS AND DOWELS
C	BOLTS CAST IN CONCRETE OR MASONRY
C	COLD FORM METAL FRAMING INSTALLATION AND WELDING

NOTES:
C: INDICATES CONTINUOUS INSPECTION
P: INDICATES PERIODIC INSPECTION
X: INDICATES REQUIRED INSPECTION

DOWELS IN EXISTING CONCRETE

1. DOWELS IN EXISTING CONCRETE SHALL BE EPOXY GROUTED WITH HILTI HIT RE500 INJECTION ADHESIVE ANCHOR ICC ES REPORT NO. ESR1682 OR APPROVED EQUAL.

2. THE HOLE DIAMETER IN EXISTING CONCRETE SHALL BE DRILLED WITH A BIT COMPLYING WITH ANSI STANDARD B212.15-1994 TO THE SPECIFIED DIAMETER AND DEPTH LISTED IN THE ICC ES REPORT AND MANUFACTURER RECOMMENDATIONS.

3. THE HOLE MUST BE CLEANED USING COMPRESSED AIR AND A NYLON BRUSH.

4. THE CONTRACTOR SHALL FOLLOW ALL RECOMMENDATIONS BY MANUFACTURER DURING EPOXY GROUTING.

5. THE FOLLOWING MINIMUM EMBEDMENT OF GRADE 60 REINFORCING INTO HARD ROCK CONCRETE OR SOLID GROUTED MASONRY SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE:

REBAR SIZE	MIN. EMBEDMENT	MIN. SPACING REBAR SPACING
#3	3"	2"
#4	5"	2"
#5	6"	3"
#6	7"	4"
#7	8"	4"
#8	9"	5"
#9	10"	5"

REFER TO ICC ES REPORT FOR EMBED DEPTHS AT SPACING LESS THAN NOTED.

MASONRY (CONCRETE BLOCK)

1. CONCRETE BLOCK SHALL BE HOLLOW LOAD-BEARING CONCRETE MASONRY UNITS CONFORMING TO C90 GRADE N, MEDIUM WEIGHT. USE OPEN END UNITS FOR ALL EXTERIOR WALLS, AND BOND BEAM UNITS AT HORIZONTAL REINFORCING.

2. CEMENT SHALL BE AS SPECIFIED FOR CONCRETE.

3. MORTAR MIX SHALL CONFORM TO REQUIREMENTS FOR TYPE S AND PROJECT SPECIFICATIONS. MORTAR SHALL ATTAIN A COMPRESSIVE STRENGTH OF 1900 PSI AT 28 DAYS. ADMIXTURE SHALL BE SIKA RED LABEL.

4. GROUT SHALL CONFORM TO REQUIREMENTS FOR COARSE GROUT. GROUT SHALL ATTAIN A COMPRESSIVE STRENGTH OF 2,000 PSI AT 28 DAYS. ADMIXTURE SHALL BE SIKA GROUT AID.

5. ADMIXTURES SHALL BE ADDED TO MORTAR OR GROUT RESPECTIVELY PER MANUFACTURER'S RECOMMENDATIONS.

6. PROVIDE A MINIMUM OF ONE BAR DIAMETER (1/2 INCH MINIMUM) GROUT BETWEEN MAIN REINFORCING AND MASONRY UNITS.

7. LOW-LIFT CONSTRUCTION; MAXIMUM GROUT POUR HEIGHT IS 5 FEET.

8. HIGH-LIFT GROUTED CONSTRUCTION MAY BE USED IN CONFORMANCE WITH CHAPTER 24 OF THE GOVERNING CODE.

9. ALL CELLS IN CONCRETE BLOCKS SHALL BE FILLED SOLID WITH GROUT, UNLESS NOTED OTHERWISE.

10. CELLS SHALL BE IN VERTICAL ALIGNMENT. DOWELS IN FOOTINGS SHALL BE SET TO ALIGN WITH CORES CONTAINING REINFORCING STEEL.

11. REFER TO ARCHITECTURAL DRAWING FOR SURFACE AND HEIGHT OF UNITS, LAYING PATTERN AND JOINT TYPE.

12. ASSUMED ULTIMATE COMPRESSIVE STRENGTH OF COMPLETED MASONRY WALL IS 1500 PSI U.N.O.

PRIMARY STRUCTURE DEFLECTION

1. CODE LEVEL DESIGN SEISMIC LOAD DEFLECTIONS.

SEISMIC LATERAL DISPLACEMENT

LEVEL	E-W		N-S	
	δxe(IN)	δx(IN)	δxe(IN)	δx(IN)
ROOF	1.9	8.4	2.1	9.3
6TH FLR	1.65	7.2	1.7	8
5TH FLR	1.2	5.3	1.4	6
4TH FLR	.8	3.5	.95	4.15
3RD FLR	.4	1.75	.45	2
2ND FLR	–	–	–	–

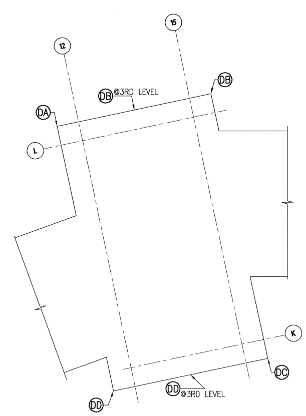
2. TYPICAL MAXIMUM VERTICAL DEFLECTIONS OF PERIMETER BEAMS ARE $\Delta_{DL}=1"$ $\Delta_{LL}=\frac{1}{2}"$ UNO IN ITEM 3.

3. GRAVITY DEFLECTION AT CURTAIN WALL.

DEFLECTION SCHEDULE

LEVEL	DA			DB			DC			DD		
	Δ_{DL} (IN)	Δ_{LL} (IN)	Δ_{TL} (IN)	Δ_{DL} (IN)	Δ_{LL} (IN)	Δ_{TL} (IN)	Δ_{DL} (IN)	Δ_{LL} (IN)	Δ_{TL} (IN)	Δ_{DL} (IN)	Δ_{LL} (IN)	Δ_{TL} (IN)
ROOF	-0.60	-0.12	-0.76	-1.06	-014	-1.27	-0.84	-0.17	-1.06	-1.33	-0.15	-1.49
6TH FLR	-0.67	-0.39	-1.10	-1.05	-0.41	-1.56	-0.72	-0.38	-1.14	-0.92	-0.35	-1.35
5TH FLR	-1.08	-0.49	-1.57	-1.23	-0.41	-1.55	-0.72	-0.38	-1.16	-1.02	-0.39	-1.50
4TH FLR	-0.59	-0.41	-1.04	-0.79	-0.42	-1.28	-0.73	-0.39	-1.18	-0.99	-0.41	-1.54
3RD FLR	-0.94	-0.33	-1.29	-0.02	-0.27	-0.89	-0.71	-0.36	-1.14	+0.03	-0.22	-0.74
2ND FLR	–	–	–	–	–	–	–	–	–	–	–	–

(-) INDICATES DOWNWARD DEFLECTION
(+) INDICATES UPWARD DEFLECTION
Δ_{DL} DEFLECTION DUE TO SUPERIMPOSED DEAD LOAD ONLY, NEGLECTING THE EFFECTS OF WEIGHT OF DECK AND FRAMING MEMBERS.
Δ_{LL} DEFLECTION DUE TO LIVE LOAD ONLY.
Δ_{TL} DEFLECTION DUE TO LIVE LOAD, SUPERIMPOSED DEAD LOAD, AND SELF WEIGHT OF THE DECK AND FRAMING MEMBERS.



PLAN & DEFLECTION SCHEDULE

STRUCTURAL ABBREVIATIONS

AB ANCHOR BOLT
ABV ABOVE
A&B ABOVE AND BELOW
ADDL ADDITIONAL
ADJ ADJACENT
ALT ALTERNATE
ANCH ANCHOR
& AND
ARCH ARCHITECT(URAL)
@ AT

BF BRACE FRAME
BLDG BUILDING
BLK BLOCK
BEL BELOW
BM BEAM
BOS BOTTOM OF STEEL
BOTT BOTTOM
BRG BEARING
BTWN BETWEEN
BU BUILT-UP
BUB BACK-UP BAR

CAMB (C) CAMBER(ED)
CG CENTER OF GRAVITY
CIP CAST IN PLACE
CJ CONSTRUCTION JOINT
CJP, CP COMPLETE JOINT PENETRATION
CL(℄) CENTERLINE
CLG CEILING
CLR CLEAR
CMU CONCRETE MASONRY UNIT
COL COLUMN
CONC CONCRETE
CONN CONNECTION
CONT CONTINUOUS
CS COLUMN STRIP
CRC COLD ROLLED CHANNEL
CTR CENTER(ED)
CTRSK COUNTERSINK
C-C CENTER TO CENTER

DBL DOUBLE
DET DETAIL
DIA(Ø) DIAMETER
DIAG DIAGONAL
DIM DIMENSION
DN DOWN
DO DITTO (REPEAT)
DP DEEP
DWG DRAWING
DWLS DOWELS

EA EACH
EBF ECCENTRIC BRACE FRAME
EF EACH FACE
EJ EXPANSION JOINT
ELEC ELECTRICAL
EL ELEVATION
ELEV ELEVATION OR ELEVATOR
EMBED EMBEDMENT
EQ EQUAL
EQUIP EQUIPMENT
ES EACH SIDE
EW EACH WAY
EWEF EACH WAY, EACH FACE
EXIST(E) EXISTING
EXP EXPANSION
EXT EXTERIOR

FIN FINISH(ED)
FLR FLOOR
FDN FOUNDATION
FLG FLANGE
FOB FACE OF BLOCK OR BRICK
FOC FACE OF CONCRETE

FOS FACE OF STUDS
FMG FRAMING
FS FAR SIDE
FT FOOT
FTG FOOTING

GA GAGE
GALV GALVANIZED
GB GRADE BEAM
GL GRID LINE

HGR HANGER
HI HIGH
HI&LO HIGH AND LOW
HORIZ HORIZONTAL
HP HIGH POINT
HSB HIGH STRENGTH BOLT
HS HIGH STRENGTH
HT HEIGHT

ID INSIDE DIAMETER
IF INSIDE FACE
IN INCH
INFO INFORMATION
INT INTERIOR

JT JOINT

KSI KIP PER SQUARE INCH

LBS POUNDS
LLBB LONG LEG BACK-BACK
LLH LONG LEG HORIZONTAL
LLV LONG LEG VERTICAL
LO LOW
LONG LONGITUDINAL
LP LOW POINT
LT WT LIGHT WEIGHT
LVL LEVEL (FLOOR)

MAX MAXIMUM
MB MACHINE BOLT
MECH MECHANICAL
MEZZ MEZZANINE
MFR MANUFACTURER
MI MIDDLE
MIN MINIMUM
MISC MISCELLANEOUS
MTL METAL
MS MIDDLE STRIP

(N) NEW
NIC NOT IN CONTRACT
NO (#) NUMBER
NS NEAR SIDE
NTS NOT TO SCALE
NORM WT NORMAL WEIGHT

OC ON CENTER
OD OUTSIDE DIAMETER
OF OUTSIDE FACE
OH OPPOSITE HAND
O-O OUT TO OUT
OPNG OPENING

PARA PARALLEL
P/C PRECAST
PERP PERPENDICULAR
PJP, PP PARTIAL JOINT PENETRATION
PL (℘) PLATE
PLCS PLACES
PSF POUNDS PER SQUARE FOOT
PSI POUNDS PER SQUARE INCH
P/T POSTTENSIONED (PRESTRESSED)
PENTR PENETRATION

RAD (R) RADIUS
REF REFERENCE
REQD REQUIRED
REINF REINFORCEMENT(ING)

SC SLIP CRITICAL
SECT SECTION
SEP SEPARATION
SCHED SCHEDULE
SIM SIMILAR
SHT SHEET
SLBB SHORT LEG BACK-BACK
SLV SHORT LEG VERTICAL
SMS SHEET METAL SCREWS
SOG SLAB ON GRADE
SPECS SPECIFICATIONS
SP SPACE (S)
SQ SQUARE
SSC SINGLE SHEAR CONNECTION
STAGG STAGGER(ED)
STD STANDARD
STIFF STIFFENER
STIRR STIRRUPS
STL STEEL
STRUC STRUCTURAL
SYMM SYMMETRICAL

T&B TOP AND BOTTOM
T&G TONGUE AND GROOVE
TEMP TEMPORARY
THK THICK(NESS)
THRD THREADED
THRU THROUGH
TP TOP OF PARAPET
TRANS TRANSVERSE
TOC TOP OF CONCRETE
TOD TOP OF DECK (STEEL)
TOS TOP OF STEEL
TSG TAPERED STEEL GIRDER
TOW TOP OF WALL
TYP TYPICAL

UNO UNLESS NOTED OTHERWISE

VERT VERTICAL

W/ WITH
WBS WELDED BEAM SEAT
WP WORK POINT
WPJ WEAKENED PLANE JOINT
WS WELDED STUDS
WT WEIGHT
WWF WELDED WIRE FABRIC

ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC FLS SS
DATE SEP 03 2009

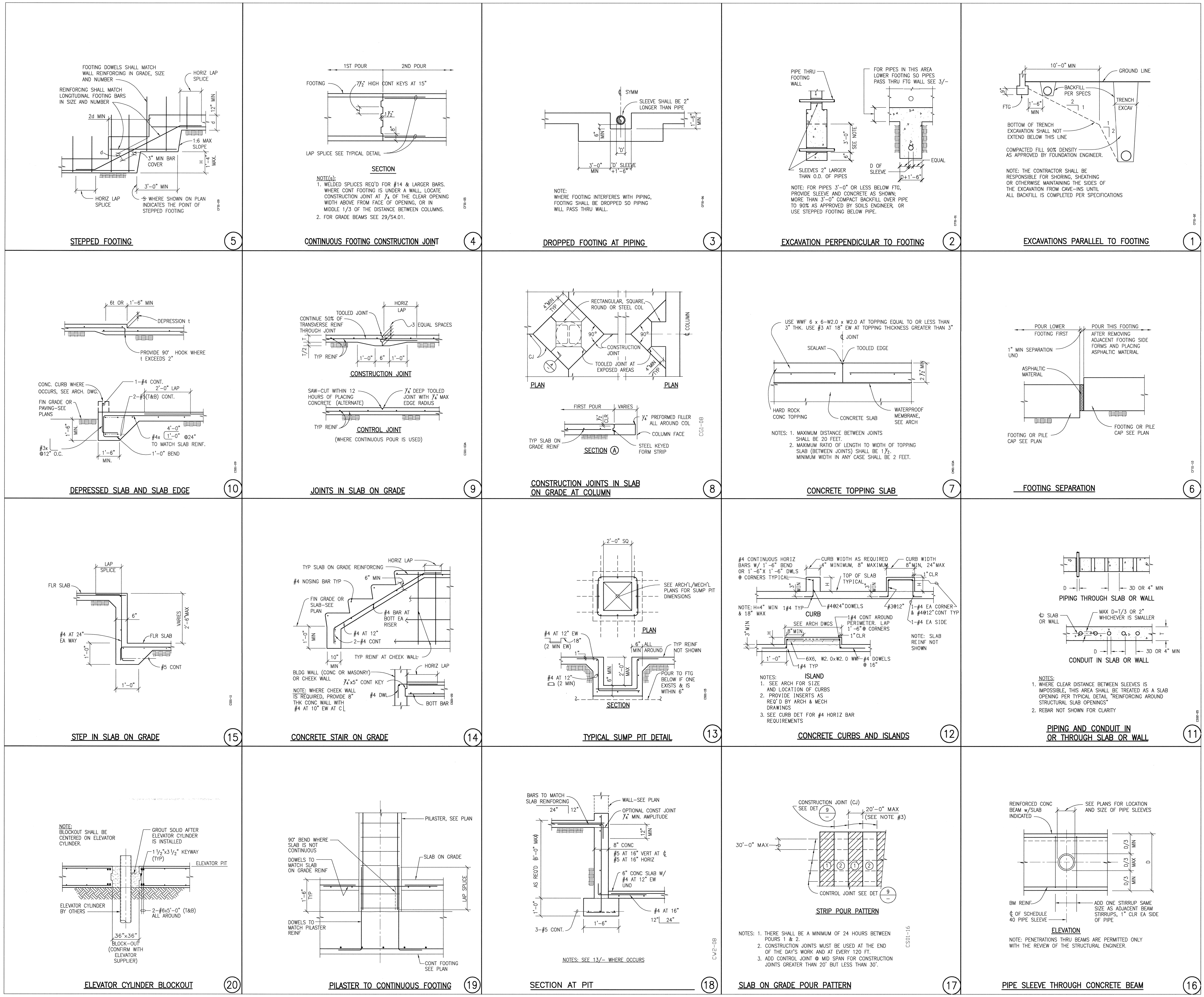
Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
GENERAL NOTES

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S1.02


STEPPED FOOTING 5
CONTINUOUS FOOTING CONSTRUCTION JOINT 4
NOTE(s):
1. WELDED SPLICES REQ'D FOR #14 & LARGER BARS. WHERE CONT FOOTING IS UNDER A WALL, LOCATE CONSTRUCTION JOINT AT ¼ OF THE CLEAR OPENING WIDTH ABOVE FROM FACE OF OPENING, OR IN MIDDLE 1/3 OF THE DISTANCE BETWEEN COLUMNS.
2. FOR GRADE BEAMS SEE 29/S4.01.
DROPPED FOOTING AT PIPING 3
NOTE: WHERE FOOTING INTERFERES WITH PIPING, FOOTING SHALL BE DROPPED SO PIPING WILL PASS THRU WALL.
EXCAVATION PERPENDICULAR TO FOOTING 2
NOTE: FOR PIPES 3'-0" OR LESS BELOW FTG, PROVIDE SLEEVE AND CONCRETE AS SHOWN; MORE THAN 3'-0" COMPACT BACKFILL OVER PIPE TO 90% AS APPROVED BY SOILS ENGINEER, OR USE STEPPED FOOTING BELOW PIPE.
EXCAVATIONS PARALLEL TO FOOTING 1
NOTE: THE CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING, SHEATHING OR OTHERWISE MAINTAINING THE SIDES OF THE EXCAVATION FROM CAVE-INS UNTIL ALL BACKFILL IS COMPLETED PER SPECIFICATIONS
DEPRESSED SLAB AND SLAB EDGE 10
JOINTS IN SLAB ON GRADE 9
CONSTRUCTION JOINTS IN SLAB ON GRADE AT COLUMN 8
CONCRETE TOPPING SLAB 7
NOTES: 1. MAXIMUM DISTANCE BETWEEN JOINTS SHALL BE 20 FEET.
2. MAXIMUM RATIO OF LENGTH TO WIDTH OF TOPPING SLAB (BETWEEN JOINTS) SHALL BE 1½. MINIMUM WIDTH IN ANY CASE SHALL BE 2 FEET.
FOOTING SEPARATION 6
STEP IN SLAB ON GRADE 15
CONCRETE STAIR ON GRADE 14
TYPICAL SUMP PIT DETAIL 13
CONCRETE CURBS AND ISLANDS 12
NOTES:
1. SEE ARCH FOR SIZE AND LOCATION OF CURBS
2. PROVIDE INSERTS AS REQ'D BY ARCH & MECH DRAWINGS
3. SEE CURB DET FOR #4 HORIZ BAR REQUIREMENTS
PIPING AND CONDUIT IN OR THROUGH SLAB OR WALL 11
NOTES:
1. WHERE CLEAR DISTANCE BETWEEN SLEEVES IS IMPOSSIBLE, THIS AREA SHALL BE TREATED AS A SLAB OPENING PER TYPICAL DETAIL "REINFORCING AROUND STRUCTURAL SLAB OPENINGS"
2. REBAR NOT SHOWN FOR CLARITY
ELEVATOR CYLINDER BLOCKOUT 20
NOTE: BLOCKOUT SHALL BE CENTERED ON ELEVATOR CYLINDER.
PILASTER TO CONTINUOUS FOOTING 19
SECTION AT PIT 18
NOTES: SEE 13/– WHERE OCCURS
SLAB ON GRADE POUR PATTERN 17
NOTES: 1. THERE SHALL BE A MINIMUM OF 24 HOURS BETWEEN POURS 1 & 2.
2. CONSTRUCTION JOINTS MUST BE USED AT THE END OF THE DAY'S WORK AND AT EVERY 120 FT.
3. ADD CONTROL JOINT @ MID SPAN FOR CONSTRUCTION JOINTS GREATER THAN 20' BUT LESS THAN 30'.
PIPE SLEEVE THROUGH CONCRETE BEAM 16
NOTE: PENETRATIONS THRU BEAMS ARE PERMITTED ONLY WITH THE REVIEW OF THE STRUCTURAL ENGINEER.

ZGF ZIMMER GUNSUL FRASCA ARCHITECTS LLP

Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York

515 South Flower Street, Suite 3700
Los Angeles, California 90071

(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 0 3 2009

Revisions

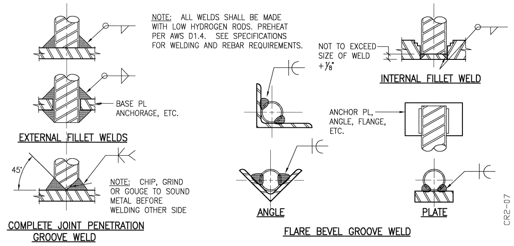
BID DOCUMENTS	10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

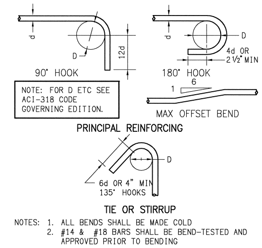
Drawing Title
TYPICAL DETAILS

Date:	OCTOBER 23, 2009
Job No:	L40302.05
Drawn By:	
Checked By:	

Drawing No.
S1.03



REINFORCING BAR WELDS – BAR TO PLATE OR STEEL SHAPE (4)



NOTES:
1. ALL BENDS SHALL BE MADE COLD
2. #14 & #18 BARS SHALL BE BEND-TESTED AND APPROVED PRIOR TO BENDING

BAR BENDS (3)

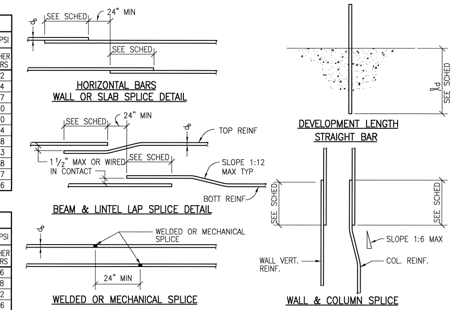
TENSION DEVELOPMENT LENGTH SCHEDULE (ℓ_d)

BAR SIZE	f'c=3000 PSI		f'c=4000 PSI		f'c=5000 PSI		f'c=6000 PSI		f'c=7000 PSI		f'c=8000 PSI	
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
#3	22	17	19	15	17	13	15	12	14	12	13	12
#4	29	22	25	19	22	17	20	16	19	15	18	14
#5	36	28	31	24	28	22	25	20	24	18	22	17
#6	43	33	37	29	33	26	31	24	28	22	26	20
#7	63	48	54	42	49	37	44	34	41	32	38	30
#8	72	55	62	48	55	43	51	39	47	36	44	34
#9	81	62	70	54	63	48	57	44	53	41	49	38
#10	91	70	79	61	70	54	64	49	59	46	56	43
#11	101	78	87	67	78	60	71	55	66	51	62	48
#14	121	93	105	81	94	72	86	66	79	61	74	57
#18	161	124	139	107	125	96	114	88	106	81	99	76

BAR SPLICE LENGTH SCHEDULE

BAR SIZE	f'c=3000 PSI		f'c=4000 PSI		f'c=5000 PSI		f'c=6000 PSI		f'c=7000 PSI		f'c=8000 PSI	
	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS	TOP BARS	OTHER BARS
#3	28	22	24	19	22	17	20	16	18	16	17	16
#4	37	29	32	25	29	22	26	20	25	19	23	18
#5	47	36	40	31	36	28	33	25	31	24	29	22
#6	56	43	48	37	43	33	40	31	37	28	34	26
#7	81	63	70	54	63	49	58	44	53	41	50	38
#8	93	72	80	62	72	55	66	51	61	47	57	44
#9	105	81	91	70	81	63	74	57	69	53	64	49
#10	118	91	102	79	91	70	83	64	77	59	72	56
#11	131	101	113	87	101	78	93	71	86	66	80	62
#14	SEE NOTE #12											
#18	SEE NOTE #12											

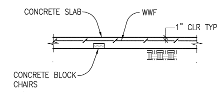
NOTES:
1. LAP SPLICES ARE SHOWN ON DWGS. WHERE NO LAP LENGTH IS SHOWN, USE THIS SCHEDULE.
2. BAR SPLICE SCHEDULE BASED ON CASE #1, LAP CLASS B
3. C-C BARS MUST BE 3.0d_b MIN BY CODE = CASE 1
4. BAR COVER ON BMS & COLS 1 1/2" + 1/2" = 2" > d_b = CASE 1 REQUIRED LAP LENGTH.



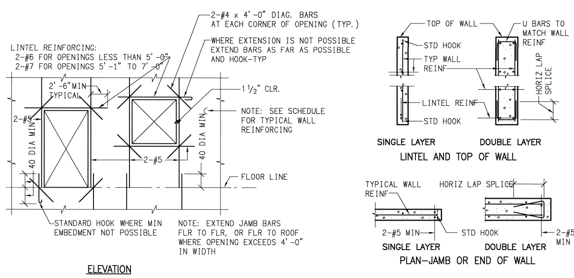
5. TABULATED VALUES ARE IN INCHES AND ARE BASED ON GRADE 60 REINFORCING (NOT COATED), NORMAL WEIGHT CONCRETE PER ACI 318-99. USE THESE VALUES ONLY WHERE LENGTHS ARE NOT INDICATED ON THE DWGS.
6. TOP BARS ARE HORIZONTAL BARS SO PLACED THAT MORE THAN 12" OF CONCRETE IS CAST IN THE MEMBER BELOW THE BAR.
7. INCREASE SCHEDULED LENGTHS BY 30% FOR LIGHTWEIGHT CONCRETE.
8. THE SMALLER BAR LAP LENGTH SHALL BE USED WHEN SPLICING DIFFERENT SIZE BARS.
9. THE CONTRACTOR, AT HIS OPTION, MAY USE A BUTT WELDED SPLICE, OR APPROVED MECHANICAL IN LIEU OF THE LAP SPLICE SHOWN-SEE TYPICAL WELDED SPLICE DETAIL.
10. ALL DETAILING AND PLACING OF REINFORCING SHALL COMPLY WITH THE PLANS AND DETAILS.
11. BUNDLED BAR SPLICES:
a. INDIVIDUAL BAR SPLICES WITHIN THE BUNDLE SHALL NOT OVERLAP EACH OTHER.
b. INCREASE LAP LENGTH 20% AT THREE BAR BUNDLES.
c. INCREASE LAP LENGTH 33% AT FOUR BAR BUNDLES
12. USE BUTT-WELDED SPLICE OR APPROVED MECHANICAL SPLICE FOR ALL #14 AND #18 BARS.

CR04-01

REGULAR WEIGHT CONCRETE REINFORCING DEVELOPMENT LENGTH & SPLICE LENGTH SCHEDULE (6)



TYPICAL SLAB ON GRADE (8)



MINIMUM REINFORCING AT CONCRETE WALL (9)

SHOTCRETE

1. SHOTCRETE MAY BE USED IN LIEU OF SINGLE SIDED CAST-IN-PLACE CONCRETE AT BASEMENT WALLS.
2. SHOTCRETING SHALL CONFORM TO ALL REQUIREMENTS OF ACI SECTION 1913, EXCEPT AS MODIFIED BY THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.
3. DEFINITIONS:

SHOTCRETE IS MORTAR OR CONCRETE PNEUMATICALLY PROJECTED AT A HIGH VELOCITY ONTO A SURFACE.

WET MIX SHOTCRETE IS SHOTCRETE IN WHICH ALL OF THE INGREDIENTS INCLUDING WATER ARE MIXED BEFORE INTRODUCTION INTO THE PLACING EQUIPMENT.

DRY MIXED SHOTCRETE DESIGNATES A MIXTURE OF PORTLAND CEMENT AND SAND - MIXED DRY, PASSED THROUGH A CEMENT GUN AND CONVEYED BY AIR THROUGH A FLEXIBLE HOSE, HYDRATED AT A NOZZLE ON THE END OF SUCH FLEXIBLE HOSE, AND DEPOSITED BY AIR PRESSURE IN ITS PLACE OF FINAL REPOSE.

4. MATERIALS:

CEMENT: ASTM C150 TYPE V, LOW ALKAI, NO FLY ASH.

AGGREGATE: ACI 506. GRADATION NO. 1 OR NO. 2, C33.

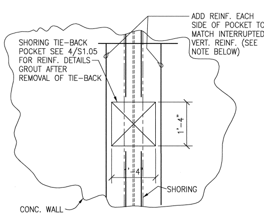
WATER: POTABLE, FRESH.

5. SHOTCRETE CONTRACTOR MUST SHOW A MINIMUM OF 5 YEARS EXPERIENCE ON BUILDING PROJECTS AND MUST BE APPROVED BY THE ARCHITECT.
6. EXISTING CONCRETE THAT IS USED AS A FORM FOR NEW CONCRETE SHALL BE CLEANED OF ALL EXISTING PLASTER OR ANY OTHER FINISH MATERIALS, SANDBLASTED OR WATERBLASTER, AND SATURATED PRIOR TO PLACING CONCRETE. THE EXISTING CONCRETE SHALL BE WETTED DAILY UNTIL THE SURFACE WILL NOT ABSORB MOISTURE. PLACEMENT OF NEW CONCRETE AGAINST THE WETTED SURFACE OF THE CONCRETE SHALL NOT BE DELAYED MORE THAN 3 DAYS AFTER THE LAST APPLICATION OF WATER TO THE WETTED SURFACE OF THE EXISTING CONCRETE.
7. "ROUGHEN", WHERE INDICATED, MEANS ROUGHENING TO FULL AMPLITUDE OF 1/4".

CONCRETE WALL REINFORCING SCHEDULE			
WALL THICKNESS	BAR SIZE & SPACING EACH MAT ~ fy = 60KSI		REMARKS
	HORIZ	VERT	
4"	#4 @ 12"	#4 @ 12"	SINGLE MAT
4 1/2" TO 6"	#4 @ 13 1/2"	#4 @ 13 1/2"	SINGLE MAT
6 1/2" TO 8"	#4 @ 12"	#4 @ 18"	SINGLE MAT
8 1/2" TO 10"	#4 @ 18"	#4 @ 18"	DOUBLE MAT
10 1/2" TO 12"	#4 @ 16"	#4 @ 18"	DOUBLE MAT
12 1/2" TO 14"	#5 @ 18"	#4 @ 18"	DOUBLE MAT
14 1/2" TO 16"	#5 @ 15"	#5 @ 18"	DOUBLE MAT
16 1/2" TO 20"	#5 @ 12"	#6 @ 12"	DOUBLE MAT

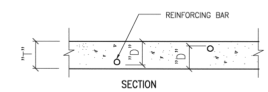
NOTES
1. THE ABOVE SHALL BE MINIMUM REINFORCING FOR ALL WALLS, SLAB OF PITS AND TRENCHES
2. SINGLE MAT REINFORCING SHALL BE IN THE CENTER OF WALL UNLESS OTHERWISE DETAILED

CONCRETE WALL MINIMUN REINFORCING SCHEDULE (15)



NOTE:
SPREAD VERT. REINF. TO EACH SIDE OF POCKET WHERE POSSIBLE, OTHERWISE, ADD REINF.

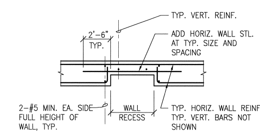
SHORING TIEBACK-POCKET DETAIL (14)



UNLESS OTHERWISE NOTED, REINFORCING SHALL BE PLACED AS SHOWN ON THE DRAWINGS WITHIN THE FOLLOWING TOLERANCE:

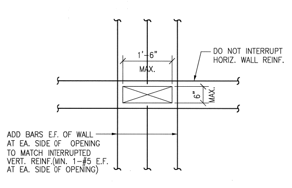
DEPTH "D" IN SLABS, JOISTS, BEAMS, WALLS, COLUMNS AND SIMILAR ELEMENTS WHERE "D" IS 24" OR LESS ——— ±1/4"
WHERE "D" IS MORE THAN 24" ——— ±1/2"
LONGITUDINAL LOCATION OF BENDS AND ENDS OF BARS ——— ±2"
EXCEPT THAT SPECIFIED CONCRETE COVER AT ENDS OF MEMBERS SHALL NOT BE REDUCED.
FABRICATED DIMENSIONS OF TIES, STIRRUPS AND SPIRALS ——— 0"-1/4"
OFFSET DIMENSIONS IN BENT BARS ——— 0"-1/2"
DIMENSION FROM FACE OF SUPPORT TO LOCATION OF AT TIE OR STIRRUP ——— ±1"

TOLERANCES FOR PLACING AND FABRICATION OF REINFORCING BARS (12)

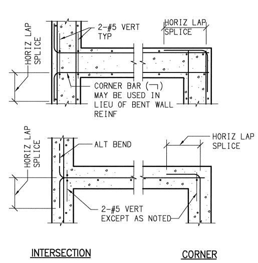


AT RECESS GREATER THAN 1/3 WALL THICKNESS PROVIDE TYPICAL OPENING REINFORCEMENT.

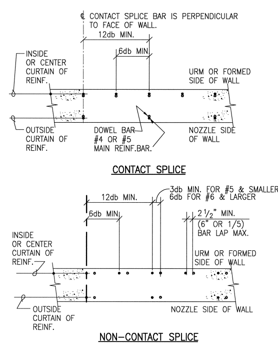
TYPICAL WALL RECESS (11)



TYPICAL WALL/SLAB SMALL OPENING DETAIL (20)

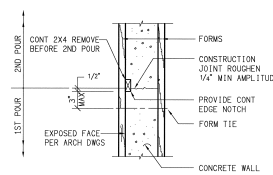


REINFORCING AT WALL INTERSECTIONS (19)



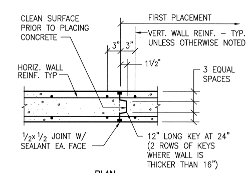
NOTE:
1. HORIZ. REINF. REQUIREMENTS ARE SIMILAR.
2. db IS BAR DIAMETER.
3. CONTACT SPLICE MAY BE USED FOR #4 & #5 REINF..
4. BARS LARGER THAN #5 MUST USE NON-CONTACT LAP SPLICE.

PLAN – SHOTCRETE WALL REINFORCING DETAIL (18)



NOTE: PROVIDE CONT 2X4 ON BOTH FACES WHEN BOTH FACES ARE EXPOSED - REMOVE 2X4 AND TIGHTEN FORM TIE BEFORE PLACING 2ND POUR

WALL HORIZONTAL CONSTRUCTION JOINTS (17)



NOTE:
1. PROVIDE CONSTRUCTION JOINT AT 60'-0" MAX
2. LOCATION AND DETAIL OF JOINTS SHALL BE APPROVED BY ARCHITECT PRIOR TO CONSTRUCTING FORMS OR PLACING CONCRETE

WALL VERTICAL CONSTRUCTION JOINTS (16)

ZIMMER GUNSUL FRASCA ARCHITECTS LLP
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APP. 01-110181
DATE SEP 03 2009

Revisions
BID DOCUMENTS 10/23/09

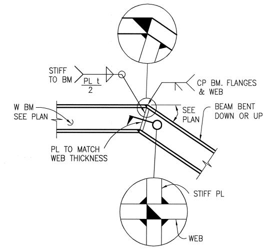
CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
TYPICAL DETAILS

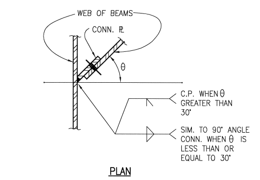
Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S1.04

File: O:\Job11000\J11717 Cal Poly\Drafting\Structural\S1.04_11717.dwg
Plotted: 10/23/09 at 9:55am By: sdam
XREFS: tblk-36x48.dwg

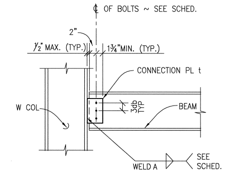


BENT BEAM DETAIL ( ) 5

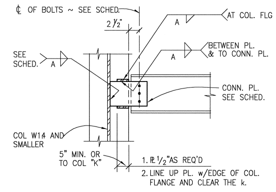


NOTE: SEE BEAM TO BEAM CONN. DETAILS FOR REMAINDER OF DETAIL

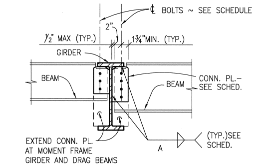
TYPICAL SKEWED BEAM CONNECTION 10



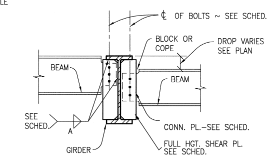
BEAM TO COLUMN FLANGE (A)



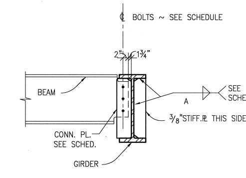
BEAM TO COLUMN WEB (B)



TYPICAL BEAM (C)

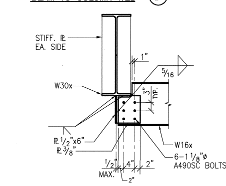


DROPPED BEAM (D)

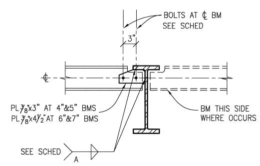


NOTE: ONE SIDED CONN. OCCURS WHERE OPPOSITE BEAMS ARE OFFSET BY 12" OR MORE.

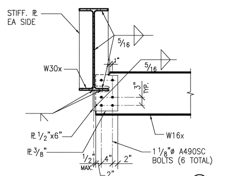
ONE SIDE BEAM CONNECTION (E)



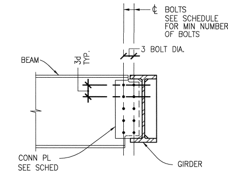
BEAM CONN (G)



BEAM 4" TO 7" (F)



BEAM CONN (H)



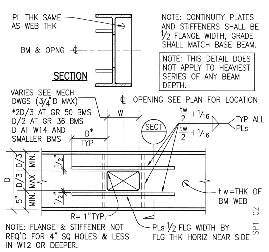
DOUBLE ROW BOLTS (J)

SIMPLE BEAM CONNECTION SCHEDULE			
SHEAR PL CONNECTION			
MEMBER (DEPTH)	# OF BOLTS 1"φ A325	CONN PL t	WELD SIZE A
< 8"	2	3/8"	1/4"
8" – 10"	2	3/8"	1/4"
12" – 14"	3	3/8"	1/4"
15" – 16"	4	1/2"	5/16"
18"	5	1/2"	5/16"
20" & 21"	5	1/2"	3/8"
24"	6	7/8"	7/8"
27"	7	7/8"	7/8"
30" & 33"	8	7/8"	7/8"
36"	10	7/8"	7/8"

NOTES:

1. FILLET WELD SIZE SHALL BE AS SHOWN UNLESS A GREATER SIZE IS REQUIRED BY A.I.S.C. TABLE J2.4
2. ALL BOLTS ARE 1"φ (UNLESS NOTED OTHERWISE) AND ARE TO BE A 325 BOLTS.
3. DOUBLE ANGLES MAY BE SUBSTITUTED FOR CONNECTOR PLATES, PROVIDED THEY MEET OR EXCEED THE REQUIREMENTS OF THE A.I.S.C.
4. ALL CONNECTIONS TO COLUMNS TO BE SLIP CRITCAL (A325–SC). ALL OTHER CONNECTIONS MAY BE BEARING TYPE (A325–N) UNO

SIMPLE BEAM CONNECTION DETAILS 6

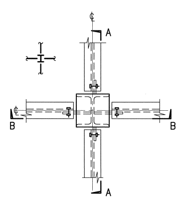


NOTE: CONTINUITY PLATES AND STIFFENERS SHALL BE 1/2 FLANGE WIDTH, GRADE SHALL MATCH BASE BEAM.

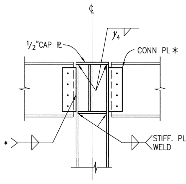
NOTE: THIS DETAIL DOES NOT APPLY TO HEAVIEST SERIES OF ANY BEAM DEPTH.

NOTE: FLANGE & STIFFENER NOT REQ'D FOR 4" SQ HOLES & LESS IN W12 OR DEEPER.

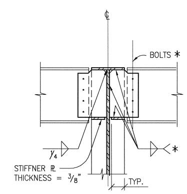
TYPICAL HOLE THRU BEAM WEB DETAIL 15



PLAN VIEW



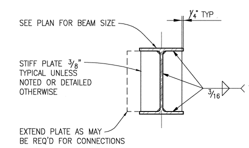
SECTION A–A



SECTION B–B

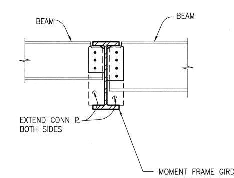
* NOTE: SEE CONNECTION SCHEDULE FOR INFORMATION NOT SHOWN.

TYPICAL BEAM TO COLUMN
ALL SIMPLE CONNECTIONS AT ROOF 13



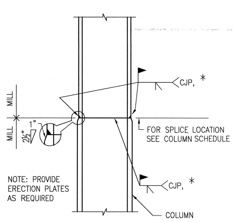
USE LARGER PLATE AND WELD AS MAY BE REQ'D BY BEAM CONN SCHEDULE

STIFFENER PLATES 12



NOTE: FOR INFO NOT SHOWN SEE 6/–.

BEAM CONNECTION ( ) 11

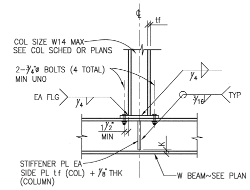


NOTE: PROVIDE ERECTION PLATES AS REQUIRED

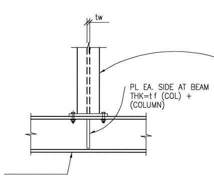
NOTES:

* INDICATES DEMAND CRITICAL WELD AS INDICATED PER AISC 341 SEE NOTE 15 IN DETAIL 6/3.20.

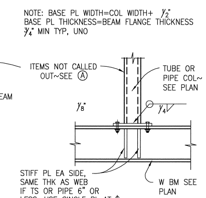
FRAME COLUMN SPLICE 20



(A) WEB PARALLEL



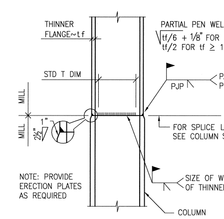
(B) WEB PERPENDICULAR



(C) PIPE COLUMN

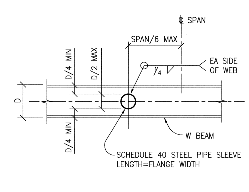
NOTE: BASE PL WIDTH=COL WIDTH+ 1/2"
BASE PL THICKNESS=BEAM FLANGE THICKNESS 3/4" MIN TYP, UNO

CARRIED COLUMNS 18



NOTE: PROVIDE ERECTION PLATES AS REQUIRED

NON FRAME COLUMN SPLICE 17



NOTE: WHERE ROUND OPENINGS ARE D/6 OR LESS, REINFORCING SHOWN IS NOT REQUIRED.

DETAIL AT ROUND OPENING 16

ZIMMER·GUNSUL·FRASCA ARCHITECTS LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 0 3 2009

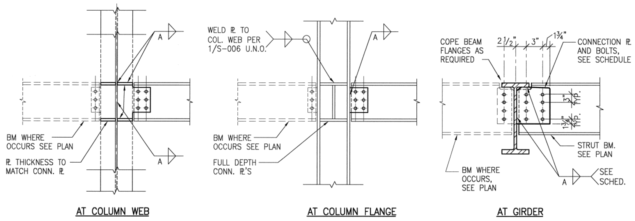
Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
TYPICAL DETAILS

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

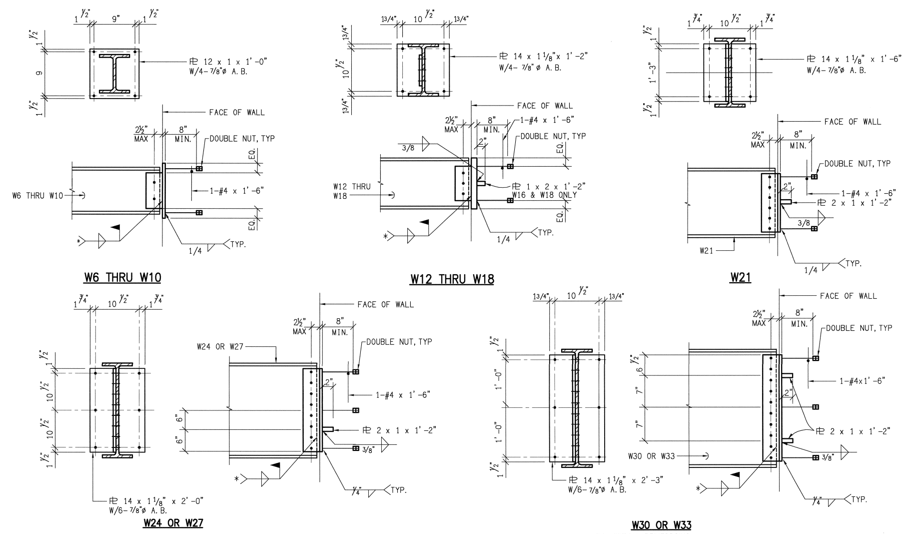
Drawing No.
S1.05


WELD ℞ TO COL. WEB PER 1/S-006 U.N.O.
BM WHERE OCCURS SEE PLAN
℞ THICKNESS TO MATCH CONN. ℞
BM WHERE OCCURS SEE PLAN
FULL DEPTH CONN. ℞'S
COPE BEAM FLANGES AS REQUIRED
CONNECTION ℞ AND BOLTS, SEE SCHEDULE
STRUT BM. SEE PLAN
BM WHERE OCCURS, SEE PLAN
SEE SCHED.
AT COLUMN WEB
AT COLUMN FLANGE
AT GIRDER

STRUT BEAM CONNECTION SCHEDULE			
MEMBER SIZE	# OF BOLTS	CONNECTION ℞ THK.	WELD SIZE A
W8, W10	4	9/16"	3/8"
W12, W14, MC12	6	9/16"	3/8"
W16	8	9/16"	3/8"
W18	10	9/16"	3/8"
W21	12	3/4"	3/8"
W24	12	3/4"	1/2"
W27	14	3/4"	9/16"
W30	16	3/4"	9/16"
W33	16	3/4"	9/16"
W36	20	3/4"	9/16"
W40	22	3/4"	5/8"
W44	24	3/4"	5/8"

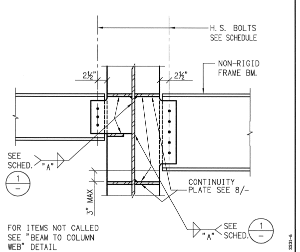
NOTES:
1. STRUT BEAM CONNECTIONS SIMILAR TO 1/S1.05
2. ALL BOLTS ARE 1"Ø (UNLESS NOTED OTHERWISE) & ARE TO BE A325SC BOLTS
3. CONNECTION PLATES MAY BE A36 MATERIAL.

DRAG BEAM CONNECTION DETAILS (℄—— AS SHOWN ON PLANS) (3)

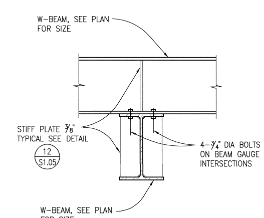

℞ 12 x 1 x 1'-0" W/4-7/8"Ø A.B.
FACE OF WALL
DOUBLE NUT, TYP
1-#4 x 1'-6"
W6 THRU W10
TYP.
℞ 14 x 1 1/8" x 1'-2" W/4-7/8"Ø A.B.
℞ 1 x 2 x 1'-2" W16 & W18 ONLY
W12 THRU W18
℞ 14 x 1 1/8" x 1'-6" W/4-7/8"Ø A.B.
℞ 2 x 1 x 1'-2"
W21
W24 OR W27
℞ 14 x 1 1/8" x 2'-0" W/6-7/8"Ø A.B.
W30 OR W33
℞ 14 x 1 1/8" x 2'-3" W/6-7/8"Ø A.B.
W6 THRU W10
W12 THRU W18
W21
W24 OR W27
W30 OR W33

NOTES:
1. FOR BEAM CONNECTION TO EMBEDDED PLATE. SEE SIMPLE BEAM CONNECTION DETAIL ABOVE.
2. EMBED PLATES FOR HSS BEAMS TO EQUAL THOSE OF WIDE FLANGE WITH EQUIVALENT DEPTH.
3. WHERE BEARING PLATES INTERFERE WITH VERTICAL REINFORCING THAT PORTION OF PLATE MAY BE REMOVED LEAVING A MINMUM OF 10" EFFECTIVE PLATE BEARING WIDTH.
4. PROVIDE HORIZONTAL SHORT SLOTTED HOLES IN SHEAR PLATES.
5. HIGH STRENGTH BOLTS TO BE TIGHTENED WITH SPUD WRENCH ONLY. DO NOT TORQUE BOLTS FOR FRICTION CONNECTION.

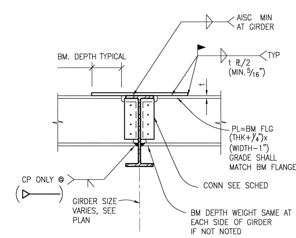
EMBEDDED SHEAR PLATES (6)



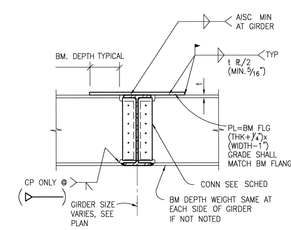
BEAM TO MOMENT COLUMN WEB W/STIFFENER (15)



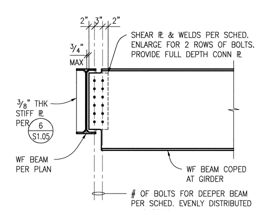
BEAM TO BEAM CONNECTION (13)



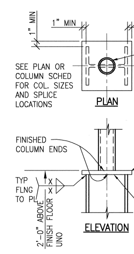
RIGID / DRAG CONNECTION BEAM TO BEAM (▷——) (12)



RIGID / DRAG CONNECTION BEAM TO BEAM (▷——) (11)

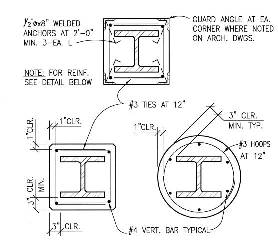


DEEP BEAM TO SHALLOW GIRDER CONNECTION (18)



WELD SCHEDULE	
COLUMN WEB OR FLANGE THICKNESS	WELD X
UP TO 3/4"	5/16
13/16 TO 1 1/4"	7/16
1 5/16 TO 1 3/4"	13/16

COLUMN SPLICE DETAIL (17)



W COLUMN CONCRETE ENCASED (16)

ZIMMER · GUNSUL · FRASCA ARCHITECTS · LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL. 01-110181
DATE SEP 0 3 2009

Revisions

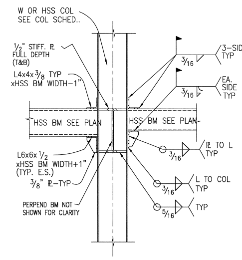
BID DOCUMENTS	10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

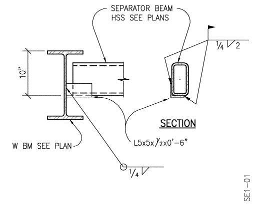
Drawing Title
TYPICAL DETAILS

Date:	OCTOBER 23, 2009
Job No:	L40302.05
Drawn By:	
Checked By:	

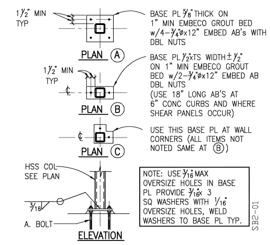
Drawing No.
S1.06



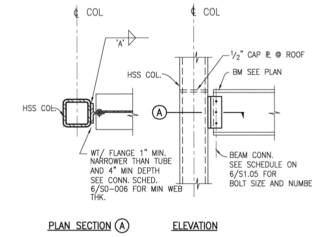
TYP HSS BEAM TO COLUMN DETAIL (4)



ELEVATOR SEPARATOR BEAM (3)

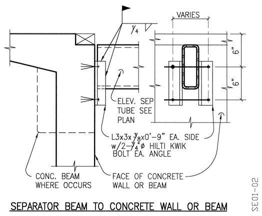

1 1/2" MIN TYP
PLAN (A)
BASE PL 7/8" THICK ON 1" MIN EMBECO GROUT BED w/4-3/4"øx12" EMBED AB's WITH DBL NUTS
1 1/2" MIN TYP
PLAN (B)
BASE PL 1/2"xTS WIDTH±1/2" ON 1" MIN EMBECO GROUT BED w/2-3/4"øx12" EMBED AB DBL NUTS (USE 18" LONG AB'S AT 6" CONC CURBS AND WHERE SHEAR PANELS OCCUR)
PLAN (C)
USE THIS BASE PL AT WALL CORNERS (ALL ITEMS NOT NOTED SAME AT (B))
HSS COL SEE PLAN
A. BOLT
ELEVATION
NOTE: USE 5/16" MAX OVERSIZE HOLES IN BASE PL PROVIDE 3/16"x 3 SQ WASHERS WITH 1/16" OVERSIZE HOLES, WELD WASHERS TO BASE PL TYP.
SB2-01

HSS COLUMN BASE PLATE DETAIL (2)



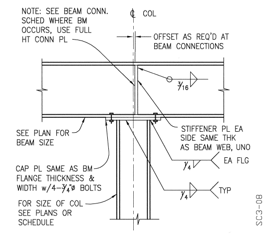
NOTE: SEE BEAM CONN SCHED. FOR WELD SIZE "A"

WF BEAM TO HSS COLUMN (1)

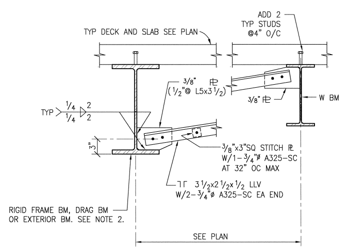


SEPARATOR BEAM TO CONCRETE WALL OR BEAM

ELEVATOR SEPARATOR BEAM (10)

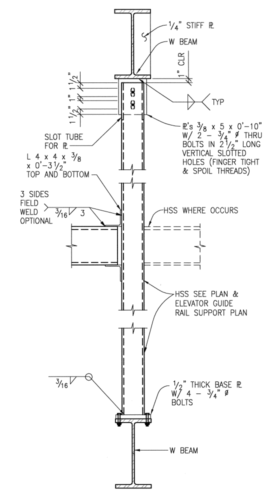

NOTE: SEE BEAM CONN. SCHED WHERE BM OCCURS, USE FULL HT CONN PL
CL COL
OFFSET AS REQ'D AT BEAM CONNECTIONS
SEE PLAN FOR BEAM SIZE
STIFFENER PL EA SIDE SAME THK AS BEAM WEB, UNO
EA FLG
CAP PL SAME AS BM FLANGE THICKNESS & WIDTH w/4-3/4"ø BOLTS
TYP
FOR SIZE OF COL SEE PLANS OR SCHEDULE
SC3-08

BEAM TO COLUMN (7)



NOTES: 1. ←-- BRACES SHOWN DASHED ON PLAN
ARROWHEAD INDICATES BOTTOM FLANGE BRACED
2. IF BM IS MF THE LATERAL BRACE IS PART OF THE SEISMIC LOAD RESISTING SYSTEM. FOR ADDITIONAL INFO SEE S3.10 & S3.11.

LATERAL BRACING (13)


1/4" STIFF PL
W BEAM
1" CLR
TYP
PL's 3/8 x 5 x 0'-10" W/ 2 - 3/4" ø THRU BOLTS IN 2 1/2" LONG VERTICAL SLOTTED HOLES (FINGER TIGHT & SPOIL THREADS)
SLOT TUBE FOR PL
L 4 x 4 x 3/8 x 0'-3 1/2" TOP AND BOTTOM
3 SIDES FIELD WELD OPTIONAL
HSS WHERE OCCURS
HSS SEE PLAN & ELEVATOR GUIDE RAIL SUPPORT PLAN
1/2" THICK BASE PL W/ 4 - 3/4" ø BOLTS
W BEAM
SE01-06

GUIDE RAIL SUPPORT DETAIL (11)

ZGF
ZIMMER GUNSUL FRASCA ARCHITECTS LLP
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York

515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC FLS SS
DATE SEP 03 2009

Revisions

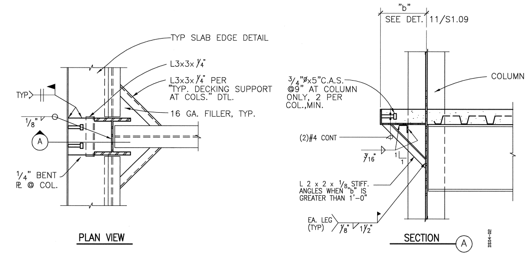
BID DOCUMENTS	10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
TYPICAL DETAILS

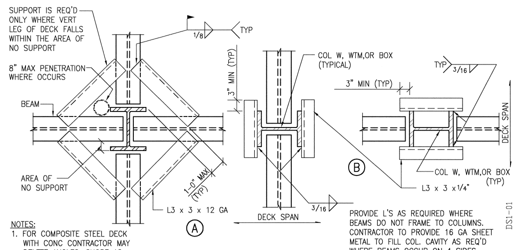
Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S1.07



NOTE:
1.) SIM. AT EXTERIOR CORNER CONDITIONS, AND AT OPPOSITE COL. ORIENTATION.
2.) SEE 16/S5.03 FOR ALTERNATE DETAIL AT MOMENT FRAME.

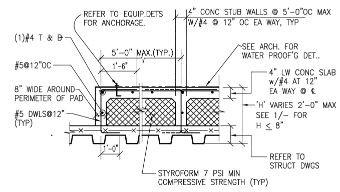
TYPICAL BENT PLATE FORM ANGLE SUPPORTS AT COLUMNS (5)



NOTES:
1. FOR COMPOSITE STEEL DECK WITH CONC CONTRACTOR MAY DELETE ANGLES. SHORE AS REQ'D DURING CONC PLACEMENT.
2. SEE 18/S5.02 FOR ALTERNATE DETAIL AT MOMENT FRAMES.

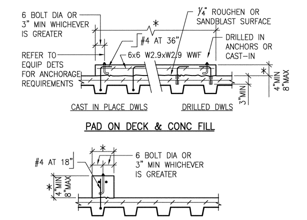
PROVIDE L'S AS REQUIRED WHERE BEAMS DO NOT FRAME TO COLUMNS. CONTRACTOR TO PROVIDE 16 GA SHEET METAL TO FILL COL. CAVITY AS REQ'D WHERE BEAMS OCCUR ON 4 SIDES SEE DETAIL (A)

METAL DECK SUPPORT AT COLUMN (3)



REFER TO EQUIP.DETS FOR ANCHORAGE.
4" CONC STUB WALLS @ 5'-0"OC MAX W/#4 @ 12" OC EA WAY, TYP
(1)#4 T & B
#5@12"OC
SEE ARCH. FOR WATER PROOF'G DET..
4" LW CONC SLAB w/#4 AT 12" EA WAY @ ℄
8" WIDE AROUND PERIMETER OF PAD
'H' VARIES 2'-0" MAX SEE 1/- FOR H ≤ 8"
#5 DWLS@12" (TYP)
REFER TO STRUCT DWGS
STYROFORM 7 PSI MIN COMPRESSIVE STRENGTH (TYP)

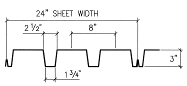
TYP CONCRETE BUILT-UP SECTION (2)



* SEE MECH, ELEC OR ARCH DWGS FOR SIZES & LOCATIONS, AS REQ'D, CO-ORDINATE DEPTH OF PAD OR HEIGHT OF WALLS W/ BOLT EMBEDMENT REQUIREMENTS.
SEE 2/- FOR PAD HEIGHT GREATER THAN 8".

CURB ON DECK & CONC FILL

SUPPORT AT CONCRETE FILL DECK (1)



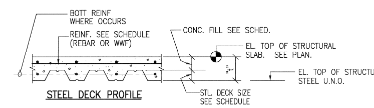
3" DECK - SECTION

NOTES:
1. DECK LAYUP SHALL PROVIDE ALL DECK SHEETS OF SUFFICIENT LENGTH TO EXTEND CONTINUOUSLY OVER AT LEAST 3 SPANS.
2. ENDS OF ADJOINING DECK SHEETS SHALL BE CENTERED OVER SUPPORTS & ABUTTED OR ACCEPTABLY LAPPED 2". ABUTTED SHEETS REQUIRE 2 TYPICAL WELDS AT EACH WELD LOCATION.
3. PUDDLE WELDS INDICATED AS ½" SHALL MEET THE WELD REQUIREMENTS FOR A FULL EFFECTIVE ½" DIAMETER FUSION AREA AT THE FACE OF THE SUPPORT MEMBER, & THE BURNED OUT PORTION OF THE DECK SHEET SHALL BE FILLED WITH MELTED WELD ROD MATERIAL TO THE THICKNESS OF THE SHEET WITHOUT POROSITY AT THE EDGE OF THE WELD TO THE SHEET.
4. DO NOT SUSPEND CEILINGS, LIGHT FIXTURES & CONDUITS, DUCTS, PIPING, OR OTHER UTILITIES & UTILITY COMPONENTS FROM DECK.
5. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

DECK TYPE	DECK SIZE	CONC. FILL	"t"	STEEL DECK PROPERTIES	DECK REINFORCING	MAX. UNSHORED LENGTH (SEE NOTE 1) DECK SPAN	LENGTH
MD-1	3"-16GA (N24)	–	3"	S^+_2 = 0.950 IN^3 S^- = 1.005 IN^3 I = 1.647 IN^4	–	1-SPAN 2-SPAN 3-SPAN	8'-6" 10'-0" 11'-0"

METAL ROOF DECKING SCHEDULE (8)

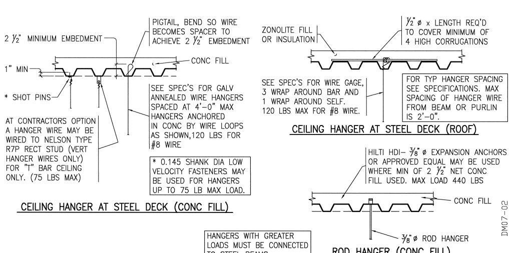
DECK TYPE	DECK SIZE	CONC. FILL	"t"	STEEL DECK PROPERTIES	DECK REINFORCING	MAX. UNSHORED LENGTH (SEE NOTE 1) DECK SPAN	LENGTH
D-1	3"-20GA (W3)	3¼" LW	6¼"	S^+ = 0.534 IN^3 S^- = 0.564 IN^3 I = 0.896 IN^4	6x6-W2.0xW2.0 WWF	1-SPAN 2-SPAN 3-SPAN	9'-0" 10'-0" 11'-0"
D-2 (SEE NOTE6)	2"-20GA (W2)	2¾" LW	4¾"	S^+ = 0.361 IN^3 S^- = 0.37 IN^3 I = 0.423 IN^4	6x6-W2.0xW2.0 WWF	1-SPAN 2-SPAN 3-SPAN	7'-0" 8'-0" 9'-0"



STEEL DECK PROFILE

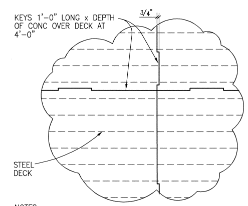
NOTES:
1. STEEL DECK SHALL BE SHORED @ MIDSPAN WHERE SPAN EXCEEDS MAX UNSHORED LENGTH.
2. FOR TYPICAL STEEL DECK DETAILS, SEE SHEET S00.09 & S00.10
3. FOR TYPICAL WELDED SHEAR STUD LAYOUT, SEE DETAIL 1/S00.10
4. SEE 11/- & 12/- FOR DECK WELDING.
5. ALL DECKS BY VERCO OR APPROVED EQUAL
6. DECK D-2 IS NOT 2-HOUR RATED.

COMPOSITE STEEL DECK SCHEDULE (6)



2 ½" MINIMUM EMBEDMENT
PIGTAIL, BEND SO WIRE BECOMES SPACER TO ACHIEVE 2 ½" EMBEDMENT
CONC FILL
1" MIN
* SHOT PINS
SEE SPEC'S FOR GALV ANNEALED WIRE HANGERS SPACED AT 4'-0" MAX HANGERS ANCHORED IN CONC BY WIRE LOOPS AS SHOWN,120 LBS FOR #8 WIRE
AT CONTRACTORS OPTION A HANGER WIRE MAY BE WIRED TO NELSON TYPE R7P RECT STUD (VERT HANGER WIRES ONLY) FOR "T" BAR CEILING ONLY. (75 LBS MAX)
* 0.145 SHANK DIA LOW VELOCITY FASTENERS MAY BE USED FOR HANGERS UP TO 75 LB MAX LOAD.
CEILING HANGER AT STEEL DECK (CONC FILL)
ZONOLITE FILL OR INSULATION
½" ø x LENGTH REQ'D TO COVER MINIMUM OF 4 HIGH CORRUGATIONS
SEE SPEC'S FOR WIRE GAGE. 3 WRAP AROUND BAR AND 1 WRAP AROUND SELF. 120 LBS MAX FOR #8 WIRE.
FOR TYP HANGER SPACING SEE SPECIFICATIONS. MAX SPACING OF HANGER WIRE FROM BEAM OR PURLIN IS 2'-0".
CEILING HANGER AT STEEL DECK (ROOF)
HILTI HDI- ⅜" ø EXPANSION ANCHORS OR APPROVED EQUAL MAY BE USED WHERE MIN OF 2 ½" NET CONC FILL USED. MAX LOAD 440 LBS
CONC FILL
⅜" ø ROD HANGER
HANGERS WITH GREATER LOADS MUST BE CONNECTED TO STEEL BEAMS.
ROD HANGER (CONC FILL)

HANGER DETAILS (14)



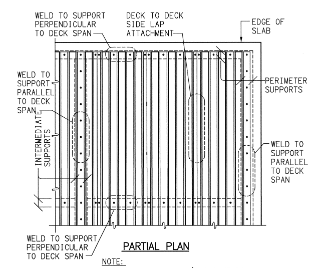
NOTES:
1. SLAB REINFORCING CONTINUOUS THRU JOINT.

CONSTRUCTION JOINT IN CONCRETE SLAB ON COMPOSITE DECK (13)

TYPICAL METAL DECK ATTACHMENT SCHEDULE		
LOCATION	W3	3" N-24
PERIMETER FRAMING PARALLEL TO DECK SPAN	3/4"ø PUDDLE WELDS @12" O.C.	3/4"ø PUDDLE WELDS @12" O.C.
PERIMETER FRAMING PERPENDICULAR TO DECK SPAN	(4)-3/4"ø PUDDLE WELDS PER PANEL	(4)-3/4"ø PUDDLE WELDS PER PANEL
SUPPORT FRAMING PARALLEL TO DECK SPAN	3/4"ø PUDDLE WELDS @12" O.C.	3/4"ø PUDDLE WELDS @12" O.C.
SUPPORT FRAMING PERPENDICULAR TO DECK SPAN	(4)-3/4"ø PUDDLE WELDS PER PANEL	(4)-3/4"ø PUDDLE WELDS PER PANEL
SEAM ATTACHMENT	BUTTON PUNCH @3'-0" O.C.	1 1/2" LONG TSW @ 12" O.C.

NOTES:
1. ALL 3/4"ø PUDDLE WELDS SHALL HAVE AN EFFECTIVE FUSION AREA AT LEAST EQUIVALENT TO 3/8"x1" LONG OR 1/2" IN DIAMETER.
2. PUDDLE WELDS MAY BE ELIMINATED WHERE LOCATION COINCIDES WITH SHEAR STUDS WELD THRU' THE DECK.
3. WHERE TWO W3 DECK UNITS ABUT, EACH UNIT SHALL BE WELDED TO THE STEEL FRAMING.
4. TSW DENOTES TOP SEAM WELD PER ICBO #2078, 1 1/2" MIN LENGTH.
5. SEE 11/- FOR WELD LOCATIONS.

TYP METAL DECK ATTACHMENT SCHEDULE (12)

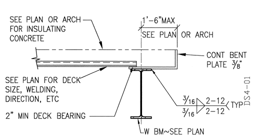


WELD TO SUPPORT PERPENDICULAR TO DECK SPAN
DECK TO DECK SIDE LAP ATTACHMENT
EDGE OF SLAB
WELD TO SUPPORT PARALLEL TO DECK SPAN
PERIMETER SUPPORTS
INTERMEDIATE SUPPORTS
WELD TO SUPPORT PARALLEL TO DECK SPAN
WELD TO SUPPORT PERPENDICULAR TO DECK SPAN

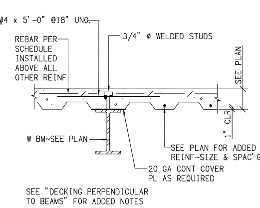
PARTIAL PLAN

NOTE:
SEE SCHEDULE ON 12/- FOR WELDING AND ATTACHMENT REQUIREMENTS.

TYPICAL METAL DECK ATTACHMENT PATTERN (11)

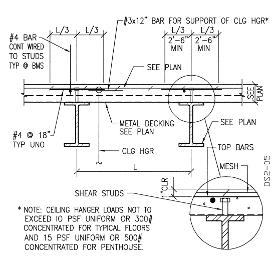


TYPICAL EXTERIOR EDGE OF SLAB AT METAL DECK WITH NO CONCRETE FILL (20)



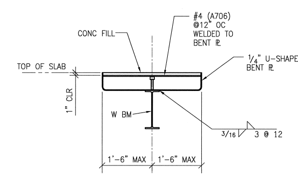
SEE "DECKING PERPENDICULAR TO BEAMS" FOR ADDED NOTES

DECKING PARALLEL TO BEAM (19)

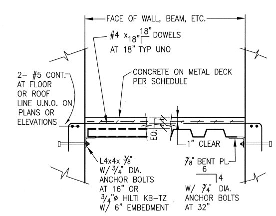


* NOTE: CEILING HANGER LOADS NOT TO EXCEED 10 PSF UNIFORM OR 300# CONCENTRATED FOR TYPICAL FLOORS AND 15 PSF UNIFORM OR 500# CONCENTRATED FOR PENTHOUSE.

DECKING PERPENDICULAR TO BEAM (18)



SECTION BETWEEN OPENINGS / EXTERIOR (17)



FACE OF WALL, BEAM, ETC.
#4 x18" DOWELS AT 18" TYP UNO
2- #5 CONT. AT FLOOR OR ROOF LINE U.N.O. ON PLANS OR ELEVATIONS
CONCRETE ON METAL DECK PER SCHEDULE
1" CLEAR
L4x4x ⅜" W/ ¾" DIA. ANCHOR BOLTS AT 16" OR ¾"ø HILTI KB-TZ W/ 6" EMBEDMENT
⅞" BENT PL W/ ¾" DIA. ANCHOR BOLTS AT 32"
DECK SPAN PERPENDICULAR
DECK SPAN PARALLEL

NOTES:
1 SEE PLAN FOR LEDGER SIZES AND ANCHORS. UNLESS NOTED OTHERWISE USE THIS DETAIL.
2 ALL DECK EDGES SHALL BE SUPPORTED.

LEDGER ANGLES (16)

ZIMMER GUNSUL FRASCA ARCHITECTS LLP
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York

515 South Flower Street, Suite 3700
Los Angeles, California 90071

(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

APPL 01-110181
DATE SEP 03 2009

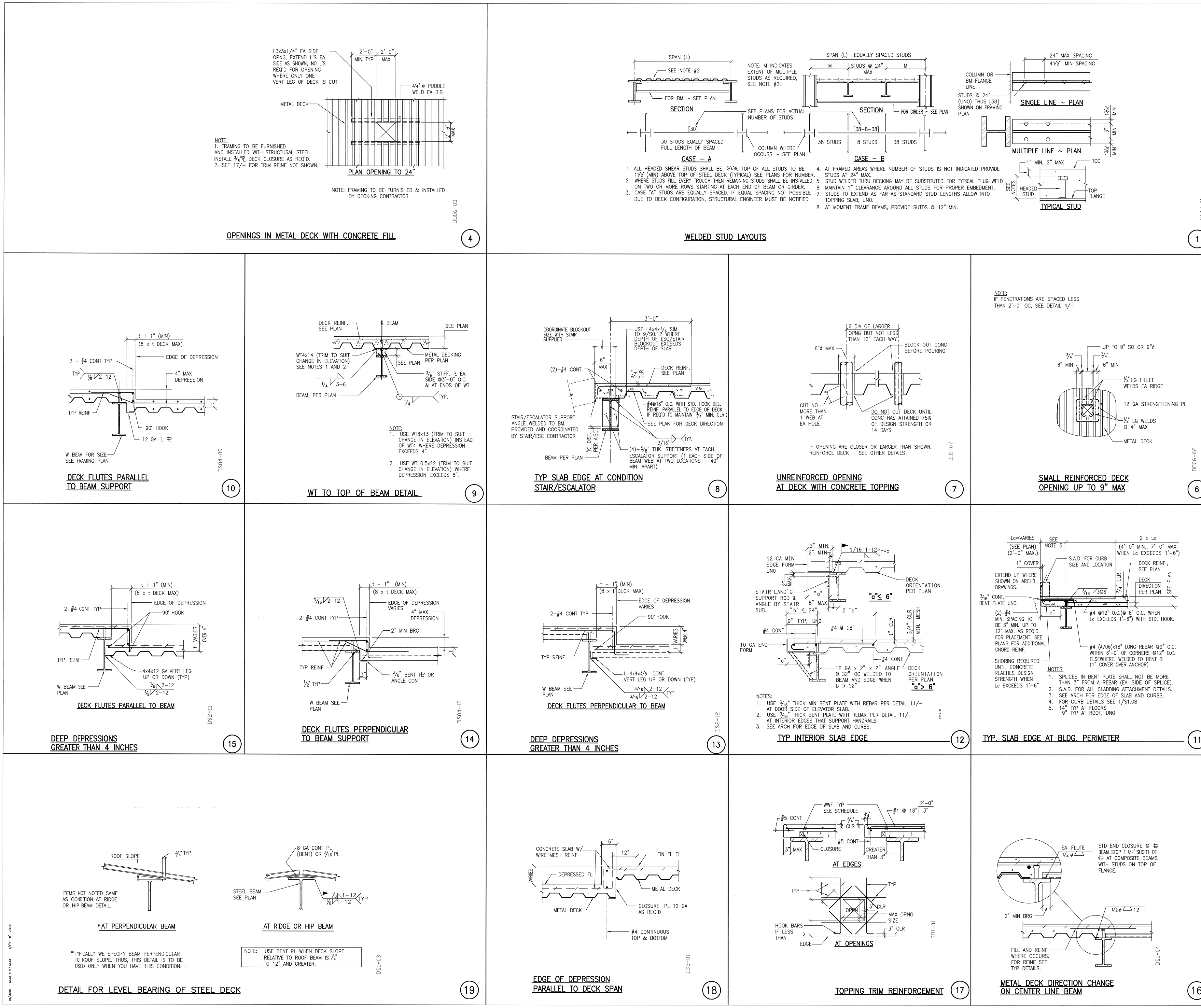
Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
TYPICAL DETAILS

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S1.08


OPENINGS IN METAL DECK WITH CONCRETE FILL
4
L3x3x1/4" EA SIDE OPNG, EXTEND L'S EA SIDE AS SHOWN, NO L'S REQ'D FOR OPENING WHERE ONLY ONE VERT LEG OF DECK IS CUT
METAL DECK
3/4" ø PUDDLE WELD EA RIB
PLAN OPENING TO 24"
NOTE:
1. FRAMING TO BE FURNISHED AND INSTALLED WITH STRUCTURAL STEEL. INSTALL 3/16" ℄ DECK CLOSURE AS REQ'D.
2. SEE 17/– FOR TRIM REINF NOT SHOWN.
NOTE: FRAMING TO BE FURNISHED & INSTALLED BY DECKING CONTRACTOR
DD06-03
WELDED STUD LAYOUTS
1
SPAN (L)
SEE NOTE #2
FOR BM ~ SEE PLAN
SECTION
NOTE: M INDICATES EXTENT OF MULTIPLE STUDS AS REQUIRED, SEE NOTE #2.
SPAN (L) EQUALLY SPACED STUDS
STUDS @ 24" MAX
FOR GIRDER ~ SEE PLAN
SEE PLANS FOR ACTUAL NUMBER OF STUDS
[30]
30 STUDS EQUALLY SPACED FULL LENGTH OF BEAM
COLUMN WHERE OCCURS ~ SEE PLAN
[38-8-38]
38 STUDS
8 STUDS
38 STUDS
CASE – A
CASE – B
24" MAX SPACING
4 1/2" MIN SPACING
COLUMN OR BM FLANGE LINE
STUDS @ 24" (UNO) THUS [38] SHOWN ON FRAMING PLAN
SINGLE LINE ~ PLAN
MULTIPLE LINE ~ PLAN
1" MIN, 2" MAX
TOC
SEE NOTES
HEADED STUD
TOP FLANGE
TYPICAL STUD
1. ALL HEADED SHEAR STUDS SHALL BE 3/4"ø. TOP OF ALL STUDS TO BE 1 1/2" (MIN) ABOVE TOP OF STEEL DECK (TYPICAL) SEE PLANS FOR NUMBER.
2. WHERE STUDS FILL EVERY TROUGH THEN REMAINING STUDS SHALL BE INSTALLED ON TWO OR MORE ROWS STARTING AT EACH END OF BEAM OR GIRDER.
3. CASE "A" STUDS ARE EQUALLY SPACED. IF EQUAL SPACING NOT POSSIBLE DUE TO DECK CONFIGURATION, STRUCTURAL ENGINEER MUST BE NOTIFIED.
4. AT FRAMED AREAS WHERE NUMBER OF STUDS IS NOT INDICATED PROVIDE STUDS AT 24" MAX.
5. STUD WELDED THRU DECKING MAY BE SUBSTITUTED FOR TYPICAL PLUG WELD
6. MAINTAIN 1" CLEARANCE AROUND ALL STUDS FOR PROPER EMBEDMENT.
7. STUDS TO EXTEND AS FAR AS STANDARD STUD LENGTHS ALLOW INTO TOPPING SLAB, UNO.
8. AT MOMENT FRAME BEAMS, PROVIDE SUTDS @ 12" MIN.
DT03-01
DECK FLUTES PARALLEL TO BEAM SUPPORT
10
t + 1" (MIN) (8 x t DECK MAX)
2 – #4 CONT TYP
EDGE OF DEPRESSION
4" MAX DEPRESSION
TYP REINF
90° HOOK
12 GA ℄
W BEAM FOR SIZE– SEE FRAMING PLAN
DS04-09
WT TO TOP OF BEAM DETAIL
9
DECK REINF. SEE PLAN
BEAM
SEE PLAN
WT4x14 (TRIM TO SUIT CHANGE IN ELEVATION) SEE NOTES 1 AND 2
METAL DECKING PER PLAN.
3/8" STIFF. ℄ EA. SIDE @3'-0" O.C. & AT ENDS OF WT
BEAM, PER PLAN
NOTE:
1. USE WT8x13 (TRIM TO SUIT CHANGE IN ELEVATION) INSTEAD OF WT4 WHERE DEPRESSION EXCEEDS 4".
2. USE WT10.5x22 (TRIM TO SUIT CHANGE IN ELEVATION) WHERE DEPRESSION EXCEEDS 8".
TYP SLAB EDGE AT CONDITION STAIR/ESCALATOR
8
COORDINATE BLOCKOUT SIZE WITH STAIR SUPPLIER
USE L4x4x1/4 SIM TO 9/S0.12 WHERE DEPTH OF ESC/STAIR BLOCKOUT EXCEEDS DEPTH OF SLAB
(2)–#4 CONT.
DECK REINF. SEE PLAN
#4@18" O.C. WITH STD. HOOK BEL. REINF. PARALLEL TO EDGE OF DECK IF REQ'D TO MAINTAIN 3/4" MIN. CLR.
SEE PLAN FOR DECK DIRECTION
STAIR/ESCALATOR SUPPORT ANGLE WELDED TO BM. PROVIDED AND COORDINATED BY STAIR/ESC CONTRACTOR
(4)–5/8" THK. STIFFENERS AT EACH ESCALATOR SUPPORT (1 EACH SIDE OF BEAM WEB AT TWO LOCATIONS – 40" MIN. APART).
BEAM PER PLAN
UNREINFORCED OPENING AT DECK WITH CONCRETE TOPPING
7
6 DIA OF LARGER OPNG BUT NOT LESS THAN 12" EACH WAY
BLOCK OUT CONC BEFORE POURING
CUT NO MORE THAN 1 WEB AT EA HOLE
DO NOT CUT DECK UNTIL CONC HAS ATTAINED 75% OF DESIGN STRENGTH OR 14 DAYS
IF OPENING ARE CLOSER OR LARGER THAN SHOWN, REINFORCE DECK – SEE OTHER DETAILS
DD1-07
SMALL REINFORCED DECK OPENING UP TO 9" MAX
6
NOTE:
IF PENETRATIONS ARE SPACED LESS THAN 2'-0" OC, SEE DETAIL 4/–
UP TO 9" SQ OR 9"ø
1/2" LG FILLET WELDS EA RIDGE
12 GA STRENGTHENING PL
1/2" LG WELDS @ 4" MAX
METAL DECK
DD06-02
DEEP DEPRESSIONS GREATER THAN 4 INCHES
15
DECK FLUTES PARALLEL TO BEAM
4x4x12 GA VERT LEG UP OR DOWN (TYP)
W BEAM SEE PLAN
DS2-11
DECK FLUTES PERPENDICULAR TO BEAM SUPPORT
14
2" MIN BRG
3/8" BENT ℄ OR ANGLE CONT
DS04-10
DEEP DEPRESSIONS GREATER THAN 4 INCHES
13
DECK FLUTES PERPENDICULAR TO BEAM
L 4x4x3/8 CONT VERT LEG UP OR DOWN (TYP)
DS2-12
TYP INTERIOR SLAB EDGE
12
12 GA MIN. EDGE FORM UNO
DECK ORIENTATION PER PLAN
STAIR LAND'G SUPPORT ROD & ANGLE BY STAIR SUB.
"a" ≤ 6"
10 GA END FORM
12 GA x 2" x 2" ANGLE @ 32" OC WELDED TO BEAM AND EDGE WHEN b > 12"
"a" > 6"
NOTES:
1. USE 3/16" THICK MIN BENT PLATE WITH REBAR PER DETAIL 11/– AT DOOR SIDE OF ELEVATOR SLAB.
2. USE 3/16" THICK BENT PLATE WITH REBAR PER DETAIL 11/– AT INTERIOR EDGES THAT SUPPORT HANDRAILS
3. SEE ARCH FOR EDGE OF SLAB AND CURBS.
TYP. SLAB EDGE AT BLDG. PERIMETER
11
Lc=VARIES (SEE PLAN) (2'-0" MAX.)
2 x Lc (4'-0" MIN., 7'-0" MAX. WHEN Lc EXCEEDS 1'-6")
S.A.D. FOR CURB SIZE AND LOCATION.
EXTEND UP WHERE SHOWN ON ARCH'L DRAWINGS.
3/16" CONT. BENT PLATE UNO
(2)–#4 MIN. SPACING TO BE 3" MIN. UP TO 12" MAX. AS REQ'D. FOR PLACEMENT. SEE PLANS FOR ADDITIONAL CHORD REINF.
#4 @12" O.C.(@ 6" O.C. WHEN Lc EXCEEDS 1'-6") WITH STD. HOOK.
#4 (A706)x18" LONG REBAR @9" O.C. WITHIN 6'-0" OF CORNERS @12" O.C. ELSEWHERE. WELDED TO BENT ℄ (1" COVER OVER ANCHOR)
SHORING REQUIRED UNTIL CONCRETE REACHES DESIGN STRENGTH WHEN Lc EXCEEDS 1'-6"
NOTES:
1. SPLICES IN BENT PLATE SHALL NOT BE MORE THAN 3" FROM A REBAR (EA. SIDE OF SPLICE).
2. S.A.D. FOR ALL CLADDING ATTACHMENT DETAILS.
3. SEE ARCH FOR EDGE OF SLAB AND CURBS.
4. FOR CURB DETAILS SEE 1/S1.08
5. 14" TYP AT FLOORS 9" TYP AT ROOF, UNO
DETAIL FOR LEVEL BEARING OF STEEL DECK
19
ROOF SLOPE
ITEMS NOT NOTED SAME AS CONDITION AT RIDGE OR HIP BEAM DETAIL.
*AT PERPENDICULAR BEAM
8 GA CONT PL (BENT) OR 3/16"PL
STEEL BEAM SEE PLAN
AT RIDGE OR HIP BEAM
*TYPICALLY WE SPECIFY BEAM PERPENDICULAR TO ROOF SLOPE. THUS, THIS DETAIL IS TO BE USED ONLY WHEN YOU HAVE THIS CONDITION.
NOTE: USE BENT PL WHEN DECK SLOPE RELATIVE TO ROOF BEAM IS 1/2" TO 12" AND GREATER.
DS1-03
EDGE OF DEPRESSION PARALLEL TO DECK SPAN
18
CONCRETE SLAB W/ WIRE MESH REINF
DEPRESSED FL
FIN FL EL
METAL DECK
CLOSURE PL 12 GA AS REQ'D
#4 CONTINUOUS TOP & BOTTOM
DS3-01
TOPPING TRIM REINFORCEMENT
17
WWF TYP SEE SCHEDULE
#4 @ 18"
#5 CONT
CLOSURE
AT EDGES
MAX OPNG SIZE
HOOK BARS IF LESS THAN
AT OPENINGS
DD1-01
METAL DECK DIRECTION CHANGE ON CENTER LINE BEAM
16
EA FLUTE
STD END CLOSURE @ ℄ BEAM STOP 1 1/2" SHORT OF ℄ AT COMPOSITE BEAMS WITH STUDS ON TOP OF FLANGE.
2" MIN BRG
FILL AND REINF WHERE OCCURS. FOR REINF SEE TYP DETAILS.
DS1-04

ZIMMER·GUNSUL·FRASCA ARCHITECTS LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants

STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 03 2009

Revisions

BID DOCUMENTS	10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
TYPICAL DETAILS

Date:	OCTOBER 23, 2009
Job No:	L40302.05
Drawn By:	
Checked By:	

Drawing No.

S1.09

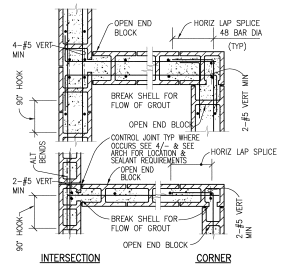
MASONRY REINFORCING LAP SPLICE SCHEDULE	
BAR SIZE	LAP LENGTH
#4	2'–0"
#5	2'–6"
#6	3'–0"
#7	3'–6"
#8	4'–0"
#9	4'–6"

MASONRY REINFORCING LAP SPLICE SCHEDULE (5)

CMU WALL REINFORCING SCHEDULE				
WALL THICKNESS (INCHES)	BAR SIZE & SPACING EACH MAT			MAXIMUM HEIGHT (SEE NOTE #6)
	HORIZ	VERT	REMARKS	
4	#4@16"	#4@16"	SINGLE MAT	12'–0"
6	#5@16"	#5@16"	SINGLE MAT	12'–0"
8	#5@16"	#5@16"	SINGLE MAT	15'–0"
8	#5@16"	#7@16"	SINGLE MAT	17'–0"
12	#5@16"	#5@16"	DOUBLE MAT	20'–0"

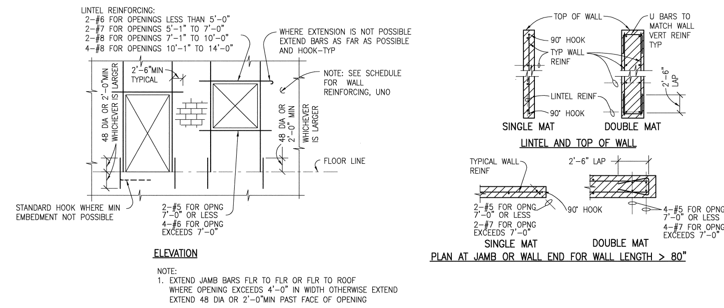
NOTES:
1. CONTINUOUS INSPECTION REQUIRED
2. THE ABOVE IS MINIMUM REINFORCING FOR ALL CONCRETE MASONRY ELEMENTS
3. SINGLE MAT REINFORCING SHALL BE IN CENTER OF WALL UNLESS OTHERWISE DETAILED
4. ALL CELLS SHALL BE GROUTED SOLID (U.N.O.)
5. USE DOUBLE OPEN END BLOCKS FOR ALL LOAD BEARING CMU WALLS.
6. MAXIMUM HEIGHT ASSUMES TOP OF WALL IS LATERALLY BRACED.

CONCRETE MASONRY WALL MINIMUM REINFORCING SCHEDULE (4)



4–#5 VERT MIN
OPEN END BLOCK
HORIZ LAP SPLICE 48 BAR DIA (TYP)
BREAK SHELL FOR FLOW OF GROUT
OPEN END BLOCK
2–#5 VERT MIN
CONTROL JOINT TYP WHERE OCCURS SEE 4/– & SEE ARCH FOR LOCATION & SEALANT REQUIREMENTS
HORIZ LAP SPLICE
2–#5 VERT MIN
OPEN END BLOCK
BREAK SHELL FOR FLOW OF GROUT
OPEN END BLOCK
2–#5 VERT MIN
90° HOOK
ALT BENDS
INTERSECTION
CORNER

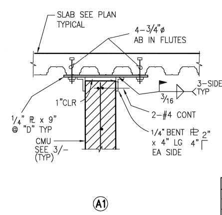
CONCRETE MASONRY WALL INTERSECTIONS (3)



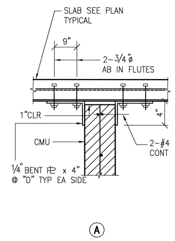
LINTEL REINFORCING:
2–#6 FOR OPENINGS LESS THAN 5'–0"
2–#7 FOR OPENINGS 5'–1" TO 7'–0"
2–#8 FOR OPENINGS 7'–1" TO 10'–0"
4–#8 FOR OPENINGS 10'–1" TO 14'–0"
WHERE EXTENSION IS NOT POSSIBLE EXTEND BARS AS FAR AS POSSIBLE AND HOOK–TYP
NOTE: SEE SCHEDULE FOR WALL REINFORCING, UNO
2'–6"MIN TYPICAL
48 DIA OR 2'–0"MIN WHICHEVER IS LARGER
FLOOR LINE
STANDARD HOOK WHERE MIN EMBEDMENT NOT POSSIBLE
2–#5 FOR OPNG 7'–0" OR LESS
4–#6 FOR OPNG EXCEEDS 7'–0"
ELEVATION
TOP OF WALL
90° HOOK
TYP WALL REINF
LINTEL REINF
90° HOOK
U BARS TO MATCH WALL VERT REINF TYP
2'–6" LAP
SINGLE MAT
DOUBLE MAT
LINTEL AND TOP OF WALL
TYPICAL WALL REINF
2'–6" LAP
2–#5 FOR OPNG 7'–0" OR LESS
2–#7 FOR OPNG EXCEEDS 7'–0"
90° HOOK
4–#5 FOR OPNG 7'–0" OR LESS
4–#7 FOR OPNG EXCEEDS 7'–0"
SINGLE MAT
DOUBLE MAT
PLAN AT JAMB OR WALL END FOR WALL LENGTH > 80"

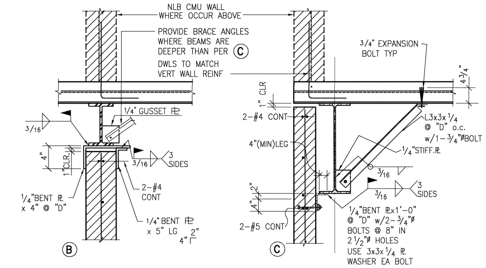
NOTE:
1. EXTEND JAMB BARS FLR TO FLR OR FLR TO ROOF WHERE OPENING EXCEEDS 4'–0" IN WIDTH OTHERWISE EXTEND EXTEND 48 DIA OR 2'–0"MIN PAST FACE OF OPENING

MINIMUM REINFORCING AT MASONRY WALL OPENINGS (1)



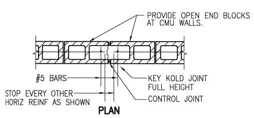
WALL HT	"D"
0'–12'–0"	7'–0"
12'–1"–14'–0"	6'–0"
14'–1"–16'–0"	5'–0"
16'–1"–22'–0"	4'–0"
22'–1"–24'–0"	2'–0"





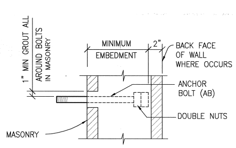
NLB CMU WALL WHERE OCCUR ABOVE
PROVIDE BRACE ANGLES WHERE BEAMS ARE DEEPER THAN PER C
DWLS TO MATCH VERT WALL REINF
1/4" GUSSET ℙ
3 SIDES
2–#4 CONT
1/4"BENT ℙ x 4" @ "D"
1/4" BENT ℙ x 5" LG
B
3/4" EXPANSION BOLT TYP
2–#4 CONT
4"(MIN)LEG
L3x3x1/4 @ "D" o.c. w/1–3/4"ø BOLT
1/4"STIFF.ℙ
3 SIDES
2–#5 CONT
1/4"BENT ℙx1'–0" @ "D" w/2–3/4"ø BOLTS @ 8" IN 2 1/2"ø HOLES USE 3x3x1/4 ℙ WASHER EA BOLT
C

TYPICAL NON LOAD BEARING MASONRY WALL DETAILS (6)



NOTES
1. PROVIDE JOINTS AT INTERVALS NOT TO EXCEED 24 FEET EXCEPT AS NOTED. SEE ARCH'L FOR LOCATION.
2. SEALANT PER ARCH DWGS.
3. HORIZONTAL REINF AT FLOOR & ROOF LINES SHALL BE CONTINUOUS THROUGH JOINT.
4. NO CONTROL JOINT IN SHEAR WALL PANELS.

CONTROL JOINT AT MASONRY WALLS (15)

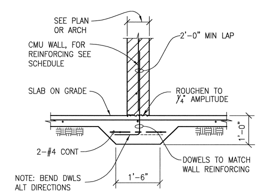


NOTE: MINIMUM BOLT SPACING SHALL BE 12 BOLT DIAMETERS WITH A MINIMUM EDGE DISTANCE OF 6 DIAMETERS AND WITH A MIN OF 6" TO END OF WALL

BOLT SIZE	EMBEDMENT
1/2"	4"
5/8"	4"
3/4"	5"
7/8"	6"
1"	7"

MT1-08

BOLT EMBEDMENT SCHEDULE (20)



MT01-08

NON–BEARING CMU FOOTING (17)

ZIMMER·GUNSUL·FRASCA ARCHITECTS LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc.
950 South Grand Ave, 4th Flr
Los Angeles, CA 90015 (J 11717)

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC FLS SS
DATE SEP 0 3 2009

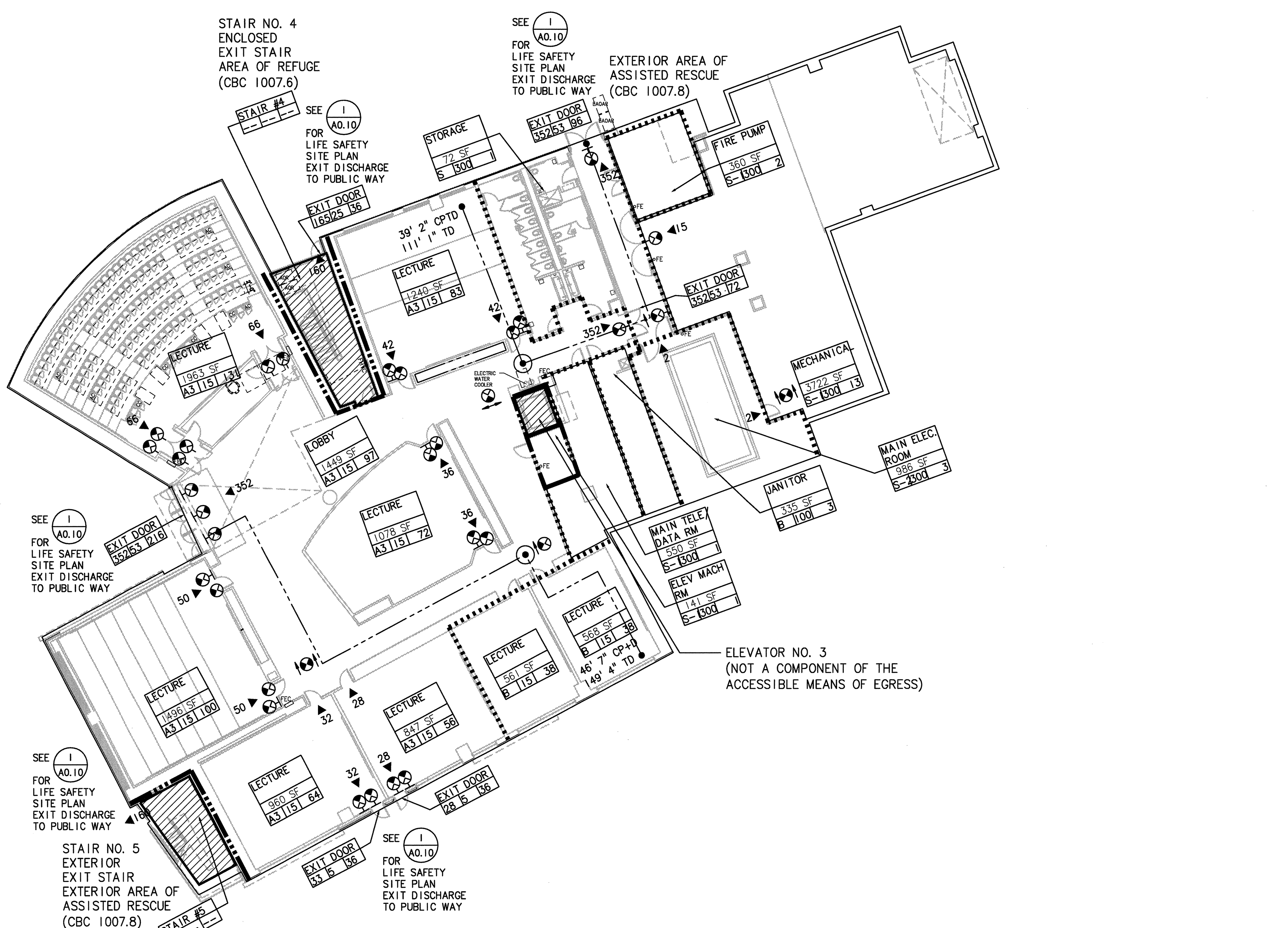
Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
TYPICAL DETAILS

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By:
Checked By:

Drawing No.
S1.10



STATE OF CALIFORNIA—THE RESOURCES AGENCY — ARNOLD SCHWARZENEGGER, Governor

OFFICE OF THE STATE FIRE MARSHAL
Fire & Life Safety Division - South
602 East Huntington Drive, Suite A
Monrovia, CA 91016

Office (626) 305-1908
Fax: (626) 962-1678
Web Site: www.fire.ca.gov

LOCAL FIRE AUTHORITY – ACCESS & WATER FLOW REVIEW

Project:

CSFM File Number:

Pursuant to Title 19, California Code of Regulations, Article 3, Section 3.05, Fire Department Access and Egress, we would appreciate your input relative to fire department access and water-flow for the above project. It is important to us, as the plan review authority, that these issues are addressed to your satisfaction.

Please return this form with all sections filled in completely. Without this form, California State Fire Marshal approval may be delayed. If you have any questions, please contact the California State Fire Marshal Plan Review Unit at (626) 305-1908.

The local fire authority is to consider the following items,

ACCEPTABLE	YES	NO
Location of fire department connection if provided.		
Number, location and size of fire hydrants.		
Fire department access.		

Local Fire Authority: ____________
Address: ____________
City/State/ZIP: ____________

Approval issued by: ____________
Rank/Title: ____________
Phone Number: ____________
Signature: ____________

CONSERVATION IS WISE—KEEP CALIFORNIA GREEN AND GOLDEN

TABLE 414.2.5(2)
MAXIMUM ALLOWABLE QUANTITY OF FLAMABLE AND COMBUSTIBLE LIQUIDS IN WHOLESALE AND RETAIL SALES OCCUPANCIES PER CONTROL AREA

TYPE OF LIQUID	Class:	Organic Store:	Vault Store:	Gen Chem:	Haz Waste/gen chem:	Haz waste/Organic:	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA (gallons) Sprinklered
Class 1A							
Acetonitrile	1A	4	8	0			
Diethyl ether	1A	20	90	1			
Petroleum Ether	1A	20	60	0			
Subtotal (liters)		44	158	1			
Subtotal (gallons) (liter x 0.264)		12	42	0			60
Class 1B, IC, II AND IIIA							
Acetone	1B	40	100	2			
Butanol	1C	5	8	0			
Cyclohexane	1B	4	25	1			
Ethanol	1B	8	40	1			
Ethyl Acetate	1B	20	44	4			
Hexane	1B	20	44	0			
isopropanol	1B	10	24	2			
methanol	1B	20	28	0			
Tetrahydrofuran	1B	8	16	0			
Toluene	1B	20	20	0			
Xylenes	1C	4	28	0			
Heptane	1B	4	20	0			
Subtotal (liters)		163	397	10			
Subtotal (gallons) (liter x 0.264)		43	105	3			7,500
Class IIIB							
Other flammables:	IIIB	4	5	5	12 L	100	
Subtotal (liters)		4	5	5	12	20	
Subtotal (gallons) (liter x 0.264)		1	1	1	3	5	Unlimited

1/A0.11 LIFE SAFETY PLAN – FIRST FLOOR
SCALE: 1/16" = 1'-0"

SYMBOLS LEGEND

- ATRIUM SEPARATION/CONTROL AREA SEPARATION 1 HR. FIRE RATED WALL ASSEMBLY, CBC 404.5 EXCEPTION 3
- 1 HR. FIRE RATED SEPARATION
- EXIT ENCLOSURE & SHAFT ENCLOSURES 2 HR. FIRE RATED WALL ASSEMBLY, CBC 707.4 AND 1020.1
- CONTROL AREA SEPARATION 2 HR. FIRE RATED WALL ASSEMBLY, CBC 414.2.4
- ◄X DIRECTION OF EGRESS AND NUMBER OF OCCUPANTS USING EGRESS
- EXIT SIGN, SINGLE FACE
- POINT OF TWO EXIT OPTIONS
- EXIT SIGN, DOUBLE FACE CBC
- ROOM NAME TAG: NAME / NAME / AREA / OG OLF OL — ROOM NAME, ROOM AREA, OCCUPANCY LOAD, OCCUPANCY LOAD FACTOR, OCCUPANCY GROUP
- EXIT COMPONENT TAG: NAME / OL WR WP — EXIT COMPONENT, WIDTH PROVIDED, WIDTH REQUIRED, OCCUPANT LOAD

MEANS OF EGRESS SYSTEM

TRAVEL DISTANCE FROM MOST REMOTE POINT TO EXIT MAX. DISTANCE 300'

EXIT ACCESS: INTERVENING SPACE, CORRIDOR, ATRIUM — EXIT: EXIT DOOR, INT. EXIT STAIR, EXT. EXIT STAIR — EXIT DISCHARGE

X'X" CPTD=COMMON PATH OF TRAVEL DISTANCE
X'X" TD=TRAVEL DISTANCE

X' D — EXIT — DISTANCE TO EXIT — PATH OF TRAVEL — MOST REMOTE POINT — PUBLIC WAY

CODE ANALYSIS

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

OCCUPANCIES

INDICATED ON PLANS.

FLOOR AREA CALCULATIONS

	CALIFORNIA BUILDING CODE	CALIFORNIA PLUMBING CODE
EXTERIOR WALLS		EXCLUDED
MECH/OP. EQMT.		EXCLUDED
STAIRS		EXCLUDED
ELEVATORS		EXCLUDED
SHAFTS	EXCLUDED	EXCLUDED
STORAGE		EXCLUDED
CLOSETS		EXCLUDED
TERRACES		EXCLUDED
ATRIUM		EXCLUDED
CORRIDORS		EXCLUDED
RESTROOMS		EXCLUDED
TOTAL AREA	208,608 SF	124,993 SF

AREAS:

FLOOR AREA OCCUPANCY (CBC SECTION 1002.1)		FLOOR AREA FIXTURE COUNT (CPC)		FLOOR AREA BY OCCUPANCY (CBC)	
LEVEL 1	23,146 SF	LEVEL 1	10,162 SF		
LEVEL 2	43,458 SF	LEVEL 2	31,624 SF	B	108,281 SF
LEVEL 3	43,209 SF	LEVEL 3	30,086 SF	A-3	12,748 SF
LEVEL 4	33,307 SF	LEVEL 4	24,280 SF	H-3	985 SF
LEVEL 5	25,294 SF	LEVEL 5	14,836 SF	S	1,405 SF
LEVEL 6	19,958 SF	LEVEL 6	14,005 SF	S-1	6,456 SF
ROOF	20,236 SF	ROOF	0 SF	S-2	1,284 SF
TOTAL	208,608 SF	TOTAL	124,993 SF	TOTAL	131,159 SF

HIGH-RISE BUILDINGS (NON HIGH-RISE) (CBC 403)

ACTUAL BUILDING HEIGHT (NON-HIGHRISE):
108'-0": 6 STORIES AND PENTHOUSE
DEFINED BUILDING HEIGHT (NON-HIGHRISE):
64'-0": TO TOP OF HIGHEST OCCUPIED FLOOR/LEVEL ABOVE BUILDING ACCESS. (CBC 403.1 EXCEPTION [SFM] 403.1.2)

ALLOWABLE AREA AND HEIGHT (CBC 503/504)

ALLOWABLE HEIGHT AND BUILDING AREAS FOR NON-SEPARATED OCCUPANCIES:
(CBC TABLE 503) WITH AUTOMATIC SPRINKLER SYSTEM INCREASE (CBC SECTION 504.2 AND 506.3)

	GROUP B	GROUP S-1
ALLOWABLE MAXIMUM HGT (FT)	160'	180'
ALLOWABLE MAXIMUM STORIES	11	12
ALLOWABLE MAX. AREA/STORY	UL	96,000 (48,000X2)

ACTUAL HEIGHT AND BUILDING AREAS PER CBC TABLE 503:

	CENTER FOR SCIENCE
ACTUAL MAXIMUM HGT (FT)	108'-0"
ACTUAL MAXIMUM STORIES	6
ACTUAL MAX. AREA/STORY	43,458

TOTAL ALLOWABLE BUILDING AREA: 96,000 SF X 6 FLOORS = 576,000 SF
TOTAL ACTUAL FLOOR AREA = 208,608 SF

ALLOWABLE HEIGHT AND BUILDING AREAS FOR SEPARATED OCCUPANCIES:
(CBC SECTION 508.3.3)

AREA: GROUP A-3 + GROUP H-3 + GROUP S-2 + GROUP B = X < 1
(ACTUAL MAX. AREA/ ALLOWABLE MAX. AREA)

	GROUP A-3	GROUP H-3	GROUP S-2	GROUP B	= X	
LEVEL 1	10,162/96,000	+ 0/96,000	+ 986/96,000	+ 335/UL	= .005	< 1
LEVEL 2	0/96,000	+ 985/96,000	+ 0/96,000	+ 30,020/UL	= .010	< 1
LEVEL 3	943/96,000	+ 0/96,000	+ 0/96,000	+ 28,418/UL	= .010	< 1
LEVEL 4	712/96,000	+ 0/96,000	+ 0/96,000	+ 22,976/UL	= .007	< 1
LEVEL 5	739/96,000	+ 0/96,000	+ 0/96,000	+ 13,435/UL	= .008	< 1
LEVEL 6	192/96,000	+ 0/96,000	+ 298/96,000	+ 13,097/UL	= .005	< 1
TOTAL	12,748/96,000	+ 985/96,000	+ 1,284/96,000	+ 108,281/UL	= .155	< 2

HEIGHT:

	GROUP A-3	GROUP H-3	GROUP S-2
ALLOWABLE MAXIMUM HGT (FT)	180'	180'	180'
ALLOWABLE MAXIMUM STORIES	12	7	12

CONTROL AREAS (CBC TABLE 414.2.2)

CHEMICAL QUANTITIES: TYPE AND QUANTITY OF CHEMICALS AT OCCUPANCY SHALL NOT EXCEED CBC TABLE 414.2.5(1)

PLUMBING CALCULATION (CPC TABLE 4-1)

CALCULATIONS BASED ON 2007 CALIFORNIA PLUMBING CODE.

TYPE OF BUILDING OR OCCUPANCY:
OFFICE OR PUBLIC BUILDINGS

OCCUPANCY LOAD FACTOR:
GROUP A-PRINCIPLE ASSEMBLY AREA (NO FIXED SEATING): 30
GROUP A-FIXED SEATING: 1/2 NUMBER OF SEATING
GROUP B-OFFICE OR PUBLIC BUILDINGS: 200

AREA
PER TABLE A, ACCESSORY AREAS MAY BE EXCLUDED (EG. HALLWAY, RESTROOM, STAIR)

OFFICE OF THE STATE FIRE MARSHAL APPROVED FIRE AND PANIC ONLY
Reviewed by: ____ Fire & Life Safety South
NOV 10 2009
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times

FLOOR LEVEL	LOAD FACTOR	AREA (SF)	LOAD BY OCCUP.	OCCUPANCY		REQ. UR	REQ. WC	REQ. LAV	PROVIDED UR	PROVIDED WC	PROVIDED LAV
LEVEL ONE	200 30 30	0 7,750 963	0 259 67	MALE FEMALE	163 163	2	2 8	2 2	2	3 9	3 3
LEVEL TWO	200	31,624	159	MALE FEMALE	80 80	1	1 4	1 1	2	3 5	3 3
LEVEL THREE	200 30	29,143 2,757	145 32	MALE FEMALE	89 89	1	1 4	1 1	2	3 5	3 3
LEVEL FOUR	200 30	23,568 712	118 24	MALE FEMALE	71 71	1	1 4	1 1	2	3 5	3 3
LEVEL FIVE	200 30	14,097 739	71 25	MALE FEMALE	48 48	1	1 3	1 1	2	3 5	3 3
LEVEL SIX	200 30	13,813 192	70 7	MALE FEMALE	39 39	1	1 3	1 1	2	3 5	3 3
TOTAL				MALE FEMALE	516 516	8	7 30	8 8	12	18 34	18 18

PLAN CHECK NOTES

EXIT ACCESS / EXIT / EXIT DISCHARGE

EXIT ACCESS

OCCUPANT LOADS — TABLE 1004.1.1
BUSINESS 100 GSF
ASSEMBLY 15 GSF

EGRESS WIDTH W/ SPRINKLER — TABLE 1005.1
A-3, B , S, S-1 AND S-2 OCCUPANCIES:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT
H-3 OCCUPANCY:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT

ACCESSIBLE MEANS OF EGRESS — CBC 1007

AMIN. EGRESS WIDTH
MIN. DOOR 34" — CBC 1008.1.1
MIN. STAIR 44" — CBC 1009.1.1
MIN. ACCESSIBLE STAIR 48" — CBC 1007.3
MIN. EXT. EXIT STAIR 48" — CBC 1007.8.2
MIN. CORRIDOR 44" — CBC 1017.2

AREA OF REFUGE — CBC 1007.6

EXTERIOR AREA OF ASSISTED RESCUE — CBC 1007.8

DOOR SWING — CBC 1008.1.2

DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHERE SERVING AN OCCUPANT LOAD OF 50 OR MORE OR A GROUP H OCCUPANCY

RAMPS — CBC 1010

EGRESS THROUGH INTERVENING SPACES — CBC 1014.2 EXCEPTION 2

H OCCUPANCY EGRESS IS NOT PROHIBITED THROUGH ADJOINING SPACE WHEN ADJOINING OR INTERVENING SPACES ARE THE SAME OR LESSER HAZZARD OCCUPANCY.

COMMON PATH OF TRAVEL — CBC 1014.3 EXCEPTION 1 & 2
MAX. DIST. 100'

EXIT AND EXIT ACCESS DOORWAYS — CBC 1015.2.1 EXCEPTION 2
SEPARATION OF EXITS 1/3 DIAGONAL

EXIT ACCESS TRAVEL DISTANCE IN ATRIUM — CBC 404.8
MAX. DIST. W/ SPRINKLER 200'

CORRIDOR RATING W/ SPRINKLER — CBC TABLE 1017.1
B OCCUPANCY (0) HOUR

DEAD ENDS — CBC TABLE 1017.3 EXCEPTION 2
MAX. DIST. W/ SPRINKLER 50'

EXIT DISCHARGE — CBC 1024.1 EXCEPTION 1

MAX. 50% EXITS PERMITTED TO EGRESS THROUGH AREAS ON THE LEVEL OF DISCHARGE PROVIDED 1.1, 1.2 AND 1.3 ARE MET.

MAXIMUM ALLOWABLE TRAVEL DISTANCES (CBC TALE 1016.1)

B OCCUPANCY 300' WITH SPRINKLER SYSTEM
A-3 OCCUPANCY 250' WITH SPRINKLER SYSTEM
H-3 OCCUPANCY 150' WITH SPRINKLER SYSTEM
S-1 OCCUPANCY 250' WITH SPRINKLER SYSTEM
S-2 OCCUPANCY 400' WITH SPRINKLER SYSTEM

FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEMS (CBC SECTION 903)

FIRE SPRINKLER SYSTEM THROUGHOUT — CBC 901.2

ADDITIONAL REQUIRED FIRE SUPPRESSION — TABLE 903.2.13
ATRIUM — CBC 404.3

STANDPIPE REQUIREMENTS (CBC SECTION 905)

STANDPIPE: CLASS I — CBC 905.3.1, EXCEPTION 1
HOSE REQUIREMENT:
1. REQUIRED IN EVERY REQUIRED STAIRWAY AT MAIN LANDING, BY FIRE CODE OFFICIAL.
2. REQUIRED AT THE ROOF OR HIGHEST LANDING OF STAIRWAYS WITH STAIR ACCESS TO THE ROOF.
3. ADDITIONAL HOSE CONNECTION REQUIRED AT THE TOP OF THE MOST HYDRAULICALLY REMOTE STANDPIPE FOR TESTING PURPOSES.

FIRE EXTINGUISHERS (CBC SECTION 906)

REQUIRED: PROVIDE AS DIRECTED BY THE CALIFORNIA FIRE CODE (CFC 2007) AND NFPA 10
TYPE: FIRE EXTINGUISHERS TO BE -SIZE- 4-A:60-B:C 10LBS.
SPACING: CLASS A HAZARDS (OFFICE AREAS)
75FT. MAX. TRAVEL DISTANCE NFPA 10 3-2.1
CLASS B HAZARDS (LAB AREAS)
50FT. MAX. TRAVEL DISTANCE NFPA 10

FIRE ALARM AND DETECTION SYSTEMS (CBC SECTION 907)

-FIRE ALARM AND DETECTION SYSTEMS — CBC 907
ATRIUM — CBC 907.2.13

-EMERGENCY ALARM SYSTEMS — CBC 908
GROUP H OCCUPANCY — CBC 908.1
ADA COMPLIANT FIRE ADDRESSABLE FIRE ALARM SYSTEM/AREAS OF REFUGE
SMOKE DETECTION (DUCT MOUNTED INCLUDED) AT SELECTED LOCATIONS
AUDIO/VISUAL STROBE SIGNALING
FLOW AND TAMPER SWITCH MONITORING POINTS
ELEVATOR MONITOR AND CENTRAL TIE CAPABILITIES
EMERGENCY LIGHTING
EXIT LIGHTING
AUTOMATIC AIR HANDLING EQUIPMENT SHUTDOWN
FIRE DEPARTMENT COMMUNICATION SYSTEM
EMERGENCY AND STANDBY POWER SYSTEM

SMOKE CONTROL SYSTEM (CBC SECTION 909)

PASSIVE NATURAL VENTILATION SMOKE CONTROL SYSTEM IN ATRIUM

ALTERNATIVE MATERIALS, DESIGNS, TESTS AND METHODS OF CONSTRUCTION — CBC 108.7.2

CONSTRUCTION

RATED PARTITIONS

INDICATED ON PLANS.

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

ATRIUM (CBC 404)

AUTOMATIC SPRINKLER PROTECTION — CBC 404.3, TABLE 903.2.13
1-HOUR SEPARATION, EXCEPT ANY THREE FLOORS — CBC 404.5 EXCEPTION 3
EXIT ACCESS TRAVEL DISTANCE MAX. = 200' — CBC 404.8

REQUIRED OCCUPANCY SEPARATION (CBC TABLE 508.3.3)

B TO A-3: 1-HOUR
B TO H-3: 1-HOUR
B TO S-1: NO SEPARATION REQUIRED
B TO S-2: 1-HOUR
S-1 TO H-3: 1-HOUR
S-1 TO S-2: 1-HOUR

FIRE RESISTIVE REQUIREMENTS (CBC TABLE 601)

STRUCTURAL FRAME	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR BEARING WALLS	2-HOUR
INTERIOR BEARING WALLS	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR NONBEARING WALLS & PARTITIONS	1-HOUR < 30'; NON-RATED N/C ≥ 30'
INTERIOR NONBEARING WALLS & PARTITIONS	NON-RATED
FLOOR CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	2-HOUR
ROOF CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	1-HOUR

TYPE OF CONSTRUCTION (CBC 602.2)

TYPE 1B-FR (FULLY SPRINKLED, SUPERVISED AUTOMATIC SPRINKLER SYSTEM)

EXTERIOR WALL AND OPENING PROTECTION (CBC TABLE 704.8)

UNPROTECTED OPENINGS: NO LIMIT > 30'
PROTECTED OPENINGS: NO LIMIT > 30'

MAX. FLAME SPREAD CLASSIFICATION: INTERIOR FINISHES (CBC TABLE 803.5)

GROUP	EXIT ENCLOSURES AND EXIT PASSAGEWAYS SPRINKLER	CORRIDORS SPRINKLED	ROOMS AND ENCLOSED SPACES SPRINKLED
A-3	B	B	C
B	B	C	C
S-1	C	C	C
S-2	C	C	C

ZIMMER GUNSUL FRASCA ARCHITECTS LLP (ZGF)
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc
1212 S. Flower Street
Los Angeles, CA 90015

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP DIV. OF THE STATE ARCHITECT OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ___ FLS ___ SS ___
DATE SEP 03 2009

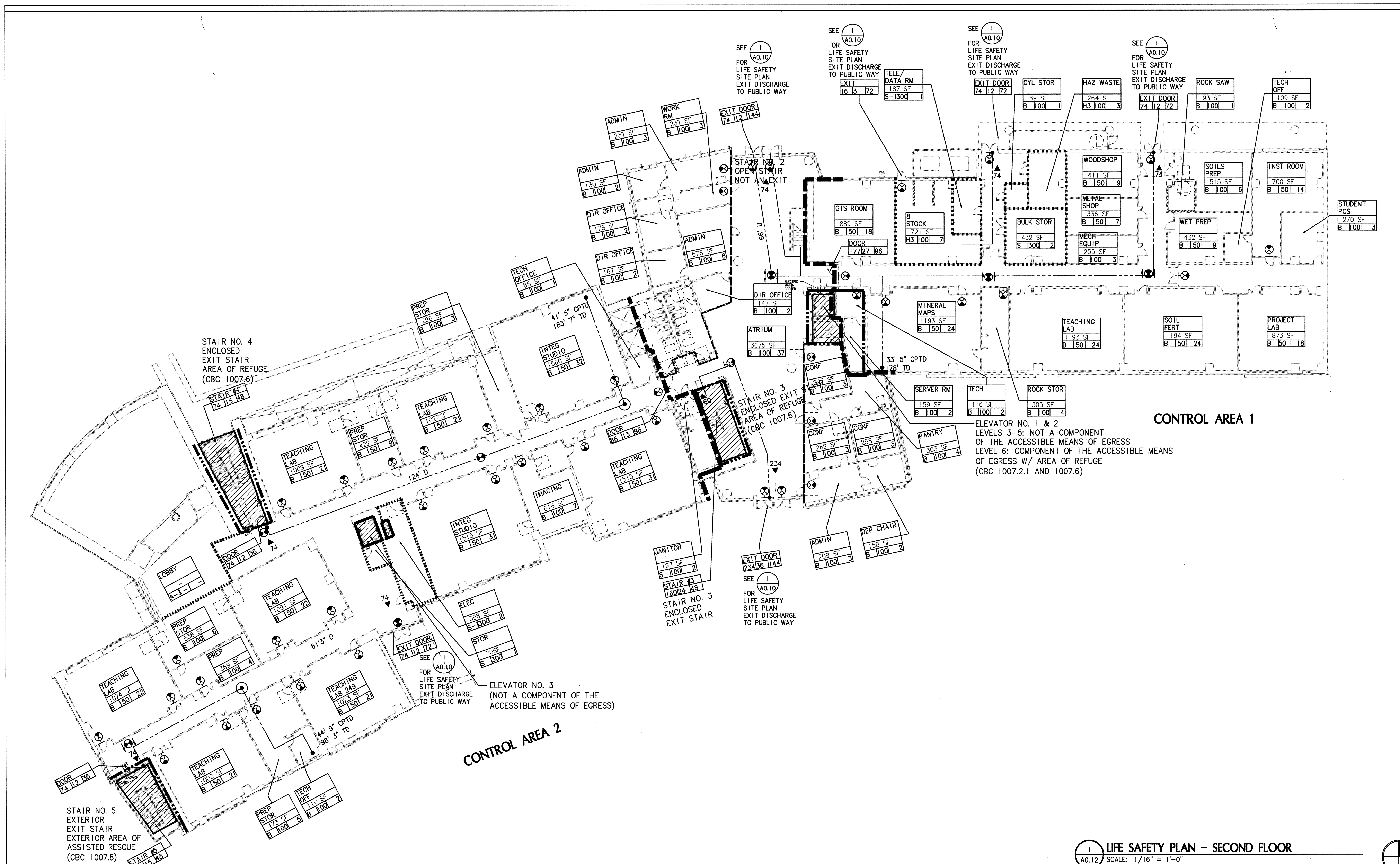
Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
LIFE SAFETY PLAN – FIRST FLOOR

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By: TR/CS
Checked By:

Drawing No.
A0.11



1 A0.12 **LIFE SAFETY PLAN - SECOND FLOOR**
SCALE: 1/16" = 1'-0"

PLAN CHECK NOTES

EXIT ACCESS / EXIT / EXIT DISCHARGE

EXIT ACCESS

OCCUPANT LOADS — TABLE 1004.1.1
- BUSINESS 100 GSF
- ASSEMBLY 15 GSF

EGRESS WIDTH W/ SPRINKLER — TABLE 1005.1
- A-3, B , S, S-1 AND S-2 OCCUPANCIES:
  - STAIRS 0.2"/OCCUPANT
  - OTHER 0.15"/OCCUPANT
- H-3 OCCUPANCY:
  - STAIRS 0.2"/OCCUPANT
  - OTHER 0.15"/OCCUPANT

ACCESSIBLE MEANS OF EGRESS — CBC 1007

AMIN. EGRESS WIDTH
- MIN. DOOR 34" — CBC 1008.1.1
- MIN. STAIR 44" — CBC 1009.1.1
- MIN. ACCESSIBLE STAIR 48" — CBC 1007.3
- MIN. EXT. EXIT STAIR 48" — CBC 1007.8.2
- MIN. CORRIDOR 44" — CBC 1017.2

AREA OF REFUGE — CBC 1007.6

EXTERIOR AREA OF ASSISTED RESCUE — CBC 1007.8

DOOR SWING — CBC 1008.1.2

DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHERE SERVING AN OCCUPANT LOAD OF 50 OR MORE OR A GROUP H OCCUPANCY

RAMPS — CBC 1010

EGRESS THROUGH INTERVENING SPACES — CBC 1014.2 EXCEPTION 2

H OCCUPANCY EGRESS IS NOT PROHIBITED THROUGH ADJOINING SPACE WHEN ADJOINING OR INTERVENING SPACES ARE THE SAME OR LESSER HAZZARD OCCUPANCY.

COMMON PATH OF TRAVEL — CBC 1014.3 EXCEPTION 1 & 2
MAX. DIST. 100'

EXIT AND EXIT ACCESS DOORWAYS — CBC 1015.2.1 EXCEPTION 2
SEPARATION OF EXITS 1/3 DIAGONAL

EXIT ACCESS TRAVEL DISTANCE IN ATRIUM — CBC 404.8
MAX. DIST. W/ SPRINKLER 200'

CORRIDOR RATING W/ SPRINKLER — CBC TABLE 1017.1
B OCCUPANCY (0) HOUR

DEAD ENDS — CBC TABLE 1017.3 EXCEPTION 2
MAX. DIST. W/ SPRINKLER 50'

EXIT DISCHARGE — CBC 1024.1 EXCEPTION 1

MAX. 50% EXITS PERMITTED TO EGRESS THROUGH AREAS ON THE LEVEL OF DISCHARGE PROVIDED 1.1, 1.2 AND 1.3 ARE MET.

MAXIMUM ALLOWABLE TRAVEL DISTANCES (CBC TALE 1016.1)

- B OCCUPANCY 300' WITH SPRINKLER SYSTEM
- A-3 OCCUPANCY 250' WITH SPRINKLER SYSTEM
- H-3 OCCUPANCY 150' WITH SPRINKLER SYSTEM
- S-1 OCCUPANCY 250' WITH SPRINKLER SYSTEM
- S-2 OCCUPANCY 400' WITH SPRINKLER SYSTEM

FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEMS (CBC SECTION 903)

FIRE SPRINKLER SYSTEM THROUGHOUT — CBC 901.2

ADDITIONAL REQUIRED FIRE SUPPRESSION ATRIUM — TABLE 903.2.13, CBC 404.3

STANDPIPE REQUIREMENTS (CBC SECTION 905)

STANDPIPE: CLASS I — CBC 905.3.1, EXCEPTION 1

HOSE REQUIREMENT:
1. REQUIRED IN EVERY REQUIRED STAIRWAY AT MAIN LANDING, BY FIRE CODE OFFICIAL.
2. REQUIRED AT THE ROOF OR HIGHEST LANDING OF STAIRWAYS WITH STAIR ACCESS TO THE ROOF.
3. ADDITIONAL HOSE CONNECTION REQUIRED AT THE TOP OF THE MOST HYDRAULICALLY REMOTE STANDPIPE FOR TESTING PURPOSES.

FIRE EXTINGUISHERS (CBC SECTION 906)

REQUIRED: PROVIDE AS DIRECTED BY THE CALIFORNIA FIRE CODE (CFC 2007) AND NFPA 10
TYPE: FIRE EXTINGUISHERS TO BE -SIZE- 4-A:60-B:C 10LBS.
SPACING: CLASS A HAZARDS (OFFICE AREAS)
75FT. MAX. TRAVEL DISTANCE NFPA 10 3-2.1
CLASS B HAZARDS (LAB AREAS)
50FT. MAX. TRAVEL DISTANCE NFPA 10

FIRE ALARM AND DETECTION SYSTEMS (CBC SECTION 907)

- -FIRE ALARM AND DETECTION SYSTEMS — CBC 907
  - ATRIUM — CBC 907.2.13
- -EMERGENCY ALARM SYSTEMS — CBC 908
  - GROUP H OCCUPANCY — CBC 908.1
- ADA COMPLIANT FIRE ADDRESSABLE FIRE ALARM SYSTEM/AREAS OF REFUGE
- SMOKE DETECTION (DUCT MOUNTED INCLUDED) AT SELECTED LOCATIONS
- AUDIO/VISUAL STROBE SIGNALING
- FLOW AND TAMPER SWITCH MONITORING POINTS
- ELEVATOR MONITOR AND CENTRAL TIE CAPABILITIES
- EMERGENCY LIGHTING
- EXIT LIGHTING
- AUTOMATIC AIR HANDLING EQUIPMENT SHUTDOWN
- FIRE DEPARTMENT COMMUNICATION SYSTEM
- EMERGENCY AND STANDBY POWER SYSTEM

SMOKE CONTROL SYSTEM (CBC SECTION 909)

PASSIVE NATURAL VENTILATION SMOKE CONTROL SYSTEM IN ATRIUM

ALTERNATIVE MATERIALS, DESIGNS, TESTS AND METHODS OF CONSTRUCTION — CBC 108.7.2

CONSTRUCTION

RATED PARTITIONS

INDICATED ON PLANS.

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

ATRIUM (CBC 404)

AUTOMATIC SPRINKLER PROTECTION — CBC 404.3, TABLE 903.2.13

1-HOUR SEPARATION, EXCEPT ANY THREE FLOORS — CBC 404.5 EXCEPTION 3

EXIT ACCESS TRAVEL DISTANCE MAX. = 200' — CBC 404.8

REQUIRED OCCUPANCY SEPARATION (CBC TABLE 508.3.3)

- B TO A-3: 1-HOUR
- B TO H-3: 1-HOUR
- B TO S-1: NO SEPARATION REQUIRED
- B TO S-2: 1-HOUR
- S-1 TO H-3: 1-HOUR
- S-1 TO S-2: 1-HOUR

FIRE RESISTIVE REQUIREMENTS (CBC TABLE 601)

STRUCTURAL FRAME	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR BEARING WALLS	2-HOUR
INTERIOR BEARING WALLS	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR NONBEARING WALLS & PARTITIONS	1-HOUR < 30'; NON-RATED N/C ≥ 30'
INTERIOR NONBEARING WALLS & PARTITIONS	NON-RATED
FLOOR CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	2-HOUR
ROOF CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	1-HOUR

TYPE OF CONSTRUCTION (CBC 602.2)

TYPE 1B-FR (FULLY SPRINKLED, SUPERVISED AUTOMATIC SPRINKLER SYSTEM)

EXTERIOR WALL AND OPENING PROTECTION (CBC TABLE 704.8)

UNPROTECTED OPENINGS: NO LIMIT > 30'
PROTECTED OPENINGS: NO LIMIT > 30'

MAX. FLAME SPREAD CLASSIFICATION: INTERIOR FINISHES (CBC TABLE 803.5)

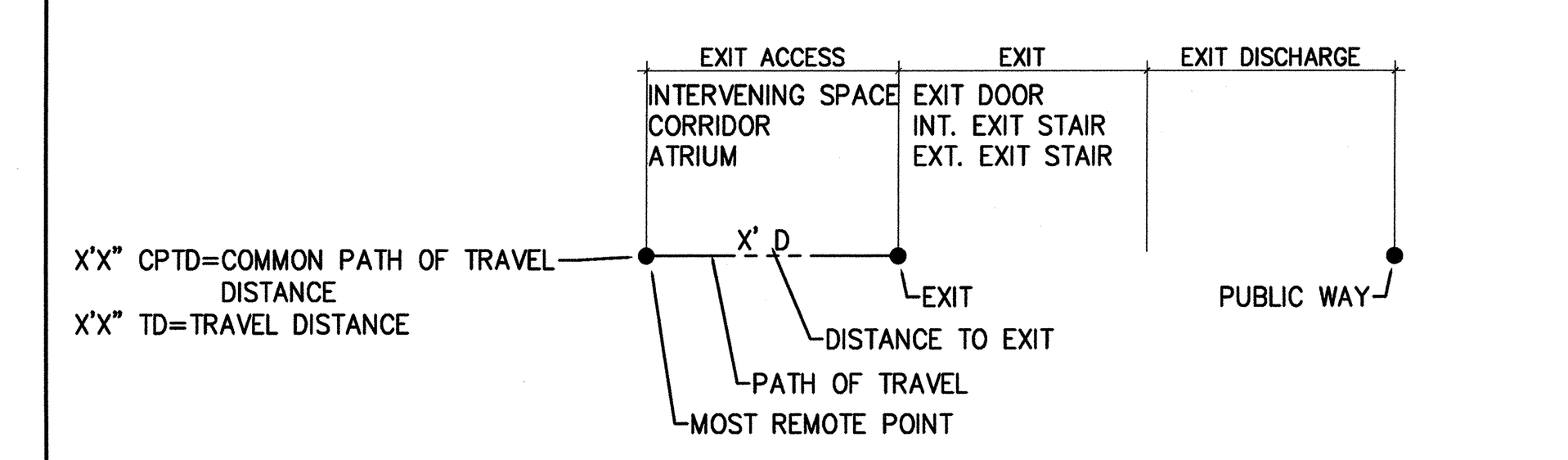
GROUP	EXIT ENCLOSURES AND EXIT PASSAGEWAYS SPRINKLER	CORRIDORS SPRINKLED	ROOMS AND ENCLOSED SPACES SPRINKLED
A-3	B	B	C
B	B	C	C
S-1	C	C	C
S-2	C	C	C

SYMBOLS LEGEND

- ATRIUM SEPARATION/CONTROL AREA SEPARATION 1 HR. FIRE RATED WALL ASSEMBLY, CBC 404.5 EXCEPTION 3
- 1 HR. FIRE RATED SEPARATION
- EXIT ENCLOSURE & SHAFT ENCLOSURES 2 HR. FIRE RATED WALL ASSEMBLY, CBC 707.4 AND 1020.1
- CONTROL AREA SEPARATION 2 HR. FIRE RATED WALL ASSEMBLY, CBC 414.2.4
- X DIRECTION OF EGRESS AND NUMBER OF OCCUPANTS USING EGRESS
- EXIT SIGN, SINGLE FACE
- POINT OF TWO EXIT OPTIONS
- EXIT SIGN, DOUBLE FACE CBC
- ROOM NAME TAG: NAME / NAME / AREA / OG OLF OL — ROOM NAME, ROOM AREA, OCCUPANCY LOAD, OCCUPANCY LOAD FACTOR, OCCUPANCY GROUP
- EXIT COMPONENT TAG: NAME / OL WR WP — EXIT COMPONENT, WIDTH PROVIDED, WIDTH REQUIRED, OCCUPANT LOAD

MEANS OF EGRESS SYSTEM

TRAVEL DISTANCE FROM MOST REMOTE POINT TO EXIT MAX. DISTANCE 300'



CODE ANALYSIS

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

OCCUPANCIES

INDICATED ON PLANS.

FLOOR AREA CALCULATIONS

	CALIFORNIA BUILDING CODE	CALIFORNIA PLUMBING CODE
EXTERIOR WALLS		EXCLUDED
MECH/OP. EQMT.		EXCLUDED
STAIRS		EXCLUDED
ELEVATORS		EXCLUDED
SHAFTS	EXCLUDED	EXCLUDED
STORAGE		EXCLUDED
CLOSETS		EXCLUDED
TERRACES		EXCLUDED
ATRIUM		EXCLUDED
CORRIDORS		EXCLUDED
RESTROOMS		EXCLUDED
TOTAL AREA	208,608 SF	124,993 SF

AREAS:

FLOOR AREA OCCUPANCY (CBC SECTION 1002.1)		FLOOR AREA FIXTURE COUNT (CPC)		FLOOR AREA BY OCCUPANCY (CBC)	
LEVEL 1	23,146 SF	LEVEL 1	10,162 SF		
LEVEL 2	43,458 SF	LEVEL 2	31,624 SF	B	108,281 SF
LEVEL 3	43,209 SF	LEVEL 3	30,086 SF	A-3	12,748 SF
LEVEL 4	33,307 SF	LEVEL 4	24,280 SF	H-3	985 SF
LEVEL 5	25,294 SF	LEVEL 5	14,836 SF	S	1,405 SF
LEVEL 6	19,958 SF	LEVEL 6	14,005 SF	S-1	6,456 SF
ROOF	20,236 SF	ROOF	0 SF	S-2	1,284 SF
TOTAL	208,608 SF	TOTAL	124,993 SF	TOTAL	131,159 SF

HIGH-RISE BUILDINGS (NON HIGH-RISE) (CBC 403)

ACTUAL BUILDING HEIGHT (NON-HIGHRISE):
108'-0": 6 STORIES AND PENTHOUSE
DEFINED BUILDING HEIGHT (NON-HIGHRISE):
64'-0": TO TOP OF HIGHEST OCCUPIED FLOOR/LEVEL ABOVE BUILDING ACCESS.
(CBC 403.1 EXCEPTION [SFM] 403.1.2)

ALLOWABLE AREA AND HEIGHT (CBC 503/504)

ALLOWABLE HEIGHT AND BUILDING AREAS FOR NON-SEPARATED OCCUPANCIES:
(CBC TABLE 503) WITH AUTOMATIC SPRINKLER SYSTEM INCREASE
(CBC SECTION 504.2 AND 506.3)

	GROUP B	GROUP S-1
ALLOWABLE MAXIMUM HGT (FT)	160'	180'
ALLOWABLE MAXIMUM STORIES	11	12
ALLOWABLE MAX. AREA/STORY	UL	96,000 (48,000X2)

ACTUAL HEIGHT AND BUILDING AREAS PER CBC TABLE 503:

	CENTER FOR SCIENCE
ACTUAL MAXIMUM HGT (FT)	108'-0"
ACTUAL MAXIMUM STORIES	6
ACTUAL MAX. AREA/STORY	43,458

TOTAL ALLOWABLE BUILDING AREA: 96,000 SF X 6 FLOORS = 576,000 SF
TOTAL ACTUAL FLOOR AREA = 208,608 SF

ALLOWABLE HEIGHT AND BUILDING AREAS FOR SEPARATED OCCUPANCIES:
(CBC SECTION 508.3.3)

AREA: (ACTUAL MAX. AREA/ ALLOWABLE MAX. AREA)	GROUP A-3	+	GROUP H-3	+	GROUP S-2	+	GROUP B	=	X	< 1
LEVEL 1	10,162/96,000	+	0/96,000	+	986/96,000	+	335/UL	=	.005	< 1
LEVEL 2	0/96,000	+	985/96,000	+	0/96,000	+	30,020/UL	=	.010	< 1
LEVEL 3	943/96,000	+	0/96,000	+	0/96,000	+	28,418/UL	=	.010	< 1
LEVEL 4	712/96,000	+	0/96,000	+	0/96,000	+	22,976/UL	=	.007	< 1
LEVEL 5	739/96,000	+	0/96,000	+	0/96,000	+	13,435/UL	=	.008	< 1
LEVEL 6	192/96,000	+	0/96,000	+	298/96,000	+	13,097/UL	=	.005	< 1
TOTAL	12,748/96,000	+	985/96,000	+	1,284/96,000	+	108,281/UL	=	.155	< 2

HEIGHT:

	GROUP A-3	GROUP H-3	GROUP S-2
ALLOWABLE MAXIMUM HGT (FT)	180'	180'	180'
ALLOWABLE MAXIMUM STORIES	12	7	12

CONTROL AREAS (CBC TABLE 414.2.2)

CHEMICAL QUANTITIES: TYPE AND QUANTITY OF CHEMICALS AT OCCUPANCY SHALL NOT EXCEED CBC TABLE 414.2.5(1)

PLUMBING CALCULATION (CPC TABLE 4-1)

CALCULATIONS BASED ON 2007 CALIFORNIA PLUMBING CODE.

TYPE OF BUILDING OR OCCUPANCY:
OFFICE OR PUBLIC BUILDINGS

OCCUPANCY LOAD FACTOR:
GROUP A-PRINCIPLE ASSEMBLY AREA (NO FIXED SEATING): 30
GROUP A-FIXED SEATING: 1/2 NUMBER OF SEATING
GROUP B-OFFICE OR PUBLIC BUILDINGS: 200

AREA
PER TABLE A, ACCESSORY AREAS MAY BE EXCLUDED (EG. HALLWAY, RESTROOM, STAIR)

OFFICE OF THE STATE FIRE MARSHAL
APPROVED FIRE AND PANIC ONLY
Reviewed by: Fire & Life Safety South
NOV 10 2009
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times

FLOOR LEVEL	LOAD FACTOR	AREA (SF)	LOAD BY OCCUP.	OCCUPANCY		REQ. UR	REQ. WC	REQ. LAV	PROVIDED UR	PROVIDED WC	PROVIDED LAV
LEVEL ONE	200 30 30	0 7,750 963	0 259 67	MALE FEMALE	163 163	2	2 8	2 2	2	3 9	3 3
LEVEL TWO	200	31,624	159	MALE FEMALE	80 80	1	1 4	1 1	2	3 5	3 3
LEVEL THREE	200 30	29,143 2,757	145 32	MALE FEMALE	89 89	1	1 4	1 1	2	3 5	3 3
LEVEL FOUR	200 30	23,568 712	118 24	MALE FEMALE	71 71	1	1 4	1 1	2	3 5	3 3
LEVEL FIVE	200 30	14,097 739	71 25	MALE FEMALE	48 48	1	1 3	1 1	2	3 5	3 3
LEVEL SIX	200 30	13,813 192	70 7	MALE FEMALE	39 39	1	1 3	1 1	2	3 5	3 3
TOTAL				MALE FEMALE	516 516	8	7 30	8 8	12	18 34	18 18

ZIMMER·GUNSUL·FRASCA·ARCHITECTS·LLP ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc
1212 S. Flower Street
Los Angeles, CA 90015

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC FLS SS
DATE SEP 03 2009

Revisions
BID DOCUMENTS 10/23/09

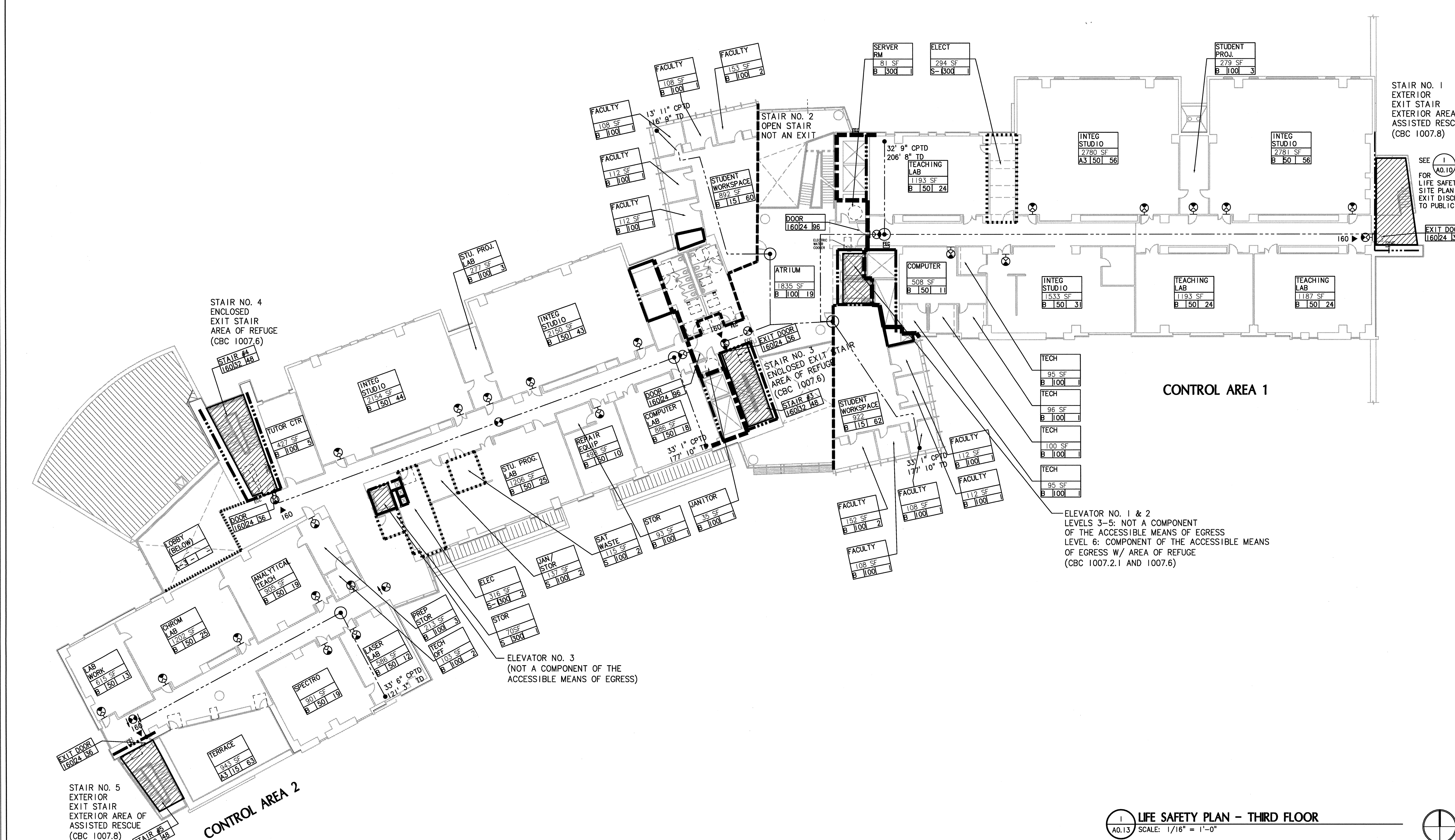
CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
LIFE SAFETY PLAN - SECOND FLOOR

STATE OF CALIFORNIA · TED ALAN HYMAN · REGISTERED ARCHITECT

Date:	OCTOBER 23, 2009
Job No:	L40302.05
Drawn By:	TR/CS
Checked By:	

Drawing No.
A0.12



1 LIFE SAFETY PLAN - THIRD FLOOR (A0.13)
SCALE: 1/16" = 1'-0"

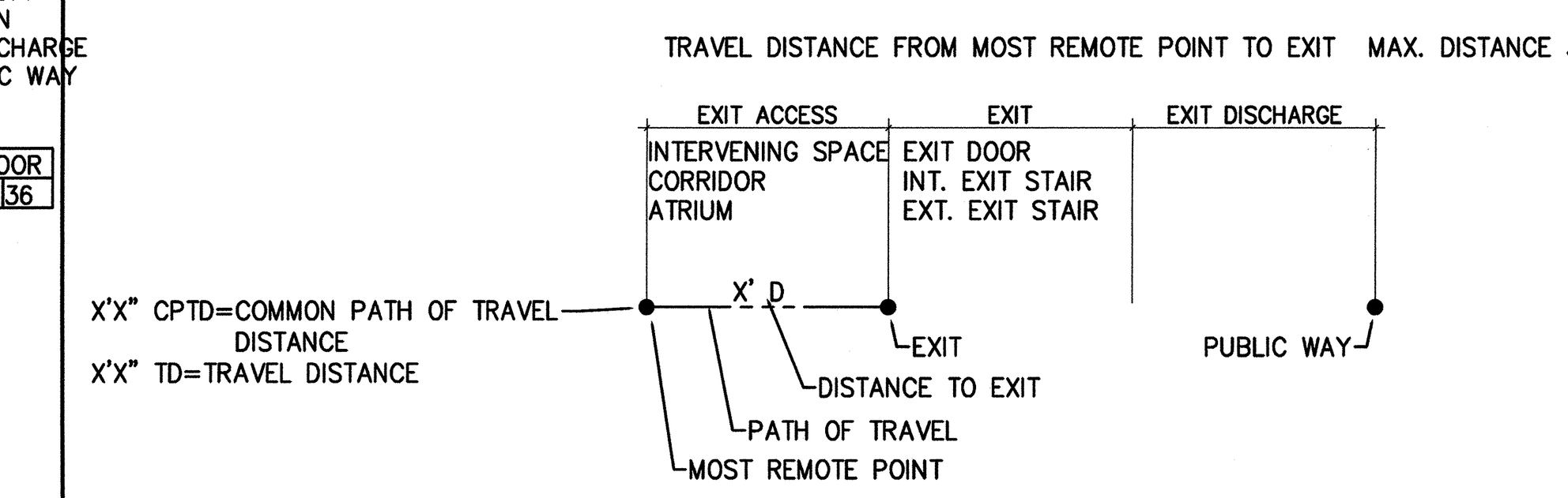
SYMBOLS LEGEND

- ATRIUM SEPARATION/CONTROL AREA SEPARATION 1 HR. FIRE RATED WALL ASSEMBLY, CBC 404.5 EXCEPTION 3
- 1 HR. FIRE RATED SEPARATION
- EXIT ENCLOSURE & SHAFT ENCLOSURES 2 HR. FIRE RATED WALL ASSEMBLY, CBC 707.4 AND 1020.1
- CONTROL AREA SEPARATION 2 HR. FIRE RATED WALL ASSEMBLY, CBC 414.2.4
- X DIRECTION OF EGRESS AND NUMBER OF OCCUPANTS USING EGRESS
- EXIT SIGN, SINGLE FACE
- POINT OF TWO EXIT OPTIONS
- EXIT SIGN, DOUBLE FACE CBC

ROOM NAME TAG: NAME / NAME / AREA / OG OLF OL — ROOM NAME, ROOM AREA, OCCUPANCY LOAD, OCCUPANCY LOAD FACTOR, OCCUPANCY GROUP

EXIT COMPONENT TAG: NAME / OL WR WP — EXIT COMPONENT, WIDTH PROVIDED, WIDTH REQUIRED, OCCUPANT LOAD

MEANS OF EGRESS SYSTEM



CODE ANALYSIS

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

OCCUPANCIES

INDICATED ON PLANS.

FLOOR AREA CALCULATIONS

	CALIFORNIA BUILDING CODE	CALIFORNIA PLUMBING CODE
EXTERIOR WALLS		EXCLUDED
MECH/OP. EQMT.		EXCLUDED
STAIRS		EXCLUDED
ELEVATORS		EXCLUDED
SHAFTS	EXCLUDED	EXCLUDED
STORAGE		EXCLUDED
CLOSETS		EXCLUDED
TERRACES		EXCLUDED
ATRIUM		EXCLUDED
CORRIDORS		EXCLUDED
RESTROOMS		EXCLUDED
TOTAL AREA	208,608 SF	124,993 SF

AREAS:

FLOOR AREA OCCUPANCY (CBC SECTION 1002.1)		FLOOR AREA FIXTURE COUNT (CPC)		FLOOR AREA BY OCCUPANCY (CBC)	
LEVEL 1	23,146 SF	LEVEL 1	10,162 SF		
LEVEL 2	43,458 SF	LEVEL 2	31,624 SF	B	108,281 SF
LEVEL 3	43,209 SF	LEVEL 3	30,086 SF	A-3	12,748 SF
LEVEL 4	33,307 SF	LEVEL 4	24,280 SF	H-3	985 SF
LEVEL 5	25,294 SF	LEVEL 5	14,836 SF	S	1,405 SF
LEVEL 6	19,958 SF	LEVEL 6	14,005 SF	S-1	6,456 SF
ROOF	20,236 SF	ROOF	0 SF	S-2	1,284 SF
TOTAL	208,608 SF	TOTAL	124,993 SF	TOTAL	131,159 SF

HIGH-RISE BUILDINGS (NON HIGH-RISE) (CBC 403)

ACTUAL BUILDING HEIGHT (NON-HIGHRISE):
108'-0": 6 STORIES AND PENTHOUSE
DEFINED BUILDING HEIGHT (NON-HIGHRISE):
64'-0": TO TOP OF HIGHEST OCCUPIED FLOOR/LEVEL ABOVE BUILDING ACCESS.
(CBC 403.1 EXCEPTION [SFM] 403.1.2)

ALLOWABLE AREA AND HEIGHT (CBC 503/504)

ALLOWABLE HEIGHT AND BUILDING AREAS FOR NON-SEPARATED OCCUPANCIES:
(CBC TABLE 503) WITH AUTOMATIC SPRINKLER SYSTEM INCREASE
(CBC SECTION 504.2 AND 506.3)

	GROUP B	GROUP S-1
ALLOWABLE MAXIMUM HGT (FT)	160'	180'
ALLOWABLE MAXIMUM STORIES	11	12
ALLOWABLE MAX. AREA/STORY	UL	96,000 (48,000X2)

ACTUAL HEIGHT AND BUILDING AREAS PER CBC TABLE 503:

	CENTER FOR SCIENCE
ACTUAL MAXIMUM HGT (FT)	108'-0"
ACTUAL MAXIMUM STORIES	6
ACTUAL MAX. AREA/STORY	43,458

TOTAL ALLOWABLE BUILDING AREA: 96,000 SF X 6 FLOORS = 576,000 SF
TOTAL ACTUAL FLOOR AREA = 208,608 SF

ALLOWABLE HEIGHT AND BUILDING AREAS FOR SEPARATED OCCUPANCIES:
(CBC SECTION 508.3.3)

AREA: GROUP A-3 + GROUP H-3 + GROUP S-2 + GROUP B = X < 1
(ACTUAL MAX. AREA/ ALLOWABLE MAX. AREA)

	GROUP A-3		GROUP H-3		GROUP S-2		GROUP B		X	
LEVEL 1	10,162/96,000	+	0/96,000	+	986/96,000	+	335/UL	=	.005	< 1
LEVEL 2	0/96,000	+	985/96,000	+	0/96,000	+	30,020/UL	=	.010	< 1
LEVEL 3	943/96,000	+	0/96,000	+	0/96,000	+	28,418/UL	=	.010	< 1
LEVEL 4	712/96,000	+	0/96,000	+	0/96,000	+	22,976/UL	=	.007	< 1
LEVEL 5	739/96,000	+	0/96,000	+	0/96,000	+	13,435/UL	=	.008	< 1
LEVEL 6	192/96,000	+	0/96,000	+	298/96,000	+	13,097/UL	=	.005	< 1
TOTAL	12,748/96,000	+	985/96,000	+	1,284/96,000	+	108,281/UL	=	.155	< 2

HEIGHT:

	GROUP A-3	GROUP H-3	GROUP S-2
ALLOWABLE MAXIMUM HGT (FT)	180'	180'	180'
ALLOWABLE MAXIMUM STORIES	12	7	12

CONTROL AREAS (CBC TABLE 414.2.2)

CHEMICAL QUANTITIES: TYPE AND QUANTITY OF CHEMICALS AT OCCUPANCY SHALL NOT EXCEED CBC TABLE 414.2.5(1)

PLUMBING CALCULATION (CPC TABLE 4-1)

CALCULATIONS BASED ON 2007 CALIFORNIA PLUMBING CODE.

TYPE OF BUILDING OR OCCUPANCY:
OFFICE OR PUBLIC BUILDINGS

OCCUPANCY LOAD FACTOR:
GROUP A-PRINCIPLE ASSEMBLY AREA (NO FIXED SEATING): 30
GROUP A-FIXED SEATING: 1/2 NUMBER OF SEATING
GROUP B-OFFICE OR PUBLIC BUILDINGS: 200

AREA
PER TABLE A, ACCESSORY AREAS MAY BE EXCLUDED (EG. HALLWAY, RESTROOM, STAIR)

FLOOR LEVEL	LOAD FACTOR	AREA (SF)	LOAD BY OCCUP.	OCCUPANCY		REQ. UR	REQ. WC	REQ. LAV	PROVIDED UR	PROVIDED WC	PROVIDED LAV
LEVEL ONE	200	0	0	MALE	163	2	2	2	2	3	3
	30	7,750	259	FEMALE	163		8	2		9	3
	30	963	67								
LEVEL TWO	200	31,624	159	MALE	80	1	1	1	2	3	3
				FEMALE	80		4	1		5	3
LEVEL THREE	200	29,143	145	MALE	89	1	1	1	2	3	3
	30	2,757	32	FEMALE	89		4	1		5	3
LEVEL FOUR	200	23,568	118	MALE	71	1	1	1	2	3	3
	30	712	24	FEMALE	71		4	1		5	3
LEVEL FIVE	200	14,097	71	MALE	48	1	1	1	2	3	3
	30	739	25	FEMALE	48		3	1		5	3
LEVEL SIX	200	13,813	70	MALE	39	1	1	1	2	3	3
	30	192	7	FEMALE	39		3	1		5	3
TOTAL				MALE	516	8	7	8	12	18	18
				FEMALE	516		30	8		34	18

OFFICE OF THE STATE FIRE MARSHAL
APPROVED FIRE AND PANIC ONLY
Reviewed by: Fire & Life Safety South
NOV 10 2009
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times.

PLAN CHECK NOTES

EXIT ACCESS / EXIT / EXIT DISCHARGE

EXIT ACCESS

OCCUPANT LOADS — TABLE 1004.1.1
BUSINESS 100 GSF
ASSEMBLY 15 GSF

EGRESS WIDTH W/ SPRINKLER — TABLE 1005.1
A-3, B , S, S-1 AND S-2 OCCUPANCIES:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT
H-3 OCCUPANCY:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT

ACCESSIBLE MEANS OF EGRESS — CBC 1007

AMIN. EGRESS WIDTH
MIN. DOOR 34" — CBC 1008.1.1
MIN. STAIR 44" — CBC 1009.1.1
MIN. ACCESSIBLE STAIR 48" — CBC 1007.3
MIN. EXT. EXIT STAIR 48" — CBC 1007.8.2
MIN. CORRIDOR 44" — CBC 1017.2

AREA OF REFUGE — CBC 1007.6

EXTERIOR AREA OF ASSISTED RESCUE — CBC 1007.8

DOOR SWING — CBC 1008.1.2

DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHERE SERVING AN OCCUPANT LOAD OF 50 OR MORE OR A GROUP H OCCUPANCY

RAMPS — CBC 1010

EGRESS THROUGH INTERVENING SPACES — CBC 1014.2 EXCEPTION 2

H OCCUPANCY EGRESS IS NOT PROHIBITED THROUGH ADJOINING SPACE WHEN ADJOINING OR INTERVENING SPACES ARE THE SAME OR LESSER HAZZARD OCCUPANCY.

COMMON PATH OF TRAVEL — CBC 1014.3 EXCEPTION 1 & 2
MAX. DIST. 100'

EXIT AND EXIT ACCESS DOORWAYS — CBC 1015.2.1 EXCEPTION 2
SEPARATION OF EXITS 1/3 DIAGONAL

EXIT ACCESS TRAVEL DISTANCE IN ATRIUM — CBC 404.8
MAX. DIST. W/ SPRINKLER 200'

CORRIDOR RATING W/ SPRINKLER — CBC TABLE 1017.1
B OCCUPANCY (0) HOUR

DEAD ENDS — CBC TABLE 1017.3 EXCEPTION 2
MAX. DIST. W/ SPRINKLER 50'

EXIT DISCHARGE — CBC 1024.1 EXCEPTION 1

MAX. 50% EXITS PERMITTED TO EGRESS THROUGH AREAS ON THE LEVEL OF DISCHARGE PROVIDED 1.1, 1.2 AND 1.3 ARE MET.

MAXIMUM ALLOWABLE TRAVEL DISTANCES (CBC TALE 1016.1)

B OCCUPANCY	300' WITH SPRINKLER SYSTEM
A-3 OCCUPANCY	250' WITH SPRINKLER SYSTEM
H-3 OCCUPANCY	150' WITH SPRINKLER SYSTEM
S-1 OCCUPANCY	250' WITH SPRINKLER SYSTEM
S-2 OCCUPANCY	400' WITH SPRINKLER SYSTEM

FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEMS (CBC SECTION 903)

FIRE SPRINKLER SYSTEM THROUGHOUT — CBC 901.2

ADDITIONAL REQUIRED FIRE SUPPRESSION — TABLE 903.2.13
ATRIUM — CBC 404.3

STANDPIPE REQUIREMENTS (CBC SECTION 905)

STANDPIPE: CLASS I — CBC 905.3.1, EXCEPTION 1
HOSE REQUIREMENT:
1. REQUIRED IN EVERY REQUIRED STAIRWAY AT MAIN LANDING, BY FIRE CODE OFFICIAL.
2. REQUIRED AT THE ROOF OR HIGHEST LANDING OF STAIRWAYS WITH STAIR ACCESS TO THE ROOF.
3. ADDITIONAL HOSE CONNECTION REQUIRED AT THE TOP OF THE MOST HYDRAULICALLY REMOTE STANDPIPE FOR TESTING PURPOSES.

FIRE EXTINGUISHERS (CBC SECTION 906)

REQUIRED: PROVIDE AS DIRECTED BY THE CALIFORNIA FIRE CODE (CFC 2007) AND NFPA 10
TYPE: FIRE EXTINGUISHERS TO BE -SIZE- 4-A:60-B:C 10LBS.
SPACING: CLASS A HAZARDS (OFFICE AREAS)
75FT. MAX. TRAVEL DISTANCE NFPA 10 3-2.1
CLASS B HAZARDS (LAB AREAS)
50FT. MAX. TRAVEL DISTANCE NFPA 10

FIRE ALARM AND DETECTION SYSTEMS (CBC SECTION 907)

-FIRE ALARM AND DETECTION SYSTEMS — CBC 907
ATRIUM — CBC 907.2.13

-EMERGENCY ALARM SYSTEMS — CBC 908
GROUP H OCCUPANCY — CBC 908.1
ADA COMPLIANT FIRE ADDRESSABLE FIRE ALARM SYSTEM/AREAS OF REFUGE
SMOKE DETECTION (DUCT MOUNTED INCLUDED) AT SELECTED LOCATIONS
AUDIO/VISUAL STROBE SIGNALING
FLOW AND TAMPER SWITCH MONITORING POINTS
ELEVATOR MONITOR AND CENTRAL TIE CAPABILITIES
EMERGENCY LIGHTING
EXIT LIGHTING
AUTOMATIC AIR HANDLING EQUIPMENT SHUTDOWN
FIRE DEPARTMENT COMMUNICATION SYSTEM
EMERGENCY AND STANDBY POWER SYSTEM

SMOKE CONTROL SYSTEM (CBC SECTION 909)

PASSIVE NATURAL VENTILATION SMOKE CONTROL SYSTEM IN ATRIUM

ALTERNATIVE MATERIALS, DESIGNS, TESTS AND METHODS OF CONSTRUCTION — CBC 108.7.2

CONSTRUCTION

RATED PARTITIONS

INDICATED ON PLANS.

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

ATRIUM (CBC 404)

AUTOMATIC SPRINKLER PROTECTION — CBC 404.3, TABLE 903.2.13
1-HOUR SEPARATION, EXCEPT ANY THREE FLOORS — CBC 404.5 EXCEPTION 3
EXIT ACCESS TRAVEL DISTANCE MAX. = 200' — CBC 404.8

REQUIRED OCCUPANCY SEPARATION (CBC TABLE 508.3.3)

B TO A-3:	1-HOUR
B TO H-3:	1-HOUR
B TO S-1:	NO SEPARATION REQUIRED
B TO S-2:	1-HOUR
S-1 TO H-3:	1-HOUR
S-1 TO S-2:	1-HOUR

FIRE RESISTIVE REQUIREMENTS (CBC TABLE 601)

STRUCTURAL FRAME	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR BEARING WALLS	2-HOUR
INTERIOR BEARING WALLS	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR NONBEARING WALLS & PARTITIONS	1-HOUR < 30'; NON-RATED N/C ≥ 30'
INTERIOR NONBEARING WALLS & PARTITIONS	NON-RATED
FLOOR CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	2-HOUR
ROOF CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	1-HOUR

TYPE OF CONSTRUCTION (CBC 602.2)

TYPE 1B-FR (FULLY SPRINKLED, SUPERVISED AUTOMATIC SPRINKLER SYSTEM)

EXTERIOR WALL AND OPENING PROTECTION (CBC TABLE 704.8)

UNPROTECTED OPENINGS: NO LIMIT > 30'
PROTECTED OPENINGS: NO LIMIT > 30'

MAX. FLAME SPREAD CLASSIFICATION: INTERIOR FINISHES (CBC TABLE 803.5)

GROUP	EXIT ENCLOSURES AND EXIT PASSAGEWAYS SPRINKLER	CORRIDORS SPRINKLED	ROOMS AND ENCLOSED SPACES SPRINKLED
A-3	B	B	C
B	B	C	C
S-1	C	C	C
S-2	C	C	C

ZIMMER · GUNSUL · FRASCA · ARCHITECTS · LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc
1212 S. Flower Street
Los Angeles, CA 90015

ANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, C

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ___ FLS ___ SS ___
DATE SEP 03 2009

Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

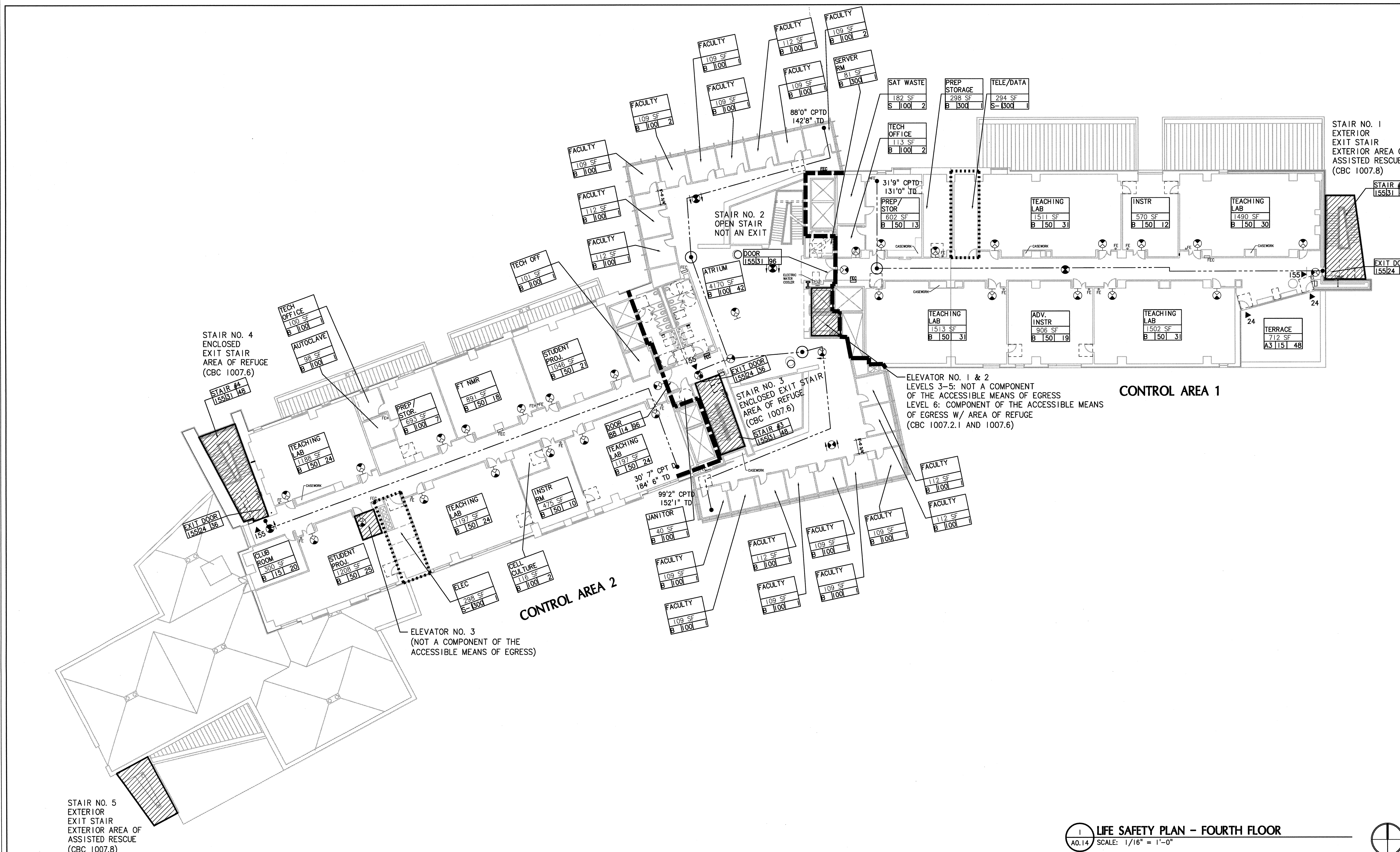
Drawing Title
LIFE SAFETY PLAN - THIRD FLOOR

STATE OF CALIFORNIA — ALAN ... LICENSED ARCHITECT

Date:	OCTOBER 23, 2009
Job No:	L40302.05
Drawn By:	TR/CS
Checked By:	

Drawing No.
A0.13

File: Z:\LAX\Projects\40302 SLO\cad\Sheets\A0-13.dwg
Plotted: 10/28/09 at 1:40pm By: nancy.tse
XREFS: sheet-ar.dwg; tbk-30x42.dwg; fp-3.dwg; gr-3.dwg; grid.dwg



LIFE SAFETY PLAN – FOURTH FLOOR

1 / A0.14 SCALE: 1/16" = 1'-0"

SYMBOLS LEGEND

- ATRIUM SEPARATION/CONTROL AREA SEPARATION 1 HR. FIRE RATED WALL ASSEMBLY, CBC 404.5 EXCEPTION 3
- 1 HR. FIRE RATED SEPARATION
- EXIT ENCLOSURE & SHAFT ENCLOSURES 2 HR. FIRE RATED WALL ASSEMBLY, CBC 707.4 AND 1020.1
- CONTROL AREA SEPARATION 2 HR. FIRE RATED WALL ASSEMBLY, CBC 414.2.4
- X DIRECTION OF EGRESS AND NUMBER OF OCCUPANTS USING EGRESS
- EXIT SIGN, SINGLE FACE
- POINT OF TWO EXIT OPTIONS
- EXIT SIGN, DOUBLE FACE CBC

ROOM NAME TAG: NAME / NAME / AREA / OG OLF OL — ROOM NAME; ROOM AREA; OCCUPANCY LOAD; OCCUPANCY LOAD FACTOR; OCCUPANCY GROUP

EXIT COMPONENT TAG: NAME / OL WR WP — EXIT COMPONENT; WIDTH PROVIDED; WIDTH REQUIRED; OCCUPANT LOAD

MEANS OF EGRESS SYSTEM

TRAVEL DISTANCE FROM MOST REMOTE POINT TO EXIT MAX. DISTANCE 300'

EXIT ACCESS	EXIT	EXIT DISCHARGE
INTERVENING SPACE CORRIDOR ATRIUM	EXIT DOOR INT. EXIT STAIR EXT. EXIT STAIR	

X'X" CPTD=COMMON PATH OF TRAVEL DISTANCE
X'X" TD=TRAVEL DISTANCE

MOST REMOTE POINT — PATH OF TRAVEL — DISTANCE TO EXIT — EXIT — PUBLIC WAY

CODE ANALYSIS

OCCUPANCY CLASSIFICATIONS

A-3 SEMINAR ROOM W/OCCUPANT LOAD > 50 — CBC 303.1
B MAIN OCCUPANCY — CBC 304.1
H-3 HAZARDOUS — CBC 307.1
S STORAGE ROOMS — CBC 311.1
S-1 MECHANICAL ROOMS — CBC 311.2
S-2 ELECTRICAL ROOMS — CBC 311.3

OCCUPANCIES

INDICATED ON PLANS.

FLOOR AREA CALCULATIONS

	CALIFORNIA BUILDING CODE	CALIFORNIA PLUMBING CODE
EXTERIOR WALLS		EXCLUDED
MECH/OP. EQMT.		EXCLUDED
STAIRS		EXCLUDED
ELEVATORS		EXCLUDED
SHAFTS	EXCLUDED	EXCLUDED
STORAGE		EXCLUDED
CLOSETS		EXCLUDED
TERRACES		EXCLUDED
ATRIUM		EXCLUDED
CORRIDORS		EXCLUDED
RESTROOMS		EXCLUDED
TOTAL AREA	208,608 SF	124,993 SF

AREAS:

FLOOR AREA OCCUPANCY (CBC SECTION 1002.1)		FLOOR AREA FIXTURE COUNT (CPC)		FLOOR AREA BY OCCUPANCY (CBC)	
LEVEL 1	23,146 SF	LEVEL 1	10,162 SF		
LEVEL 2	43,458 SF	LEVEL 2	31,624 SF	B	108,281 SF
LEVEL 3	43,209 SF	LEVEL 3	30,086 SF	A-3	12,748 SF
LEVEL 4	33,307 SF	LEVEL 4	24,280 SF	H-3	985 SF
LEVEL 5	25,294 SF	LEVEL 5	14,836 SF	S	1,405 SF
LEVEL 6	19,958 SF	LEVEL 6	14,005 SF	S-1	6,456 SF
ROOF	20,236 SF	ROOF	0 SF	S-2	1,284 SF
TOTAL	208,608 SF	TOTAL	124,993 SF	TOTAL	131,159 SF

HIGH-RISE BUILDINGS (NON HIGH-RISE) (CBC 403)

ACTUAL BUILDING HEIGHT (NON-HIGHRISE):
108'-0": 6 STORIES AND PENTHOUSE
DEFINED BUILDING HEIGHT (NON-HIGHRISE):
64'-0": TO TOP OF HIGHEST OCCUPIED FLOOR/LEVEL ABOVE BUILDING ACCESS.
(CBC 403.1 EXCEPTION [SFM] 403.1.2)

ALLOWABLE AREA AND HEIGHT (CBC 503/504)

ALLOWABLE HEIGHT AND BUILDING AREAS FOR NON-SEPARATED OCCUPANCIES:
(CBC TABLE 503) WITH AUTOMATIC SPRINKLER SYSTEM INCREASE
(CBC SECTION 504.2 AND 506.3)

	GROUP B	GROUP S-1
ALLOWABLE MAXIMUM HGT (FT)	160'	180'
ALLOWABLE MAXIMUM STORIES	11	12
ALLOWABLE MAX. AREA/STORY	UL	96,000 (48,000X2)

ACTUAL HEIGHT AND BUILDING AREAS PER CBC TABLE 503:

	CENTER FOR SCIENCE
ACTUAL MAXIMUM HGT (FT)	108'-0"
ACTUAL MAXIMUM STORIES	6
ACTUAL MAX. AREA/STORY	43,458

TOTAL ALLOWABLE BUILDING AREA: 96,000 SF X 6 FLOORS = 576,000 SF
TOTAL ACTUAL FLOOR AREA = 208,608 SF

ALLOWABLE HEIGHT AND BUILDING AREAS FOR SEPARATED OCCUPANCIES:
(CBC SECTION 508.3.3)

AREA: (ACTUAL MAX. AREA/ ALLOWABLE MAX. AREA)	GROUP A-3	+	GROUP H-3	+	GROUP S-2	+	GROUP B	=	X	< 1
LEVEL 1	10,162/96,000	+	0/96,000	+	986/96,000	+	335/UL	=	.005	< 1
LEVEL 2	0/96,000	+	985/96,000	+	0/96,000	+	30,020/UL	=	.010	< 1
LEVEL 3	943/96,000	+	0/96,000	+	0/96,000	+	28,418/UL	=	.010	< 1
LEVEL 4	712/96,000	+	0/96,000	+	0/96,000	+	22,976/UL	=	.007	< 1
LEVEL 5	739/96,000	+	0/96,000	+	0/96,000	+	13,435/UL	=	.008	< 1
LEVEL 6	192/96,000	+	0/96,000	+	298/96,000	+	13,097/UL	=	.005	< 1
TOTAL	12,748/96,000	+	985/96,000	+	1,284/96,000	+	108,281/UL	=	.155	< 2

HEIGHT:

	GROUP A-3	GROUP H-3	GROUP S-2
ALLOWABLE MAXIMUM HGT (FT)	180'	180'	180'
ALLOWABLE MAXIMUM STORIES	12	7	12

CONTROL AREAS (CBC TABLE 414.2.2)

CHEMICAL QUANTITIES: TYPE AND QUANTITY OF CHEMICALS AT OCCUPANCY SHALL NOT EXCEED CBC TABLE 414.2.5(1)

PLUMBING CALCULATION (CPC TABLE 4-1)

CALCULATIONS BASED ON 2007 CALIFORNIA PLUMBING CODE.

TYPE OF BUILDING OR OCCUPANCY:
OFFICE OR PUBLIC BUILDINGS

OCCUPANCY LOAD FACTOR:
GROUP A-PRINCIPLE ASSEMBLY AREA (NO FIXED SEATING): 30
GROUP A-FIXED SEATING: 1/2 NUMBER OF SEATING
GROUP B-OFFICE OR PUBLIC BUILDINGS: 200

AREA
PER TABLE A, ACCESSORY AREAS MAY BE EXCLUDED (EG. HALLWAY, RESTROOM, STAIR)

OFFICE OF THE STATE FIRE MARSHAL
APPROVED FIRE AND PANIC ONLY
Reviewed by:
Fire & Life Safety South
NOV 10 2009
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times

FLOOR LEVEL	LOAD FACTOR	AREA (SF)	LOAD BY OCCUP.	OCCUPANCY		REQ. UR	REQ. WC	REQ. LAV	PROVIDED UR	PROVIDED WC	PROVIDED LAV
LEVEL ONE	200 30 30	0 7,750 963	0 259 67	MALE FEMALE	163 163	2	2 8	2 2	2	3 9	3 3
LEVEL TWO	200	31,624	159	MALE FEMALE	80 80	1	1 4	1 1	2	3 5	3 3
LEVEL THREE	200 30	29,143 2,757	145 32	MALE FEMALE	89 89	1	1 4	1 1	2	3 5	3 3
LEVEL FOUR	200 30	23,568 712	118 24	MALE FEMALE	71 71	1	1 4	1 1	2	3 5	3 3
LEVEL FIVE	200 30	14,097 739	71 25	MALE FEMALE	48 48	1	1 3	1 1	2	3 5	3 3
LEVEL SIX	200 30	13,813 192	70 7	MALE FEMALE	39 39	1	1 3	1 1	2	3 5	3 3
TOTAL				MALE FEMALE	516 516	8	7 30	8 8	12	18 34	18 18

PLAN CHECK NOTES

EXIT ACCESS / EXIT / EXIT DISCHARGE

EXIT ACCESS

OCCUPANT LOADS — TABLE 1004.1.1
BUSINESS 100 GSF
ASSEMBLY 15 GSF

EGRESS WIDTH W/ SPRINKLER — TABLE 1005.1
A-3, B , S, S-1 AND S-2 OCCUPANCIES:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT
H-3 OCCUPANCY:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT

ACCESSIBLE MEANS OF EGRESS — CBC 1007

AMIN. EGRESS WIDTH
MIN. DOOR 34" — CBC 1008.1.1
MIN. STAIR 44" — CBC 1009.1.1
MIN. ACCESSIBLE STAIR 48" — CBC 1007.3
MIN. EXT. EXIT STAIR 48" — CBC 1007.8.2
MIN. CORRIDOR 44" — CBC 1017.2

AREA OF REFUGE — CBC 1007.6

EXTERIOR AREA OF ASSISTED RESCUE — CBC 1007.8

DOOR SWING — CBC 1008.1.2

DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHERE SERVING AN OCCUPANT LOAD OF 50 OR MORE OR A GROUP H OCCUPANCY

RAMPS — CBC 1010

EGRESS THROUGH INTERVENING SPACES — CBC 1014.2 EXCEPTION 2

H OCCUPANCY EGRESS IS NOT PROHIBITED THROUGH ADJOINING SPACE WHEN ADJOINING OR INTERVENING SPACES ARE THE SAME OR LESSER HAZZARD OCCUPANCY.

COMMON PATH OF TRAVEL — CBC 1014.3 EXCEPTION 1 & 2
MAX. DIST. 100'

EXIT AND EXIT ACCESS DOORWAYS — CBC 1015.2.1 EXCEPTION 2
SEPARATION OF EXITS 1/3 DIAGONAL

EXIT ACCESS TRAVEL DISTANCE IN ATRIUM — CBC 404.8
MAX. DIST. W/ SPRINKLER 200'

CORRIDOR RATING W/ SPRINKLER — CBC TABLE 1017.1
B OCCUPANCY (0) HOUR

DEAD ENDS — CBC TABLE 1017.3 EXCEPTION 2
MAX. DIST. W/ SPRINKLER 50'

EXIT DISCHARGE — CBC 1024.1 EXCEPTION 1

MAX. 50% EXITS PERMITTED TO EGRESS THROUGH AREAS ON THE LEVEL OF DISCHARGE PROVIDED 1.1, 1.2 AND 1.3 ARE MET.

MAXIMUM ALLOWABLE TRAVEL DISTANCES (CBC TALE 1016.1)

B OCCUPANCY 300' WITH SPRINKLER SYSTEM
A-3 OCCUPANCY 250' WITH SPRINKLER SYSTEM
H-3 OCCUPANCY 150' WITH SPRINKLER SYSTEM
S-1 OCCUPANCY 250' WITH SPRINKLER SYSTEM
S-2 OCCUPANCY 400' WITH SPRINKLER SYSTEM

FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEMS (CBC SECTION 903)

FIRE SPRINKLER SYSTEM THROUGHOUT — CBC 901.2

ADDITIONAL REQUIRED FIRE SUPPRESSION — TABLE 903.2.13
ATRIUM — CBC 404.3

STANDPIPE REQUIREMENTS (CBC SECTION 905)

STANDPIPE: CLASS I — CBC 905.3.1, EXCEPTION 1
HOSE REQUIREMENT:
1. REQUIRED IN EVERY REQUIRED STAIRWAY AT MAIN LANDING, BY FIRE CODE OFFICIAL.
2. REQUIRED AT THE ROOF OR HIGHEST LANDING OF STAIRWAYS WITH STAIR ACCESS TO THE ROOF.
3. ADDITIONAL HOSE CONNECTION REQUIRED AT THE TOP OF THE MOST HYDRAULICALLY REMOTE STANDPIPE FOR TESTING PURPOSES.

FIRE EXTINGUISHERS (CBC SECTION 906)

REQUIRED: PROVIDE AS DIRECTED BY THE CALIFORNIA FIRE CODE (CFC 2007) AND NFPA 10
TYPE: FIRE EXTINGUISHERS TO BE -SIZE- 4-A:60-B:C 10LBS.
SPACING: CLASS A HAZARDS (OFFICE AREAS)
75FT. MAX. TRAVEL DISTANCE NFPA 10 3-2.1
CLASS B HAZARDS (LAB AREAS)
50FT. MAX. TRAVEL DISTANCE NFPA 10

FIRE ALARM AND DETECTION SYSTEMS (CBC SECTION 907)

-FIRE ALARM AND DETECTION SYSTEMS — CBC 907
ATRIUM — CBC 907.2.13

-EMERGENCY ALARM SYSTEMS — CBC 908
GROUP H OCCUPANCY — CBC 908.1
ADA COMPLIANT FIRE ADDRESSABLE FIRE ALARM SYSTEM/AREAS OF REFUGE
SMOKE DETECTION (DUCT MOUNTED INCLUDED) AT SELECTED LOCATIONS
AUDIO/VISUAL STROBE SIGNALING
FLOW AND TAMPER SWITCH MONITORING POINTS
ELEVATOR MONITOR AND CENTRAL TIE CAPABILITIES
EMERGENCY LIGHTING
EXIT LIGHTING
AUTOMATIC AIR HANDLING EQUIPMENT SHUTDOWN
FIRE DEPARTMENT COMMUNICATION SYSTEM
EMERGENCY AND STANDBY POWER SYSTEM

SMOKE CONTROL SYSTEM (CBC SECTION 909)

PASSIVE NATURAL VENTILATION SMOKE CONTROL SYSTEM IN ATRIUM

ALTERNATIVE MATERIALS, DESIGNS, TESTS AND METHODS OF CONSTRUCTION — CBC 108.7.2

CONSTRUCTION

RATED PARTITIONS

INDICATED ON PLANS.

OCCUPANCY CLASSIFICATIONS

A-3 SEMINAR ROOM W/OCCUPANT LOAD > 50 — CBC 303.1
B MAIN OCCUPANCY — CBC 304.1
H-3 HAZARDOUS — CBC 307.1
S STORAGE ROOMS — CBC 311.1
S-1 MECHANICAL ROOMS — CBC 311.2
S-2 ELECTRICAL ROOMS — CBC 311.3

ATRIUM (CBC 404)

AUTOMATIC SPRINKLER PROTECTION — CBC 404.3, TABLE 903.2.13
1-HOUR SEPARATION, EXCEPT ANY THREE FLOORS — CBC 404.5 EXCEPTION 3
EXIT ACCESS TRAVEL DISTANCE MAX. = 200' — CBC 404.8

REQUIRED OCCUPANCY SEPARATION (CBC TABLE 508.3.3)

B TO A-3: 1-HOUR
B TO H-3: 1-HOUR
B TO S-1: NO SEPARATION REQUIRED
B TO S-2: 1-HOUR
S-1 TO H-3: 1-HOUR
S-1 TO S-2: 1-HOUR

FIRE RESISTIVE REQUIREMENTS (CBC TABLE 601)

STRUCTURAL FRAME — 2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR BEARING WALLS — 2-HOUR
INTERIOR BEARING WALLS — 2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR NONBEARING WALLS & PARTITIONS — 1-HOUR < 30'; NON-RATED N/C ≥ 30'
INTERIOR NONBEARING WALLS & PARTITIONS — NON-RATED
FLOOR CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS — 2-HOUR
ROOF CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS — 1-HOUR

TYPE OF CONSTRUCTION (CBC 602.2)

TYPE 1B-FR (FULLY SPRINKLED, SUPERVISED AUTOMATIC SPRINKLER SYSTEM)

EXTERIOR WALL AND OPENING PROTECTION (CBC TABLE 704.8)

UNPROTECTED OPENINGS: NO LIMIT > 30'
PROTECTED OPENINGS: NO LIMIT > 30'

MAX. FLAME SPREAD CLASSIFICATION: INTERIOR FINISHES (CBC TABLE 803.5)

GROUP	EXIT ENCLOSURES AND EXIT PASSAGEWAYS SPRINKLER	CORRIDORS SPRINKLED	ROOMS AND ENCLOSED SPACES SPRINKLED
A-3	B	B	C
B	B	C	C
S-1	C	C	C
S-2	C	C	C

ZIMMER · GUNSUL · FRASCA ARCHITECTS LLP
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc
1212 S. Flower Street
Los Angeles, CA 90015

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC ___ FLS ___ SS ___
DATE SEP 03 2009

Revisions
BID DOCUMENTS 10/23/09

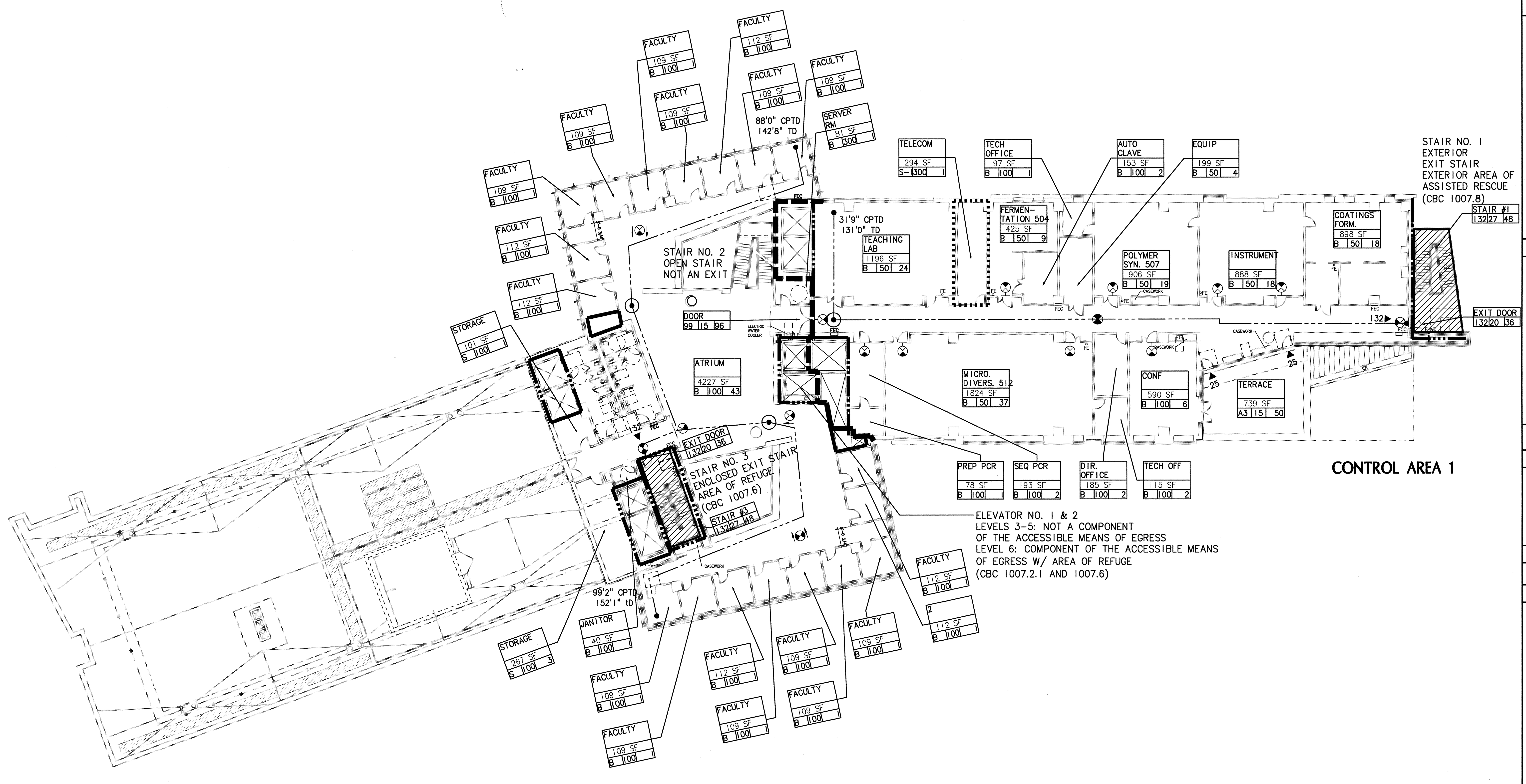
CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
LIFE SAFETY PLAN – FOURTH FLOOR

STATE OF CALIFORNIA — TED ALAN [?]YMAN — REGISTERED ARCHITECT

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By: TR/CS
Checked By:

Drawing No.
A0.14



LIFE SAFETY PLAN - FIFTH FLOOR
1 / A0.15 SCALE: 1/16" = 1'-0"

SYMBOLS LEGEND

ATRIUM SEPARATION/CONTROL AREA SEPARATION 1 HR. FIRE RATED WALL ASSEMBLY, CBC 404.5 EXCEPTION 3

1 HR. FIRE RATED SEPARATION

EXIT ENCLOSURE & SHAFT ENCLOSURES 2 HR. FIRE RATED WALL ASSEMBLY, CBC 707.4 AND 1020.1

CONTROL AREA SEPARATION 2 HR. FIRE RATED WALL ASSEMBLY, CBC 414.2.4

X DIRECTION OF EGRESS AND NUMBER OF OCCUPANTS USING EGRESS

EXIT SIGN, SINGLE FACE

POINT OF TWO EXIT OPTIONS

EXIT SIGN, DOUBLE FACE CBC

ROOM NAME TAG: NAME / NAME — ROOM NAME; AREA — ROOM AREA; OG | OLF | OL — OCCUPANCY LOAD, OCCUPANCY LOAD FACTOR, OCCUPANCY GROUP

EXIT COMPONENT TAG: NAME — EXIT COMPONENT; OL | WR | WP — WIDTH PROVIDED, WIDTH REQUIRED, OCCUPANT LOAD

MEANS OF EGRESS SYSTEM

TRAVEL DISTANCE FROM MOST REMOTE POINT TO EXIT MAX. DISTANCE 300'

EXIT ACCESS	EXIT	EXIT DISCHARGE
INTERVENING SPACE CORRIDOR ATRIUM	EXIT DOOR INT. EXIT STAIR EXT. EXIT STAIR	

X'X" CPTD=COMMON PATH OF TRAVEL DISTANCE
X'X" TD=TRAVEL DISTANCE

X' D — EXIT — PUBLIC WAY — DISTANCE TO EXIT — PATH OF TRAVEL — MOST REMOTE POINT

CODE ANALYSIS

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

OCCUPANCIES

INDICATED ON PLANS.

FLOOR AREA CALCULATIONS

	CALIFORNIA BUILDING CODE	CALIFORNIA PLUMBING CODE
EXTERIOR WALLS		EXCLUDED
MECH/OP. EQMT.		EXCLUDED
STAIRS		EXCLUDED
ELEVATORS		EXCLUDED
SHAFTS	EXCLUDED	EXCLUDED
STORAGE		EXCLUDED
CLOSETS		EXCLUDED
TERRACES		EXCLUDED
ATRIUM		EXCLUDED
CORRIDORS		EXCLUDED
RESTROOMS		EXCLUDED
TOTAL AREA	208,608 SF	124,993 SF

AREAS:

FLOOR AREA OCCUPANCY (CBC SECTION 1002.1)		FLOOR AREA FIXTURE COUNT (CPC)		FLOOR AREA BY OCCUPANCY (CBC)	
LEVEL 1	23,146 SF	LEVEL 1	10,162 SF		
LEVEL 2	43,458 SF	LEVEL 2	31,624 SF	B	108,281 SF
LEVEL 3	43,209 SF	LEVEL 3	30,086 SF	A-3	12,748 SF
LEVEL 4	33,307 SF	LEVEL 4	24,280 SF	H-3	985 SF
LEVEL 5	25,294 SF	LEVEL 5	14,836 SF	S	1,405 SF
LEVEL 6	19,958 SF	LEVEL 6	14,005 SF	S-1	6,456 SF
ROOF	20,236 SF	ROOF	0 SF	S-2	1,284 SF
TOTAL	208,608 SF	TOTAL	124,993 SF	TOTAL	131,159 SF

HIGH-RISE BUILDINGS (NON HIGH-RISE) (CBC 403)

ACTUAL BUILDING HEIGHT (NON-HIGHRISE):
108'-0": 6 STORIES AND PENTHOUSE
DEFINED BUILDING HEIGHT (NON-HIGHRISE):
64'-0": TO TOP OF HIGHEST OCCUPIED FLOOR/LEVEL ABOVE BUILDING ACCESS.
(CBC 403.1 EXCEPTION [SFM] 403.1.2)

ALLOWABLE AREA AND HEIGHT (CBC 503/504)

ALLOWABLE HEIGHT AND BUILDING AREAS FOR NON-SEPARATED OCCUPANCIES:
(CBC TABLE 503) WITH AUTOMATIC SPRINKLER SYSTEM INCREASE
(CBC SECTION 504.2 AND 506.3)

	GROUP B	GROUP S-1
ALLOWABLE MAXIMUM HGT (FT)	160'	180'
ALLOWABLE MAXIMUM STORIES	11	12
ALLOWABLE MAX. AREA/STORY	UL	96,000 (48,000X2)

ACTUAL HEIGHT AND BUILDING AREAS PER CBC TABLE 503:

	CENTER FOR SCIENCE
ACTUAL MAXIMUM HGT (FT)	108'-0"
ACTUAL MAXIMUM STORIES	6
ACTUAL MAX. AREA/STORY	43,458

TOTAL ALLOWABLE BUILDING AREA: 96,000 SF X 6 FLOORS = 576,000 SF
TOTAL ACTUAL FLOOR AREA = 208,608 SF

ALLOWABLE HEIGHT AND BUILDING AREAS FOR SEPARATED OCCUPANCIES:
(CBC SECTION 508.3.3)

AREA: GROUP A-3 + GROUP H-3 + GROUP S-2 + GROUP B = X < 1
(ACTUAL MAX. AREA/ ALLOWABLE MAX. AREA)

	GROUP A-3		GROUP H-3		GROUP S-2		GROUP B		X	
LEVEL 1	10,162/96,000	+	0/96,000	+	986/96,000	+	335/UL	=	.005	< 1
LEVEL 2	0/96,000	+	985/96,000	+	0/96,000	+	30,020/UL	=	.010	< 1
LEVEL 3	943/96,000	+	0/96,000	+	0/96,000	+	28,418/UL	=	.010	< 1
LEVEL 4	712/96,000	+	0/96,000	+	0/96,000	+	22,976/UL	=	.007	< 1
LEVEL 5	739/96,000	+	0/96,000	+	0/96,000	+	13,435/UL	=	.008	< 1
LEVEL 6	192/96,000	+	0/96,000	+	298/96,000	+	13,097/UL	=	.005	< 1
TOTAL	12,748/96,000	+	985/96,000	+	1,284/96,000	+	108,281/UL	=	.155	< 2

HEIGHT:

	GROUP A-3	GROUP H-3	GROUP S-2
ALLOWABLE MAXIMUM HGT (FT)	180'	180'	180'
ALLOWABLE MAXIMUM STORIES	12	7	12

CONTROL AREAS (CBC TABLE 414.2.2)

CHEMICAL QUANTITIES: TYPE AND QUANTITY OF CHEMICALS AT OCCUPANCY SHALL NOT EXCEED CBC TABLE 414.2.5(1)

PLUMBING CALCULATION (CPC TABLE 4-1)

OFFICE OF THE STATE FIRE MARSHAL
APPROVED FIRE AND PANIC ONLY
Reviewed by:
Fire & Life Safety South
NOV 10 2009
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times

CALCULATIONS BASED ON 2007 CALIFORNIA PLUMBING CODE.

TYPE OF BUILDING OR OCCUPANCY:
OFFICE OR PUBLIC BUILDINGS

OCCUPANCY LOAD FACTOR:
GROUP A-PRINCIPLE ASSEMBLY AREA (NO FIXED SEATING): 30
GROUP A-FIXED SEATING: 1/2 NUMBER OF SEATING
GROUP B-OFFICE OR PUBLIC BUILDINGS: 200

AREA
PER TABLE A, ACCESSORY AREAS MAY BE EXCLUDED (EG. HALLWAY, RESTROOM, STAIR)

FLOOR LEVEL	LOAD FACTOR	AREA (SF)	LOAD BY OCCUP.	OCCUPANCY		REQ. UR	REQ. WC	REQ. LAV	PROVIDED UR	PROVIDED WC	PROVIDED LAV
LEVEL ONE	200 30 30	0 7,750 963	0 259 67	MALE FEMALE	163 163	2	2 8	2 2	2	3 9	3 3
LEVEL TWO	200	31,624	159	MALE FEMALE	80 80	1	1 4	1 1	2	3 5	3 3
LEVEL THREE	200 30	29,143 2,757	145 32	MALE FEMALE	89 89	1	1 4	1 1	2	3 5	3 3
LEVEL FOUR	200 30	23,568 712	118 24	MALE FEMALE	71 71	1	1 4	1 1	2	3 5	3 3
LEVEL FIVE	200 30	14,097 739	71 25	MALE FEMALE	48 48	1	1 3	1 1	2	3 5	3 3
LEVEL SIX	200 30	13,813 192	70 7	MALE FEMALE	39 39	1	1 3	1 1	2	3 5	3 3
TOTAL				MALE FEMALE	516 516	8	7 30	8 8	12	18 34	18 18

PLAN CHECK NOTES

EXIT ACCESS / EXIT / EXIT DISCHARGE

EXIT ACCESS

OCCUPANT LOADS — TABLE 1004.1.1
BUSINESS 100 GSF
ASSEMBLY 15 GSF

EGRESS WIDTH W/ SPRINKLER — TABLE 1005.1
A-3, B , S, S-1 AND S-2 OCCUPANCIES:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT
H-3 OCCUPANCY:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT

ACCESSIBLE MEANS OF EGRESS — CBC 1007

AMIN. EGRESS WIDTH
MIN. DOOR 34" — CBC 1008.1.1
MIN. STAIR 44" — CBC 1009.1.1
MIN. ACCESSIBLE STAIR 48" — CBC 1007.3
MIN. EXT. EXIT STAIR 48" — CBC 1007.8.2
MIN. CORRIDOR 44" — CBC 1017.2

AREA OF REFUGE — CBC 1007.6

EXTERIOR AREA OF ASSISTED RESCUE — CBC 1007.8

DOOR SWING — CBC 1008.1.2

DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHERE SERVING AN OCCUPANT LOAD OF 50 OR MORE OR A GROUP H OCCUPANCY

RAMPS — CBC 1010

EGRESS THROUGH INTERVENING SPACES — CBC 1014.2 EXCEPTION 2

H OCCUPANCY EGRESS IS NOT PROHIBITED THROUGH ADJOINING SPACE WHEN ADJOINING OR INTERVENING SPACES ARE THE SAME OR LESSER HAZZARD OCCUPANCY.

COMMON PATH OF TRAVEL — CBC 1014.3 EXCEPTION 1 & 2
MAX. DIST. 100'

EXIT AND EXIT ACCESS DOORWAYS — CBC 1015.2.1 EXCEPTION 2
SEPARATION OF EXITS 1/3 DIAGONAL

EXIT ACCESS TRAVEL DISTANCE IN ATRIUM — CBC 404.8
MAX. DIST. W/ SPRINKLER 200'

CORRIDOR RATING W/ SPRINKLER — CBC TABLE 1017.1
B OCCUPANCY (0) HOUR

DEAD ENDS — CBC TABLE 1017.3 EXCEPTION 2
MAX. DIST. W/ SPRINKLER 50'

EXIT DISCHARGE — CBC 1024.1 EXCEPTION 1

MAX. 50% EXITS PERMITTED TO EGRESS THROUGH AREAS ON THE LEVEL OF DISCHARGE PROVIDED 1.1, 1.2 AND 1.3 ARE MET.

MAXIMUM ALLOWABLE TRAVEL DISTANCES (CBC TALE 1016.1)

B OCCUPANCY	300' WITH SPRINKLER SYSTEM
A-3 OCCUPANCY	250' WITH SPRINKLER SYSTEM
H-3 OCCUPANCY	150' WITH SPRINKLER SYSTEM
S-1 OCCUPANCY	250' WITH SPRINKLER SYSTEM
S-2 OCCUPANCY	400' WITH SPRINKLER SYSTEM

FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEMS (CBC SECTION 903)

FIRE SPRINKLER SYSTEM THROUGHOUT — CBC 901.2

ADDITIONAL REQUIRED FIRE SUPPRESSION — TABLE 903.2.13
ATRIUM — CBC 404.3

STANDPIPE REQUIREMENTS (CBC SECTION 905)

STANDPIPE: CLASS I — CBC 905.3.1, EXCEPTION 1
HOSE REQUIREMENT:
1. REQUIRED IN EVERY REQUIRED STAIRWAY AT MAIN LANDING, BY FIRE CODE OFFICIAL.
2. REQUIRED AT THE ROOF OR HIGHEST LANDING OF STAIRWAYS WITH STAIR ACCESS TO THE ROOF.
3. ADDITIONAL HOSE CONNECTION REQUIRED AT THE TOP OF THE MOST HYDRAULICALLY REMOTE STANDPIPE FOR TESTING PURPOSES.

FIRE EXTINGUISHERS (CBC SECTION 906)

REQUIRED: PROVIDE AS DIRECTED BY THE CALIFORNIA FIRE CODE (CFC 2007) AND NFPA 10
TYPE: FIRE EXTINGUISHERS TO BE -SIZE- 4-A:60-B:C 10LBS.
SPACING: CLASS A HAZARDS (OFFICE AREAS)
75FT. MAX. TRAVEL DISTANCE NFPA 10 3-2.1
CLASS B HAZARDS (LAB AREAS)
50FT. MAX. TRAVEL DISTANCE NFPA 10

FIRE ALARM AND DETECTION SYSTEMS (CBC SECTION 907)

-FIRE ALARM AND DETECTION SYSTEMS — CBC 907
ATRIUM — CBC 907.2.13

-EMERGENCY ALARM SYSTEMS — CBC 908
GROUP H OCCUPANCY — CBC 908.1
ADA COMPLIANT FIRE ADDRESSABLE FIRE ALARM SYSTEM/AREAS OF REFUGE
SMOKE DETECTION (DUCT MOUNTED INCLUDED) AT SELECTED LOCATIONS
AUDIO/VISUAL STROBE SIGNALING
FLOW AND TAMPER SWITCH MONITORING POINTS
ELEVATOR MONITOR AND CENTRAL TIE CAPABILITIES
EMERGENCY LIGHTING
EXIT LIGHTING
AUTOMATIC AIR HANDLING EQUIPMENT SHUTDOWN
FIRE DEPARTMENT COMMUNICATION SYSTEM
EMERGENCY AND STANDBY POWER SYSTEM

SMOKE CONTROL SYSTEM (CBC SECTION 909)

PASSIVE NATURAL VENTILATION SMOKE CONTROL SYSTEM IN ATRIUM

ALTERNATIVE MATERIALS, DESIGNS, TESTS AND METHODS OF CONSTRUCTION — CBC 108.7.2

CONSTRUCTION

RATED PARTITIONS

INDICATED ON PLANS.

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

ATRIUM (CBC 404)

AUTOMATIC SPRINKLER PROTECTION — CBC 404.3, TABLE 903.2.13

1-HOUR SEPARATION, EXCEPT ANY THREE FLOORS — CBC 404.5 EXCEPTION 3
EXIT ACCESS TRAVEL DISTANCE MAX. = 200' — CBC 404.8

REQUIRED OCCUPANCY SEPARATION (CBC TABLE 508.3.3)

B TO A-3:	1-HOUR
B TO H-3:	1-HOUR
B TO S-1:	NO SEPARATION REQUIRED
B TO S-2:	1-HOUR
S-1 TO H-3:	1-HOUR
S-1 TO S-2:	1-HOUR

FIRE RESISTIVE REQUIREMENTS (CBC TABLE 601)

STRUCTURAL FRAME	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR BEARING WALLS	2-HOUR
INTERIOR BEARING WALLS	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR NONBEARING WALLS & PARTITIONS	1-HOUR < 30'; NON-RATED N/C ≥ 30'
INTERIOR NONBEARING WALLS & PARTITIONS	NON-RATED
FLOOR CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	2-HOUR
ROOF CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	1-HOUR

TYPE OF CONSTRUCTION (CBC 602.2)

TYPE 1B-FR (FULLY SPRINKLED, SUPERVISED AUTOMATIC SPRINKLER SYSTEM)

EXTERIOR WALL AND OPENING PROTECTION (CBC TABLE 704.8)

UNPROTECTED OPENINGS: NO LIMIT > 30'
PROTECTED OPENINGS: NO LIMIT > 30'

MAX. FLAME SPREAD CLASSIFICATION: INTERIOR FINISHES (CBC TABLE 803.5)

GROUP	EXIT ENCLOSURES AND EXIT PASSAGEWAYS SPRINKLER	CORRIDORS SPRINKLED	ROOMS AND ENCLOSED SPACES SPRINKLED
A-3	B	B	C
B	B	C	C
S-1	C	C	C
S-2	C	C	C

ZIMMER·GUNSUL·FRASCA·ARCHITECTS·LLP ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc
1212 S. Flower Street
Los Angeles, CA 90015

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Associates
4212 1/2 Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
DATE SEP 03 2009

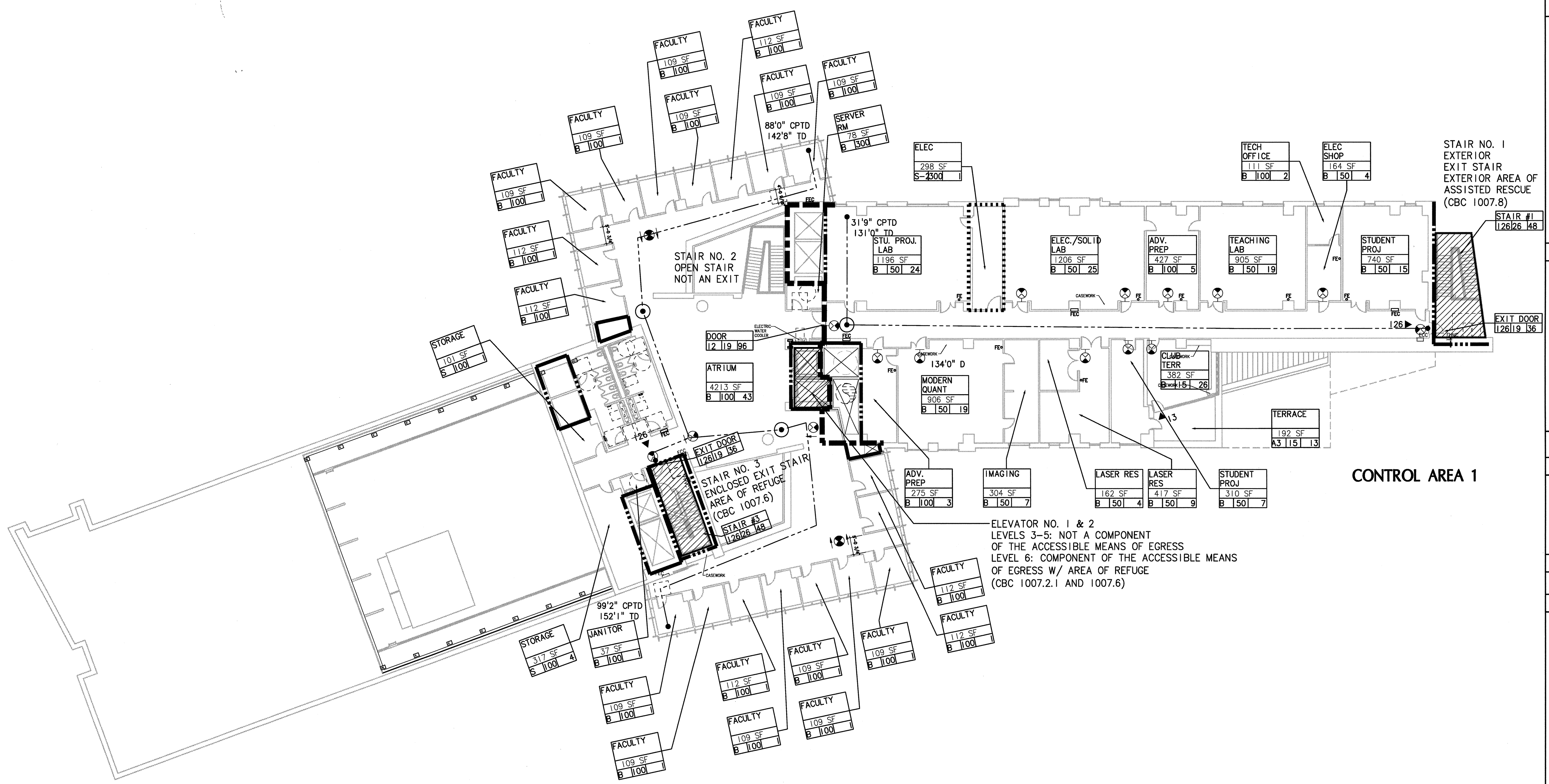
Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
LIFE SAFETY PLAN - FIFTH FLOOR

Date: OCTOBER 23, 2009
Job No: L40302.05
Drawn By: TR/CS
Checked By:

Drawing No.
A0.15



SYMBOLS LEGEND

- ATRIUM SEPARATION/CONTROL AREA SEPARATION 1 HR. FIRE RATED WALL ASSEMBLY, CBC 404.5 EXCEPTION 3
- 1 HR. FIRE RATED SEPARATION
- EXIT ENCLOSURE & SHAFT ENCLOSURES 2 HR. FIRE RATED WALL ASSEMBLY, CBC 707.4 AND 1020.1
- CONTROL AREA SEPARATION 2 HR. FIRE RATED WALL ASSEMBLY, CBC 414.2.4
- X DIRECTION OF EGRESS AND NUMBER OF OCCUPANTS USING EGRESS
- EXIT SIGN, SINGLE FACE
- POINT OF TWO EXIT OPTIONS
- EXIT SIGN, DOUBLE FACE CBC

ROOM NAME TAG: NAME / NAME — ROOM NAME; AREA — ROOM AREA; OL — OCCUPANCY LOAD; OLF — OCCUPANCY LOAD FACTOR; OG — OCCUPANCY GROUP

EXIT COMPONENT TAG: NAME — EXIT COMPONENT; WP — WIDTH PROVIDED; WR — WIDTH REQUIRED; OL — OCCUPANT LOAD

MEANS OF EGRESS SYSTEM

TRAVEL DISTANCE FROM MOST REMOTE POINT TO EXIT MAX. DISTANCE 300'

EXIT ACCESS	EXIT	EXIT DISCHARGE
INTERVENING SPACE CORRIDOR ATRIUM	EXIT DOOR INT. EXIT STAIR EXT. EXIT STAIR	

X'X" CPTD=COMMON PATH OF TRAVEL DISTANCE
X'X" TD=TRAVEL DISTANCE

X' D — EXIT — DISTANCE TO EXIT — PATH OF TRAVEL — MOST REMOTE POINT — PUBLIC WAY

CODE ANALYSIS

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

OCCUPANCIES

INDICATED ON PLANS.

FLOOR AREA CALCULATIONS

	CALIFORNIA BUILDING CODE	CALIFORNIA PLUMBING CODE
EXTERIOR WALLS		EXCLUDED
MECH/OP. EQMT.		EXCLUDED
STAIRS		EXCLUDED
ELEVATORS		EXCLUDED
SHAFTS	EXCLUDED	EXCLUDED
STORAGE		EXCLUDED
CLOSETS		EXCLUDED
TERRACES		EXCLUDED
ATRIUM		EXCLUDED
CORRIDORS		EXCLUDED
RESTROOMS		EXCLUDED
TOTAL AREA	208,608 SF	124,993 SF

AREAS:

FLOOR AREA OCCUPANCY (CBC SECTION 1002.1)		FLOOR AREA FIXTURE COUNT (CPC)		FLOOR AREA BY OCCUPANCY (CBC)	
LEVEL 1	23,146 SF	LEVEL 1	10,162 SF		
LEVEL 2	43,458 SF	LEVEL 2	31,624 SF	B	108,281 SF
LEVEL 3	43,209 SF	LEVEL 3	30,086 SF	A-3	12,748 SF
LEVEL 4	33,307 SF	LEVEL 4	24,280 SF	H-3	985 SF
LEVEL 5	25,294 SF	LEVEL 5	14,836 SF	S	1,405 SF
LEVEL 6	19,958 SF	LEVEL 6	14,005 SF	S-1	6,456 SF
ROOF	20,236 SF	ROOF	0 SF	S-2	1,284 SF
TOTAL	208,608 SF	TOTAL	124,993 SF	TOTAL	131,159 SF

HIGH-RISE BUILDINGS (NON HIGH-RISE) (CBC 403)

ACTUAL BUILDING HEIGHT (NON-HIGHRISE):
108'-0": 6 STORIES AND PENTHOUSE
DEFINED BUILDING HEIGHT (NON-HIGHRISE):
64'-0": TO TOP OF HIGHEST OCCUPIED FLOOR/LEVEL ABOVE BUILDING ACCESS.
(CBC 403.1 EXCEPTION [SFM] 403.1.2)

ALLOWABLE AREA AND HEIGHT (CBC 503/504)

ALLOWABLE HEIGHT AND BUILDING AREAS FOR NON-SEPARATED OCCUPANCIES:
(CBC TABLE 503) WITH AUTOMATIC SPRINKLER SYSTEM INCREASE
(CBC SECTION 504.2 AND 506.3)

	GROUP B	GROUP S-1
ALLOWABLE MAXIMUM HGT (FT)	160'	180'
ALLOWABLE MAXIMUM STORIES	11	12
ALLOWABLE MAX. AREA/STORY	UL	96,000 (48,000X2)

ACTUAL HEIGHT AND BUILDING AREAS PER CBC TABLE 503:

	CENTER FOR SCIENCE
ACTUAL MAXIMUM HGT (FT)	108'-0"
ACTUAL MAXIMUM STORIES	6
ACTUAL MAX. AREA/STORY	43,458

TOTAL ALLOWABLE BUILDING AREA: 96,000 SF X 6 FLOORS = 576,000 SF
TOTAL ACTUAL FLOOR AREA = 208,608 SF

ALLOWABLE HEIGHT AND BUILDING AREAS FOR SEPARATED OCCUPANCIES:
(CBC SECTION 508.3.3)

AREA: GROUP A-3 + GROUP H-3 + GROUP S-2 + GROUP B = X < 1
(ACTUAL MAX. AREA/ALLOWABLE MAX. AREA)

	GROUP A-3		GROUP H-3		GROUP S-2		GROUP B		X	
LEVEL 1	10,162/96,000	+	0/96,000	+	986/96,000	+	335/UL	=	.005	< 1
LEVEL 2	0/96,000	+	985/96,000	+	0/96,000	+	30,020/UL	=	.010	< 1
LEVEL 3	943/96,000	+	0/96,000	+	0/96,000	+	28,418/UL	=	.010	< 1
LEVEL 4	712/96,000	+	0/96,000	+	0/96,000	+	22,976/UL	=	.007	< 1
LEVEL 5	739/96,000	+	0/96,000	+	0/96,000	+	13,435/UL	=	.008	< 1
LEVEL 6	192/96,000	+	0/96,000	+	298/96,000	+	13,097/UL	=	.005	< 1
TOTAL	12,748/96,000	+	985/96,000	+	1,284/96,000	+	108,281/UL	=	.155	< 2

HEIGHT:

	GROUP A-3	GROUP H-3	GROUP S-2
ALLOWABLE MAXIMUM HGT (FT)	180'	180'	180'
ALLOWABLE MAXIMUM STORIES	12	7	12

CONTROL AREAS (CBC TABLE 414.2.2)

CHEMICAL QUANTITIES: TYPE AND QUANTITY OF CHEMICALS AT OCCUPANCY SHALL NOT EXCEED CBC TABLE 414.2.5(1)

PLUMBING CALCULATION (CPC TABLE 4-1)

CALCULATIONS BASED ON 2007 CALIFORNIA PLUMBING CODE.

TYPE OF BUILDING OR OCCUPANCY:
OFFICE OR PUBLIC BUILDINGS

OCCUPANCY LOAD FACTOR:
GROUP A-PRINCIPLE ASSEMBLY AREA (NO FIXED SEATING): 30
GROUP A-FIXED SEATING: 1/2 NUMBER OF SEATING
GROUP B-OFFICE OR PUBLIC BUILDINGS: 200

AREA
PER TABLE A, ACCESSORY AREAS MAY BE EXCLUDED (EG. HALLWAY, RESTROOM, STAIR)

OFFICE OF THE STATE FIRE MARSHAL
APPROVED FIRE AND PANIC ONLY
Reviewed by: Fire & Life Safety South
NOV 10 2009
Approval of this plan does not authorize or approve any omission or deviation from applicable regulations. Final approval is subject to field inspection. One set of approved plans shall be available on the project site at all times

FLOOR LEVEL	LOAD FACTOR	AREA (SF)	LOAD BY OCCUP.	OCCUPANCY		REQ. UR	REQ. WC	REQ. LAV	PROVIDED UR	PROVIDED WC	PROVIDED LAV
LEVEL ONE	200 30 30	0 7,750 963	0 259 67	MALE FEMALE	163 163	2	2 8	2 2	2	3 9	3 3
LEVEL TWO	200	31,624	159	MALE FEMALE	80 80	1	1 4	1 1	2	3 5	3 3
LEVEL THREE	200 30	29,143 2,757	145 32	MALE FEMALE	89 89	1	1 4	1 1	2	3 5	3 3
LEVEL FOUR	200 30	23,568 712	118 24	MALE FEMALE	71 71	1	1 4	1 1	2	3 5	3 3
LEVEL FIVE	200 30	14,097 739	71 25	MALE FEMALE	48 48	1	1 3	1 1	2	3 5	3 3
LEVEL SIX	200 30	13,813 192	70 7	MALE FEMALE	39 39	1	1 3	1 1	2	3 5	3 3
TOTAL				MALE FEMALE	516 516	8	7 30	8 8	12	18 34	18 18

PLAN CHECK NOTES

EXIT ACCESS / EXIT / EXIT DISCHARGE

EXIT ACCESS

OCCUPANT LOADS — TABLE 1004.1.1
BUSINESS 100 GSF
ASSEMBLY 15 GSF

EGRESS WIDTH W/ SPRINKLER — TABLE 1005.1
A-3, B , S, S-1 AND S-2 OCCUPANCIES:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT
H-3 OCCUPANCY:
STAIRS 0.2"/OCCUPANT
OTHER 0.15"/OCCUPANT

ACCESSIBLE MEANS OF EGRESS — CBC 1007

AMIN. EGRESS WIDTH
MIN. DOOR 34" — CBC 1008.1.1
MIN. STAIR 44" — CBC 1009.1.1
MIN. ACCESSIBLE STAIR 48" — CBC 1007.3
MIN. EXT. EXIT STAIR 48" — CBC 1007.8.2
MIN. CORRIDOR 44" — CBC 1017.2

AREA OF REFUGE — CBC 1007.6

EXTERIOR AREA OF ASSISTED RESCUE — CBC 1007.8

DOOR SWING — CBC 1008.1.2

DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL WHERE SERVING AN OCCUPANT LOAD OF 50 OR MORE OR A GROUP H OCCUPANCY

RAMPS — CBC 1010

EGRESS THROUGH INTERVENING SPACES — CBC 1014.2 EXCEPTION 2

H OCCUPANCY EGRESS IS NOT PROHIBITED THROUGH ADJOINING SPACE WHEN ADJOINING OR INTERVENING SPACES ARE THE SAME OR LESSER HAZZARD OCCUPANCY.

COMMON PATH OF TRAVEL — CBC 1014.3 EXCEPTION 1 & 2
MAX. DIST. 100'

EXIT AND EXIT ACCESS DOORWAYS — CBC 1015.2.1 EXCEPTION 2
SEPARATION OF EXITS 1/3 DIAGONAL

EXIT ACCESS TRAVEL DISTANCE IN ATRIUM — CBC 404.8
MAX. DIST. W/ SPRINKLER 200'

CORRIDOR RATING W/ SPRINKLER — CBC TABLE 1017.1
B OCCUPANCY (0) HOUR

DEAD ENDS — CBC TABLE 1017.3 EXCEPTION 2
MAX. DIST. W/ SPRINKLER 50'

EXIT DISCHARGE — CBC 1024.1 EXCEPTION 1

MAX. 50% EXITS PERMITTED TO EGRESS THROUGH AREAS ON THE LEVEL OF DISCHARGE PROVIDED 1.1, 1.2 AND 1.3 ARE MET.

MAXIMUM ALLOWABLE TRAVEL DISTANCES (CBC TALE 1016.1)

B OCCUPANCY	300' WITH SPRINKLER SYSTEM
A-3 OCCUPANCY	250' WITH SPRINKLER SYSTEM
H-3 OCCUPANCY	150' WITH SPRINKLER SYSTEM
S-1 OCCUPANCY	250' WITH SPRINKLER SYSTEM
S-2 OCCUPANCY	400' WITH SPRINKLER SYSTEM

FIRE PROTECTION SYSTEMS

AUTOMATIC SPRINKLER SYSTEMS (CBC SECTION 903)

FIRE SPRINKLER SYSTEM THROUGHOUT — CBC 901.2

ADDITIONAL REQUIRED FIRE SUPPRESSION — TABLE 903.2.13
ATRIUM — CBC 404.3

STANDPIPE REQUIREMENTS (CBC SECTION 905)

STANDPIPE: CLASS I — CBC 905.3.1, EXCEPTION 1
HOSE REQUIREMENT:
1. REQUIRED IN EVERY REQUIRED STAIRWAY AT MAIN LANDING, BY FIRE CODE OFFICIAL.
2. REQUIRED AT THE ROOF OR HIGHEST LANDING OF STAIRWAYS WITH STAIR ACCESS TO THE ROOF.
3. ADDITIONAL HOSE CONNECTION REQUIRED AT THE TOP OF THE MOST HYDRAULICALLY REMOTE STANDPIPE FOR TESTING PURPOSES.

FIRE EXTINGUISHERS (CBC SECTION 906)

REQUIRED: PROVIDE AS DIRECTED BY THE CALIFORNIA FIRE CODE (CFC 2007) AND NFPA 10
TYPE: FIRE EXTINGUISHERS TO BE -SIZE- 4-A:60-B:C 10LBS.
SPACING: CLASS A HAZARDS (OFFICE AREAS)
75FT. MAX. TRAVEL DISTANCE NFPA 10 3-2.1
CLASS B HAZARDS (LAB AREAS)
50FT. MAX. TRAVEL DISTANCE NFPA 10

FIRE ALARM AND DETECTION SYSTEMS (CBC SECTION 907)

-FIRE ALARM AND DETECTION SYSTEMS — CBC 907
ATRIUM — CBC 907.2.13

-EMERGENCY ALARM SYSTEMS — CBC 908
GROUP H OCCUPANCY — CBC 908.1

ADA COMPLIANT FIRE ADDRESSABLE FIRE ALARM SYSTEM/AREAS OF REFUGE
SMOKE DETECTION (DUCT MOUNTED INCLUDED) AT SELECTED LOCATIONS
AUDIO/VISUAL STROBE SIGNALING
FLOW AND TAMPER SWITCH MONITORING POINTS
ELEVATOR MONITOR AND CENTRAL TIE CAPABILITIES
EMERGENCY LIGHTING
EXIT LIGHTING
AUTOMATIC AIR HANDLING EQUIPMENT SHUTDOWN
FIRE DEPARTMENT COMMUNICATION SYSTEM
EMERGENCY AND STANDBY POWER SYSTEM

SMOKE CONTROL SYSTEM (CBC SECTION 909)

PASSIVE NATURAL VENTILATION SMOKE CONTROL SYSTEM IN ATRIUM

ALTERNATIVE MATERIALS, DESIGNS, TESTS AND METHODS OF CONSTRUCTION — CBC 108.7.2

1 / A0.16 LIFE SAFETY PLAN - SIXTH FLOOR

SCALE: 1/16" = 1'-0"

CONSTRUCTION

RATED PARTITIONS

INDICATED ON PLANS.

OCCUPANCY CLASSIFICATIONS

A-3	SEMINAR ROOM W/OCCUPANT LOAD > 50	CBC 303.1
B	MAIN OCCUPANCY	CBC 304.1
H-3	HAZARDOUS	CBC 307.1
S	STORAGE ROOMS	CBC 311.1
S-1	MECHANICAL ROOMS	CBC 311.2
S-2	ELECTRICAL ROOMS	CBC 311.3

ATRIUM (CBC 404)

AUTOMATIC SPRINKLER PROTECTION — CBC 404.3, TABLE 903.2.13
1-HOUR SEPARATION, EXCEPT ANY THREE FLOORS — CBC 404.5 EXCEPTION 3
EXIT ACCESS TRAVEL DISTANCE MAX. = 200' — CBC 404.8

REQUIRED OCCUPANCY SEPARATION (CBC TABLE 508.3.3)

B TO A-3:	1-HOUR
B TO H-3:	1-HOUR
B TO S-1:	NO SEPARATION REQUIRED
B TO S-2:	1-HOUR
S-1 TO H-3:	1-HOUR
S-1 TO S-2:	1-HOUR

FIRE RESISTIVE REQUIREMENTS (CBC TABLE 601)

STRUCTURAL FRAME	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR BEARING WALLS	2-HOUR
INTERIOR BEARING WALLS	2-HOUR (1-HR WHERE ONLY SUPPORTING ROOF)
EXTERIOR NONBEARING WALLS & PARTITIONS	1-HOUR < 30'; NON-RATED N/C ≥ 30'
INTERIOR NONBEARING WALLS & PARTITIONS	NON-RATED
FLOOR CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	2-HOUR
ROOF CONSTRUCTION INCL. SUPPORTING BEAMS & JOISTS	1-HOUR

TYPE OF CONSTRUCTION (CBC 602.2)

TYPE 1B-FR (FULLY SPRINKLED, SUPERVISED AUTOMATIC SPRINKLER SYSTEM)

EXTERIOR WALL AND OPENING PROTECTION (CBC TABLE 704.8)

UNPROTECTED OPENINGS: NO LIMIT > 30'
PROTECTED OPENINGS: NO LIMIT > 30'

MAX. FLAME SPREAD CLASSIFICATION: INTERIOR FINISHES (CBC TABLE 803.5)

GROUP	EXIT ENCLOSURES AND EXIT PASSAGEWAYS SPRINKLER	CORRIDORS SPRINKLED	ROOMS AND ENCLOSED SPACES SPRINKLED
A-3	B	B	C
B	B	C	C
S-1	C	C	C
S-2	C	C	C

ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP
ZGF
Architecture / Planning / Interior Design
Portland Seattle Los Angeles Washington DC New York
515 South Flower Street, Suite 3700
Los Angeles, California 90071
(PH) 213 617 1901
(FAX) 213 617 0047

Consultants
STRUCTURAL ENGINEER
John A. Martin & Associates, Inc
1212 S. Flower Street
Los Angeles, CA 90015

MECHANICAL ENGINEER
Rumsey Engineers
99 Linden Street
Oakland, CA 94607

ELECTRICAL ENGINEER
Integrated Design Associates, Inc
3140 De La Cruz Boulevard, Suite 110
Santa Clara, CA 95054

CIVIL ENGINEER
Cannon Associates
1050 Southwood Drive
San Luis Obispo, CA 93401

LANDSCAPE ARCHITECT
Katherine Spitz and Assoc
Glencoe Avenue
Marina del Rey, CA 90292

LABORATORY
Research Facilities Design
3965 Fifth Avenue, Suite 300
San Diego, CA 92103-3107

LIGHTING DESIGN
David Nelson & Associates, LLC
P.O. Box 270254
Littleton, CO 80127

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181
AC FLS SS
DATE SEP 03 2009

Revisions
BID DOCUMENTS 10/23/09

CENTER FOR SCIENCE
SAN LUIS OBISPO, CA

Drawing Title
LIFE SAFETY PLAN - SIXTH FLOOR

STATE OF CALIFORNIA — ALAN ... LICENSED ARCHITECT

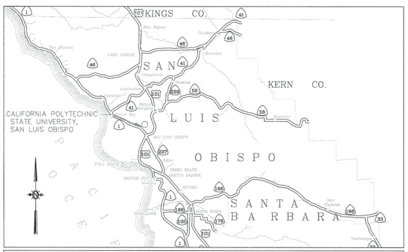
Date:	OCTOBER 23, 2009
Job No:	L40302.05
Drawn By:	TR/CS
Checked By:	
Drawing No.	

A0.16

CAL POLY
CENTER FOR SCIENCE
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
SAN LUIS OBISPO, CA.

DESIGNED AND INSTALLED BY

AERO AUTOMATIC SPRINKLER CO.



REGIONAL MAP N.T.S.

PROJECT DIRECTORY

OWNER CALIFORNIA STATE POLYTECHNIC UNIVERSITY
FACILITIES PLANNING & CAPITAL PROJECTS
BUILDING 70
SAN LUIS OBISPO, CA 93047
TEL- (805) 756-2581
FAX- (805) 756-7566

ARCHITECT ZIMMER GUNSUL FRASCA ARCHITECTS, LLP
515 SOUTH FLOWER ST.
SUITE 3700
LOS ANGELES, CA 90071
TEL- (213) 617-1901
FAX- (213) 617-0047

STRUCTURAL ENGINEER JOHN A. MARTIN & ASSOCIATES
950 S. GRAND AVENUE
4TH FLOOR
LOS ANGELES, CA 90015
TEL- (213) 483-6490
FAX- (213) 483-3084

MECHANICAL/ PLUMBING ENGINEER RUMSEY ENGINEERS
99 LINDEN STREET
OAKLAND, CA 94607
TEL- (510) 663-2070
FAX- (510) 663-2080

ELECTRICAL ENGINEER INTEGRATED DESIGN ASSOCIATES
1084 FOXWORTHY AVENUE, SUITE 150
SAN JOSE, CA 95118
TEL- (408) 448-6300
FAX- (408) 448-6301

CIVIL ENGINEER CANNON ASSOCIATES
364 PACIFIC STREET
SAN LUIS OBISPO, CA 93401
TEL- (805) 544-7407
FAX- (805) 544-3863

LANDSCAPE ARCHITECT KATHERINE SPITZ ASSOCIATES
4212 1/2 GLENCOE AVENUE
MARINA DEL REY, CA 90292
TEL- (310) 574-4460
FAX- (310) 574-4462

LABORATORY CONSULTANT RESEARCH FACILITIES DESIGN
3965 FIFTH AVENUE, SUITE 300
SAN DIEGO, CA. 92103-3107
TEL- (619) 297-0159
FAX- (619) 294-4901

LIGHTING DESIGN DAVID NELSON AND ASSOCIATES, LLC
P.O. BOX 270254
LITTLETON, CO 80127
TEL- (720) 981-4560
FAX- (303) 484-3230

PROJECT DATA

NEW BUILDING DATA
NUMBER OF STORIES: SIX (6) STORIES
ZGF PROJECT NUMBER: L40302
TYPE CONSTRUCTION: 1B, FIRE-RESISTIVE
BUILDING OCCUPANCY: GROUP B, BUSINESS OCCUPANCY, CONTAINING THE FOLLOWING USES:

USE	OCCUPANCY
LOBBIES/ LECTURE	A-3
OFFICES:	B
CONFERENCE ROOMS: (LESS THAN 50 OCCUPANTS)	B
LABORATORIES:	B
ELECTRICAL AND TELEPHONE / DATA	S-1
MECHANICAL ROOMS:	S-1
STORAGE	H-3
STORAGE	S-2

FIRE PROTECTION: FULLY FIRE SPRINKLERED
HEIGHT: 108'
FLOOR AREA:

FLOOR	SQ FT
LEVEL ONE:	23,146 G.S.F.
LEVEL TWO:	43,458 G.S.F.
LEVEL THREE:	43,209 G.S.F.
LEVEL FOUR:	33,307 G.S.F.
LEVEL FIVE:	25,294 G.S.F.
LEVEL SIX:	19,958 G.S.F.
TOTAL:	188,372 G.S.F.

BUILDING CODES:
2007 (CBC) CALIFORNIA BUILDING CODE
2007 (CFC) CALIFORNIA FIRE CODE
2007 (CMC) CALIFORNIA MECHANICAL CODE
2007 (CPC) CALIFORNIA PLUMBING CODE
2006 (NFPA 70) NATIONAL ELECTRICAL CODE
2006 (NFPA 101) LIFE SAFETY CODE
ADA STANDARDS FOR ACCESSIBLE DESIGN
ADA ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES (ADAAG)
[28 CFR PART 36, APPENDIX A]
NFPA 13 - AUTOMATIC SPRINKLER SYSTEMS, 2007 EDITION.
NFPA 14 - STANDPIPE AND HOSE SYSTEMS, 2004 EDITION.
NFPA 20 - STATIONARY PUMPS FOR FIRE PROTECTION, 2003 EDITION.

FIRE PROTECTION SYMBOLS

SYMBOL	DESCRIPTION
●	RECESSED PENDENT SPRINKLER
● 200	HIGH TEMPERATURE PENDENT SPRINKLER
○	UPRIGHT SPRINKLER
	EXT. COVERAGE PENDENT SPRINKLER
◎	UPRIGHT SPRINKLER ON SPRIG UP
◁	HORZ. SIDEWALL SPRINKLER
	RISE OR DROP IN PIPING w/ TEE
	RISE OR DROP IN PIPING w/ ELBOW
	PIPE HANGER LOCATIONS
	PIPE HANGER LOCATION W/ STIFFNER
	FIRE SPRINKLER RISER
	INSPECTOR'S TEST CONNECTION
	NEW PIPING
	EXISTING PIPING
XX	HYDRAULIC REFERENCE POINT
LAT	LATERAL SWAY BRACE
LONG	LONGITUDAL SWAY BRACE
× BLR	BRANCH LINE RESTRAINT (BLR)
	4 WAY SWAY BRACE
★3'-1 1/2"	DECK TO CENTERLINE
10'-4" AFF	CENTERLINE ABOVE FINISH FLOOR
✳	DENOTES EXISTING 1" OUTLET

SCOPE OF WORK / HAZARD ANALYSIS

PROVIDE A COMPLETE WET PIPE FIRE SPRINKLER SYSTEM FOR A NEW 6-STORY CLASSROOM/LABRATORY BUILDING WITH FIRE PUMP & CLASS 1 STANDPIPE SYSTEM.
ALL SPRINKLERS TO BE QUICK RESPONSE TYPE UNLESS NOTED OTHERWISE.
SPRINKLERS IN FINISHED CEILINGS TO BE RECESSED CHROME PENDENT SPRINKLERS.
SPRINKLERS IN EXPOSED AREAS TO BE CHROME UPRIGHT OR PENDENT SPRINKLERS.
PIPING TO BE BLACK STEEL SCHEDULE 10 AND SCHEDULE 40.

DESIGN CRITERIA:
OCCUPANCY CLASSIFICATION

◇	OCCUPANCY	HAZARD	MAX SPACING	DESIGN	HOSE
A-3	LOBBIES/LECTURE	LIGHT HAZARD	225	.10/1500	100/0
B	OFFICE/CONFERENCE RM	LIGHT HAZARD	130	.10/1500	100/0
B	LABORATORIES	O.H. GR. 1	130	.15/1500	100/150
S-I	STORAGE/MECH/ELECT RM	O.H. GR. 1	130	.15/1500	100/150

FLOW TEST INFORMATION:

ACTUAL	REDUCED 10 PERCENT
STATIC: 60 psi	STATIC: 54 psi
RESIDUAL: 55 psi	RESIDUAL: 49 psi
FLOW: 914 gpm	FLOW: 914 gpm

TEST DATE: 8-19-2011 9:12 AM
ORIFICE SIZE: 2-1/2"
ORIFICE COEFFICIENT: 0.90

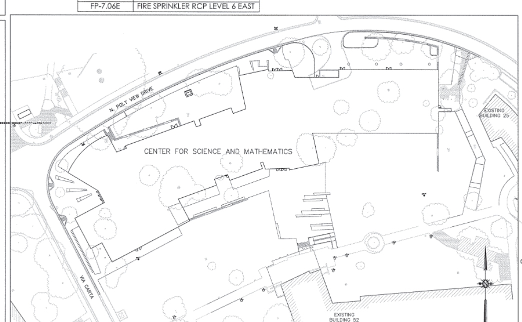
FLOW TEST PERFORMED BY FLUID RESOURCE MANAGEMENT
NOTE: FLOWING HYDRANT # 64 WITH STATIC & RESIDUAL PRESSURE FROM HYDRANT # 63

GENERAL SYSTEM NOTES:

1. ALL SYSTEM PIPING SHALL BE HYDROSTATICALLY TESTED AT 200 PSI OR AT 50 PSI ABOVE THE OPERATIONAL STATIC PRESSURE OF THE SYSTEM, WHICHEVER IS GREATER FOR TWO HOURS.
2. EACH VALVE SHALL HAVE A PERMANENTLY AFFIXED SIGN INDICATING ITS FUNCTION. ALL SPRINKLER SYSTEM CONTROL VALVE HANDLES TO BE LOCATED 7'-0" MAX. A.F.F.
3. A STOCK OF SPARE SPRINKLERS OF EACH STYLE AND TEMPERATURE RATING, WITH A SPRINKLER WRENCH, SHALL BE LOCATED NEAR THE RISER WHERE THE TEMPERATURE TO WHICH THEY
4. SPRINKLERS SHALL BE QUICK RESPONSE
WITH CHROME RECESSED ESCUTCHEONS U.O.N. AND SHALL BE IN ALIGNMENT AND PARALLEL TO CEILING GRIDS
SPRINKLERS IN UNFINISHED AREAS TO BE TYCO MODEL TY-FRB QUICK RESPONSE BRASS UPRIGHT
5. MAIN PIPING FOR THIS SYSTEM SHALL BE SCHEDULE 10 PIPE WITH GROOVED ENDS WITH APPLICABLE FITTINGS.
BRANCH LINE CONNECTIONS TO THE MAIN SHALL BE PRE-DRILLED WITH SHOP WELDED OUTLETS.
THREADED PIPING 1" TO 2" TO BE BLACK STEEL BMT SCHEDULE 40 WITH BLACK CAST IRON OR DUCTILE IRON FITTINGS
1 1/4" AND LARGER BRANCH LINE & MAIN PIPING TO BE SCHEDULE 10 PIPE WITH GROOVED ENDS WITH GROOVED FITTINGS.
6. ALL MATERIALS USED IN THE INSTALLATION OF THESE SYSTEMS SHALL BE NEW AND OF CURRENT ISSUE, AND APPROVED BY U.L. (UNDERWRITERS LAB) AND/OR FM (FACTORY MUTUAL). ALL MATERIALS SHALL BE IN CONFORMANCE WITH NFPA-13, 2007 AS WELL AS THE AUTHORITY HAVING JURISDICTION.
7. SYSTEM PIPING WILL BE SUPPORTED WITH HANGERS IN ACCORDANCE WITH NFPA-13, 2007.
8. SPACING AND DETAILS OF THE SUPPORT AND BRACING OF FIRE SPRINKLER PIPING SHALL COMPLY WITH THE 2007 EDITION OF NFPA 13.
9. PAINTING OF THE SYSTEM PIPING AND COMPONENTS IS NOT PART OF THIS SCOPE AND, IF REQUIRED, IT SHALL BE PERFORMED BY OTHERS
10. UNDERGROUND PIPING IS NOT PART OF THIS SCOPE. FIRE PROTECTION CONTRACT TO START AT FLANGE (BY OTHERS) AT 6" ABOVE FINISHED FLOOR.
11. WIRING OF WATERFLOW SWITCH & CONTROL VALVE TAMPER SWITCHES BY OTHERS. ALL OTHER ALARM DEVICES TO BE PROVIDED, INSTALLED AND TESTED BY OTHERS

Sheet List Table

Sheet Number	Sheet Title
FP-1.0	COVER SHEET
FP-2.0	FIRE SPRINKLER SITE PLAN
FP-3.0	FIRE PUMP PLAN
~~FP-4.9~~	~~TEMP. STANDPIPE~~
FP-4.0	STANDPIPE - OVERALL ISOMETRIC
FP-4.1	STANDPIPE # 1 DETAILS
FP-4.2	STANDPIPE # 3 DETAILS
FP-4.3	STANDPIPE # 4 DETAILS
FP-4.4	STANDPIPE # 5 DETAILS
FP-5.0	HANGER & E.Q. DETAILS
FP-6.01W	FIRE SPRINKLER PLAN LEVEL 1 WEST
FP-6.02W	FIRE SPRINKLER PLAN LEVEL 2 WEST
FP-6.02E	FIRE SPRINKLER PLAN LEVEL 2 EAST
FP-6.03W	FIRE SPRINKLER PLAN LEVEL 3 WEST
FP-6.03E	FIRE SPRINKLER PLAN LEVEL 3 EAST
FP-6.04W	FIRE SPRINKLER PLAN LEVEL 4 WEST
FP-6.04E	FIRE SPRINKLER PLAN LEVEL 4 EAST
FP-6.05E	FIRE SPRINKLER PLAN LEVEL 5 EAST
FP-6.06E	FIRE SPRINKLER PLAN LEVEL 6 EAST
FP-7.01W	FIRE SPRINKLER RCP LEVEL 1 WEST
FP-7.02W	FIRE SPRINKLER RCP LEVEL 2 WEST
FP-7.02E	FIRE SPRINKLER RCP LEVEL 2 EAST
FP-7.03W	FIRE SPRINKLER RCP LEVEL 3 WEST
FP-7.03E	FIRE SPRINKLER RCP LEVEL 3 EAST
FP-7.04W	FIRE SPRINKLER RCP LEVEL 4 WEST
FP-7.04E	FIRE SPRINKLER RCP LEVEL 4 EAST
FP-7.05E	FIRE SPRINKLER RCP LEVEL 5 EAST
FP-7.06E	FIRE SPRINKLER RCP LEVEL 6 EAST



VICINITY MAP 1 INCH = 50 FEET

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECH
OFFICE OF REGULATION SERVICES
APPL 01-110181

REGISTERED PROFESSIONAL ENGINEER GEORGE PROVENCHER FP 693 exp 12-31-11 FIRE PROTECTION STATE OF CALIFORNIA 09/29/11

NORTH

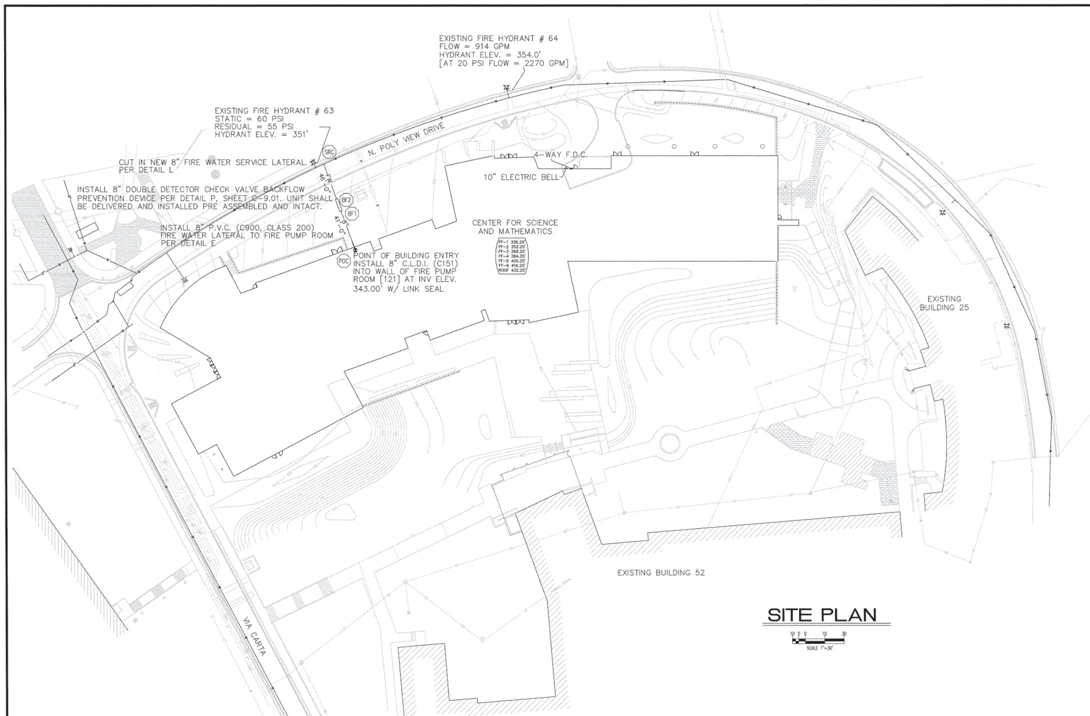
AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. 623.580.7800
Phoenix, Arizona 85024 Fax 623.434.3154
AZ-L16-234798 CA-C16-901529
AZ-C16-234797 NV-C41-69370
UT-8370-6690455-5501 NM-MS 12-354807

PROJECT: CAL POLY CENTER FOR SCIENCE
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
SAN LUIS OBISPO, CA.

CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

PLAN DESCRIPTION: COVER SHEET

DRAWN BY:	NRL
SCALE:	AS NOTED
DATE:	8-15-2011
CONTRACT:	10034
SHEET:	FP-1.0



EXISTING FIRE HYDRANT # 64
FLOW = 914 GPM
HYDRANT ELEV. = 354.0'
[AT 20 PSI FLOW = 2270 GPM]
EXISTING FIRE HYDRANT # 63
STATIC = 60 PSI
RESIDUAL = 55 PSI
HYDRANT ELEV. = 351'
N. POLY VIEW DRIVE
CUT IN NEW 8" FIRE WATER SERVICE LATERAL. PER DETAIL L
INSTALL 8" DOUBLE DETECTOR CHECK VALVE BACKFLOW PREVENTION DEVICE PER DETAIL P, SHEET C-9.01. UNIT SHALL BE DELIVERED AND INSTALLED PRE ASSEMBLED AND INTACT.
INSTALL 8" P.V.C. (C900, CLASS 200) FIRE WATER LATERAL TO FIRE PUMP ROOM PER DETAIL E
POINT OF BUILDING ENTRY INSTALL 8" C.L.D.I. (C151) INTO WALL OF FIRE PUMP ROOM [121] AT INV ELEV. 343.00' W/ LINK SEAL
4-WAY F.D.C.
10" ELECTRIC BELL
CENTER FOR SCIENCE AND MATHEMATICS
EXISTING BUILDING 25
EXISTING BUILDING 52
VIA CARTA

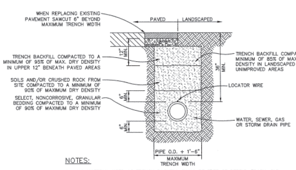
SITE PLAN

SCALE 1"=30'

FLOW TEST SUMMARY	
STATIC PSI	60
RESIDUAL PSI	55
PITOT PSI	35
ORIFICE DIAMETER	2 1/2
COEFFICIENT OF DISCHARGE	0.9
GPM	914
DATE	8-19-2011
LOCATION	N. POLY VIEW DRIVE
BY WHO	FLUID RESOURCE MANAGEMENT, INC.

ADJUSTED FLOW 10 % REDUCTION	
STATIC PSI	54
RESIDUAL PSI	49
GPM	914

STATIC & RESIDUAL TAKEN FROM HYD. # 63
FLOW TAKEN FROM HYD. # 64



WHEN REPLACING EXISTING PAVEMENT SAWCUT 6" BEYOND MAXIMUM TRENCH WIDTH
PAVED
LANDSCAPED
TRENCH BACKFILL COMPACTED TO A MINIMUM OF 95% OF MAX. DRY DENSITY IN UPPER 12" BENEATH PAVED AREAS
SOILS AND/OR CRUSHED ROCK FROM SITE COMPACTED TO A MINIMUM OF 90% OF MAXIMUM DRY DENSITY
SELECT, NONCORROSIVE, GRANULAR BEDDING COMPACTED TO A MINIMUM OF 90% OF MAXIMUM DRY DENSITY
TRENCH BACKFILL COMPACTED TO A MINIMUM OF 85% OF MAXIMUM DRY DENSITY IN LANDSCAPED OR OTHER UNIMPROVED AREAS
LOCATOR WIRE
WATER, SEWER, GAS OR STORM DRAIN PIPE
12" MIN.
36" MIN.
6" MIN.
PIPE O.D. + 1'-6" MAXIMUM TRENCH WIDTH

NOTES:

A. ALL MATERIAL USED AS TRENCH BACKFILL SHALL BE FREE OF DEBRIS, TRASH, OLD PAVEMENT AND ORGANIC MATERIAL AND SHALL BE CLEANED OF ANY ROCKS AND IRREDUCIBLE MATERIAL LARGER THAN 3 INCHES.

B. WHEN BACKFILL MATERIAL INCLUDES ROCKS, THE ROCKS SHALL BE PLACED IN A SUFFICIENT SOIL MATRIX TO ENSURE THAT VOIDS CAUSED BY NESTING OF THE ROCKS WILL NOT OCCUR AND THAT THE FILL CAN BE PROPERLY COMPACTED.

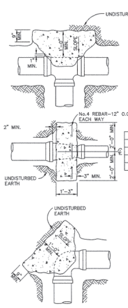
C. SELECT BEDDING SHALL NOT CONTAIN ANY ROCKS.

D. THE PAVEMENT AND LANDSCAPED AREAS SHALL BE INSTALLED PER APPROPRIATE PLANS AND SPECIFICATIONS.

E. No. 12 AWG LOCATOR WIRE SHALL BE TAPED TO THE TOP OF ALL PIPES.

(E) PIPE IN TRENCH DETAIL
N.T.S.

NOTE; UTILITY PLAN PREVIOUSLY APPROVED BY THE OFFICE OF STATE FIRE MARSHAL (FIRE and PANIC ONLY) ON NOV. 10, 2009. THESE DETAILS ARE ALL FROM THAT CIVIL PACKAGE.



PIPE SIZE	BEARING SIZE
12"	15 S.F.
10"	11 S.F.
8"	7 S.F.
6"	4 S.F.
4"	2 S.F.

REDUCER SIZE		
LARGE END	SMALL END	BEARING AREA
12"	8"	9 S.F.
12"	10"	5 S.F.
8"	6"	4 S.F.

NOTE:
BEARING AREA SHALL BE AGAINST UNDISTURBED EARTH

ALL BOLTS AND FITTINGS SHALL BE COVERED AND TAPED WITH PLASTIC WRAP, CUMULATIVE 15 MIL.

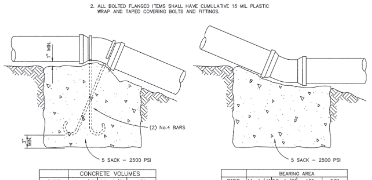
CONCRETE SHALL BE 5-SACK, 2500 PSI

	BEARING AREA			
PIPE SIZE	11-1/4° BEND	22-1/2° BEND	45° BEND	90° BEND
12"	3 S.F.	6 S.F.	12 S.F.	21 S.F.
10"	2 S.F.	4 S.F.	8 S.F.	15 S.F.
8"	2 S.F.	3 S.F.	5 S.F.	10 S.F.
6"	1 S.F.	2 S.F.	3 S.F.	4 S.F.
4"	1 S.F.	1 S.F.	1 S.F.	2 S.F.

(N) THRUST BLOCK DETAIL
N.T.S.

NOTE:
1. CONCRETE BLOCK SHOULD BE APPROX. EQUAL IN ALL DIMENSIONS.

2. ALL BOLTED FLANGED ITEMS SHALL HAVE CUMULATIVE 15 MIL PLASTIC WRAP AND TAPED COVERING BOLTS AND FITTINGS.

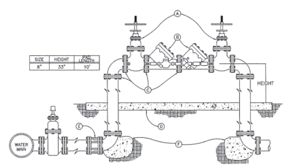


	CONCRETE VOLUMES		
PIPE SIZE	11-1/4° BEND	22-1/2° BEND	45° BEND
12"	1 YD	3 YDS	6 YDS
10"	1 YD	2 YDS	4 YDS
8"	0.5 YD	1 YD	2 YDS

	BEARING AREA			
PIPE SIZE	11-1/4° BEND	22-1/2° BEND	45° BEND	90° BEND
12"	3 S.F.	6 S.F.	12 S.F.	21 S.F.
10"	2 S.F.	4 S.F.	8 S.F.	15 S.F.
8"	2 S.F.	3 S.F.	5 S.F.	10 S.F.
6"	1 S.F.	2 S.F.	3 S.F.	4 S.F.
4"	1 S.F.	1 S.F.	1 S.F.	2 S.F.

(O) VERTICAL THRUST BLOCK DETAIL
N.T.S.

SIZE	HEIGHT	PAD LENGTH
8"	33"	10'



(A) 8" O.S.&Y. GATE VALVES WITH FULLY-ENCAPSULATED RESILIENT SEAT – Dresser or Kennedy (CONFORMING TO LATEST EDITION OF AWWA STANDARD C509-80.

(B) U.S.C. APPROVED DOUBLE DETECTOR CHECK VALVE BACKFLOW PREVENTION ASSEMBLY, WITH 3/4" NON-VALVED BYPASS METER ASSEMBLY. [8" WILKINS MODEL 350ADA]

(C) ALL RISERS AND ABOVE-GROUND MAINLINE FITTINGS SHALL BE FLANGE-TYPE.

(D) P.C.C. PAD, 12" MIN. AROUND RISERS, 5-SACK.

(E) M.J. x FLANGE ADAPTOR.

(F) P.C.C. THRUST BLOCKS, 5-SACK.

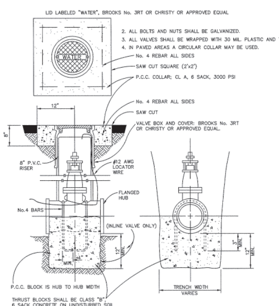
(G) 2-2 1/2" FDC ON DOWN STREAM SIDE OF BACKFLOW PREVENTION DEVICE.

(H) DOUBLE CHECK ASSEMBLY SHALL BE PROVIDED PER THE COUNTY OF SAN LUIS OBISPO APPROVED BACK FLOW DEVICES LIST. [8" WILKINS MODEL 350ADA]

(P) DOUBLE CHECK ASSEMBLY
N.T.S.

LID LABELED "WATER", BROOKS No. 3RT OR CHRISTY OR APPROVED EQUAL

2. ALL BOLTS AND NUTS SHALL BE GALVANIZED.
3. ALL VALVES SHALL BE WRAPPED WITH 30 MIL. PLASTIC AND TAPED.
4. IN PAVED AREAS A CIRCULAR COLLAR MAY BE USED.



WATER
No. 4 REBAR ALL SIDES
SAW CUT SQUARE (2'x2')
P.C.C. COLLAR; CL A, 6 SACK, 3000 PSI
12"
No. 4 REBAR ALL SIDES
SAW CUT
VALVE BOX AND COVER: BROOKS No. 3RT OR CHRISTY OR APPROVED EQUAL.
8"
8" P.V.C. RISER
#12 AWG LOCATOR WIRE
FLANGED HUB
No.4 BARS
(INLINE VALVE ONLY)
12" MIN.
3" MIN.
TRENCH WIDTH VARIES
P.C.C. BLOCK IS HUB TO HUB WIDTH
THRUST BLOCKS SHALL BE CLASS "B", 6 SACK CONCRETE ON UNDISTURBED SOIL

(L) GATE VALVE BOX & ANCHOR
N.T.S.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECH
OFFICE OF REGULATION SERVICES
APPL 01-110181

REGISTERED PROFESSIONAL ENGINEER GEORGE PROVENCHER FP 693 exp 12-31-11 FIRE PROTECTION STATE OF CALIFORNIA
09/29/11

SPRINKLER HEAD LEGEND: SYM. | MFG. | MODEL | SIN | RESP. | STYLE | FINISH | N.P.T. ORIFICE | K | TEMP. | ESCUTCHEON: DESC. | TYPE | FINISH | TEMP. | QTY.

TOTAL SPRINKLERS THIS SHEET

REVISIONS: # | DATE | BY | DESCRIPTION
1 | 8-15-2011 | NRL | SUBMITTAL TO GENERAL CONTRACTOR

NORTH

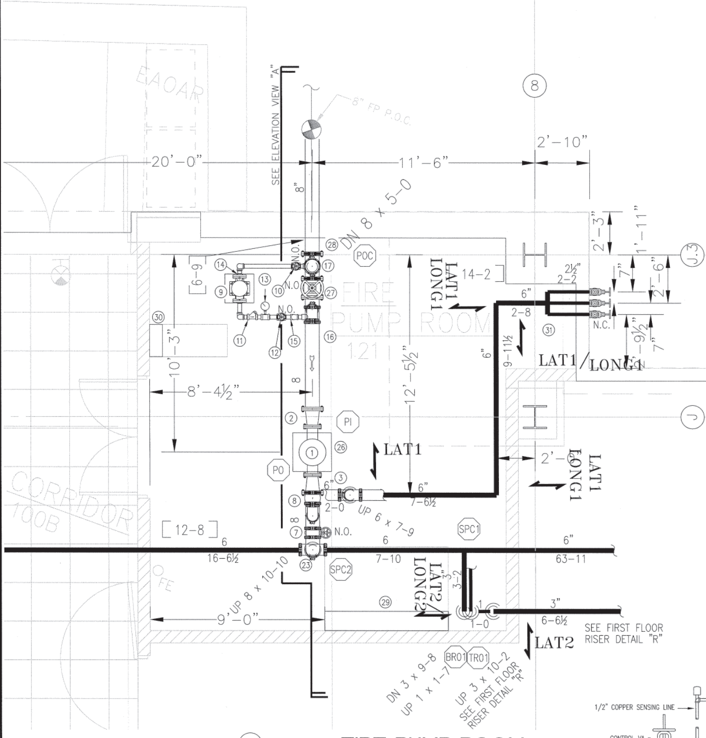
AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. Phoenix, Arizona 85024
623.580.7800 Fax 623.434.3154
AZ-L16-234798 AZ-C16-234797 UT-8370-6690455-5501
CA-C16-901529 NV-C41-69370 NM-MS 12-354807

PROJECT: CAL POLY CENTER FOR SCIENCE
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
SAN LUIS OBISPO, CA.

CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

PLAN DESCRIPTION: FIRE SPRINKLER SITE PLAN

DRAWN BY:	NRL
SCALE:	AS NOTED
DATE:	8-15-2011
CONTRACT:	10034
SHEET:	FP-2.0



FIRE PUMP ROOM

SCALE 1/2"=1'-0"

FIRE PUMP KEY NOTES

1- VERTICAL INLINE FIRE PUMP RATED 113 P.S.I. @ 750 GPM W/ELECTRIC MOTOR DRIVE (60 H.P.)
2- 8"x6" ECCENTRIC FLANGED REDUCER
3- 8"X6" CONCENTRIC FLANGED INCREASER
4- DISCHARGE GUAGE
5- SUCTION GAGE
6- 8" GROOVED TEE
7- 8" GROOVED BUTTERFLY VA. W/ TAMPER SWITCH
8- 8" GROOVED CHECK VALVE. (250 PSI)
9- JOCKEY PUMP (CRN 3-11 [2.0 H.P.])
10- 1 1/4" THREADED O.S.& Y. VALVE
11- 1 1/4" THREADED CHECK VALVE
12- 1 1/4" THREADED H.D. O.S.& Y. VALVE
13- WATER GAGE ON 1/4" 3-WAY VALVE
14- 1 1/4" TO JOCKEY PUMP
15- 1 1/4" FROM JOCKEY PUMP
16- 8" CITY BYPASS
17- 8" GROOVED 90° ELBOW
18- 8" GROOVED COUPLING FLEXIBLE
19- 6" GROOVED COUPLING FLEXIBLE
20- 1" AIR RELEASE VALVE
21- 2" PIPE STAND.
22- 6" GROOVED 90° ELBOW.
23- 6" GROOVED TEE.
24- 6" GROOVED BUTTERFLY VA. W/ TAMPER SWITCH.
25- 8" X 6" GROOVED REDUCING COUPLING.
26- 24" X 24" X 8" FIRE PUMP HOUSEKEEPING PAD
27- 8" O.S.&Y. W/ TAMPER SWITCH
28- 8" GROOVED FLANGE
29- FIRE PUMP CONTROL PANEL WITH AUTOMATIC TRANSFER SWITCH.
30- JOCKEY PUMP CONTROL PANEL.
31- 6" TEST HEADER W/ THREE (3) 2 1/2" HOSE VA.
32- 6" FLOW METER [GROOVED]

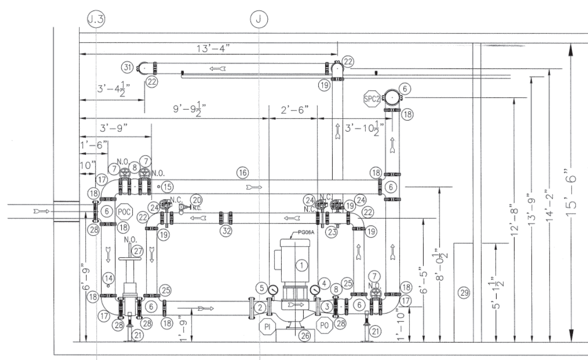
FLOW TEST SUMMARY

STATIC PSI	60
RESIDUAL PSI	55
PITOT PSI	35
ORIFICE DIAMETER	2 1/2
COEFFICIENT OF DISCHARGE	0.9
GPM	914
DATE	8-19-2011
LOCATION	N. POLY VIEW DRIVE
BY WHO	FLUID RESOURCE MANAGEMENT, INC.

ADJUSTED FLOW
10 % REDUCTION

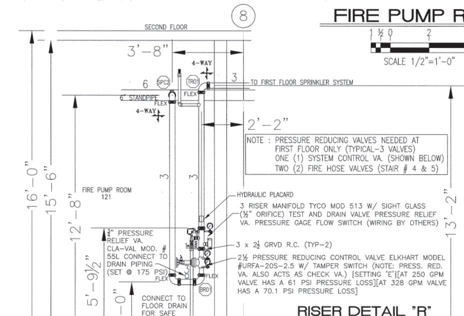
STATIC PSI	54
RESIDUAL PSI	49
GPM	914

STATIC & RESIDUAL TAKEN FROM HYD. # 63
FLOW TAKEN FROM HYD. # 64



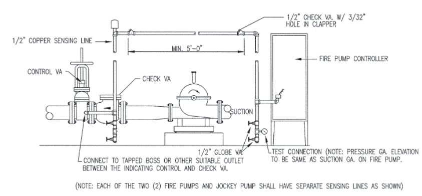
ELEVATION VIEW "A"

SCALE 1/2"=1'-0"

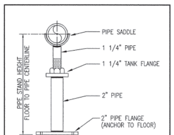


RISER DETAIL "R"

SCALE 1/2"=1'-0"



(NOTE: EACH OF THE TWO (2) FIRE PUMPS AND JOCKEY PUMP SHALL HAVE SEPARATE SENSING LINES AS SHOWN)



TYPICAL PIPE STAND

NO SCALE

FIRE PUMP SETTINGS :

FIRE PUMP MAXIMUM CHURN = 191 PSI
JOCKEY PUMP STOP = 165 PSI
JOCKEY PUMP START = 155 PSI
FIRE PUMP START = 150 PSI

GENERAL FIRE PUMP NOTES:

1. ALL PIPING TO BE INSTALLED AND TESTED PER NFPA-13 2007 EDITION & NFPA-20 2003 EDITION.
2. ALL HANGERS AND SUPPORTS TO BE STANDARD AS PER NFPA-13 2010 EDITION.
3. ALL GROOVED COUPLINGS SHALL BE FLEX. (TYCO) OR EQUAL. ALL COUPLINGS AND FITTINGS ON DISCHARGE SIDE OF PUMP SHALL 175# RATED.
4. ALL MATERIALS TO BE U.L. LISTED.
5. ALL VALVES TO BE MONITORED WITH TAMPER SWITCHES.
6. MATERIALS SHALL BE U.S. MANUFACTURE.
7. PUMP ROOM TO BE PROVIDED WITH SUFFICIENT HEAT AND VENTILATION TO MAINTAIN A MINIMUM TEMPERATURE OF 40°F.
8. ALL ELECTRICAL WIRING TO BE PROVIDED BY OTHERS.
9. ALL PAINTING OF PIPING TO BE PROVIDED BY OTHERS.
10. ALL CONCRETE PADS, FOUNDATIONS, ETC., TO BE PROVIDED BY OTHERS.
11. ADEQUATE CLEARANCE SHALL BE PROVIDED AROUND ALL PUMPS AND VALVES.

SPECIFIC FIRE PUMP NOTES:

1. ALL 1" THRU 2" PIPE SHALL BE BLACK SCHEDULE 40 W/DUCTILE IRON SCREWED FITTINGS.
2. 8" PIPE ON SUCTION SIDE OF PUMP SHALL BE GALVANIZED SCH 40 WITH CUT GROOVED OR WELDED, W/GROOVED, FLANGED AND WELDED FITTINGS.
3. ALL 6" & 8" DISCHARGE PIPE SHALL BE BLACK SCHEDULE 40 WITH EITHER GROOVED OR FLANGED FITTING/COUP.
4. CITY FLOW TEST: STATIC=60 psi; RESIDUAL=55 psi; FLOW=914 gpm
5. PUMP DESIGN CURVE: CHURN--125 PSI @ 0 GPM
   DESIGN--113 PSI @ 750 GPM
   150%--- 86 PSI @ 1125 GPM
6. PUMP SHALL BE PERFORMANCE TESTED TO THE THREE (3) POINTS LISTED IN NOTE 5, PER NFPA-20, PARAGRAPH 14.2.7.2 CONTROLLER SHALL BE TESTED WITH SIX (6) AUTOMATIC STARTS, AND SIX (6) MANUAL STARTS; EACH SHALL HAVE A MINIMUM OF FIVE (5) MINUTES OF PUMP OPERATION, PER NFPA-20, PARAGRAPH 14.2.8.1, 14.2.8.2 TOTAL PUMP OPERATION SHALL BE A MINIMUM OF ONE (1) HOUR, PER NFPA-20, PARAGRAPH 14.2.12.

PROVIDE AUX. DRAINS FOR ALL TRAPPED PORTIONS OF PUMPROOM PIPING
SUPPORT ALL PIPE WITH PIPE STANDS OR FROM CONCRETE STRUCTURE AS APPROPRIATE.
FIELD VERIFY ALL INCOMING SPIGOT LOCATIONS AND ADJUST PIPING AS REQUIRED TO COMPENSATE FOR ACTUAL FIELD DIMENSIONS

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECH
OFFICE OF REGULATION SERVICES
APPL 01-110181

SPRINKLER HEAD LEGEND
TOTAL SPRINKLERS THIS SHEET
REVISIONS
NORTH

AERO AUTOMATIC SPRINKLER CO.

CAL POLY
CENTER FOR SCIENCE
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
SAN LUIS OBISPO, CA.

GILBANE CONSTRUCTION

FIRE PUMP PLAN

DRAWN BY: NRL
SCALE: AS NOTED
DATE: 8-15-2011
CONTRACT: 10034
SHEET: FP-3.0

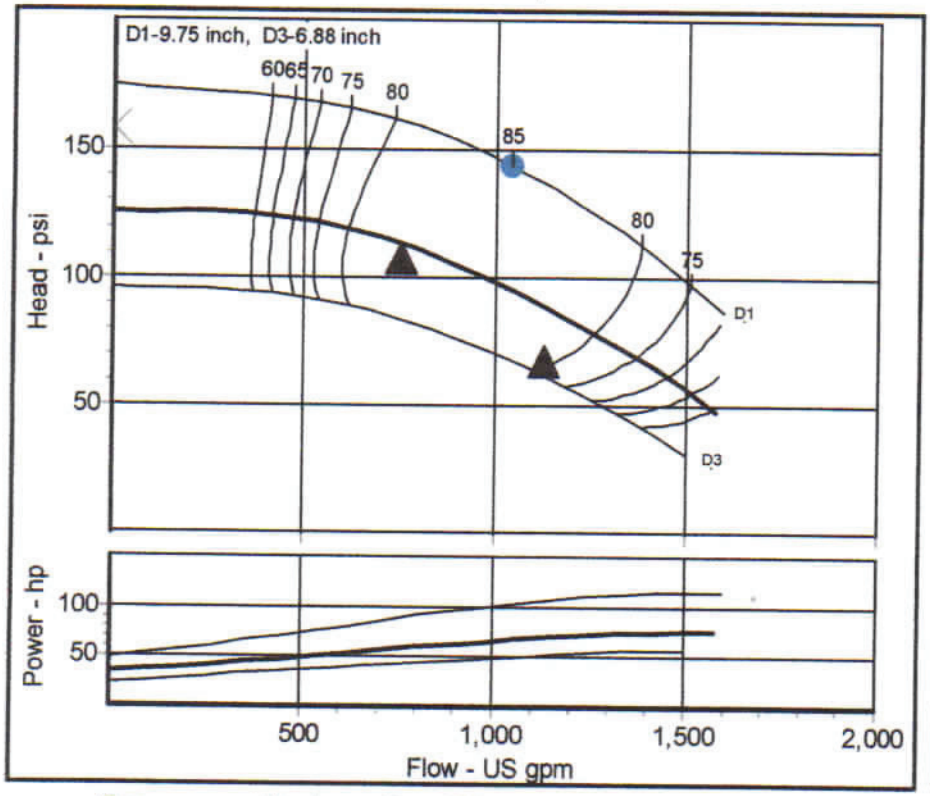
PEERLESS PUMP Reliability | When It Matters

Approved Fire Pumps

1151 N. Pomona Rd., Ste. B Corona, Ca 92882
Dena Mueller
Phone 951-738-9100
Fax 951-7389191

Project : Cal Poly Center for Science
Quote Ref. : UK-999999-1 **Page No : 1** **Date :** Monday, February 28, 2011

Type:	**PG - In-Line Close Coupled Fire**	Item :	**1**
Pump Model:	**6PVF10**	Impeller No.:	2699332
Pump Op. Speed:	**3550 RPM, 60 Hz Electric**	Liquid:	**Water**
Impeller Dia.:	**8.24** inch	Temperature:	**59** °F
Curve No.:	**3116186**	Viscosity:	**1.14** cSt
Market :	**FM/UL/ULC Listed Fire Pump**	Sp. Gravity:	**1.00**
		Your Ref. :	



Rated Flow	**750** US gpm
Rated Head	**113** psi
Imp. Dia.	**8.24** inch
Rated Power Required	**58.1** hp
Rated Efficiency	**85.3** %

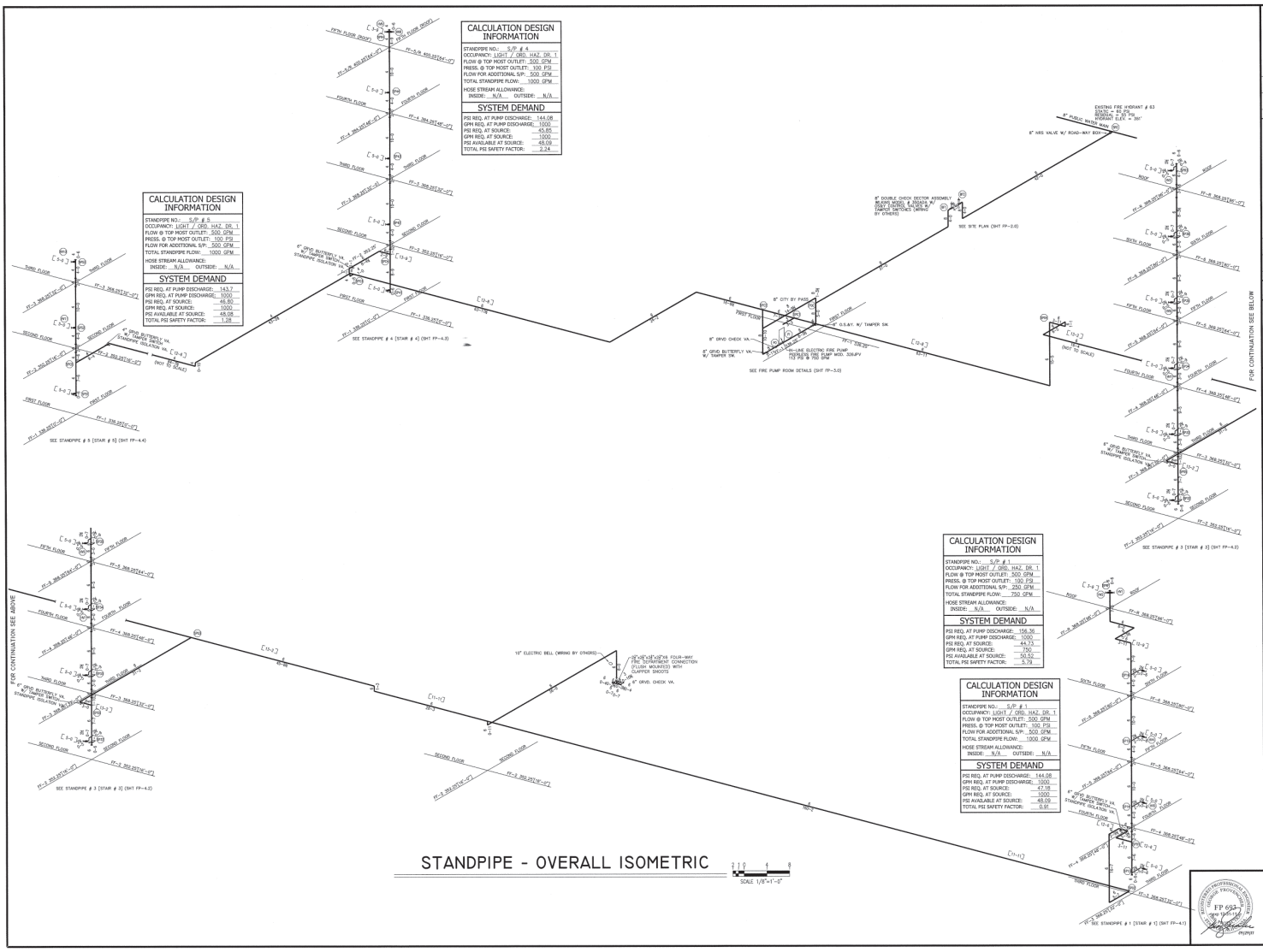
NFPA Limits:

140% Head at shutoff	**158.2** psi
65% Head at 150% flow	**73.4** psi
Flow at 150%	**1125** US gpm
Head at 150	**89** psi
Power Req. at 150%	**69.3** hp
Efficiency at 150%	**84.5** %
Peak Power	**75.4** hp
Closed Valve Pressure	**125.2** psi
Approval	**UL**

Comments

Performance curve represents typical performance. NPSH data is

Flow (US gpm)	Head (psi)	Pump Efficiency (%)	Power Required (hp)	NPSH Required (ft)
0.0	125.2	0.0	34.7	
197.6	125.2	36.6	39.5	
395.1	124.2	62.8	45.7	
592.7	119.6	78.8	52.6	
790.2	110.9	86.2	59.5	
987.8	98.9	87.0	65.7	
1185.3	84.4	82.8	70.7	
1382.9	67.9	74.2	74.0	
1580.4	48.2	59.1	75.4	



STANDPIPE - OVERALL ISOMETRIC

SCALE 1/8"=1'-0"

CALCULATION DESIGN INFORMATION

AREA:	"1-2"
OCCUPANCY:	LECTURE
HAZARD:	LIGHT HAZARD
DENSITY:	0.10 GPM / SQ.FT.
AREA OF OPERATION:	1575 SQ. FT.
AREA PER HEAD:	163 SQ.FT. (MAX.)
HOSE STREAM ALLOWANCE: INSIDE:	100
OUTSIDE:	

SYSTEM DEMAND

PSI REQ. AT BASE OF RISER:	162.2
GPM REQ. AT BASE OF RISER:	328.4
PSI REQ. AT SOURCE:	45.59
GPM REQ. AT SOURCE:	428.4
PSI AVAILABLE AT SOURCE:	52.76
TOTAL PSI SAFETY FACTOR:	7.17

CALCULATION DESIGN INFORMATION

AREA:	"1-1"
OCCUPANCY:	LECTURE
HAZARD:	LIGHT HAZARD
DENSITY:	0.10 GPM / SQ.FT.
AREA OF OPERATION:	1520 SQ. FT.
AREA PER HEAD:	168 SQ.FT. (MAX.)
HOSE STREAM ALLOWANCE: INSIDE:	100
OUTSIDE:	

SYSTEM DEMAND

PSI REQ. AT BASE OF RISER:	126.6
GPM REQ. AT BASE OF RISER:	250.6
PSI REQ. AT SOURCE:	7.27
GPM REQ. AT SOURCE:	350.6
PSI AVAILABLE AT SOURCE:	53.15
TOTAL PSI SAFETY FACTOR:	45.88

FIRE SPRINKLER PLAN LEVEL I WEST

SCALE 1/8"=1'-0"

FIRE SPRINKLER PLAN LEVEL 2 WEST

SCALE 1/8"=1'-0"

SPRINKLER HEAD LEGEND											ESCUTCHEON			
SYM.	MFG.	MODEL	SIN	RESP	STYLE	FINISH	N.P.T.	ORIFICE	K	TEMP.	ESC. TYPE	FINISH	TEMP.	QTY.
●	TYCO	TY-FRB	TY3231	QR	PEND	CHRM	1/2"	1/2"	5.6	155	RECESSED	CHRM	N/A	186
◎	TYCO	TY-FRB	TY3131	QR	UPR	CHRM	1/2"	1/2"	5.6	200	–	–	–	2
TOTAL SPRINKLERS THIS SHEET														188

#	DATE	BY	DESCRIPTION
1	9-28-2011	NRL	SUBMITTAL TO GENERAL CONTRACTOR

REVISIONS

NORTH

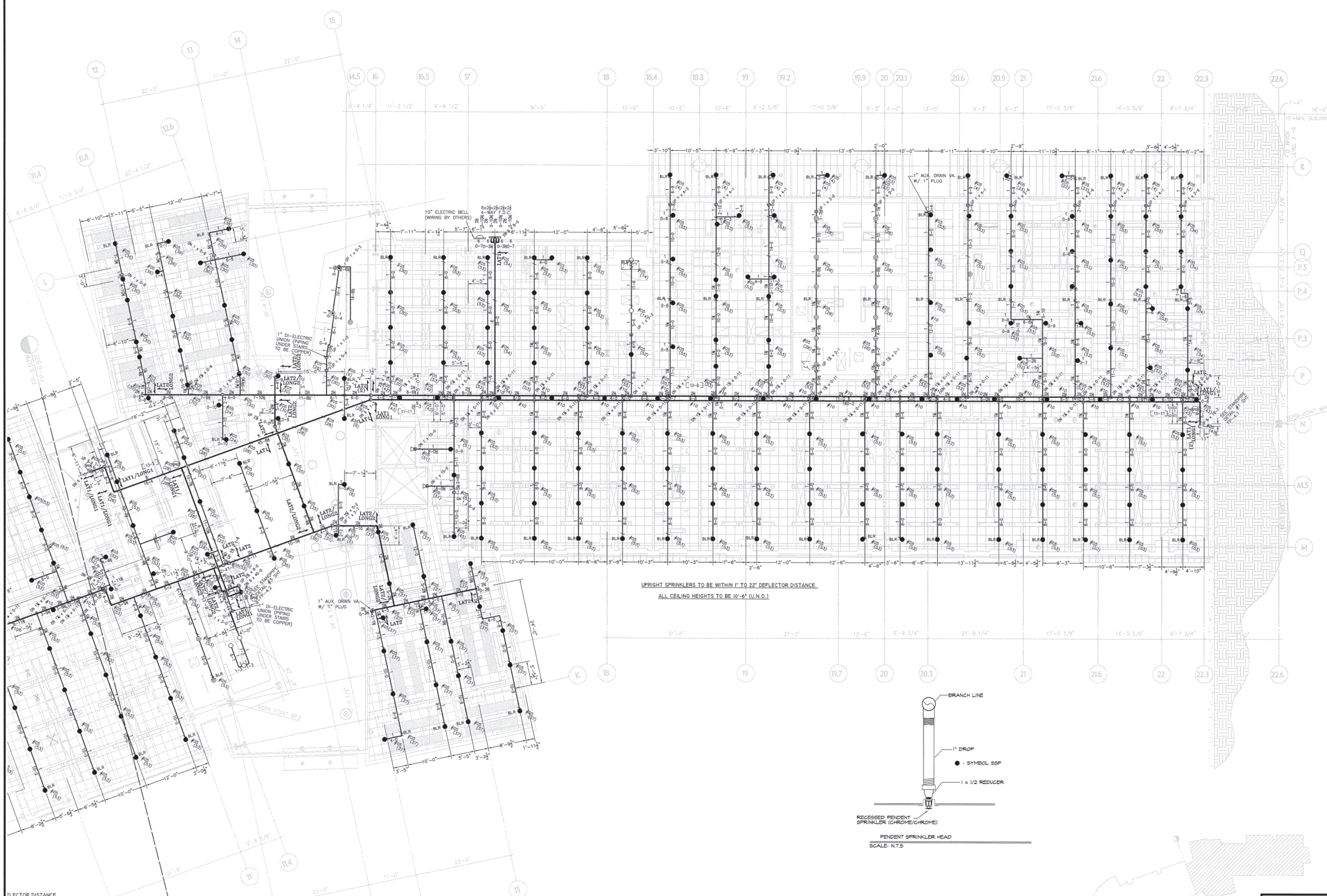
AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. Phoenix, Arizona 85024
623.580.7800 Fax 623.434.3154
AZ-L16-234798 AZ-C16-234797 UT-9370-6690455-5501
CA-C16-901529 NV-C41-69370 NM-MS 12-354807

PROJECT: CAL POLY CENTER FOR SCIENCE
SAN LUIS OBISPO, CA.

CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

PLAN DESCRIPTION: FIRE SPRINKLER PLAN LEVEL 2 WEST

DRAWN BY: NRL
SCALE: 1/8"=1'-0"
DATE: 8-15-2011
CONTRACT: 10034
SHEET: FP-6.02W



FIRE SPRINKLER PLAN LEVEL 2 EAST

SCALE 1/8"=1'-0"

SPRINKLER HEAD LEGEND

SYM.	MFG.	MODEL	SIN	RESP	STYLE	FINISH	N.P.T.	ORIFICE	K	TEMP.	ESC. TYPE	ESC. FINISH	ESC. TEMP.	QTY.
●	TYCO	TY-FRB	TY3231	QR	PEND	CHRM	1/2"	1/2"	5.6	155	RECESSED	CHRM	N/A	186
◎	TYCO	TY-FRB	TY3131	QR	UPR	CHRM	1/2"	1/2"	5.6	200	-	-	-	2

TOTAL SPRINKLERS THIS SHEET 188

REVISIONS

#	DATE	BY	DESCRIPTION
1	9-28-2011	NRL	SUBMITTAL TO GENERAL CONTRACTOR

NORTH

AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. 623.580.7800
Phoenix, Arizona 85024 Fax 623.434.3154
AZ-L16-234798 CA-C16-901529
AZ-C16-234797 NV-C41-69370
UT-9370-6690455-5501 NM-MS 12-354807

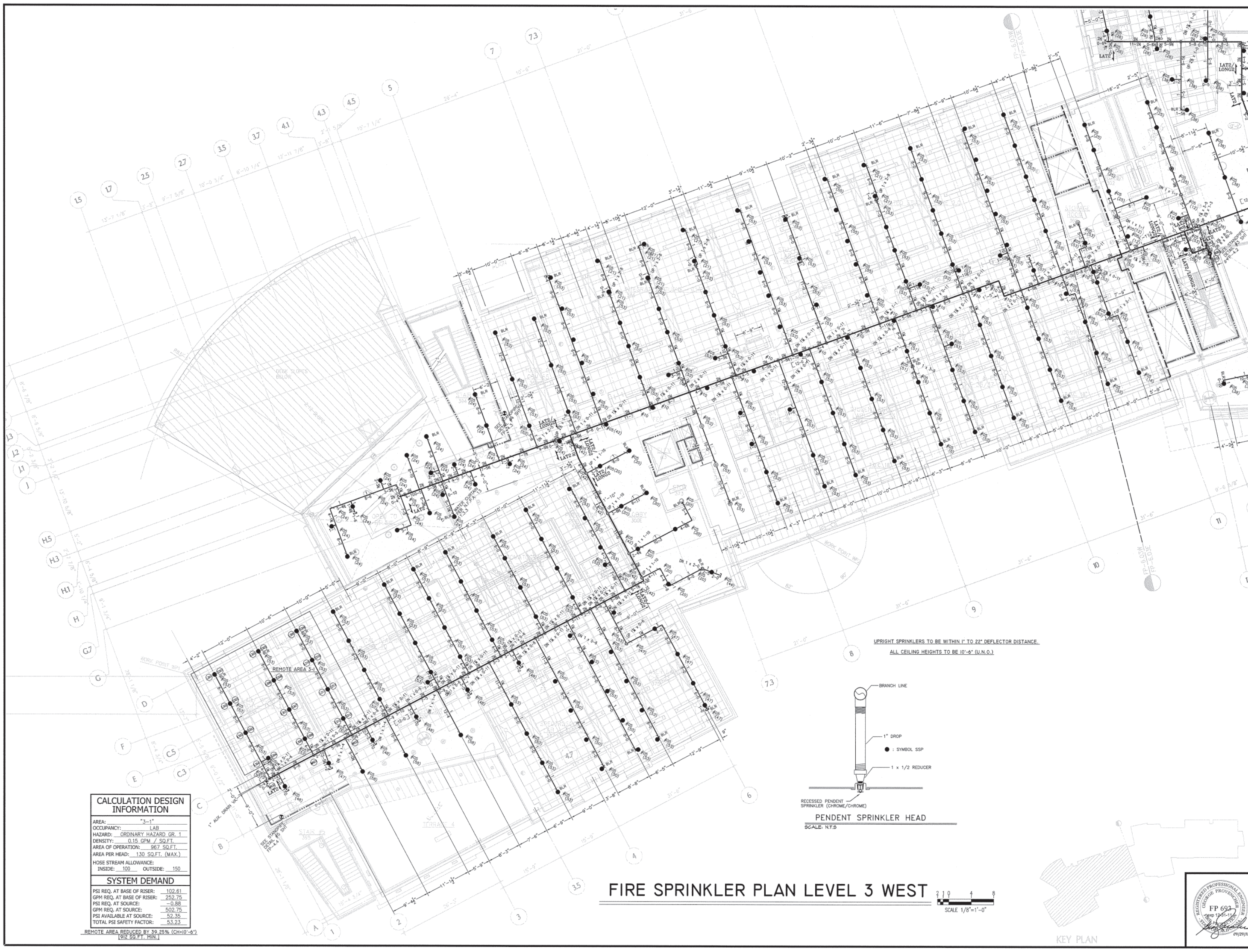
PROJECT: CAL POLY CENTER FOR SCIENCE
SAN LUIS OBISPO, CA.

CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

PLAN DESCRIPTION: FIRE SPRINKLER PLAN LEVEL 2 EAST

DRAWN BY:	NRL
SCALE:	1/8"=1'-0"
DATE:	8-15-2011
CONTRACT:	10034
SHEET:	FP-6.02E

KEY PLAN



UPRIGHT SPRINKLERS TO BE WITHIN 1" TO 22" DEFLECTOR DISTANCE

ALL CEILING HEIGHTS TO BE 10'-6" (U.N.O.)

BRANCH LINE
1" DROP
● : SYMBOL SSP
1 x 1/2 REDUCER
RECESSED PENDENT SPRINKLER (CHROME/CHROME)

PENDENT SPRINKLER HEAD

SCALE: N.T.S

CALCULATION DESIGN INFORMATION

AREA: "3-1"
OCCUPANCY: LAB
HAZARD: ORDINARY HAZARD GR. 1
DENSITY: 0.15 GPM / SQ.FT.
AREA OF OPERATION: 967 SQ.FT.
AREA PER HEAD: 130 SQ.FT. (MAX.)
HOSE STREAM ALLOWANCE:
INSIDE: 100 OUTSIDE: 150

SYSTEM DEMAND

PSI REQ. AT BASE OF RISER:	102.61
GPM REQ. AT BASE OF RISER:	252.75
PSI REQ. AT SOURCE:	-0.88
GPM REQ. AT SOURCE:	502.75
PSI AVAILABLE AT SOURCE:	52.35
TOTAL PSI SAFETY FACTOR:	53.23

REMOTE AREA REDUCED BY 39.25% (CH=10'-6")
[912 SQ.FT. MIN.]

FIRE SPRINKLER PLAN LEVEL 3 WEST

SCALE 1/8"=1'-0"

KEY PLAN

SPRINKLER HEAD LEGEND

SYM.	MFG.	MODEL	SIN	RESP	STYLE	FINISH	N.P.T.	ORIFICE	K	TEMP.	ESC. TYPE	FINISH	TEMP.	QTY.
●	TYCO	TY-FRB	TY3231	QR	PEND	CHRM	1/2"	1/2"	5.6	155	RECESSED	CHRM	N/A	204
◎	TYCO	TY-FRB	TY3131	QR	UPR	CHRM	1/2"	1/2"	5.6	200	-	-	-	4

(ESC. TYPE, FINISH and TEMP. are under ESCUTCHEON)

TOTAL SPRINKLERS THIS SHEET 208

REVISIONS

#	DATE	BY	DESCRIPTION
1	9-28-2011	NRL	SUBMITTAL TO GENERAL CONTRACTOR

NORTH

AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. 623.580.7800
Phoenix, Arizona 85024 Fax 623.434.3154
AZ-L16-234798 CA-C16-901529
AZ-C16-234797 NV-C41-69370
UT-S370-6690455-5501 NM-MS 12-354807

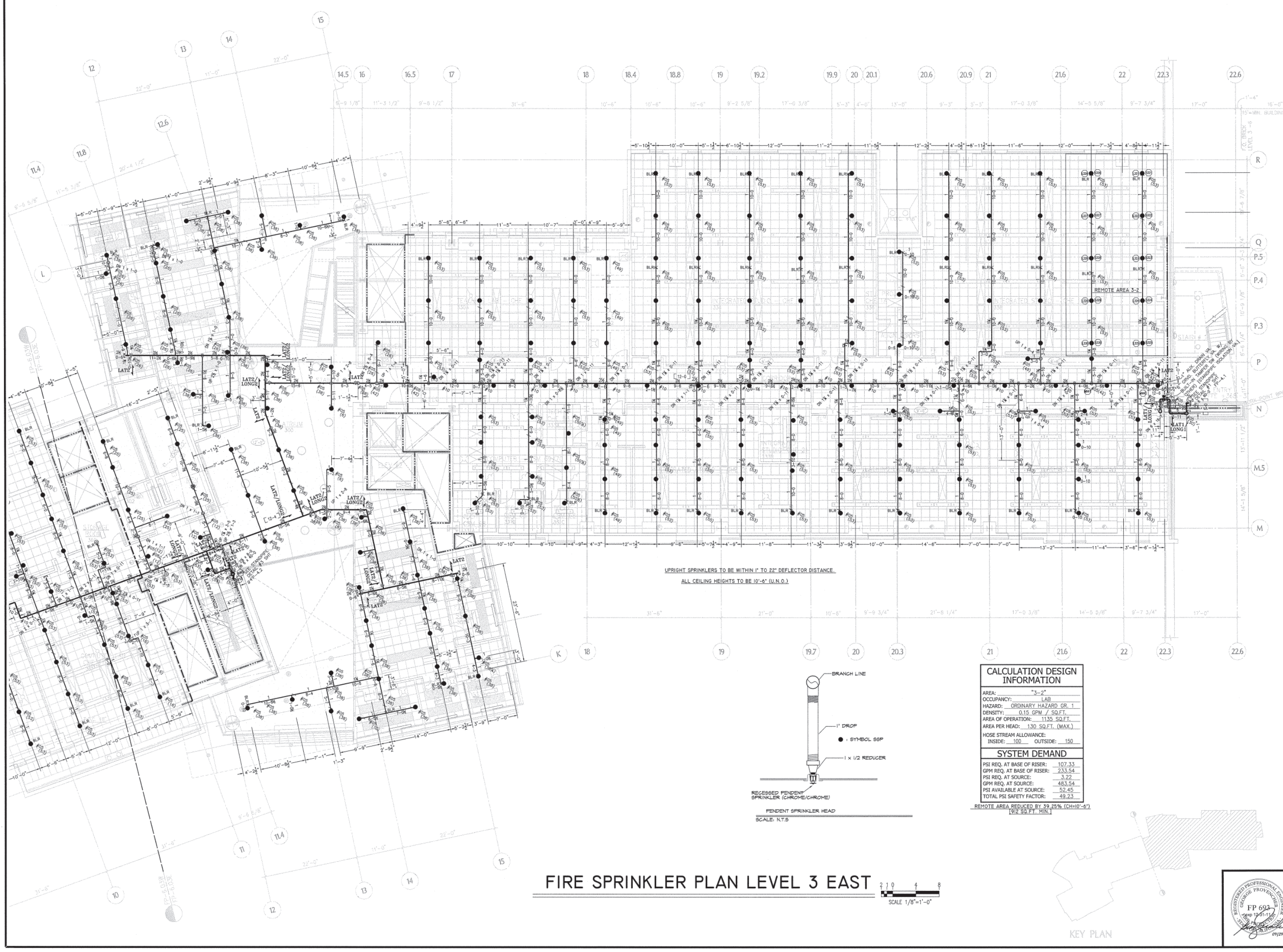
PROJECT: CAL POLY CENTER FOR SCIENCE
SAN LUIS OBISPO, CA.

CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

PLAN DESCRIPTION: FIRE SPRINKLER PLAN LEVEL 3 WEST

REGISTERED PROFESSIONAL ENGINEER GEORGE PROVENCHER FP 693 exp 12-31-11 FIRE PROTECTION STATE OF CALIFORNIA
09/29/11

DRAWN BY:	NRL
SCALE:	1/8"=1'-0"
DATE:	8-15-2011
CONTRACT:	10034
SHEET:	FP-6.03W



CALCULATION DESIGN INFORMATION

AREA:	"3-2"
OCCUPANCY:	LAB
HAZARD:	ORDINARY HAZARD GR. 1
DENSITY:	0.15 GPM / SQ.FT.
AREA OF OPERATION:	1135 SQ.FT.
AREA PER HEAD:	130 SQ.FT. (MAX.)
HOSE STREAM ALLOWANCE: INSIDE:	100
OUTSIDE:	150

SYSTEM DEMAND

PSI REQ. AT BASE OF RISER:	107.33
GPM REQ. AT BASE OF RISER:	233.54
PSI REQ. AT SOURCE:	3.22
GPM REQ. AT SOURCE:	483.54
PSI AVAILABLE AT SOURCE:	52.45
TOTAL PSI SAFETY FACTOR:	49.23

REMOTE AREA REDUCED BY 39.25% (CH=10'-6")
[912 SQ.FT. MIN.]

FIRE SPRINKLER PLAN LEVEL 3 EAST

SCALE 1/8"=1'-0"

SPRINKLER HEAD LEGEND

SYM.	MFG.	MODEL	SIN	RESP	STYLE	FINISH	N.P.T.	ORIFICE	K	TEMP.	ESC. TYPE	FINISH	TEMP.	QTY.
●	TYCO	TY-FRB	TY3231	QR	PEND	CHRM	1/2"	1/2"	5.6	155	RECESSED	CHRM	N/A	224
◎	TYCO	TY-FRB	TY3131	QR	UPR	CHRM	1/2"	1/2"	5.6	200	-	-	-	2
TOTAL SPRINKLERS THIS SHEET														226

REVISIONS

#	DATE	BY	DESCRIPTION
	9-28-2011	NRL	SUBMITTAL TO GENERAL CONTRACTOR

NORTH

AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. Phoenix, Arizona 85024
623.580.7800 Fax 623.434.3154
AZ-L16-234798 AZ-C16-234797 UT-8370-6690455-5501
CA-C16-901529 NV-C41-69370 NM-MS 12-354807

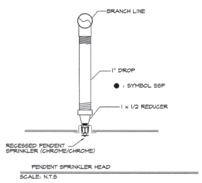
PROJECT: CAL POLY CENTER FOR SCIENCE
SAN LUIS OBISPO, CA.

CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

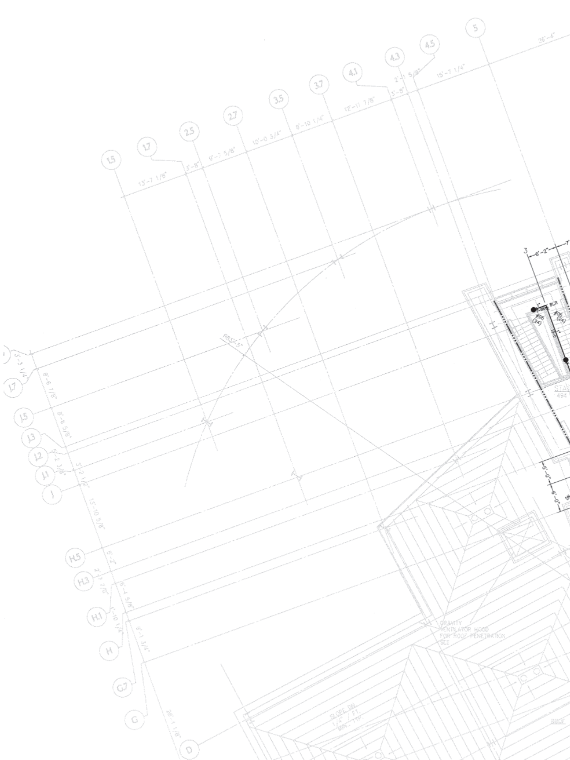
PLAN DESCRIPTION: FIRE SPRINKLER PLAN LEVEL 3 EAST

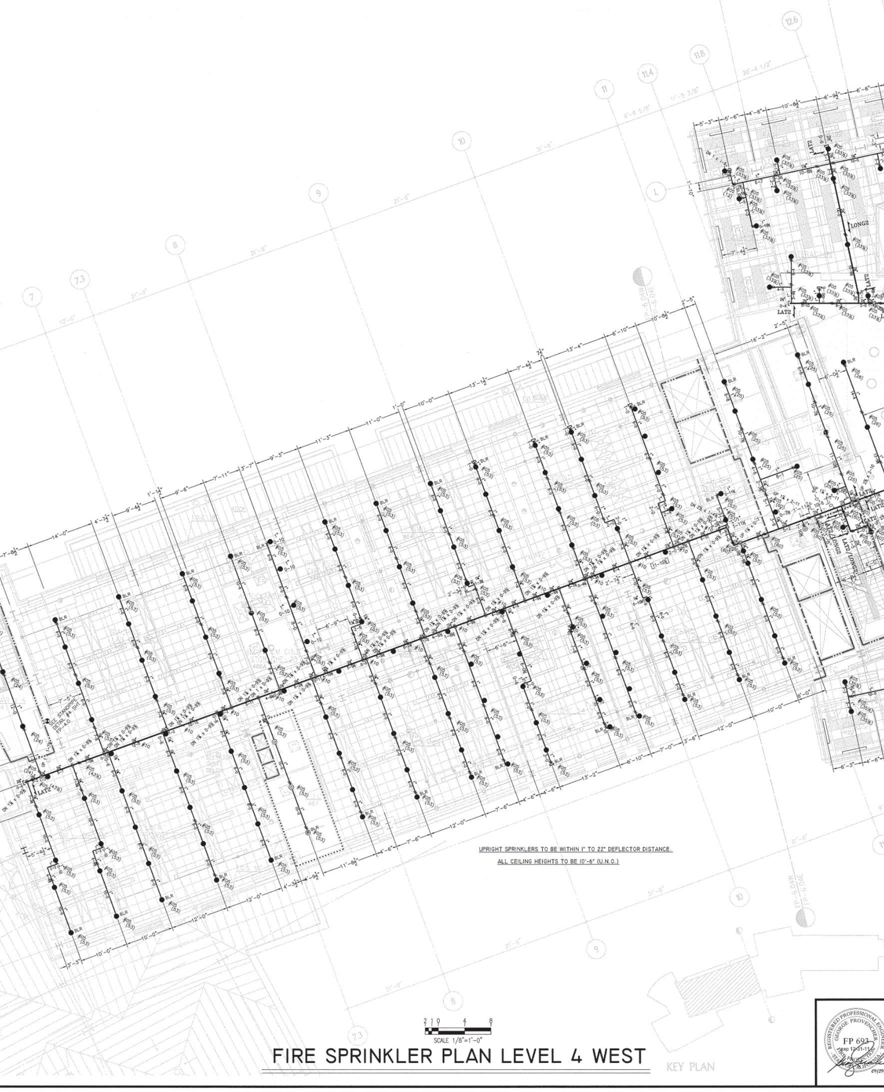
DRAWN BY:	NRL
SCALE:	1/8"=1'-0"
DATE:	8-15-2011
CONTRACT:	10034
SHEET:	FP-6.03E

REGISTERED PROFESSIONAL ENGINEER ... PROVENCHER FP 693 Exp. 12-31-11 FIRE PROTECTION STATE OF CALIFORNIA 09/29/11



PENDENT SPRINKLER HEAD
SCALE: N.T.S





FIRE SPRINKLER PLAN LEVEL 4 WEST

SPRINKLER HEAD LEGEND											ESCUTCHEON			
SYM.	MFG.	MODEL	SIN	RESP	STYLE	FINISH	N.P.T.	ORIFICE	K	TEMP.	ESC. TYPE	FINISH	TEMP.	QTY.
●	TYCO	TY-FRB	TY3231	QR	PEND	CHRM	1/2"	1/2"	5.6	155	RECESSED	CHRM	N/A	118
◎	TYCO	TY-FRB	TY3131	QR	UPR	BRASS	1/2"	1/2"	5.6	200	–	–	–	3
TOTAL SPRINKLERS THIS SHEET														121

REVISIONS

#	DATE	BY	DESCRIPTION
1	9-28-2011	NRL	SUBMITTAL TO GENERAL CONTRACTOR

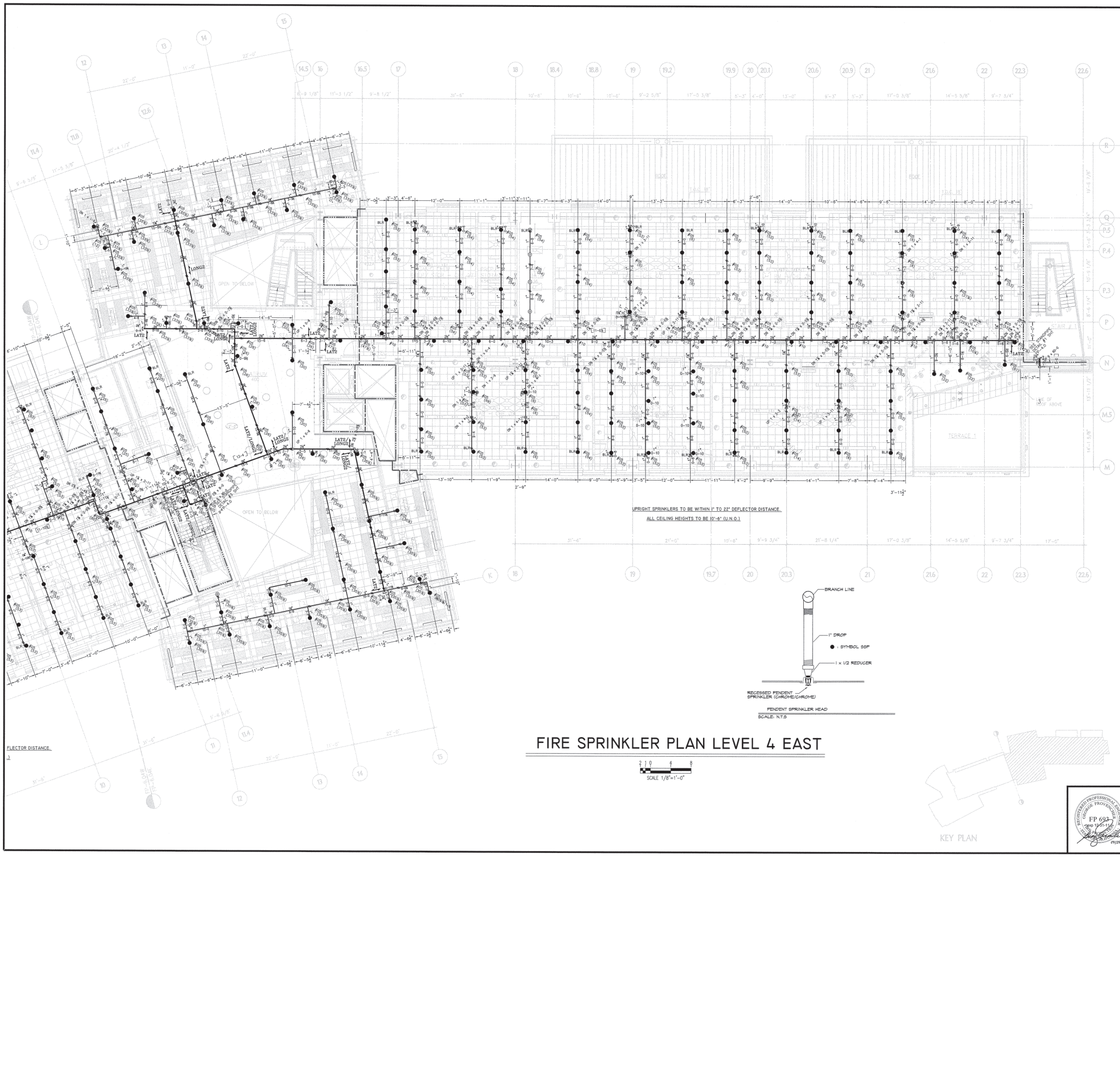
NORTH

AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. Phoenix, Arizona 85024
623.580.7800 Fax 623.434.3154
AZ-L16-234798 AZ-C16-234797 UT-9370-6690455-5501
CA-C16-901529 NV-C41-69370 NM-MS 12-354807

PROJECT: CAL POLY CENTER FOR SCIENCE
SAN LUIS OBISPO, CA.
CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122
PLAN DESCRIPTION: FIRE SPRINKLER PLAN LEVEL 4 WEST

REGISTERED PROFESSIONAL ENGINEER GEORGE PROVENCHER FP 693 exp 12-31-11 FIRE PROTECTION STATE OF CALIFORNIA 09/29/11

DRAWN BY:	NRL
SCALE:	1/8"=1'-0"
DATE:	8-15-2011
CONTRACT:	10034
SHEET:	FP-6.04W



FIRE SPRINKLER PLAN LEVEL 4 EAST

SCALE 1/8"=1'-0"

SPRINKLER HEAD LEGEND

SYM.	MFG.	MODEL	SIN	RESP	STYLE	FINISH	N.P.T.	ORIFICE	K	TEMP.	ESC. TYPE	ESC. FINISH	ESC. TEMP.	QTY.
●	TYCO	TY-FRB	TY3231	QR	PEND	CHRM	1/2"	1/2"	5.6	155	RECESSED	CHRM	N/A	189
◎	TYCO	TY-FRB	TY3131	QR	UPR	CHRM	1/2"	1/2"	5.6	200	–	–	–	5

TOTAL SPRINKLERS THIS SHEET 194

REVISIONS

#	DATE	BY	DESCRIPTION
1	9-28-2011	NRL	SUBMITTAL TO GENERAL CONTRACTOR

NORTH

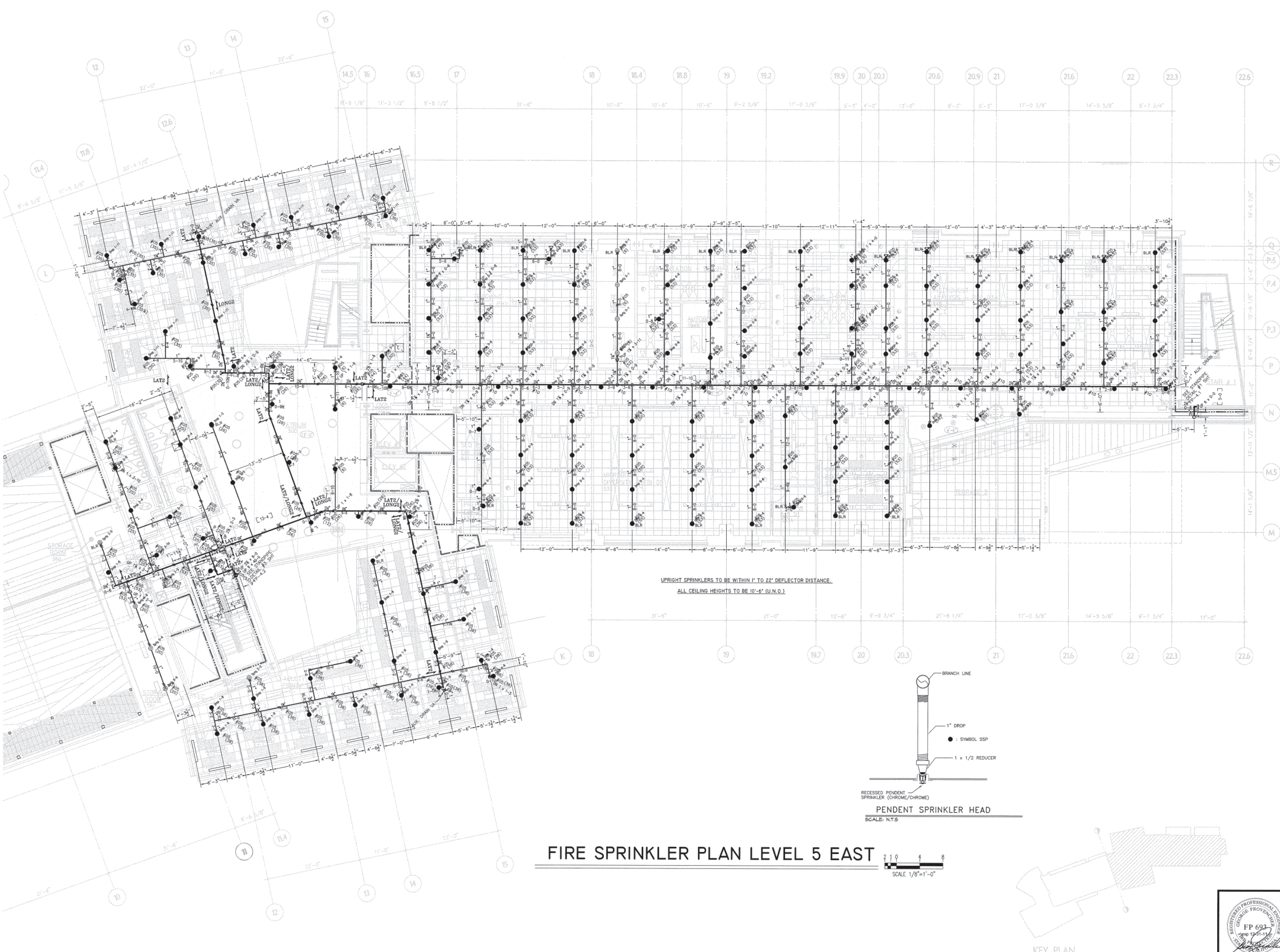
AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. Phoenix, Arizona 85024
623.580.7800 Fax 623.434.3154
AZ-L16-234798 AZ-C16-234797 UT-8370-6690455-5501
CA-C16-901529 NV-C41-69370 NM-MS 12-354807

PROJECT: CAL POLY CENTER FOR SCIENCE
SAN LUIS OBISPO, CA.

CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

PLAN DESCRIPTION: FIRE SPRINKLER PLAN LEVEL 4 EAST

DRAWN BY: NRL
SCALE: 1/8"=1'-0"
DATE: 8-15-2011
CONTRACT: 10034
SHEET: FP-6.04E



FIRE SPRINKLER PLAN LEVEL 5 EAST

SCALE 1/8"=1'-0"

SPRINKLER HEAD LEGEND

SYM.	MFG.	MODEL	SIN	RESP	STYLE	FINISH	N.P.T.	ORIFICE	K	TEMP.	ESC. TYPE	FINISH	TEMP.	QTY.
●	TYCO	TY-FRB	TY3231	QR	PEND	CHRM	1/2"	1/2"	5.6	155	RECESSED	CHRM	N/A	184
◎	TYCO	TY-FRB	TY3131	QR	UPR	CHRM	1/2"	1/2"	5.6	200	–	–	–	10

(ESCUTCHEON: ESC. TYPE, FINISH, TEMP.)

TOTAL SPRINKLERS THIS SHEET 194

REVISIONS

#	DATE	BY	DESCRIPTION
	9-28-2011	NRL	SUBMITTAL TO GENERAL CONTRACTOR

NORTH

AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. Phoenix, Arizona 85024
623.580.7800 Fax 623.434.3154
AZ-L16-2347798 AZ-C16-234797 UT-S370-6690455-5501
CA-C16-901529 NV-C41-69370 NM-MS 12-354807

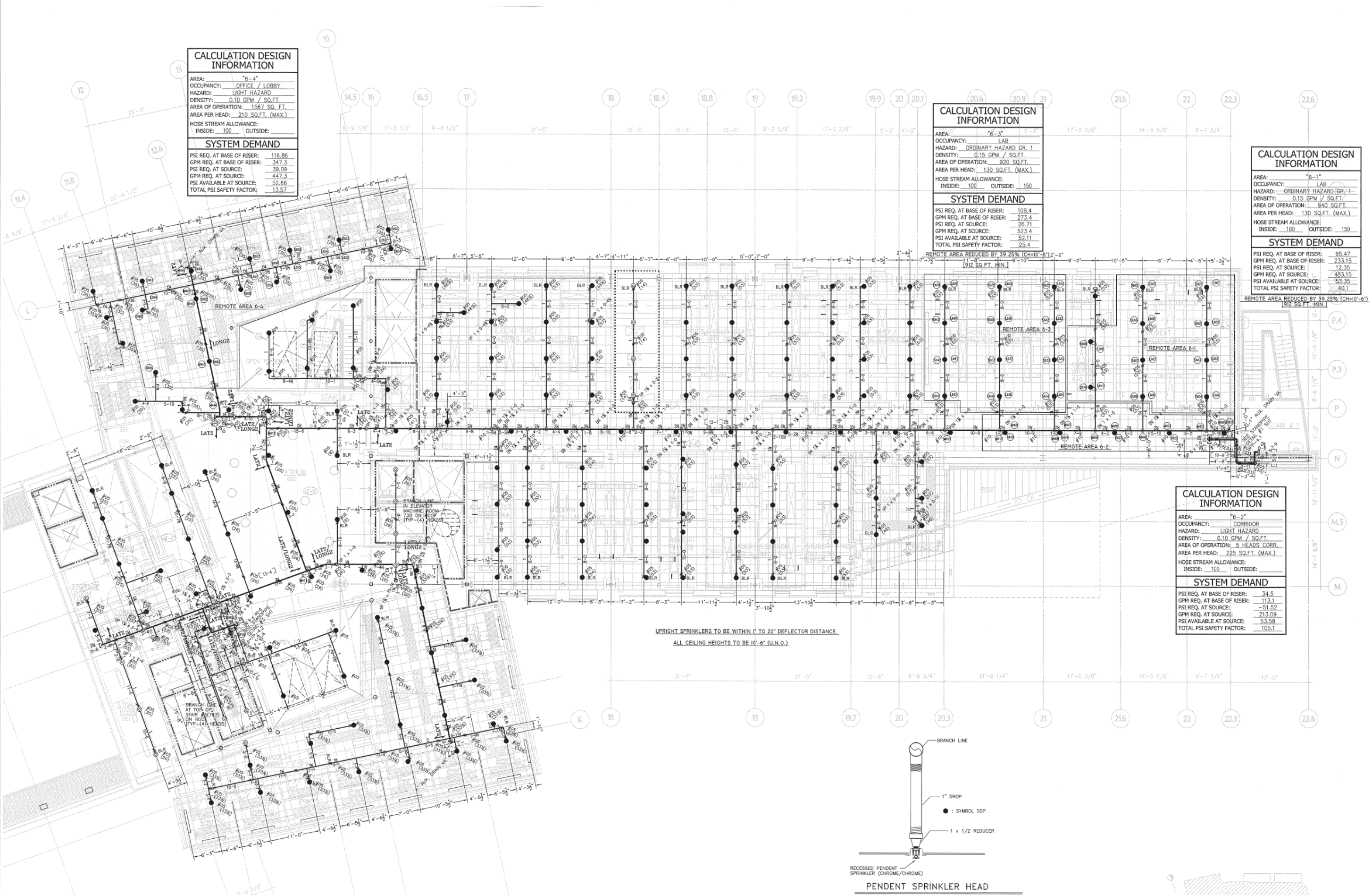
PROJECT: CAL POLY CENTER FOR SCIENCE
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
SAN LUIS OBISPO, CA.

CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

PLAN DESCRIPTION: FIRE SPRINKLER PLAN LEVEL 5 EAST

DRAWN BY: NRL
SCALE: 1/8"=1'-0"
DATE: 8-15-2011
CONTRACT: 10034
SHEET: FP-6.05E

FP 693
09/29/11



CALCULATION DESIGN INFORMATION

AREA:	"6-4"
OCCUPANCY:	OFFICE / LOBBY
HAZARD:	LIGHT HAZARD
DENSITY:	0.10 GPM / SQ.FT.
AREA OF OPERATION:	1567 SQ. FT.
AREA PER HEAD:	210 SQ.FT. (MAX.)
HOSE STREAM ALLOWANCE: INSIDE:	100
OUTSIDE:	

SYSTEM DEMAND

PSI REQ. AT BASE OF RISER:	116.86
GPM REQ. AT BASE OF RISER:	347.3
PSI REQ. AT SOURCE:	39.09
GPM REQ. AT SOURCE:	447.3
PSI AVAILABLE AT SOURCE:	52.66
TOTAL PSI SAFETY FACTOR:	13.57

CALCULATION DESIGN INFORMATION

AREA:	"6-3"
OCCUPANCY:	LAB
HAZARD:	ORDINARY HAZARD GR. 1
DENSITY:	0.15 GPM / SQ.FT.
AREA OF OPERATION:	920 SQ.FT.
AREA PER HEAD:	130 SQ.FT. (MAX.)
HOSE STREAM ALLOWANCE: INSIDE:	100
OUTSIDE:	150

SYSTEM DEMAND

PSI REQ. AT BASE OF RISER:	108.4
GPM REQ. AT BASE OF RISER:	273.4
PSI REQ. AT SOURCE:	26.71
GPM REQ. AT SOURCE:	523.4
PSI AVAILABLE AT SOURCE:	52.11
TOTAL PSI SAFETY FACTOR:	25.4

CALCULATION DESIGN INFORMATION

AREA:	"6-1"
OCCUPANCY:	LAB
HAZARD:	ORDINARY HAZARD GR. 1
DENSITY:	0.15 GPM / SQ.FT.
AREA OF OPERATION:	940 SQ.FT.
AREA PER HEAD:	130 SQ.FT. (MAX.)
HOSE STREAM ALLOWANCE: INSIDE:	100
OUTSIDE:	150

SYSTEM DEMAND

PSI REQ. AT BASE OF RISER:	95.47
GPM REQ. AT BASE OF RISER:	233.15
PSI REQ. AT SOURCE:	12.35
GPM REQ. AT SOURCE:	483.15
PSI AVAILABLE AT SOURCE:	53.35
TOTAL PSI SAFETY FACTOR:	40.1

CALCULATION DESIGN INFORMATION

AREA:	"6-2"
OCCUPANCY:	CORRIDOR
HAZARD:	LIGHT HAZARD
DENSITY:	0.10 GPM / SQ.FT.
AREA OF OPERATION:	5 HEADS CORR.
AREA PER HEAD:	225 SQ.FT. (MAX.)
HOSE STREAM ALLOWANCE: INSIDE:	100
OUTSIDE:	

SYSTEM DEMAND

PSI REQ. AT BASE OF RISER:	34.5
GPM REQ. AT BASE OF RISER:	113.1
PSI REQ. AT SOURCE:	-51.52
GPM REQ. AT SOURCE:	213.09
PSI AVAILABLE AT SOURCE:	53.58
TOTAL PSI SAFETY FACTOR:	105.1

UPRIGHT SPRINKLERS TO BE WITHIN 1" TO 22" DEFLECTOR DISTANCE

ALL CEILING HEIGHTS TO BE 10'-6" (U.N.O.)

PENDENT SPRINKLER HEAD

SCALE: N.T.S

FIRE SPRINKLER PLAN LEVEL 6 EAST

SCALE 1/8"=1'-0"

KEY PLAN

SPRINKLER HEAD LEGEND

SYM.	MFG.	MODEL	SIN	RESP	STYLE	FINISH	N.P.T.	ORIFICE	K	TEMP.	ESC. TYPE	ESC. FINISH	ESC. TEMP.	QTY.
●	TYCO	TY-FRB	TY3231	QR	PEND	CHRM	1/2"	1/2"	5.6	155	RECESSED	CHRM	N/A	193
◎	TYCO	TY-FRB	TY3131	QR	UPR	CHRM	1/2"	1/2"	5.6	200	N/A	N/A	N/A	20

TOTAL SPRINKLERS THIS SHEET 213

REVISIONS

#	DATE	BY	DESCRIPTION
	9-28-2011	NRL	SUBMITTAL TO GENERAL CONTRACTOR

NORTH

AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. Phoenix, Arizona 85024
623.580.7800 Fax 623.434.3154
AZ-L16-234798 AZ-C16-234797 UT-S370-6690455-5501
CA-C16-901529 NV-C41-69370 NM-MS 12-354807

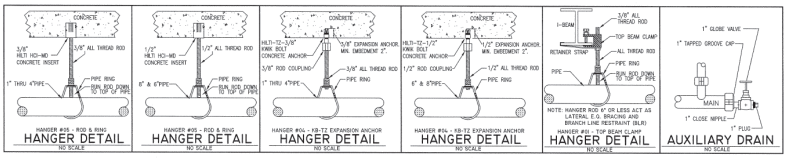
PROJECT: CAL POLY CENTER FOR SCIENCE
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
SAN LUIS OBISPO, CA.

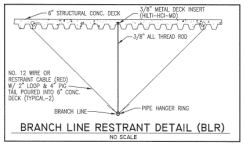
CONTRACT WITH: GILBANE CONSTRUCTION
6265 GREENWICH DRIVE, SUITE 103
SAN DIEGO, CA. 92122

PLAN DESCRIPTION: FIRE SPRINKLER PLAN LEVEL 6 EAST

DRAWN BY:	----
SCALE:	1/8"=1'-0"
DATE:	8-15-2011
CONTRACT:	10034
SHEET:	FP-6.06E

REGISTERED PROFESSIONAL ENGINEER PROVENCHER FP 693 12-31-11 FIRE PROTECTION STATE OF CALIFORNIA
09/29/11





Tol-Brace Seismic Calculations

Project Address: Cal Poly Center for Science, California Polytechnic State University, San Luis Obispo, Ca. Job # 10034

Aero Automatic Sprinkler C. 21605 N. Central Ave, Phoenix, Az. 85024 (623)580-7847 CA-C16-901529

Calculations based on 2007 NFPA Pamphlet #13

Brace Information

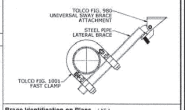
Maximum Spacing	40' 0" (12.19 m)
Maximum Brace Length	7' 0" (2.14 m)
Bracing Material	1" Sch.40
Angle from Vertical	30° Min.
Least Rad. of Gyration	0.421" (11 mm)
L/R Value	200
Max Horizontal Load	1227 lbs (557 kg)
Force Factor (Cp)	0.61

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1101 Clamp	1007 lbs (457 kg)
Fig.960 Universal Swivel	1382 lbs (627 kg)

*Calculation Based on CONCENTRIC Loading
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the rating of the assembly.

Assembly Detail



Fastener Information

Fastener Orientation	NPPA Type A
Type	HILTI-TZ
Diameter	1/2
Length	3 3/4
Maximum Load	1412 lbs (640 kg)

Brace Identification on Plans: LAT 1
Orientation of Brace: Lateral

Load Information

Braced Pipe: 6" Sch.40 Steel Pipe

Size and Type of Pipe	Total Length	Total Calculated Load
6" Sch.40 Steel Pipe (152.4 mm)	40ft (12.2 m)	773 lbs (351 kg)
Percentage added for Fittings and Sprinklers	15%	116 lbs (52.62 kg)
Total Adjusted Load of all pipe within Zone of Influence		889 lbs (403 kg)

(Tol-Brace Version 7)

Tol-Brace Seismic Calculations

Project Address: Cal Poly Center for Science, California Polytechnic State University, San Luis Obispo, Ca. Job # 10034

Aero Automatic Sprinkler C. 21605 N. Central Ave, Phoenix, Az. 85024 (623)580-7847 CA-C16-901529

Calculations based on 2007 NFPA Pamphlet #13

Brace Information

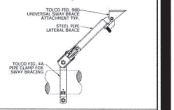
Maximum Spacing	45' 0" (13.72 m)
Maximum Brace Length	7' 0" (2.14 m)
Bracing Material	1" Sch.40
Angle from Vertical	30° Min.
Least Rad. of Gyration	0.421" (11 mm)
L/R Value	200
Max Horizontal Load	1227 lbs (557 kg)
Force Factor (Cp)	0.61

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4A Clamp	1007 lbs (457 kg)
Fig.960 Universal Swivel	1382 lbs (627 kg)

*Calculation Based on CONCENTRIC Loading
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the rating of the assembly.

Assembly Detail



Fastener Information

Fastener Orientation	NPPA Type A
Type	HILTI-TZ
Diameter	1/2
Length	3 3/4
Maximum Load	1412 lbs (640 kg)

Brace Identification on Plans: LONG 1
Orientation of Brace: Longitudinal

Load Information

Braced Pipe: 6" Sch.40 Steel Pipe

Size and Type of Pipe	Total Length	Total Calculated Load
6" Sch.40 Steel Pipe (152.4 mm)	40ft (12.2 m)	372 lbs (395 kg)
Percentage added for Fittings and Sprinklers	15%	132 lbs (59.87 kg)
Total Adjusted Load of all pipe within Zone of Influence		1003 lbs (454 kg)

(Tol-Brace Version 7)

Tol-Brace Seismic Calculations

Project Address: Cal Poly Center for Science, California Polytechnic State University, San Luis Obispo, Ca. Job # 10034

Aero Automatic Sprinkler C. 21605 N. Central Ave, Phoenix, Az. 85024 (623)580-7847 CA-C16-901529

Calculations based on 2007 NFPA Pamphlet #13

Brace Information

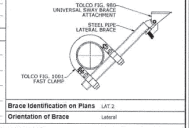
Maximum Spacing	35' 0" (10.67 m)
Maximum Brace Length	7' 0" (2.14 m)
Bracing Material	1" Sch.40
Angle from Vertical	30° Min.
Least Rad. of Gyration	0.421" (11 mm)
L/R Value	200
Max Horizontal Load	1227 lbs (557 kg)
Force Factor (Cp)	0.61

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1101 Clamp	1007 lbs (457 kg)
Fig.960 Universal Swivel	1382 lbs (627 kg)

*Calculation Based on CONCENTRIC Loading
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the rating of the assembly.

Assembly Detail



Fastener Information

Fastener Orientation	NPPA Type A
Type	HILTI-TZ
Diameter	1/2
Length	3 3/4
Maximum Load	1412 lbs (640 kg)

Brace Identification on Plans: LAT 2
Orientation of Brace: Lateral

Load Information

Braced Pipe: 3" Sch.10 Steel Pipe

Size and Type of Pipe	Total Length	Total Calculated Load
3" Sch.10 Steel Pipe (76.2 mm)	35ft (10.7 m)	170 lbs (77 kg)
1.5" Sch.40 Steel Pipe (38.1 mm)	10ft (3 m)	22 lbs (10 kg)
1.25" Sch.40 Steel Pipe (31.75 mm)	31ft (9.4 m)	65 lbs (29 kg)
1" Sch.40 Steel Pipe (25.4 mm)	140ft (42.7 m)	175 lbs (79 kg)
Percentage added for Fittings and Sprinklers	15%	43 lbs (20.58 kg)
Total Adjusted Load of all pipe within Zone of Influence		455 lbs (220 kg)

(Tol-Brace Version 7)

Tol-Brace Seismic Calculations

Project Address: Cal Poly Center for Science, California Polytechnic State University, San Luis Obispo, Ca. Job # 10034

Aero Automatic Sprinkler C. 21605 N. Central Ave, Phoenix, Az. 85024 (623)580-7847 CA-C16-901529

Calculations based on 2007 NFPA Pamphlet #13

Brace Information

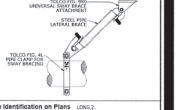
Maximum Spacing	80' 0" (24.38 m)
Maximum Brace Length	7' 0" (2.14 m)
Bracing Material	1" Sch.40
Angle from Vertical	30° Min.
Least Rad. of Gyration	0.421" (11 mm)
L/R Value	200
Max Horizontal Load	1227 lbs (557 kg)
Force Factor (Cp)	0.61

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4L Clamp	1007 lbs (457 kg)
Fig.960 Universal Swivel	1382 lbs (627 kg)

*Calculation Based on CONCENTRIC Loading
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the rating of the assembly.

Assembly Detail



Fastener Information

Fastener Orientation	NPPA Type A
Type	HILTI-TZ
Diameter	1/2
Length	3 3/4
Maximum Load	1412 lbs (640 kg)

Brace Identification on Plans: LONG 2
Orientation of Brace: Longitudinal

Load Information

Braced Pipe: 3" Sch.10 Steel Pipe

Size and Type of Pipe	Total Length	Total Calculated Load
3" Sch.10 Steel Pipe (76.2 mm)	80ft (24.4 m)	307 lbs (170 kg)
Percentage added for Fittings and Sprinklers	15%	69 lbs (26.31 kg)
Total Adjusted Load of all pipe within Zone of Influence		446 lbs (202 kg)

(Tol-Brace Version 7)

SPRINKLER PIPE HANGER SPACING
N.F.P.A. 13, 2007 EDITION

TABLE 9.2.2.1 MAXIMUM DISTANCE BETWEEN HANGERS (FT-IN.)

NOMINAL PIPE SIZE	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3" & 4"	6"	8"
STEEL PIPE	N/A	12-0	12-0	15-0	15-0	15-0	15-0	15-0	15-0
THREADED LIGHTWALL	N/A	12-0	12-0	12-0	12-0			N/A	N/A
COPPER TUBE									
CPVC	5-6	6-0	6-6	7-0	8-0	9-0	N/A	N/A	N/A

FIGURE A-9.2.3.4 DISTANCE FROM SPRINKLER TO HANGER

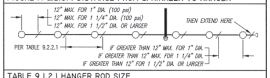


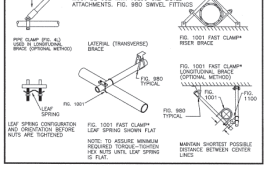
TABLE 9.1.2.1 HANGER ROD SIZE

PIPE SIZE	DIAMETER OF ROD	PIPE SIZE	DIAMETER OF ROD
UP TO AND INCLUDING 4"	3/8"	6" AND 8"	1/2"

THE CUMULATIVE HORIZONTAL LENGTH OF AN UNSUPPORTED ARMOVER TO A SPRINKLER, SPRINKLER DROP, OR SPRIG-UP SHALL NOT EXCEED 12 IN. FOR STEEL OR 6 IN. FOR COPPER TUBE. (PRESSURE EXCEEDS 100 psi)

SWAY BRACING

SWAY BRACE COMPONENTS



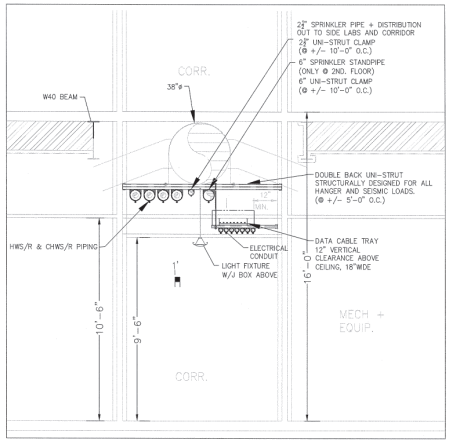
NOTES

1. LAT 1 TO BE USED FOR LATERAL SWAY BRACING OF SPRINKLER SYSTEM 6" MAINS. MAX SPACING 40'-0".
2. LAT 2 TO BE USED FOR LATERAL SWAY BRACING OF SPRINKLER SYSTEM 3" OR 2 1/2" MAINS WITH BRANCH LINES. MAX SPACING 35'-0".
3. LONG 1 TO BE USED FOR LONGITUDINAL SWAY BRACING OF SPRINKLER SYSTEM 6" MAINS. MAX SPACING 45'-0".
4. LONG 2 TO BE USED FOR LONGITUDINAL SWAY BRACING OF SPRINKLER SYSTEM 3" OR 2 1/2" MAINS. MAX SPACING 80'-0".

SEISMIC CRITERIA

SEISMIC DESIGN CATEGORY: D
SEISMIC IMP. FACTOR: 1.0
SITE SOIL PROFILE TYPE: B
SPECTRAL RESPONSE ACCELERATIONS:
Ss = 1.26*
S1 = 0.491*
SEISMIC COEFFICIENT:
Cp = 0.61**

*Ss & S1 VALUES TAKEN FROM STRUCTURAL DRAWING S 1.01 - DATED 10-23-2009
** VALUE INTERPOLATED FROM TABLE 9.3.5.6.2 OF N.F.P.A.

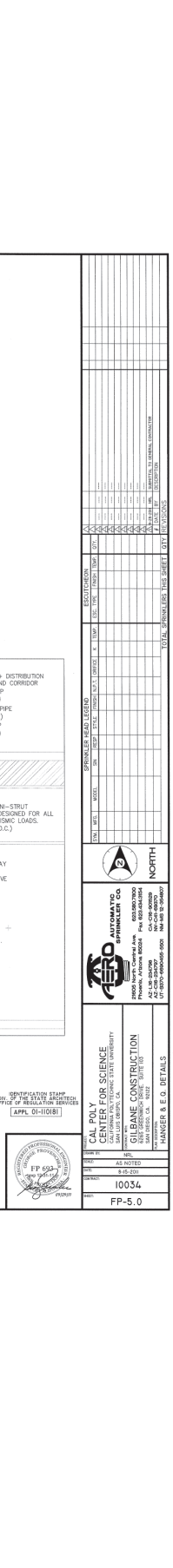


HANGER DETAIL # 10
SCALE 1/2"=1'-0"

WEIGHT OF WATER FILLED PIPE [LB./FT.]

		NOMINAL SIZE	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
THREADED OR GROOVED PIPE	SCHEDULE 40	I.D.	2.05	2.93	3.61	5.13	7.89	10.82	16.40	31.69	47.70
GROOVED PIPE	SCHEDULE 10	I.D.	NOT USED	NOT USED	NOT USED	4.22	5.89	7.94	11.78	23.03	40.08

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
OFFICE OF REGULATION SERVICES
APPL 01-110181



Field Adjustable Pressure Reducing (URFA)

Elkhart's URFA valve is a true pressure reducing valve, operated automatically by inner hydraulic controls. While the valves are preset at the factory, they are field adjustable — allowing you to tailor the pressure to your needs. They feature manual valve open and close, as well as pressure adjustment — all of which require extremely low torque to change due to the patent pending design. Inlet pressure up to 400 psi (27.58 bar) is controlled under all flow and no-flow conditions.

Valve size and weight permit installation in significantly tighter areas and smaller hose cabinets (those used for 1½" or 2½" valves) — allowing savings of both space and money. The URFA also functions as a floor control valve in automatic sprinkler systems as well as a standpipe valve or hose valve for Class I and Class III systems.

INLET SIZE	OUTLET SIZES		TYPE		CERT.	DIMENSIONS (INCHES)								Integral Superv. Switch	FINISH			Wt. (Lbs.)	MODEL	FIGURE
2½" F NPT*	2½"		Angled	Straight	UL Listed	Closed		Open		C	D	E	F		Brass		Chrome			
	F (NPT)*	M(NHT)				A	B	A	B						Cast	Pol	Pol			
~~•~~	~~•~~		~~•~~		~~•~~	~~13⅜~~	~~11⅝~~	~~14¼~~	~~12¼~~	~~2⅝~~	~~3¼~~	~~5~~	~~4¼~~	o	s	o	o	~~18½~~	~~URFA-20-2.5~~	~~1~~
•		•	•		•	13⅜	11⅝	14¼	12¼	2⅝	3⅜	5	4¼	o	s	o	o	18½	URFA-25-2.5	2
•	•			•	•	14½	11 29/32	15⅛	12¼	3½	4	5	4¼	o	s	o	o	26½	URFA-20S-2.5	3

KEY s = standard o = option
* Grooved connection available for inlet or outlet use — add 1.44" per connection.

Figure 1

URFA-20-2.5

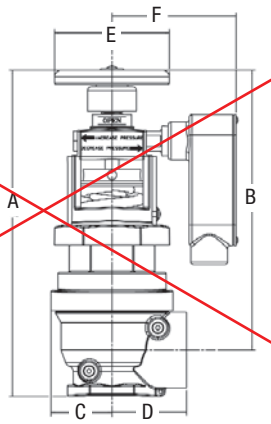


Fig. 1

Figure 2

URFA-25-2.5

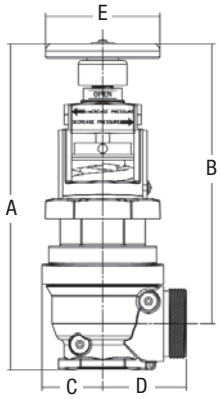


Fig. 2

Figure 3

URFA-20S-2.5

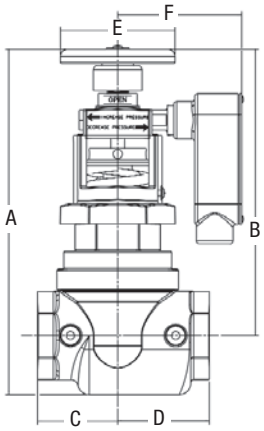


Fig. 3

PRODUCT HIGHLIGHTS

URFA features include:

- Manual open-close requires less than 15 lbs. of torque
- Pressure rated up to 400 psi (27.58 bar)
- Flow rated up to 500 gpm (1893 lpm)
- Open-Close indication from 2 view directions
- Color-coded pressure reduction label
- Tapped for pressure gauge on both inlet and outlet side of valve
- Tamper-resistant protection
- UL Listed as a check valve for use in dual riser systems
- Optional integral supervisory switch (alarm) mounts directly to valve with no bracket required
- Optional integral supervisory switch (alarm) is available either "OPEN TO SIGNAL" or "CLOSE TO SIGNAL"
  - With the valve in the open position, to close an electrical circuit and send the signal is defined as "OPEN TO SIGNAL"
  - With the valve in the closed position, to close an electrical circuit and send a signal is defined as "CLOSE TO SIGNAL"

ADDITIONAL INFORMATION

Includes adjustment rod.

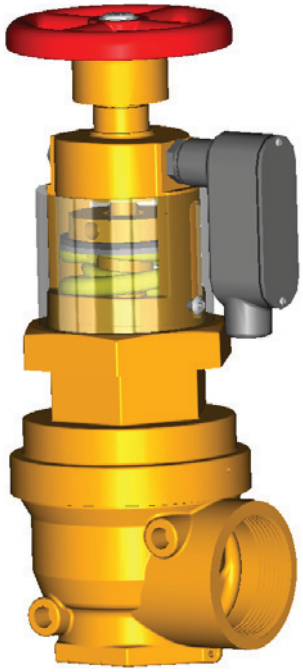
THREADS

- *Valve inlet information is NPT unless otherwise specified. Special threads available through adapter use.*
- *See index T-12 for alternative outlet thread options.*

Elkhart Brass
Fire Fighting Equipment

URFA –20S-2.5”
URFA-20-2.5”
URFA-25-2.5”

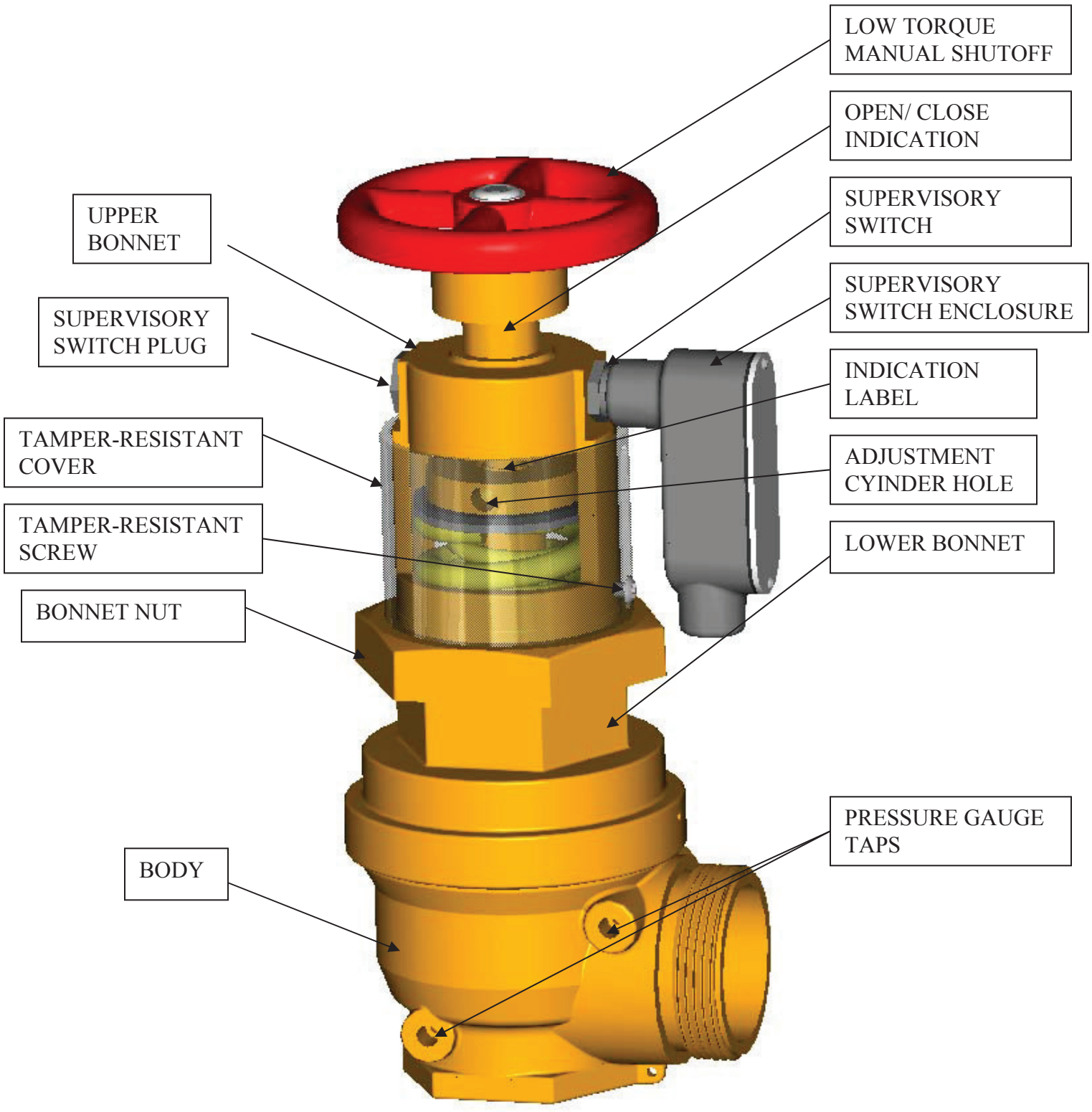
INSTALLATION AND OPERATING INSTRUCTIONS FOR FIELD ADJUSTABLE PRESSURE REDUCING/ CONTROLLING VALVES



(URFA-20-2.5 MODEL SHOWN)

98042000 Rev-C

URFA VALVE MAJOR COMPONENTS



SPECIFICATIONS

- Pressure rated up to 400 psi.
- Flow rated up to 500 GPM
- Open-Close indication from 2 view directions
- Pressure reduction can be field adjusted
- Pressure reduction adjustment can be easily determined by indication label
- Pressure reduction adjustment has tamper resistant feature
- Low-torque manual close handwheel
- Built-in automatic check valve
- Regulates pressure under both flow and no-flow conditions
- Tapped for pressure gauge on both inlet and outlet side of valve
- Optional integral supervisory switch (For Indoor Use Only)

INLET – OUTLET CONNECTIONS

VALVE MODEL	INLET THREAD	OUTLET THREAD
~~URFA-20-2.5~~	~~2-1/2" FEMALE NPT~~	~~2-1/2" FEMALE NPT~~
URFA-20S-2.5	2-1/2" FEMALE NPT	2-1/2" FEMALE NPT
URFA-25-2.5	2-1/2" FEMALE NPT	2-1/2" MALE HOSE

APPLICATION

A. AUTOMATIC SPRINKLER SYSTEMS

The models URFA-20S-2.5 and URFA-20-2.5 valves are most commonly used in automatic sprinkler systems as floor control valves in high-rise buildings where supply riser pressures exceed 175 psi. The URFA valves are Listed by Underwriters Laboratories as "Special System Water Control Valves – Pressure Reducing and Pressure Control Type (VLMT)", and also meet the listing requirements for indicating valves. Installation requirements for pressure reducing valves in automatic sprinkler systems are given in Section 4-6.1.2 of NFPA 13, Standard for the installation of Sprinkler Systems, 1999 Edition. When designing URFA pressure reducing valves into a sprinkler system a maximum flow rate of 400 GPM should be observed.

URFA Pressure Reducing Valves are also listed as checking devices, which eliminates the need for a separate check valve. When sprinklers on a given floor are fed from dual risers, the URFA valve acts as a check valve to prevent loss of sprinkler water supply in the event of one riser sustaining damage.

Requirements for Alarm Attachments are given in Section 5-15.1.6 of NFPA 13, Standard for the installation of Sprinkler Systems, 1999 Edition. An integral, listed supervisory alarm switch is available on URFA pressure reducing valves as option number "01" when ordering.

B. STANDPIPE SYSTEM

The models URFA-25-2.5 and URFA-20-2.5 valves are most commonly used in standpipe systems. The URFA-25-2.5 valves have a male hose thread outlet for connecting to fire suppression hose. When hose racks are used, the URFA-20-2.5 can be utilized along with a special hose nipple for support of the rack. The URFA valves are Listed by Underwriters Laboratories as Standpipe Equipment Pressure Reducing Devices (VUTX). Requirements for installation of pressure reducing valves in standpipe systems are given in Section 5-8 of NFPA-14, Standard for the Installation of Standpipe Hose Systems, 1993 Edition.

INSTALLATION REQUIREMENTS

A. AUTOMATIC SPRINKLER SYSTEM

1. To permit easy replacement or repair of valve, pipe unions or rubber gasket mechanical couplings should be installed immediately upstream or downstream of each URFA valve.
2. A relief valve of not less then ½ inch size is to be installed on the downstream side of each URFA valve
3. Pressure gauges are to be installed on the inlet and outlet side of each pressure-reducing valve
4. Valve adjustment setting should be selected to provide an outlet pressure not exceeding 165 psi at the maximum inlet pressure
5. Upon system completion, each Valve must be tested under both flow and no-flow conditions to verify that static residual outlet pressures and flow rates satisfy system design requirements. See Section 8-2.5 NFPA 13 for more information on mandatory flow and no-flow test requirements.

B. STANDPIPE SYSTEM

1. The URFA-25-2.5 can be used for both Class I and Class III service.
2. NFPA 14 requires that hose valve outlet pressures for Class I and Class III service be no greater then 175 psi. and no less then 100 psi. When permitted by the authority having jurisdiction, pressures less then 100 psi may be allowed, but in no cases shall the valve discharge pressure be less then 65 psi
3. Upon system completion, each valve must be tested under both flow and no-flow conditions to verify that static and residual outlet pressures and flow rates satisfy system design requirements. See Section 8-5.5 of NFPA 14 for more information on required flow and no-flow testing.

CONSTRUCTION & OPERATING PRINCIPLE

The URFA is a field adjustable pressure-reducing valve, which utilizes a hydraulic piston and cylinder assembly within the valve lower bonnet to allow the valve to self-throttle in response

to the pressure on the downstream side of the valve. Because the piston, main stem and valve seat float freely from the manual valve stem and handwheel assembly, the valve is able to self-close under static conditions and maintains a reduced pressure both under no-flow and flowing conditions Valve discharge pressure is transmitted to the top side of the piston through pressure passages in the main stem. The presence of the piston results in a net area differential, which produces a hydraulic balancing force in the closed direction. The magnitude of this balancing force is in direct proportion to the hydraulic area of the piston.

The Field Adjustable feature of the valve is controlled by a spring within the valve upper bonnet. The spring adds an opening force to the main stem so that pressure reduction may be changed as the spring force is changed. This feature allows for the valve to satisfy all expected inlet/outlet pressure ratios. The Field Adjustable feature allows for one type of valve to be specified for all locations in a structure. Once installed the valves can be adjusted to the correct pressure reduction ratio based on their locations.

The URFA valves feature a patent pending manual close design that allows for extremely low torque of the handwheel while manually opening and closing the valve. The unique design allows for the for independent operation of the valve stem from the manual close push-rod; this allows for the operator to bypass the large torque required to overcome the stiffness of the adjustment spring.

INSTALLATION OF VALVE

- The valve should first be plumbed into the system
- The upper bonnet may be rotated for optimized access to adjustment window
    - Loosen Bonnet Nut
    - Rotate Upper Bonnet to desired location of adjustment window
    - Apply service removable thread lock to the Bonnet Nut threads
    - Tighten the Bonnet Nut firmly
- See wire diagram for proper installation of supervisory switch
- The system should be slowly filled with water and purged of air
- The system should then be flushed to remove any debris

VALVE SETTING SELECTION

The URFA valves have settings of A, B, C, D, and E. Each valve setting corresponds to a pressure reduction graph located at the end of this manual. The valve setting is determined by where the top of the adjustment cylinder lines up on the Adjustment Identification Label located on the main stem (refer to Figure 1). To determine the correct setting for each URFA valve in the system design please use the following step.

1. Determine the standpipe or sprinkler riser residual pressure for each valve location. This is the inlet pressure at each valve under design flow conditions. In order to accurately determine these pressures, complete water supply data will be required, including results of municipal supply, flow test, and the pump performance curve. The URFA inlet pressure will be equal to the sum of the pump discharge pressure and the

municipal supply pressure at the design flow rate, less piping friction loss and elevation loss.

2. Turn to the appropriate valve performance chart. The valve model and flow range for each graph is indicated in the title at the top of the graph. Be sure to use the correct graph for the designed flow rate through the valve.
3. Locate the valve inlet residual pressure on the vertical axis of the chart and draw a line from the pressure horizontally across the chart.
4. Locate the desired valve outlet residual pressure on the chart horizontal axis and draw a vertical line from this pressure across the chart
5. From the intersection of the inlet and outlet pressure lines constructed in (3) and (4) above, move horizontally to the nearest valve performance curve (actually straight diagonal lines). This will be the appropriate valve setting for the chosen location.
6. Determine the valve static inlet pressure. This will be the sum of the municipal supply static pressure plus the pump churn pressure, less the elevation loss.
7. To determine the valve static outlet pressure, refer to the appropriate static chart. Locate the valve static inlet pressure on the vertical axis of the chart. Follow across to the appropriate valve curve and drop down to the horizontal axis to read valve outlet static pressure.
8. If static outlet pressure is found to exceed the maximum outlet pressure allowed by NFPA 13 or NPFA 14, it will be necessary to re-select a valve setting to the left of the originally chosen type.

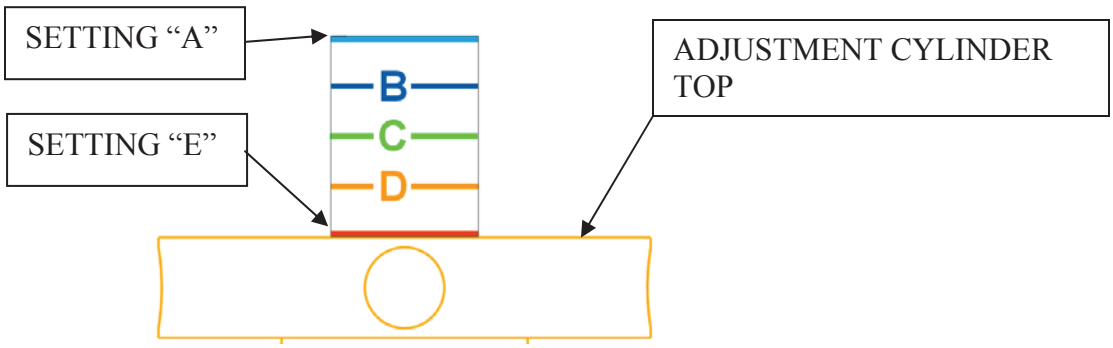


Figure - 1

SETTING PRESSURE REDUCTION

1. Remove the tamper-resistant screw from the clear cover by means of tamper-resistant Allen wrench provided with valve.
2. Insert adjustment tool provided with valve through the slot in the clear cover into the hole in the adjustment cylinder.
3. Rotate adjustment cylinder until the top of the adjustment cylinder is aligned with desired mark on the Indication Label (refer to Figure 1).
4. Once rotation limit is reached during adjustment remove the adjustment tool from the adjustment cylinder hole and re-insert the adjustment tool into the next available hole.

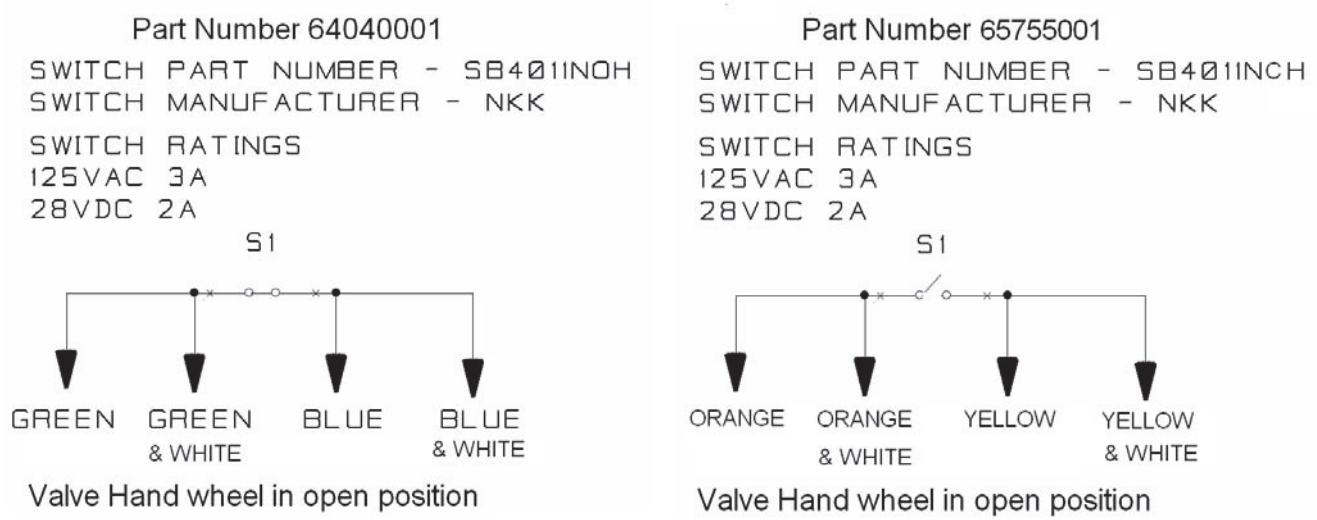
5. Once the proper adjustment is obtained verify the outlet pressure is correct with pressure gauges both upstream and downstream of the valve during both flow and no-flow pressure testing; make adjustments as needed. See Section 8-2.5 of NFPA 13 for more details on required flow and no-flow testing.
6. Once the valve is properly adjusted replace the tamper-resistant screw that was removed in step 2.
7. A tamper-resistant allen wrench and adjustment tool should be stored in a special location for Fire Department use.

NOTE: Rotating the adjustment cylinder clockwise will increase outlet pressure. Conversely, rotating the adjustment cylinder counter-clockwise will decrease outlet pressure.

SUPERVISORY SWITCH

Pressure reducing/ controlling valves that are to be used as part of a sprinkler system should include a supervisory switch to signal when a valve is not manually in the fully opened position (refer to NFPA 13 for more details on supervisory requirements). An optional supervisory switch assembly with UL approval for use with URFA valves is available on all models. The supervisory switch may be mounted to either side of the upper bonnet in the ¾ inch tapped holes provided. A cap plug is secured in the upper bonnet tapped holes when the supervisory switch is not installed. A UL Listed conduit elbow is utilized as a water-resistant enclosure for the electronic switch. The conduit elbow provides an opening for fastening conduit to the enclosure, and a lid may be removed to gain access for wiring connections. The lid is attached with two pin-in-hex security screws. A key is provided for installation access into the conduit enclosure. Two switch options are available for the supervisory switch assembly. The first, part number 64040001, will provide a closed circuit when the valve hand wheel is in the full open position. The second option, part number 65755001, will provide an open circuit when the valve hand wheel is in the full open position. Please specify the required switch configuration when ordering. Figure 2 describes wiring details. The two switch options have different colored leads for easy identification. Part number 64040001, the closed circuit switch, has blue and green wire leads. Part number 65755001, the open circuit switch, has yellow and orange wire leads. The solid colored wires act as a primary wiring configuration and the striped wires act as a secondary or back up wiring configuration.

Figure - 2



Note: Supervisory switch rated for Indoor Use Only.

The supervisory switch enclosure may be positioned with the conduit enclosure at various angles so to better meet space requirements (see Figure 3). To reposition the conduit enclosure angle, hold rotation on the hex adaptor fastened to the upper bonnet with the use of an open box wrench. While insuring the hex adaptor remains fully threaded against the upper bonnet, position the conduit enclosure to the desired angle. When completed the hex adaptor MUST be fully threaded against the upper bonnet to insure proper function. If the hex adaptor becomes unthreaded the supervisory switch will send an opened signal. Also ensure that the manual handwheel may be fully closed without interference from the supervisory switch assembly.

Figure - 3

VALVE CARE & MAINTENANCE

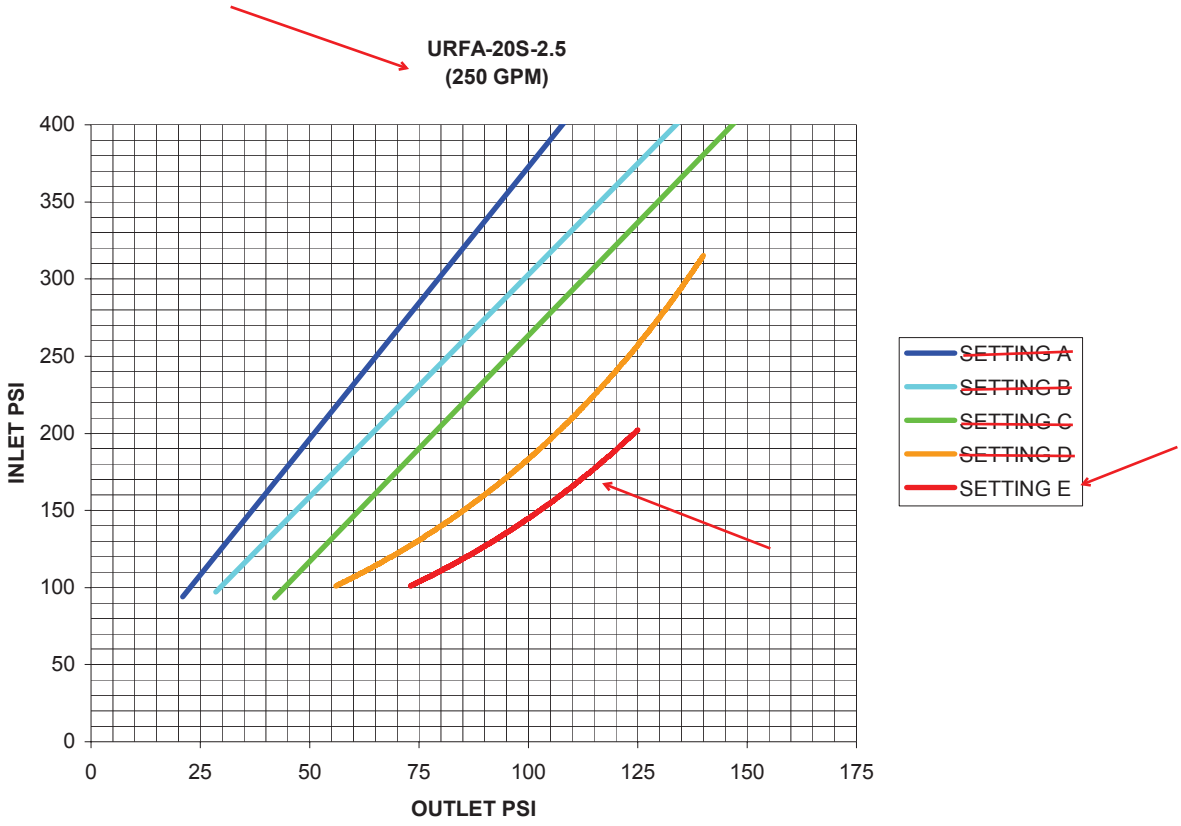
URFA valves require minimal maintenance. However, a routine inspection and test program is essential for any fire protection system to insure that it is in proper operating condition. NFPA 25, standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems should be consulted for a determination of required test frequency and methods.

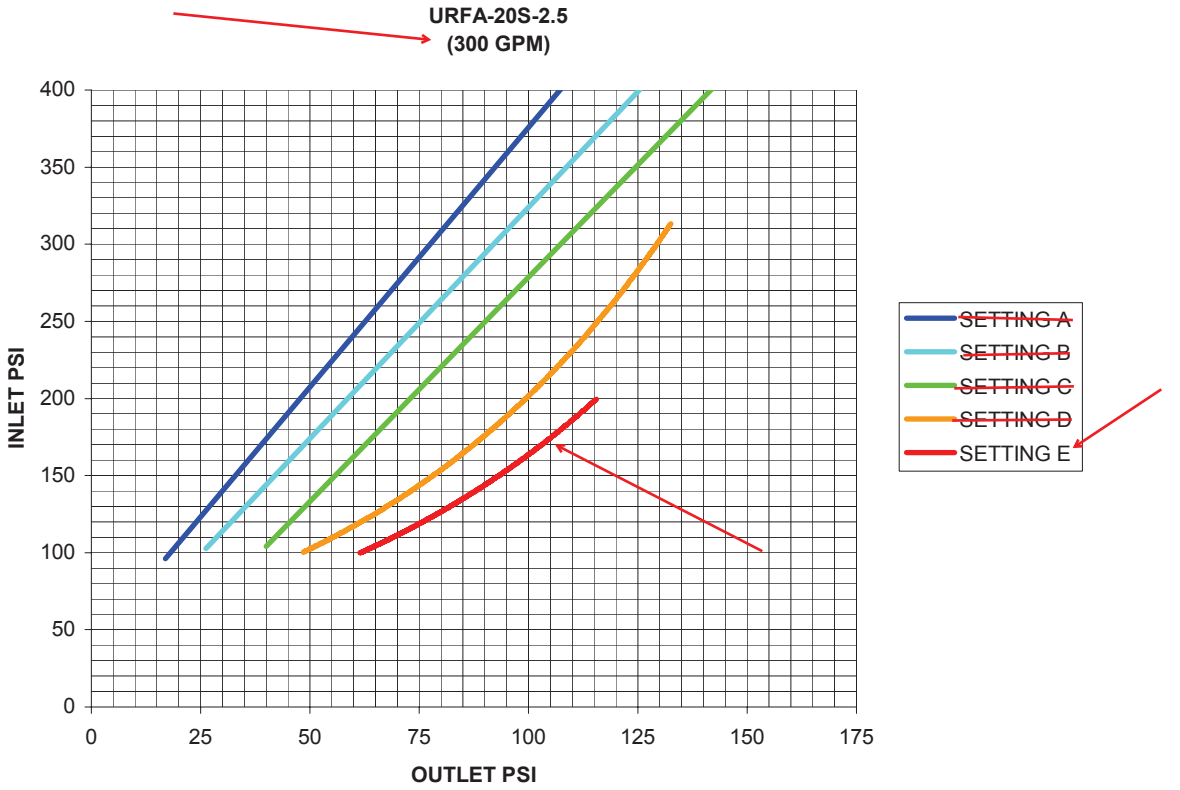
Below is a summary of the required frequency of inspections and testing for pressure reducing valves:

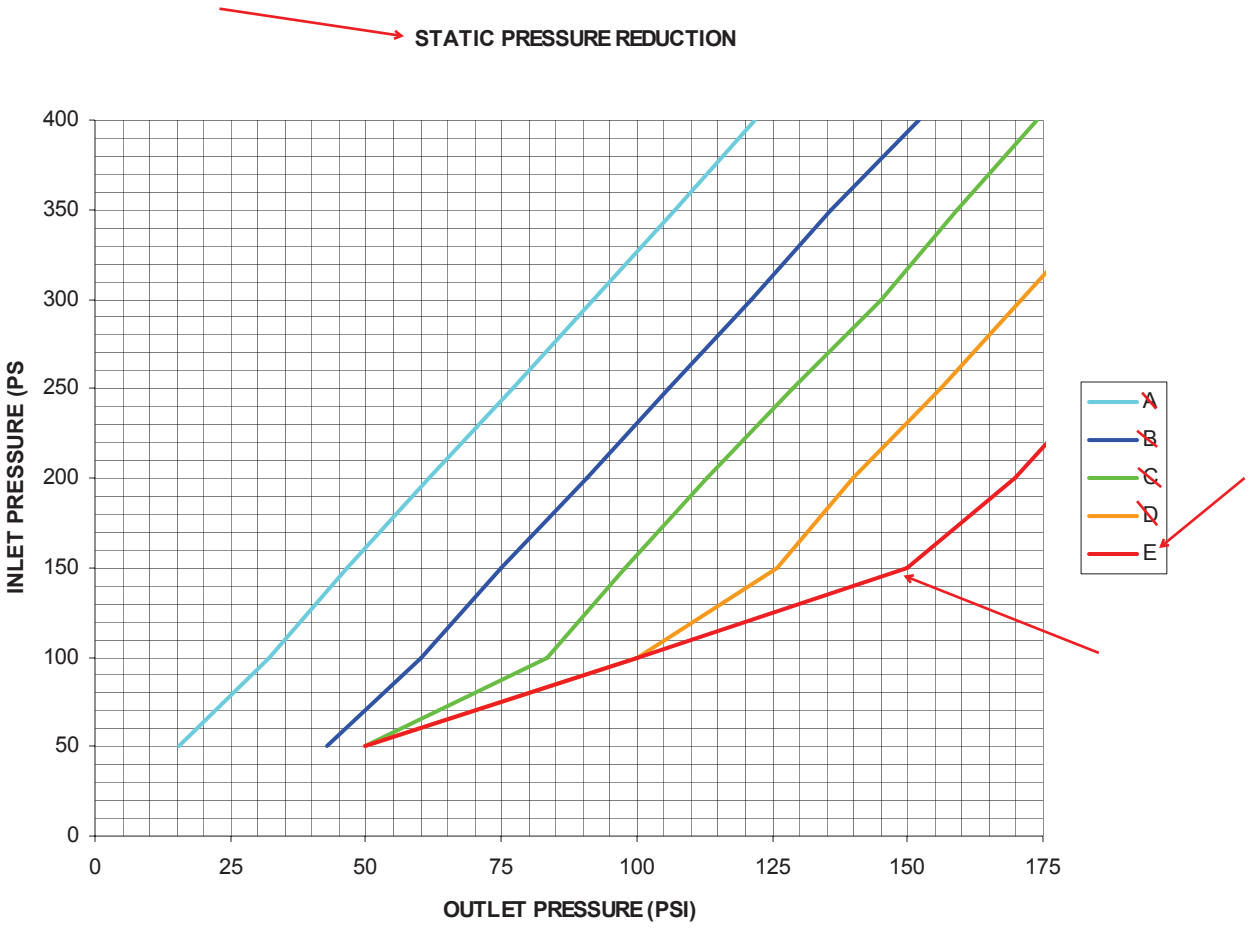
Valve Application	Inspection	Flow Test
Sprinkler System Pressure Regulating Control Valve	Quarterly	Annually
Hose Connection and Hose Rack Assembly Pressure Regulating Valve	Quarterly	5-Years

Quarterly inspections should verify that the tamper-resistant cover is properly secured and compare actual valve adjustment settings to documented correct adjustment settings for each valve. If a valve is found to have incorrect valve setting it should be reset to the proper setting and undergo flow and no-flow testing to verify proper pressure reduction is obtained.

Flow test results should be compared to previous test results, and to system performance criteria. If the valve adjustment settings match the original and correct settings for each valve then no significant variance should occur from the original flow testing data.


URFA-20S-2.5
(250 GPM)
INLET PSI
400
350
300
250
200
150
100
50
0
0
25
50
75
100
125
150
175
OUTLET PSI
SETTING A
SETTING B
SETTING C
SETTING D
SETTING E


URFA-20S-2.5
(300 GPM)
INLET PSI
400
350
300
250
200
150
100
50
0
0
25
50
75
100
125
150
175
OUTLET PSI
SETTING A
SETTING B
SETTING C
SETTING D
SETTING E


STATIC PRESSURE REDUCTION
INLET PRESSURE (PS
400
350
300
250
200
150
100
50
0
0
25
50
75
100
125
150
175
OUTLET PRESSURE (PSI)
A
B
C
D
E

Elkhart Brass
Fire Fighting Equipment

URFA Valve Calculator

Project Name	Cal Poly Center for Science
Floor Location	First Floor
Static Inlet Pressure (PSI) *	183
Residual Inlet Pressure (PSI) *	174.5
Design Static Outlet Pressure	
Design Residual Outlet Pressure	
Flow Rate (GPM) *	250
Valve Body Style	URFA-20S-2.5 (IN-LINE BODY)

Indicator Setting	Static Outlet Pressure (PSI)	Residual Outlet Pressure (PSI)
~~A~~	~~56.40~~	~~43.77~~
~~B~~	~~85.56~~	~~55.34~~
~~C~~	~~107.90~~	~~69.71~~
~~D~~	~~135.24~~	~~96.64~~
E	163.20	113.60

PRESSURE LOSS ACROSS VALVE IS

174.5 psi - 113.6 psi = 60.9 psi

@ 250 GPM

Elkhart Brass

Fire Fighting Equipment

URFA Valve Calculator

Project Name	Cal Poly Center for Science
Floor Location	First Floor [R/A=2]
Static Inlet Pressure (PSI) *	183
Residual Inlet Pressure (PSI) *	169
Design Static Outlet Pressure	
Design Residual Outlet Pressure	
Flow Rate (GPM) *	328
Valve Body Style	URFA-20S-2.5 (IN-LINE BODY)

Indicator Setting	Static Outlet Pressure (PSI)	Residual Outlet Pressure (PSI)
~~A~~	~~56.40~~	~~36.38~~
~~B~~	~~85.56~~	~~45.66~~
~~C~~	~~107.90~~	~~54.23~~
~~D~~	~~135.24~~	~~83.89~~
E	163.20	98.86

PRESSURE LOSS ACROSS VALVE IS

169 psi − 98.86 psi = 70.14 psi

@ 328 GPM

AERO AUTOMATIC SPRINKLER CO.
21605 North Central Ave. 623.580.7800
Phoenix, Arizona 85024 Fax 623.434.3164

AZ-L16-234798 CA-C16-901529
AZ-C16-234797 NV-C41-69370
UT-S370-6690455-5501 NM-MS 12-354807

Fire Protection by Computer Design

Aero Automatic Sprinkler Co.
21605 N. Central Ave.
Phoenix, Arizona 85024
623-580-7800

Job Name	:	Cal Poly Center for Science LVL 1 [R/A=2]
Building	:	FP-6.01W
Location	:	San Luis Obispo, Ca.
System	:	1-2
Contract	:	10034
Data File	:	Cal Poly CFS LVL 1-2.WXF

HYDRAULIC CALCULATIONS
for

Project name: Cal Poly Center For Science
Location: San Luis Obispo, Ca.
Drawing no: FP-6.01W
Date: 9-25-2011

Design

Remote area number: 1-2
Remote area location: 1 st. Floor Lecture
Occupancy classification: Light Hazard
Density: 0.10 - Gpm/SqFt
Area of application: 1500 - SqFt
Coverage per sprinkler: 163 - SqFt
Type of sprinklers calculated: Tyco; Mod. TY-FRB; 1/2"; 1/2";K=5.6; 155 Deg
No. of sprinklers calculated: 16
In-rack demand: N/A - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 428.4 - GPM @ 45.59 - Psi
Type of system: WET
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 8-19-2011
Location: N. Poly View Drive
Source: Fluid Resource Management

Name of contractor: Aero Automatic Sprinkler Co.
Address: 21605 N. Central Ave. Phoenix, Az. 85024
Phone number: 623-580-7847
Name of designer: Neal Larsen
Authority having jurisdiction: C.S.F.M.
Notes: (Include peaking information or gridded systems here.) Flow Test Information :
Hydrant # 63; Static = 60 psi; Res.= 55 psi {Elev.=351.0'}
Hydrant # 64; Flow = 914 gpm
FLOW TEST USED IN HYD. CALCS REDUCED BY 10 % [STATIC=54psi; RES.=49psi]

Water Supply Curve (C)

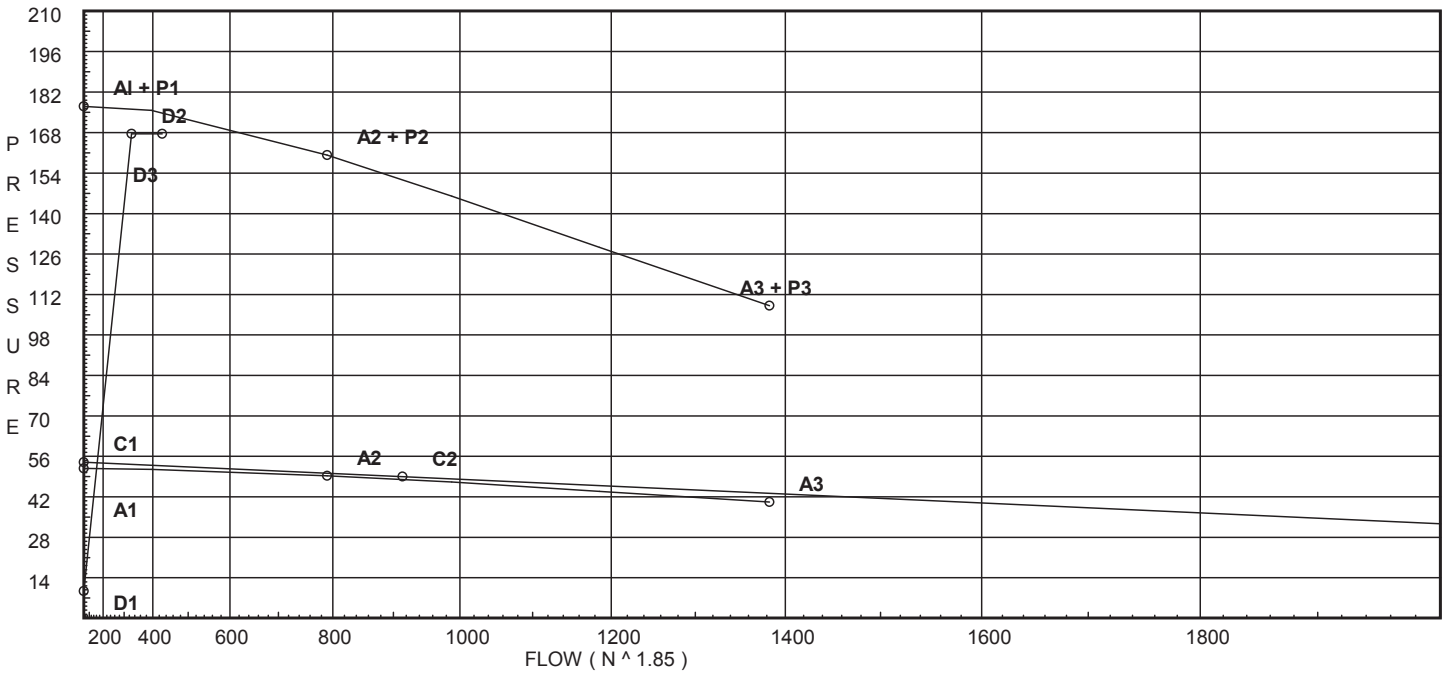
Aero Automatic Sprinkler Co.
Cal Poly Center for Science LVL 1 [R/A=2]

City Water Supply:
- C1 - Static Pressure : 54
- C2 - Residual Pressure: 49
- C2 - Residual Flow : 914

City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow
- A1 - Adjusted Static: 51.872
- A2 - Adj Resid : 49.314 @ 790.2
- A3 - Adj Resid : 40.224 @ 1382.9

Pump Data:
- P1 - Pump Churn Pressure : 125.2
- P2 - Pump Rated Pressure : 110.9
- P2 - Pump Rated Flow : 790.2
- P3 - Pump Pressure @ Max Flow : 67.9
- P3 - Pump Max Flow : 1382.9
- City Residual Flow @ 0 = 3307.91
- City Residual Flow @ 20 = 2576.03
- City Water @ 150% of Pump = 43.24

Demand:
- D1 - Elevation : 9.420
- D2 - System Flow : 328.401
- D2 - System Pressure : 167.582
- Hose (Adj City) : _____
- Hose (Demand) : 100
- D3 - System Demand : 428.401
- Safety Margin : 7.179



Fittings Used Summary

Fitting Legend Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	Generic Butterfly Valve	0	0	2.25	2	2.5	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
C	Generic Check Vlv	4	5	5	7	9	11	14	16	19	22	27	32	45	55	65	76	87	98	109	130
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	Generic Gate Valve	0	0	0	1	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
H	45' Ell Grvd-Vic #11	0	0	1	1.5	2	2	3	3	3.5	3.5	4.5	5	6.5	8.5	10	18	20	23	25	30
I	90' Ell Grvd-Vic #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
T	90' Flow Thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zic	Wilkens 350ADA	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

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

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
S121	34.75	5.6	7.0	na	14.82	0.1	117	7.0
S122	34.75	5.6	7.93	na	15.77	0.1	124	7.0
S123	34.75	5.6	11.11	na	18.67	0.1	124	7.0
S124	34.75	5.6	12.56	na	19.84	0.1	124	7.0
S125	28.833	5.6	10.5	na	18.15	0.1	143	7.0
S126	28.833	5.6	11.19	na	18.73	0.1	143	7.0
S127	28.833	5.6	14.14	na	21.06	0.1	143	7.0
S128	25.833	5.6	11.6	na	19.07	0.1	143	7.0
S129	25.833	5.6	12.13	na	19.5	0.1	143	7.0
S130	25.833	5.6	15.36	na	21.95	0.1	143	7.0
S131	22.833	5.6	13.67	na	20.71	0.1	143	7.0
S132	22.833	5.6	14.36	na	21.22	0.1	163	7.0
S133	22.833	5.6	18.06	na	23.8	0.1	163	7.0
S134	19.833	5.6	17.51	na	23.43	0.1	143	7.0
S135	19.833	5.6	19.32	na	24.61	0.1	114	7.0
S136	19.833	5.6	23.35	na	27.06	0.1	114	7.0
L121	36.917		6.37	na				
L122	36.917		7.59	na				
L123	36.917		11.0	na				
L124	36.917		12.54	na				
L125	36.0		8.4	na				
L126	36.0		10.01	na				
L127	36.0		13.44	na				
L128	34.5		9.12	na				
L129	34.5		10.59	na				
L130	34.5		14.36	na				
L131	33.0		11.38	na				
L132	33.0		12.71	na				
L133	33.0		17.08	na				
L134	31.5		16.04	na				
L135	31.5		17.74	na				
L136	31.5		22.43	na				
M121	36.917		14.67	na				
M122	36.0		15.16	na				
M123	34.5		16.22	na				
M124	33.0		19.23	na				
M125	31.5		24.65	na				
M105	13.167		71.73	na				
TR01	13.167		86.12	na				
BR01	3.0		162.22	na				
SPC1	12.667		162.45	na	100.0			
SPC2	12.667		162.73	na				
PO	1.833		167.58	na				
PI	1.75		51.42	na				
POC	6.75		49.38	na				
BF1	13.0		46.8	na				
BF2	13.0		52.57	na				
SRC	13.0		52.77	na				

The maximum velocity is 19.32 and it occurs in the pipe between nodes M125 and M105

Node1 / to / Node2	Elev1 / Elev2	K / Fact	Qa / Qt	Nom / Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact / Pf/Ft	Pt Pe Pf	*******	Notes	******
*FLOWING SPRINKLER R/A # 2												
S121	34.750	5.60	14.82	1	1E	2.0	2.167	120	7.000			
to						0.0	2.000		-0.939			
L121	36.917		14.82	1.049		0.0	4.167	0.0749	0.312	Vel = 5.50		
			0.0									
L121			14.82						6.373	K Factor = 5.87		
S122	34.750	5.60	15.77	1	1T	5.0	2.167	120	7.930			
to						0.0	5.000		-0.939			
L122	36.917		15.77	1.049		0.0	7.167	0.0840	0.602	Vel = 5.85		
			0.0									
L122			15.77						7.593	K Factor = 5.72		
S123	34.750	5.60	18.67	1	1T	5.0	2.167	120	11.113			
to						0.0	5.000		-0.939			
L123	36.917		18.67	1.049		0.0	7.167	0.1147	0.822	Vel = 6.93		
			0.0									
L123			18.67						10.996	K Factor = 5.63		
S124	34.750	5.60	19.84	1	1T	5.0	2.167	120	12.555			
to						0.0	5.000		-0.939			
L124	36.917		19.84	1.049		0.0	7.167	0.1284	0.920	Vel = 7.37		
			0.0									
L124			19.84						12.536	K Factor = 5.60		
S125	28.833	5.60	18.15	1	1E	2.0	7.167	120	10.504			
to						0.0	2.000		-3.104			
L125	36		18.15	1.049		0.0	9.167	0.1088	0.997	Vel = 6.74		
			0.0									
L125			18.15						8.397	K Factor = 6.26		
S126	28.833	5.60	18.73	1	1E	2.0	9.667	120	11.192			
to					1T	5.0	7.000		-3.104			
L126	36		18.73	1.049		0.0	16.667	0.1153	1.921	Vel = 6.95		
			0.0									
L126			18.73						10.009	K Factor = 5.92		
S127	28.833	5.60	21.06	1	1E	2.0	9.750	120	14.144			
to					1T	5.0	7.000		-3.104			
L127	36		21.06	1.049		0.0	16.750	0.1432	2.399	Vel = 7.82		
			0.0									
L127			21.06						13.439	K Factor = 5.74		
S128	25.833	5.60	19.07	1	1E	2.0	8.667	120	11.601			
to						0.0	2.000		-3.754			
L128	34.500		19.07	1.049		0.0	10.667	0.1192	1.271	Vel = 7.08		
			0.0									
L128			19.07						9.118	K Factor = 6.32		
S129	25.833	5.60	19.50	1	1E	2.0	10.833	120	12.127			
to					1T	5.0	7.000		-3.754			
L129	34.500		19.5	1.049		0.0	17.833	0.1242	2.215	Vel = 7.24		
			0.0									
L129			19.50						10.588	K Factor = 5.99		
S130	25.833	5.60	21.95	1	1E	2.0	10.833	120	15.361			
to					1T	5.0	7.000		-3.754			
L130	34.500		21.95	1.049		0.0	17.833	0.1546	2.757	Vel = 8.15		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
L130			21.95						14.364	K Factor = 5.79
S131	22.833	5.60	20.71	1	1T	5.0	10.167	120	13.674	
to						0.0	5.000		-4.403	
L131	33		20.71	1.049		0.0	15.167	0.1388	2.105	Vel = 7.69
			0.0							
L131			20.71						11.376	K Factor = 6.14
S132	22.833	5.60	21.22	1	1E	2.0	11.917	120	14.362	
to					1T	5.0	7.000		-4.403	
L132	33		21.22	1.049		0.0	18.917	0.1452	2.747	Vel = 7.88
			0.0							
L132			21.22						12.706	K Factor = 5.95
S133	22.833	5.60	23.80	1	1E	2.0	12.083	120	18.057	
to					1T	5.0	7.000		-4.403	
L133	33		23.8	1.049		0.0	19.083	0.1794	3.424	Vel = 8.84
			0.0							
L133			23.80						17.078	K Factor = 5.76
S134	19.833	5.60	23.44	1	1E	2.0	13.500	120	17.512	
to					1T	5.0	7.000		-5.053	
L134	31.500		23.44	1.049		0.0	20.500	0.1745	3.577	Vel = 8.70
			0.0							
L134			23.44						16.036	K Factor = 5.85
S135	19.833	5.60	24.61	1	1T	5.0	13.167	120	19.319	
to						0.0	5.000		-5.053	
L135	31.500		24.61	1.049		0.0	18.167	0.1911	3.471	Vel = 9.14
			0.0							
L135			24.61						17.737	K Factor = 5.84
S136	19.833	5.60	27.06	1	1T	5.0	13.167	120	23.350	
to						0.0	5.000		-5.053	
L136	31.500		27.06	1.049		0.0	18.167	0.2276	4.135	Vel = 10.05
			0.0							
L136			27.06						22.432	K Factor = 5.71
*BRANCH LINES R/A # 2										
L121	36.917		14.82	1	1E	2.0	14.333	120	6.373	
to						0.0	2.000		0.0	
L122	36.917		14.82	1.049		0.0	16.333	0.0747	1.220	Vel = 5.50
L122	36.917		15.77	1		0.0	11.917	120	7.593	
to						0.0	0.0		0.0	
L123	36.917		30.59	1.049		0.0	11.917	0.2856	3.403	Vel = 11.36
L123	36.917		18.67	1	1T	5.0	0.333	120	10.996	
to						0.0	5.000		0.0	
M121	36.917		49.26	1.049		0.0	5.333	0.6895	3.677	Vel = 18.29
			0.0							
M121			49.26						14.673	K Factor = 12.86
L124	36.917		19.84	1	1T	5.0	11.667	120	12.536	
to						0.0	5.000		0.0	
M121	36.917		19.84	1.049		0.0	16.667	0.1282	2.137	Vel = 7.37

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
M121			19.84						14.673	K Factor = 5.18
L125	36		18.15	1		0.0	14.833	120	8.397	
to						0.0	0.0		0.0	
L126	36		18.15	1.049		0.0	14.833	0.1087	1.612	Vel = 6.74
L126	36		18.73	1	1T	5.0	7.750	120	10.009	
to						0.0	5.000		0.0	
M122	36		36.88	1.049		0.0	12.750	0.4038	5.148	Vel = 13.69
			0.0							
M122			36.88						15.157	K Factor = 9.47
L127	36		21.06	1	1T	5.0	7.000	120	13.439	
to						0.0	5.000		0.0	
M122	36		21.06	1.049		0.0	12.000	0.1432	1.718	Vel = 7.82
			0.0							
M122			21.06						15.157	K Factor = 5.41
L128	34.500		19.07	1		0.0	12.333	120	9.118	
to						0.0	0.0		0.0	
L129	34.500		19.07	1.049		0.0	12.333	0.1192	1.470	Vel = 7.08
L129	34.500		19.51	1	1T	5.0	7.833	120	10.588	
to						0.0	5.000		0.0	
M123	34.500		38.58	1.049		0.0	12.833	0.4387	5.630	Vel = 14.32
			0.0							
M123			38.58						16.218	K Factor = 9.58
L130	34.500		21.95	1	1T	5.0	7.000	120	14.364	
to						0.0	5.000		0.0	
M123	34.500		21.95	1.049		0.0	12.000	0.1545	1.854	Vel = 8.15
			0.0							
M123			21.95						16.218	K Factor = 5.45
L131	33		20.71	1		0.0	9.583	120	11.376	
to						0.0	0.0		0.0	
L132	33		20.71	1.049		0.0	9.583	0.1388	1.330	Vel = 7.69
L132	33		21.22	1	1T	5.0	7.750	120	12.706	
to						0.0	5.000		0.0	
M124	33		41.93	1.049		0.0	12.750	0.5118	6.526	Vel = 15.57
			0.0							
M124			41.93						19.232	K Factor = 9.56
L133	33		23.80	1	1T	5.0	7.000	120	17.078	
to						0.0	5.000		0.0	
M124	33		23.8	1.049		0.0	12.000	0.1795	2.154	Vel = 8.84
			0.0							
M124			23.80						19.232	K Factor = 5.43
L134	31.500		23.44	1		0.0	9.750	120	16.036	
to						0.0	0.0		0.0	
L135	31.500		23.44	1.049		0.0	9.750	0.1745	1.701	Vel = 8.70
L135	31.500		24.61	1	1T	5.0	5.500	120	17.737	
to						0.0	5.000		0.0	
M125	31.500		48.05	1.049		0.0	10.500	0.6586	6.915	Vel = 17.84

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
M125			48.05						24.652	K Factor = 9.68
L136	31.500		27.06	1	1T	5.0	4.750	120	22.432	
to						0.0	5.000		0.0	
M125	31.500		27.06	1.049		0.0	9.750	0.2277	2.220	Vel = 10.05
			0.0							
M125			27.06						24.652	K Factor = 5.45
*FEED MAIN										
M121	36.917		69.10	2.5		0.0	6.000	120	14.673	
to						0.0	0.0		0.397	
M122	36		69.1	2.635		0.0	6.000	0.0145	0.087	Vel = 4.07
M122	36		57.94	2.5		0.0	9.167	120	15.157	
to						0.0	0.0		0.650	
M123	34.500		127.04	2.635		0.0	9.167	0.0448	0.411	Vel = 7.47
M123	34.500		60.52	2.5	1T	16.474	9.167	120	16.218	
to						0.0	16.474		0.650	
M124	33		187.56	2.635		0.0	25.641	0.0922	2.364	Vel = 11.03
M124	33		65.73	2.5	1H	4.119	9.083	120	19.232	
to					1T	16.474	20.593		0.650	
M125	31.500		253.29	2.635		0.0	29.676	0.1607	4.770	Vel = 14.90
M125	31.500		75.11	2.5	2T	32.948	92.917	120	24.652	
to					3I	24.711	57.659		7.940	
M105	13.167		328.4	2.635		0.0	150.576	0.2599	39.134	Vel = 19.32
M105	13.167		0.0	3	4I	26.879	109.083	120	71.726	
to					1T	20.159	47.038		0.0	
TR01	13.167		328.4	3.26		0.0	156.121	0.0922	14.391	Vel = 12.62
TR01	13.167		0.0	3	1I	6.72	10.167	120	86.117	
to						0.0	6.720		74.543	* Fixed loss = 70.14
BR01	3		328.4	3.26		0.0	16.887	0.0922	1.557	Vel = 12.62
BR01	3		0.0	3	2I	13.44	14.333	120	162.217	
to					1T	20.159	33.599		-4.187	
SPC1	12.667		328.4	3.26		0.0	47.932	0.0922	4.419	Vel = 12.62
SPC1	12.667	H100	100.00	6	1T	30.0	7.917	120	162.449	
to						0.0	30.000		0.0	
SPC2	12.667		428.4	6.065		0.0	37.917	0.0073	0.278	Vel = 4.76
SPC2	12.667		0.0	8	1I	13.0	14.750	120	162.727	
to					1B	12.0	70.000		4.692	
PO	1.833		428.4	7.981	1C	45.0	84.750	0.0019	0.163	Vel = 2.75
			0.0							
PO			428.40						167.582	K Factor = 33.09
System Demand Pressure							167.582			
Safety Margin							7.179			
Continuation Pressure							174.761			
Pressure @ Pump Outlet							174.761			
Pressure From Pump Curve							-123.339			
Pressure @ Pump Inlet							51.422			
PI	1.750		0.0	8	1G	4.0	14.000	120	51.422	
to					1I	13.0	52.000		-2.166	
POC	6.750		428.4	7.981	1T	35.0	66.000	0.0019	0.127	Vel = 2.75

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
POC	6.750		0.0	8	2E	56.936	41.000	140	49.383	
to						0.0	56.936		-2.707	
BF1	13		428.4	8.27		0.0	97.936	0.0012	0.120	Vel = 2.56
BF1	13		0.0	8	1Zic	0.0	4.000	120	46.796	
to						0.0	0.0		5.766	* Fixed loss = 5.766
BF2	13		428.4	7.981		0.0	4.000	0.0018	0.007	Vel = 2.75
BF2	13		0.0	8	2E	56.936	46.000	140	52.569	
to					1G	6.326	118.616		0.0	
SRC	13		428.4	8.27	1T	55.354	164.616	0.0012	0.200	Vel = 2.56
			0.0							
SRC			428.40						52.769	K Factor = 58.97

Deep Blue Integration

FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM RECORD OF COMPLETION

To be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.

Attach additional sheets, data, or calculations as necessary to provide a complete record.

1. PROPERTY INFORMATION

Name of property: *Cal Poly Center For Math And Science 180*

Address: *01 Grand AVE, SAN LUIS OBISPO, CA 93407*

Description of property: CLASSROOM LABS, LECTURE HALLS, FACULTY OFFICES

Occupancy type: A, B, H3

Name of property representative: GILBANECO – CONTRACTOR, CAL POLY FACILITIES + CAPITOL PROJECTS

Address: 1 GRAND AVE, BLDG 70 - SAN LUIS OBISPO, CA 93407

Phone: 805-441-2186 Fax: E-mail: PJUDD@CALPOLY.EDU

Authority having jurisdiction over this property: OSFM 1234 E. SHAW AVE FRESNO, CA 93710

Phone: 916-825-7880 Fax: E-mail: POLLY.PARENTI@FIRE.CA.GOV

2. INSTALLATION, SERVICE, AND TESTING CONTRACTOR INFORMATION

Installation contractor for this equipment: *Deep Blue Integration Inc.*

Address: *3442 Empresa Dr., Suite C, San Luis Obispo, California, 93401*

License or certification number: *B, C-10, C-16 #943465*

Phone: *1-888-600-0324* Fax: *805-791-2037* E-mail: *info@deepblueintegration.com*

Service organization for this equipment: *Deep Blue Integration Inc.*

Address: *3442 Empresa Dr., Suite C, San Luis Obispo, California, 93401*

License or certification number: *B, C-10, C-16 #943465*

Phone: *888-600-0324* Fax: *805-791-2037* E-mail: *info@deepblueintegration.com*

A contract for test and inspection in accordance with NFPA standards is in effect as of:

Contracted testing company: *N/A*

Address:

Phone: Fax: E-mail:

Contract expires: Contract number: Frequency of routine inspections:

3. DESCRIPTION OF SYSTEM OR SERVICE

☐ Fire alarm system (nonvoice)

☒ Fire alarm with in-building fire emergency voice alarm communication system (EVACS)

☐ Mass notification system (MNS)

☐ Combination system, with the following components:

☐ Fire alarm ☐ EVACS ☐ MNS ☐ Two-way, in-building, emergency communication system

☐ Other (specify):

3. DESCRIPTION OF SYSTEM OR SERVICE *(continued)*

NFPA 72 edition: Additional description of system(s):

3.1 Control Unit

Manufacturer: *Honywell Notifier* Model number: *NFS2-640*

3.2 Mass Notification System ☐ This system does not incorporate an MNS

3.2.1 System Type:

☒ In-building MNS—combination

☐ In-building MNS—stand-alone ☐ Wide-area MNS ☐ Distributed recipient MNS

☐ Other (specify):

3.2.2 System Features:

☒ Combination fire alarm/MNS ☐ MNS autonomous control unit ☐ Wide-area MNS to regional national alerting interface

☐ Local operating console (LOC) ☐ Direct recipient MNS (DRMNS) ☐ Wide-area MNS to DRMNS interface

☐ Wide-area MNS to high-power speaker array (HPSA) interface ☐ In-building MNS to wide-area MNS interface

☐ Other (specify):

3.3 System Documentation

☒ An owner's manual, a copy of the manufacturer's instructions, a written sequence of operation, and a copy of the numbered record drawings are stored on site. Location: *At Alarm Panel*

3.4 System Software ☒ This system does not have alterable site-specific software.

Operating system (executive) software revision level:

Site-specific software revision date: *2-2013* Revision completed by: *Honywell*

☐ A copy of the site-specific software is stored on site. Location:

3.5 Off-Premises Signal Transmission ☐ This system does not have off-premises transmission.

Name of organization receiving alarm signals with phone numbers:

Alarm: *Cal Poly Dispach Center* Phone: *805-756-2281*

Supervisory: *Cal Poly Dispach Center* Phone: *805-756-2281*

Trouble: *Cal Poly Dispach Center* Phone: *805-756-2281*

Entity to which alarms are retransmitted: DACT Phone:

Method of retransmission: ~~[illegible]~~*y*

If Chapter 26, specify the means of transmission from the protected premises to the supervising station:

If Chapter 27, specify the type of auxiliary alarm system: ☐ Local energy ☐ Shunt ☐ Wired ☐ Wireless

4. CIRCUITS AND PATHWAYS

4.1 Signaling Line Pathways

4.1.1 Pathways Class Designations and Survivability

Pathways class: B Survivability level: 1 Quantity: 2
(See NFPA 72, Sections 12.3 and 12.4)

4.1.2 Pathways Utilizing Two or More Media

Quantity: Description:

4.1.3 Device Power Pathways

☒ No separate power pathways from the signaling line pathway

☐ Power pathways are separate but of the same pathway classification as the signaling line pathway

☐ Power pathways are separate and different classification from the signaling line pathway

4.1.4 Isolation Modules

Quantity:

4.2 Alarm Initiating Device Pathways

4.2.1 Pathways Class Designations and Survivability

Pathways class: Survivability level: Quantity:
(See NFPA 72, Sections 12.3 and 12.4)

4.2.2 Pathways Utilizing Two or More Media

Quantity: Description:

4.2.3 Device Power Pathways

☒ No separate power pathways from the initiating device pathway

☐ Power pathways are separate but of the same pathway classification as the initiating device pathway

☐ Power pathways are separate and different classification from the initiating device pathway

4.3 Non-Voice Audible System Pathways

4.3.1 Pathways Class Designations and Survivability

Pathways class: B Survivability level: 1 Quantity: 22
(See NFPA 72, Sections 12.3 and 12.4)

4.3.2 Pathways Utilizing Two or More Media

Quantity: Description:

4.3.3 Device Power Pathways

☒ No separate power pathways from the notification appliance pathway

☐ Power pathways are separate but of the same pathway classification as the notification appliance pathway

☐ Power pathways are separate and different classification from the notification appliance pathway

5. ALARM INITIATING DEVICES

5.1 Manual Initiating Devices

5.1.1 Manual Fire Alarm Boxes ☐ This system does not have manual fire alarm boxes.

Type and number of devices: Addressable: ~~20~~ 30 Conventional: Coded: Transmitter:

Other (specify):

5.1.2 Other Alarm Boxes ☒ This system does not have other alarm boxes.

Description:

Type and number of devices: Addressable: Conventional: Coded: Transmitter:

Other (specify):

5.2 Automatic Initiating Devices

5.2.1 Smoke Detectors ☐ This system does not have smoke detectors.

Type and number of devices: Addressable: 30 Conventional: BEAM SMOKE DETECTION—

Other (specify): 11 ~~8~~ IMAGERS AND EMITTERS

Type of coverage: ☐ Complete area ☒ Partial area ☐ Nonrequired partial area

Other (specify):

Type of smoke detector sensing technology: ☐ Ionization ☒ Photoelectric ☐ Multicriteria ☐ Aspirating ☒ Beam

Other (specify):

5.2.2 Duct Smoke Detectors ☐ This system does not have alarm-causing duct smoke detectors.

Type and number of devices: Addressable: 62 Conventional:

Other (specify):

Type of coverage: Partial Area – LOCAL @ SFD LOCATIONS

Type of smoke detector sensing technology: ☐ Ionization ☒ Photoelectric ☐ Aspirating ☐ Beam

5.2.3 Radiant Energy (Flame) Detectors ☒ This system does not have radiant energy detectors.

Type and number of devices: Addressable: Conventional:

Other (specify):

Type of coverage:

5.2.4 Gas Detectors ☒ This system does not have gas detectors.

Type of detector(s):

Number of devices: Addressable: Conventional:

Type of coverage:

5.2.5 Heat Detectors ☒ This system does not have heat detectors.

Type and number of devices: Addressable: Conventional:

Type of coverage: ☐ Complete area ☐ Partial area ☐ Nonrequired partial area ☐ Linear ☐ Spot

Type of heat detector sensing technology: ☐ Fixed temperature ☐ Rate-of-rise ☐ Rate compensated

5. ALARM INITIATING DEVICES *(continued)*

5.2.6 Addressable Monitoring Modules ☐ This system does not have monitoring modules.

Number of devices: 29 — TROUBLE MONITORS, NON-ALARM POINTS

5.2.7 Waterflow Alarm Devices ☐ This system does not have waterflow alarm devices.

Type and number of devices: Addressable: 7 Conventional: Coded: Transmitter:

5.2.8 Alarm Verification ☒ This system does not incorporate alarm verification.

Number of devices subject to alarm verification: Alarm verification set for: seconds

5.2.9 Presignal ☒ This system does not incorporate pre-signal.

Number of devices subject to presignal:

Describe presignal functions:

5.2.10 Positive Alarm Sequence (PAS) ☒ This system does not incorporate PAS.

Describe PAS:

5.2.11 Other Initiating Devices ☒ This system does not have other initiating devices.

Describe:

6. SUPERVISORY SIGNAL-INITIATING DEVICES

6.1 Sprinkler System Supervisory Devices ☐ This system does not have sprinkler supervisory devices.

Type and number of devices: Addressable: 12 Conventional: Coded: Transmitter:

Other (specify):

6.2 Fire Pump Description and Supervisory Devices ☐ This system does not have a fire pump.

Type fire pump: ☒ Electric pump ☐ Engine

Type and number of devices: Addressable: 3 Conventional: Coded: Transmitter:

Other (specify):

6.2.1 Fire Pump Functions Supervised

☒ Power ☒ Running ☒ Phase reversal ☐ Selector switch not in auto ☐ Engine or control panel trouble ☐ Low fuel

Other (specify):

6.3 Duct Smoke Detectors (DSDs) ☐ This system does not have DSDs causing supervisory signals.

Type and number of devices: Addressable: Conventional:

Other (specify):

Type of coverage:

Type of smoke detector sensing technology: ☐ Ionization ☐ Photoelectric ☐ Aspirating ☐ Beam

6.4 Other Supervisory Devices ☐ This system does not have other supervisory devices.

Describe: SMOKE FIRE DAMPER POSITION INDICATORS 52

FIREFIGHTER SMOKE CONTROL PANEL 1

7. MONITORED SYSTEMS

7.1 Engine-Driven Generator ☒ This system does not have a generator.

7.1.1 Generator Functions Supervised

☐ Engine or control panel trouble ☐ Generator running ☐ Selector switch not in auto ☐ Low fuel

☐ Other (specify):

7.2 Special Hazard Suppression Systems ☒ This system does not monitor special hazard systems.

Description of special hazard system(s):

7.3 Other Monitoring Systems ☒ This system does not monitor other systems.

Description of special hazard system(s):

8. ANNUNCIATORS

☐ This system does not have annunciators.

8.1 Location and Description of Annunciators

Location 1: *Floor 2 North Lobby*

Location 2: *Floor 1 West Lobby*

Location 3:

9. ALARM NOTIFICATION APPLIANCES

9.1 In-Building Fire Emergency Voice Alarm Communication System ☐ This system does not have an EVACS.

Number of single voice alarm channels: 1

Number of multiple voice alarm channels:

Number of speakers: 172

Number of speaker circuits: 9

Location of amplification and sound-processing equipment: *Elecrtical Rooms at FAPS Locations*

Location of paging microphone stations:

Location 1: AT FA CU, Room 122

Location 2:

Location 3:

9.2 Nonvoice Notification Appliances ☐ This system does not have nonvoice notification appliances.

Horns: Ø With visible: — Bells: 1 With visible: Ø

Chimes: Ø With visible: —

Visible only: 66 Other (describe):

9.3 Notification Appliance Power Extender Panels ☐ This system does not have power extender panels.

Quantity: 4

Locations: Rooms 267, 332, 467, 632

10. MASS NOTIFICATION CONTROLS, APPLIANCES, AND CIRCUITS ☒ This system does not have an MNS.

10.1 MNS Local Operating Consoles

Location 1:

Location 2:

Location 3:

10.2 High-Power Speaker Arrays

Number of HPSA speaker initiation zones:

Location 1:

Location 2:

Location 3:

10.3 Mass Notification Devices

Combination fire alarm/MNS visible appliances: MNS-only visible appliances:

Textual signs: Other (describe):

Supervision class:

10.3.1 Special Hazard Notification

☐ This system does not have special suppression predischarge notification.

☐ MNS systems DO NOT override notification appliances required to provide special suppression predischarge notification.

11. TWO-WAY EMERGENCY COMMUNICATION SYSTEMS

11.1 Telephone System

☐ This system does not have a two-way telephone system.

Number of telephone jacks installed: 12 Number of warden stations installed: 0

Number of telephone handsets stored on site: 5

Type of telephone system installed: ☐ Electrically powered ☒ Sound powered

11.2 Two-Way Radio Communications Enhancement System

☒ This system does not have a two-way radio communications enhancement system.

Percentage of area covered by two-way radio service: Critical areas: % General building areas: %

Amplification component locations:

Inbound signal strength: dBm Outbound signal strength: dBm

Donor antenna isolation is: dB above the signal booster gain

Radio frequencies covered:

Radio system monitor panel location:

11. TWO-WAY EMERGENCY COMMUNICATION SYSTEMS *(continued)*

11.3 Area of Refuge (Area of Rescue Assistance) Emergency Communications Systems

☒ This system does not have an area of refuge (area of rescue assistance) emergency communications system.

Number of stations: Location of central control point:

Days and hours when central control point is attended:

Location of alternate control point:

Days and hours when alternate control point is attended:

11.4 Elevator Emergency Communications Systems

☒ This system does not have an elevator emergency communications system.

Number of elevators with stations: Location of central control point:

Days and hours when central control point is attended:

Location of alternate control point:

Days and hours when alternate control point is attended:

11.5 Other Two-Way Communication Systems

Describe:

12. CONTROL FUNCTIONS

This system activates the following control fuctions:

☒ Hold-open door releasing devices ☒ Smoke management ☒ HVAC shutdown ☒ F/S dampers

☐ Door unlocking ☒ Elevator recall ☐ Fuel source shutdown ☐ Extinguishing agent release

☐ Elevator shunt trip ☐ Mass notification system override of fire alarm notification appliances

Other (specify):

12.1 Addressable Control Modules

☐ This system does not have control modules.

Number of devices: 90 - RELAY + CONTROL FUNCTIONS

Other (specify):

13. SYSTEM POWER

13.1 Control Unit

13.1.1 Primary Power

Input voltage of control panel: 120 VAC Control panel amps: 6 AMP

Overcurrent protection: Type: BREAKER Amps: 20 AMP

Location (of primary supply panel board): PANEL 1D W, CIRCUIT #

Disconnecting means location: TEL/DATA ROOM #106

13.1.2 Engine-Driven Generator

☒ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

13. SYSTEM POWER *(continued)*

13.1.3 Uninterruptible Power System ☒ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

13.1.4 Batteries

Location: AT FACP Type: SLA Nominal voltage: 12 VDC Amp/hour rating: 55 AH

Calculated capacity of batteries to drive the system:

In standby mode (hours): 24 In alarm mode (minutes): 15

☒ Batteries are marked with date of manufacture ☐ Battery calculations are attached - ON AS-BUILT PLANS

13.2 In-Building Fire Emergency Voice Alarm Communication System or Mass Notification System

☐ This system does not have an EVACS or MNS system.

13.2.1 Primary Power

Input voltage of EVACS or MNS panel: 120 VAC EVACS or MNS panel amps: 3 AMP

Overcurrent protection: Type: BREAKER Amps: 20 AMP

Location (of primary supply panel board): PANEL 1DW CIRUIT# -

Disconnecting means location: TEL/DATA Room 106

13.2.2 Engine-Driven Generator ☒ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

13.2.3 Uninterruptible Power System ☒ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

13.2.4 Batteries

Location: AT FACP Type: SLA Nominal voltage: 12 VDC Amp/hour rating: 55 AH

Calculated capacity of batteries to drive the system:

In standby mode (hours): 24 In alarm mode (minutes): 15

☒ Batteries are marked with date of manufacture ☐ Battery calculations are attached - ON AS-BUILT PLAN

13. SYSTEM POWER *(continued)*

13.3 Notification Appliance Power Extender Panels ☐ This system does not have power extender panels.

13.3.1 Primary Power

Input voltage of power extender panel(s): 120 VAC Power extender panel amps: 6 AMP

Overcurrent protection: Type: BREAKER Amps: 20 AMP

Location (of primary supply panel board): PANEL 2SB-W#1 Rooms 267,

Disconnecting means location: PANEL 3SB-E#6 332, 467, 632

PANEL 4SB-W#9

PANEL 6SB-W#27

13.3.2 Engine-Driven Generator ☒ This system does not have a generator.

Location of generator:

Location of fuel storage: Type of fuel:

13.3.3 Uninterruptible Power System ☒ This system does not have a UPS.

Equipment powered by a UPS system:

Location of UPS system:

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): In alarm mode (minutes):

13.3.4 Batteries

Location: Type: Nominal voltage: Amp/hour rating:

Calculated capacity of batteries to drive the system:

In standby mode (hours): In alarm mode (minutes):

☐ Batteries are marked with date of manufacture ☐ Battery calculations are attached

14. RECORD OF SYSTEM INSTALLATION

Fill out after all installation is complete and wiring has been checked for opens, shorts, ground faults, and improper branching, but before confucting operational acceptance tests.

This is a: ☒ New system ☐ Modification to an existing system Permit number:

The system has been installed in accordance with the following requirements: (Note any or all that apply.)

☒ *NFPA 72*, Edition: 2007

☐ *NFPA 70, National Electrical Code*, Article 760, Edition: 2005, CEC 2007

☒ Manufacturer's published instructions

Other (specify): CBC 2007, CFC 2007, PARTS OF CFC 2010, APPROVED PLANS & SPECIFICATION

System deviations from referenced NFPA standards: NONE

Signed: Printed name: CURTIS STREETER Date:

Organization: DEEP BLUE INTEGRATION, INC. Title: PRESIDENT Phone: 888-600 0324

15. RECORD OF SYSTEM OPERATIONAL ACCEPTANCE TEST

☑ New system

All operational features and functions of this system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements for the following:

☐ Modifications to an existing system

All newly modified operational features and functions of the system were tested by, or in the presence of, the signer shown below, on the date shown below, and were found to be operating properly in accordance with the requirements of the following:

☑ *NFPA 72*, Edition: 2007

☑ *NFPA 70, National Electrical Code,* Article 760, Edition: 2005, CEC 2007

☒ Manufacturer's published instructions APPROVED PLANS + SPECIFICATIONS

Other (specify): CBC 2007, CFC 2007, PARTS OF CFC 2010

☒ Individual device testing documentation [Inspection and Testing Form (Figure 14.6.2.4) ~~is attached~~] ON CD ROM

Signed: [signature] Printed name: CURTIS STREETER Date: 8-15-13

Organization: DEEP BLUE INTEGRATION INC. Title: PRESIDENT Phone: 888-600-0324

16. CERTIFICATIONS AND APPROVALS

16.1 System Installation Contractor:

This system, as specified herein, has been installed and tested according to all NFPA standards cited herein.

Signed: [signature] Printed name: CURTIS STREETER Date: 8-15-13

Organization: DEEP BLUE INTEGRATION INC. Title: PRESIDENT Phone: 888-600-0324

16.2 System Service Contractor:

The undersigned has a service contract for this system in effect as of the date shown below.

Signed: [signature] Printed name: CURTIS STREETER Date: 8-15-13

Organization: DEEP BLUE INTEGRATION INC. Title: PRESIDENT Phone: 888-600-0324

16.3 Supervising Station:

This system, as specified herein, will be monitored according to all NFPA standards cited herein.

Signed: [signature] Printed name: CURTIS STREETER Date: 8-15-13

Organization: DEEP BLUE INTEGRATION INC. Title: PRESIDENT Phone: 888 600 0324

16. CERTIFICATIONS AND APPROVALS *(continued)*

16.4 Property or Owner Representative:

This system, as specified herein, will be monitored according to all NFPA standards cited herein.

Signed: [signature] Printed name: PERRY JUDD Date:

Organization: CAL POLY FACILITIES * CAPITAL PROJECTS Title: Phone: 805-441-2186

16.5 Authority Having Jurisdiction:

I have witnessed a satisfactory acceptance test of this system and find it to be installed and operating properly in accordance with its approved plans and specifications, with its approved sequence of operations, and with all NFPA standards cited herein.

Signed: Polly Parenti Printed name: Polly Parenti Date: 8-15-13

Organization: OSFM Title: DEPUTY STATE FIRE MARSHAL Phone: 916-845-7880

GENERAL NOTES

1. NOTIFICATION DEVICES CANNOT BE T-TAPPED. ADDRESSABLE (IDC) DEVICES CAN BE T-TAPPED. ALL FIRE ALARM CABLING SHALL SHALL BE RUN FROM DEVICE TO DEVICE, WITH NO SPLICES. ANY REQUIRED TERMINATIONS MUST BE MADE IN APPROVED BOX.

2. ALL INTERIOR INITIATING DEVICES, NOTIFICATION DEVICES, AND MODULES REQUIRE 4"SQUARE SPECIAL DEEP BACK BOXES U.O.N.

3. PANEL BACK BOXES AND OTHER LISTED BACK BOXES SHALL BE PROVIDED TO THE EC BY DBI. ALL CONTROL PANELS, POWER SUPPLIES, AND BATTERY BOXES SHALL UTILIZE ONLY FACTORY KNOCKOUTS NEAR THE TOP OF THE CAN TO ALLOW PLACEMENT OF BATTERIES.

4. ALL FIRE ALARM CONDUIT TO BE $\frac{3}{4}$" EMT MINIMUM U.O.N. FIRE ALARM CONDUIT SHALL BE SEPARATE FROM CONDUIT SYSTEM FOR SECURITY ALARM CABLING AND OTHER SYSTEMS.

5. WALL MOUNT AUDIO/VISUAL DEVICES SHALL BE MOUNTED 80" AFF TO BOTTOM OF THE STROBE LENS.

6. MANUAL PULL STATIONS SHALL BE MOUNTED 48" AFF TO CENTERLINE OF BOX. MPS SHALL BE DOUBLE ACTION AND KEYED THE SAME AS THE FACP.

7. DEDICATED 120 VAC CIRCUIT WITH LOCKOUT @ BREAKER TO BE PROVIDED BY OTHERS AT LOCATION OF PANELS AND POWER SUPPLIES.

8. KNOX BOX, PIV, SUPERVISORY SWITCHES, FLOW SWITCHES, SOLENOIDS, AND SPRINKLER BELLS SHALL BE PROVIDED BY OTHERS.

9. SMOKE DETECTORS SHALL NOT BE PLACED WITHIN 3' OF ANY SUPPLY AIR REGISTER OR WHERE THE AIR MOVEMENT EXCEEDS THE MANUFACTURER'S LISTING.

10. FIRE FIGHTER TELEPHONE RISER IS CLASS A, STYLE Z

11. VOLTAGE DROP CALCULATIONS FOR NOTIFICATION DEVICES ARE BASED ON THE LAYOUT SHOWN. DEVIATION FROM THESE PLANS COULD RESULT IN ADDITIONAL CONDUIT WORK, REENGINEERING, UPSIZED CABLE AND/OR ADDITIONAL POWER REQUIREMENTS.

12. PAINT ALL FIRE ALARM JUNCTION BOXES AND COVERS RED IN UNFINISHED AREAS (IE ABOVE CEILINGS, MECHANICAL ROOMS ETC.) IN FINISHED AREAS CONDUIT AND JUNCTION BOXES CAN BE PAINTED TO MATCH THE ROOM FINISH, THE INSIDE COVER IF THE JUNCTION BOX MUST BE IDENTIFIED AS "FIRE ALARM" AND THE CONDUIT MUST HAVE PAINTED RED BANDS $\frac{3}{4}$" WIDE AT 10' CENTERS AND AT EACH SIDE OF A FLOOR, WALL, OR CEILING PENETRATION.

13. UPON COMPLETION OF INSTALLATION OF THE FIRE ALARM SYSTEM A SATISFACTORY TEST OF THE ENTIRE SYSTEM SHALL BE MADE IN THE PRESENCE OF THE AUTHORITY HAVING JURISDICTION (AHJ).

14. ALL NOTIFICATION DEVICES SHALL BE SYNCHRONIZED.

15. A STAMPED SET OF APPROVED FIRE ALARM PLANS SHALL BE AT THE JOBSITE AND USED FOR INSTALLATION.

16. SIGNALING LINE CIRCUIT IS CLASS B, STYLE 4

17. NOTIFICATION APPLIANCE CIRCUIT IS CLASS B, STYLE Y

5

18. ALL SMOKE DETECTORS SHALL BE INSTALLED AT LEAST 1'-0" FROM FLUORESCENT LIGHT FIXTURES TO AVOID UNWANTED ALARMS AND SHALL BE INSTALLED IN AREAS THAT DO NOT EXCEED THE MANUFACTURE'S OPERATING TEMPERATURE RANGE BETWEEN 32°F AND 120°F.

CODE REGULATIONS

CALIFORNIA CODE REGULATIONS

APPLICABLE CODES

2007 BUILDING STANDARDS ADMINISTRATIVE CODE	TITLE 24 PART 1
2007 CALIFORNIA BUILDING CODE (CBC)	TITLE 24 PART 2
2007 CALIFORNIA ELECTRICAL CODE (CEC)	TITLE 24 PART 3
2007 CALIFORNIA MECHANICAL CODE (CMC)	TITLE 24 PART 4
2007 CALIFORNIA PLUMBING CODE (CPC)	TITLE 24 PART 5
2007 CALIFORNIA ENERGY CODE	TITLE 24 PART 6
2007 CALIFORNIA ELEVATOR SAFETY CONSTRUCTION CODE	TITLE 24 PART 7
2007 CALIFORNIA HISTORICAL BUILDING CODE	TITLE 24 PART 8
2007 CALIFORNIA FIRE CODE (CFC)	TITLE 24 PART 9
2007 CALIFORNIA REFERENCED STANDARDS CODE	TITLE 24 PART 12

APPLICABLE STANDARDS & GUIDELINES

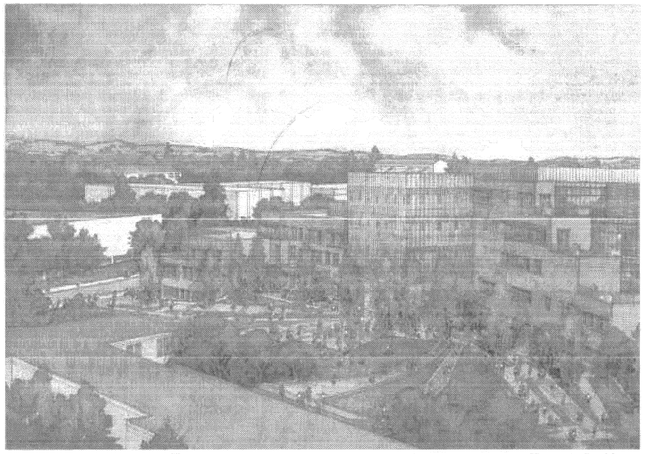
2007 AUTOMATIC SRINKLER SYSTEMS	NFPA 13
2007 STATIONARY PUMPS	NFPA 20
2007 NATIONAL FIRE ALARM CODES (CALIFORNIA AMENDED)	NFPA 72
2007 STANDARD FOR INSTALLATION OF AIR-CONDITIONING	NFPA90A
2007 STANDARD FOR INSTALLATION OF WARN AIR HEATING	NFPA 90B
2006 STANDARD FOR SMOKE-CONTROL SYSTEMS UTILIZING BARRIERS AND PRESSURE DIFFERENCES	NFPA 92A
2005 STANDARD FOR SMOKE MANAGEMENT SYSTEMS IN MALLS, ATRIA, AND LARGE SPACES	NFPA 92B

4

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CALIFORNIA 93407

FIRE ALARM & EMERGENCY COMMUNICATION SYSTEM

SITE PLAN



CENTER FOR SCIENCE

PROJECT DESCRIPTION

1. OCCUPANCY TYPE: A, B, AND H3
2. SYSTEM TYPE: CLASS B, ADDRESSABLE, MANUAL
3. METHOD OF COMMUNICATION: TELEPHONE
4. SCOPE OF WORK: FIRE ALARM & VOICE EVACUATION SYSTEMS

SEQUENCE OF OPERATIONS MATRIX

EVENT	ACTION: SUPERVISORY CONDITION AT FACU	TROUBLE CONDITION AT FACU	ALARM CONDITION AT FACU	ACTIVATE FIRE ALARM AUDIO/VISUAL DEVICES AND VOICE ALARM COMMUNICATION	DISPLAY TEXT ON LCD CONTROLLER UNIT	ACTIVATE SHUNT TRIP RELEASE FOR ELEVATOR	SHUTDOWN AIR HANDLER UNIT	ACTIVATE ELEVATOR RECALL	SHUTDOWN INDIVIDUAL ASSOCIATED DAMPERS	ACTIVATE SUPERVISORY SIGNAL TO RECEIVING STATION (CAMPUS POLICE)	ACTIVATE TROUBLE SIGNAL TO RECEIVING STATION (CAMPUS POLICE)	ACTIVATE ALARM SIGNAL TO RECEIVING STATION (CAMPUS POLICE)	DEACTIVATE MAGNETIC DOOR HOLDERS	BYPASS ALL ALARM OUTPUTS INCLUDING NOTIFICATION, SHUNTS, RELAY OUTPUTS FOR TESTING	OPEN ATRIUM DOORS WITH MOTORIZED DOOR OPERATORS	ACTIVATE ATRIUM PASSIVE SMOKE EVACUATION SYSTEM
FIRE ALARM CONTROL UNIT																
PANEL SUPERVISORY CONDITION (TEST BYBASS) ON ACM-24 AT	X				X						X				X	
PANEL TROUBLE CONDITION (AC POWER FAIL, LOW BATTERY, OPEN CIRCUIT, GROUND FAULT, ETC.)		X			X							X				
PANEL ALARM CONDITION			X	X	X		X			X			X			
MANUAL PULL STATION ACTIVATION			X	X	X					X			X			
SPOT SMOKE DETECTOR ACTIVATION			X	X	X					X			X			
DUCT SMOKE DETECTOR ACTIVATION			X	X	X				X	X			X			
AIR HANDLING UNIT DUCT SMOKE DETECTOR ACTIVATION			X	X	X		X						X			
SPRINKLER TAMPER SWITCH	X				X						X		X			
SPRINKLER WATER FLOW ACTIVATION			X	X	X					X			X			
FIRE PUMP RUNNING			X	X	X					X			X			
FIRE PUMP LOSS OF PH ASE	X				X						X					
FIRE PUMP PHASE REVERSAL	X				X						X		X			
HEAT DETECTOR ACTIVATION (ELEVATOR EQUIPMENT)			X	X	X	X				X			X			
ELEVATOR LOBBY/ EMR SMOKE / ELEVATOR HOISTWAYS			X	X	X			X		X			X			
SHUNT TRIP POWER SUPERVISION	X				X						X					
GENERAL ALARM (ANYWHERE WITHIN THE BUILDING)			X	X	X		X			X			X			
ATRIUM SMOKE CONTORL SYSTEM ALARM			X	X	X					X			X		X	X
BEAM SMOKE DETECTION WITHIN ATRIUM			X	X	X					X			X		X	X
PULL STATION WITHIN ATRIUM			X	X	X					X			X		X	X
SPRINKLER WATER FLOW WITHIN ATRIUM			X	X	X					X			X		X	X

2 3 4

SYMBOL LEGEND

	COUNT	FIRE ALARM SYMBOLS		MODEL #	CSFM LISTING #
6	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
5	0	H	HEAT DETECTOR	FST-851	7270-0028:196
5	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
2	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
2	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
6	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
6	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
6	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
6	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
5	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
4	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

AS-BUILT SET

COVER SHEET

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#8864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

SYMBOL	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 093.1 & FI 99	4/11/2012	
3	SFM REVIEW COMMENTS	8/20/2012	
4	CRB 95.2	1/15/2013	
5	FA & SMOKE CONTROL SFM COMMENTS	4/3/2013	
6	AS-BUILT DRAWINGS	8/23/2013	

DATE: 08/23/2013
SCALE:
DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter
DRAWN BY: Derek Richardson
CHECKED BY: CURTIS STREETER, SET NICET IV #102972
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA
CSFM #18-40-03-0001

SHEET ID
FA-0

SYMBOL LEGEND

	COUNT	FIRE ALARM SYMBOLS		MODEL #	CSFM LISTING #
A	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
A	0	H	HEAT DETECTOR	FST-851	7270-0028:196
A	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
A	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
A A	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
A	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
A	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
A	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
A	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
A	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
A	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

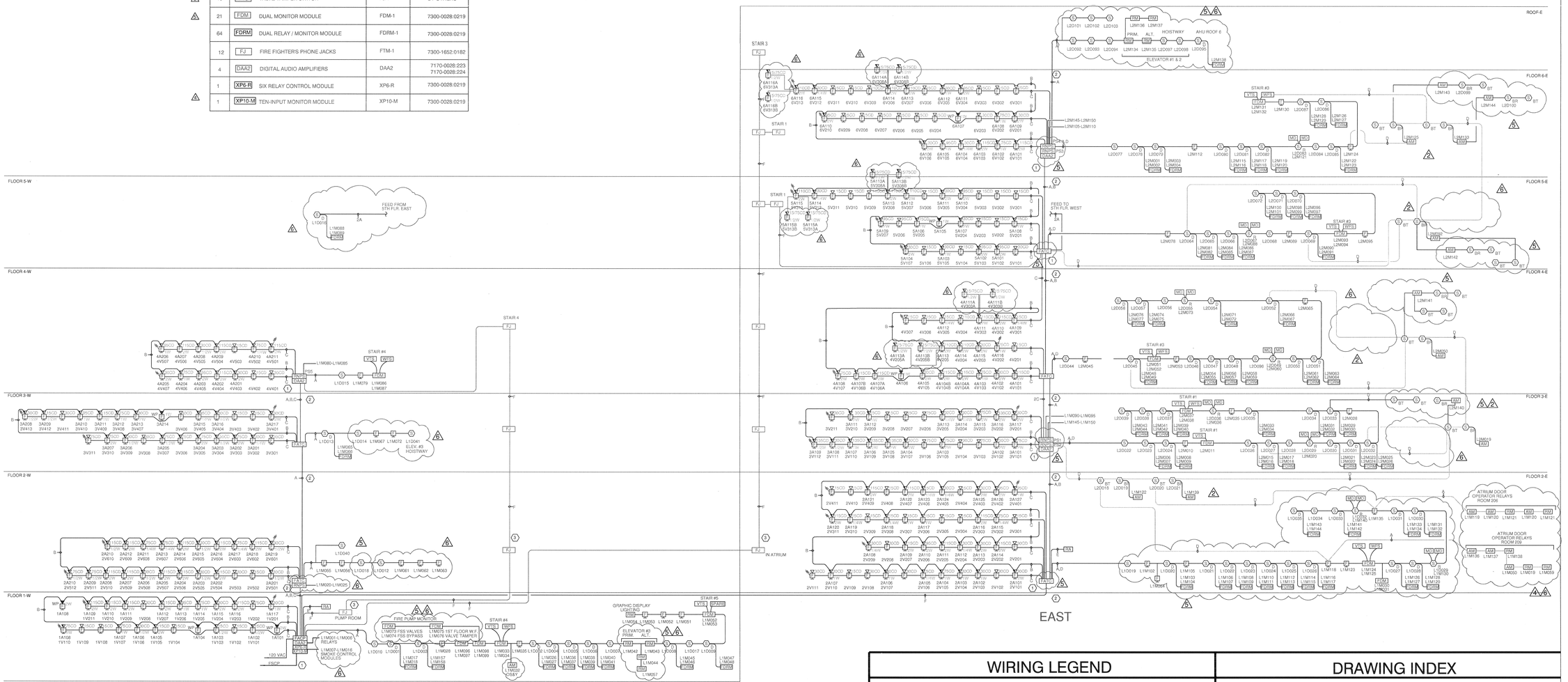
GENERAL NOTES:

1. The Notification Appliance Circuits vary between 14 AWG and 12 AWG, see voltage drops for correct sizing.
5 2. All smoke detectors shall be placed at least 1'-0" from fluorescent light fixtures to avoid unwanted alarms and in areas that will not exceed manufacture's specified operating temperature 32°F to 120°F.

SHEET NOTES:

1. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.
2. The riser going between floors will be in 2" conduit or larger.
3. 6.10.1.16* All circuits necessary for the operation of two-way telephone communication systems shall be installed using one of the following methods:
   (1) A 2-hour fire rated circuit integrity (CI) cable
   (2) A 2-hour fire rated cable system (electrical circuit protective system)
   (3) A 2-hour fire rated enclosure
   (4) Performance alternatives approved by the authority having jurisdiction
   (5) Buildings fully protected by an automatic sprinkler system installed in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, with the wiring or cables installed in metal raceways and in accordance with Article 760 of NFPA 70

A.6.10.1.16 One or more of the following means might be considered acceptable to provide a level of survivability consistent with the intent of this requirement:
   (1) Routing two-way telephone circuits separately
   (2) Using short-circuit fault tolerant circuits



FIRE ALARM RISER DIAGRAM
NTS

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆60DBI◆2034 FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

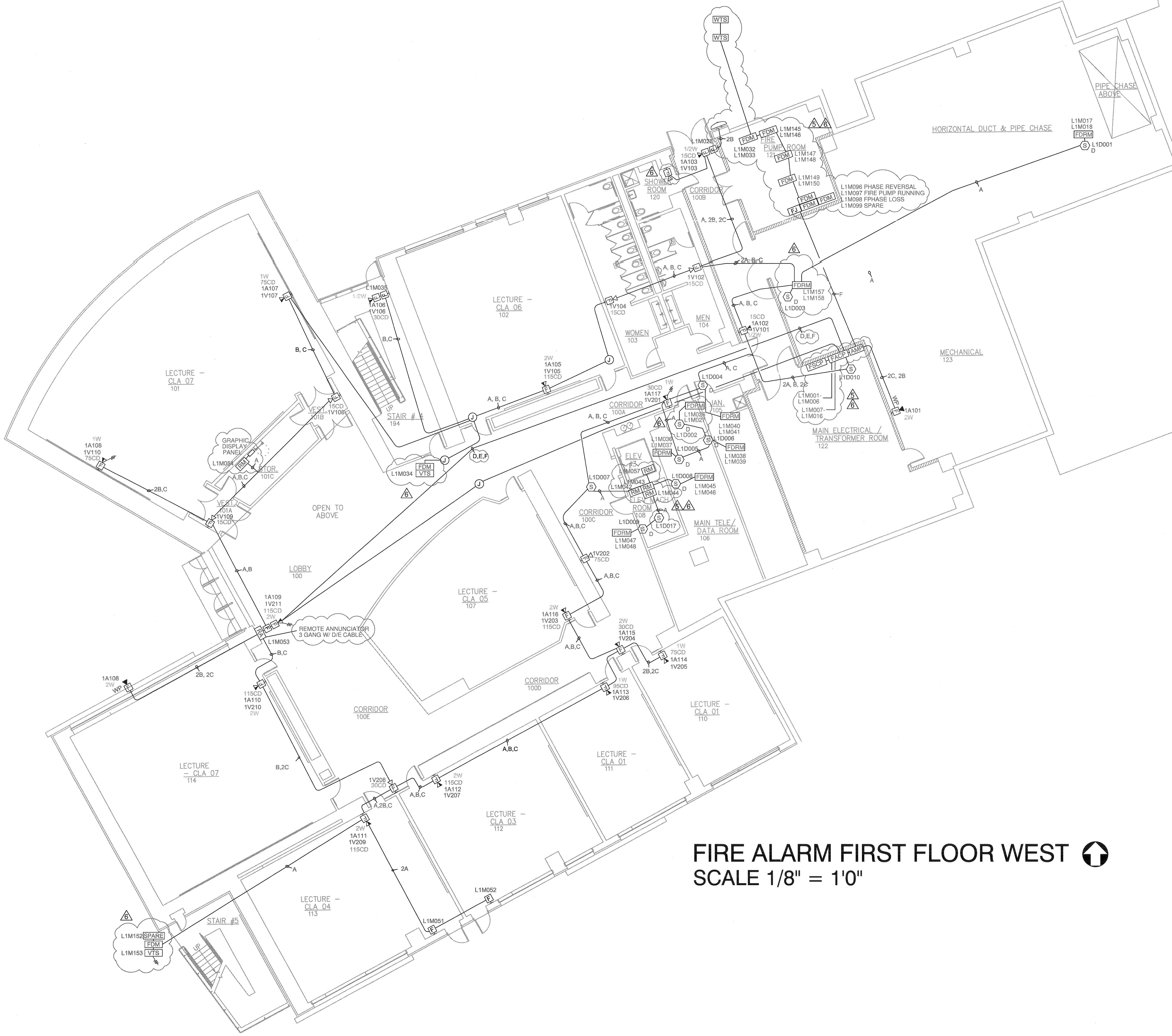
	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRS # 1093.1 & FI 99	5/18/2012	
3	SFM REVIEW COMMENTS	4/11/2012	
4	CRS 93.2	8/20/2012	
5	FA & SMOKE CONTROL SFM COMMENTS	1/15/2013	
6	AS-BUILT DRAWINGS	4/3/2013	
	SYMBOL	8/23/2013	

DATE: 08/23/2013
SCALE:
DRAWING CODE: FA ALL DRAWINGS CP/CFS
DESIGNED BY: Curtis Streeter
DRAWN BY: Derek Richardson
CHECKED BY: CURTIS STREETER, SET NICET IV #102872
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID
FA 1.0



FIRE ALARM FIRST FLOOR WEST

SCALE 1/8" = 1'0"

SYMBOL LEGEND

	COUNT	FIRE ALARM SYMBOLS		MODEL #	CSFM LISTING #
6	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
5	0	H	HEAT DETECTOR	FST-851	7270-0028:196
5	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
5	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
2	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
6	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
6	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
6	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
6	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
5	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
4	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

SYMBOL	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 093.1 & FI 99	5/18/2012 4/11/2012	
3	SFM REVIEW COMMENTS	8/20/2012	
4	CRB 93.2	1/15/2013	
5	FA & SMOKE CONTROL SFM COMMENTS	4/3/2013	
6	AS-BUILT DRAWINGS	8/23/2013	

DESIGNED BY: Curtis Streeter
DRAWN BY: Derek Richardson
CHECKED BY: CURTIS STREETER, SET NICET IV #102672
PROJECT ENGINEER: Integral Design Associates INC.

DATE: 08/23/2013
SCALE:
DRAWING CODE: FA ALL DRAWINGS CPCFS

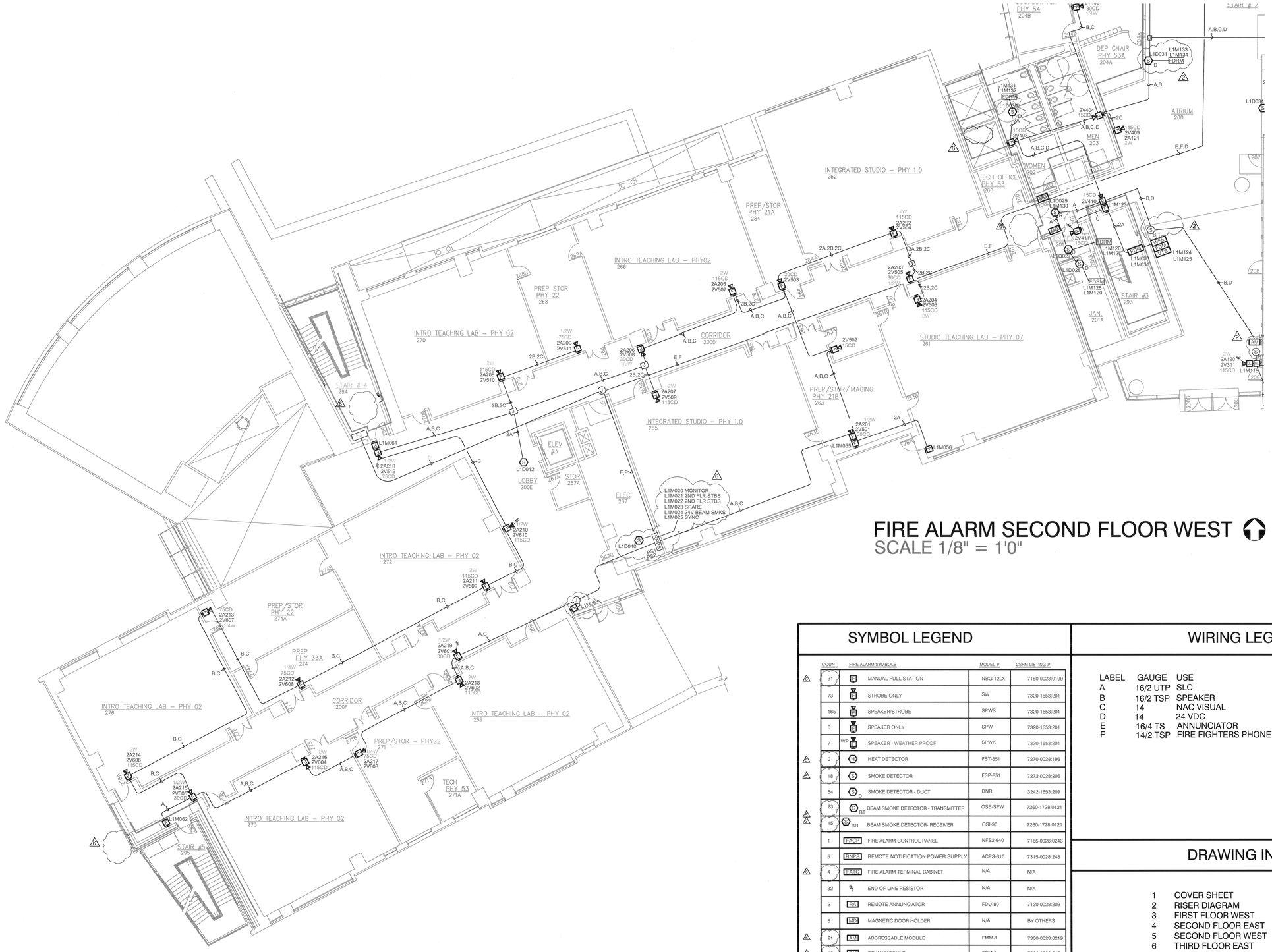
CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY

SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.01W



FIRE ALARM SECOND FLOOR WEST

SCALE 1/8" = 1'0"

SYMBOL LEGEND

	COUNT		FIRE ALARM SYMBOLS	MODEL #	CSFM LISTING #
⚠	31	M	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73		STROBE ONLY	SW	7320-1653:201
	165		SPEAKER/STROBE	SPWS	7320-1653:201
	6		SPEAKER ONLY	SPW	7320-1653:201
	7	WP	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
⚠	0	H	HEAT DETECTOR	FST-851	7270-0028:196
⚠	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
⚠	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
⚠	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
⚠	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
⚠	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
⚠	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
⚠	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
⚠	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
⚠	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆60004◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 093.1 & FI 99	5/18/2012 4/11/2012	
3	SFM REVIEW COMMENTS	8/20/2012	
4	CRB 93.2	1/15/2013	
5	FA & SMOKE CONTROL SFM COMMENTS	4/3/2013	
6	AS-BUILT DRAWINGS	8/23/2013	

DATE: 08/23/2013

SCALE:

DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter

DRAWN BY: Derek Richardson

CHECKED BY: CURTIS STREETER, SET NICET IV # 060972

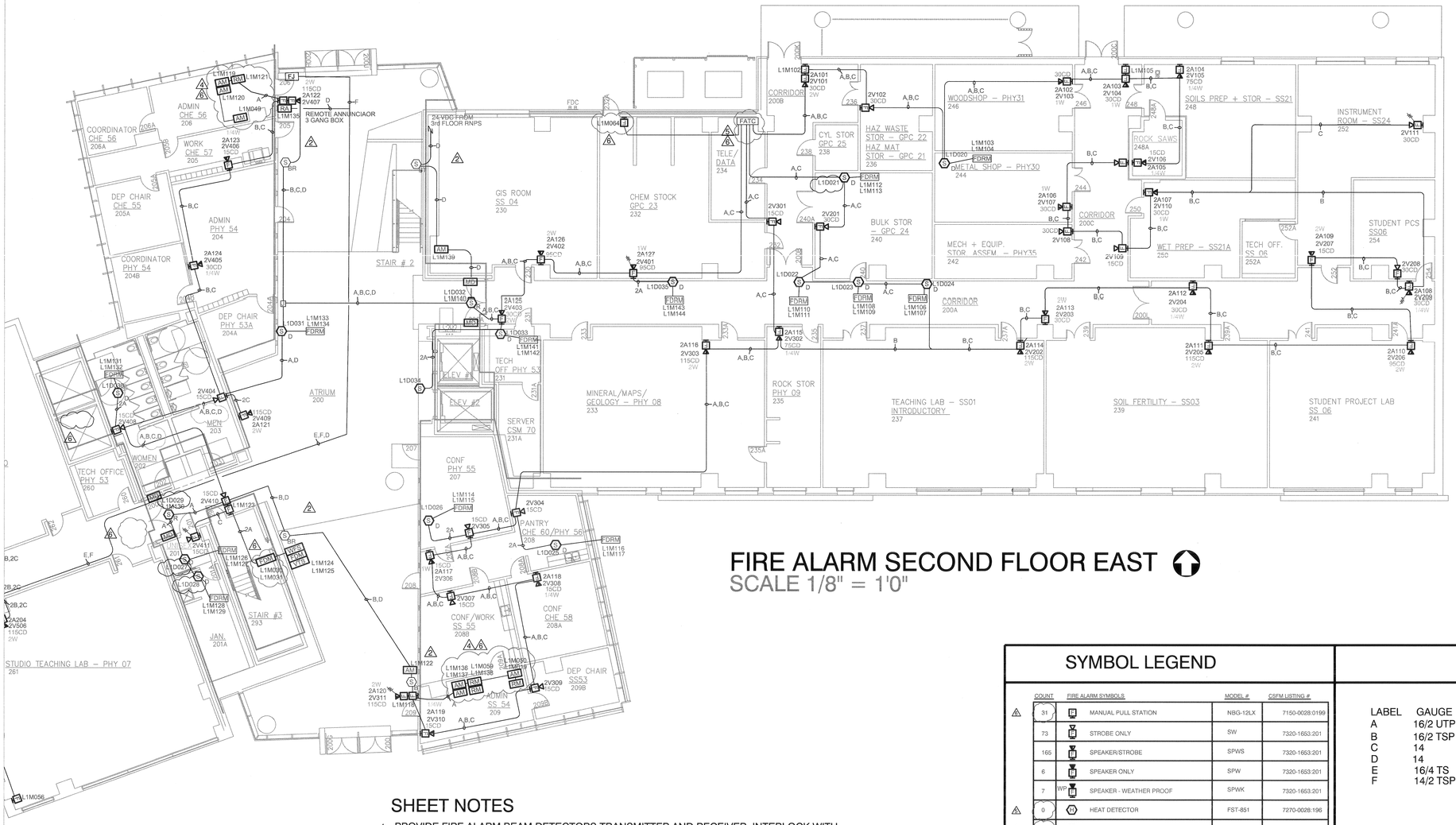
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.02W



FIRE ALARM SECOND FLOOR EAST

SCALE 1/8" = 1'0"

SHEET NOTES

1 PROVIDE FIRE ALARM BEAM DETECTORS TRANSMITTER AND RECEIVER. INTERLOCK WITH SMOKE EVACUATION SYSTEM SUCH THAT WHEN BEAM DETECTOR IS ACTIVATED, SMOKE EVACUATION SYSTEM IS ACTIVATED. REFER TO DETAIL 4 & 5/FA5.0.

2 ACTIVATION OF A MANUAL PULL STATION, BEAM DETECTOR OR SPRINKLER WATER FLOW WITHIN THE ATRIUM SHALL ACTIVATE ATRIUM SMOKE EVACUATION SYSTEM. SMOKE EVACUATION SYSTEM SHALL FUNCTION AS DIRECTED BY MECHANICAL DOCUMENTS. REFER TO DETAIL 9/M5.05 FOR ADDITIONAL INFORMATION.

3 ACTIVATION OF AN ALARM ANYWHERE WITHIN THE BUILDING SHALL SHUT DOWN ALL AIR HANDLING UNITS.

4 ACTIVATION OF THE ATRIUM SMOKE CONTROL SYSTEM SHALL OPEN ALL ATRIUM DOORS WITH MOTORIZED DOOR OPERATORS.

SYMBOL LEGEND

	COUNT	FIRE ALARM SYMBOLS		MODEL #	CSFM LISTING #
⚠	31		MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73		STROBE ONLY	SW	7320-1653:201
	165		SPEAKER/STROBE	SPWS	7320-1653:201
	6		SPEAKER ONLY	SPW	7320-1653:201
	7	WP	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
⚠	0	H	HEAT DETECTOR	FST-851	7270-0028:196
⚠	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
⚠ ⚠	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
⚠ ⚠	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
⚠	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
⚠	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
⚠	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
⚠	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
⚠	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAAC	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
⚠	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

SYMBOL	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # F093.1 & F199	5/18/2012	
3	SFM REVIEW COMMENTS	4/11/2012	
4	CRB 93.2	8/20/2012	
5	FA & SMOKE CONTROL SFM COMMENTS	11/5/2013	
6	AS-BUILT DRAWINGS	4/3/2013	
		8/23/2013	

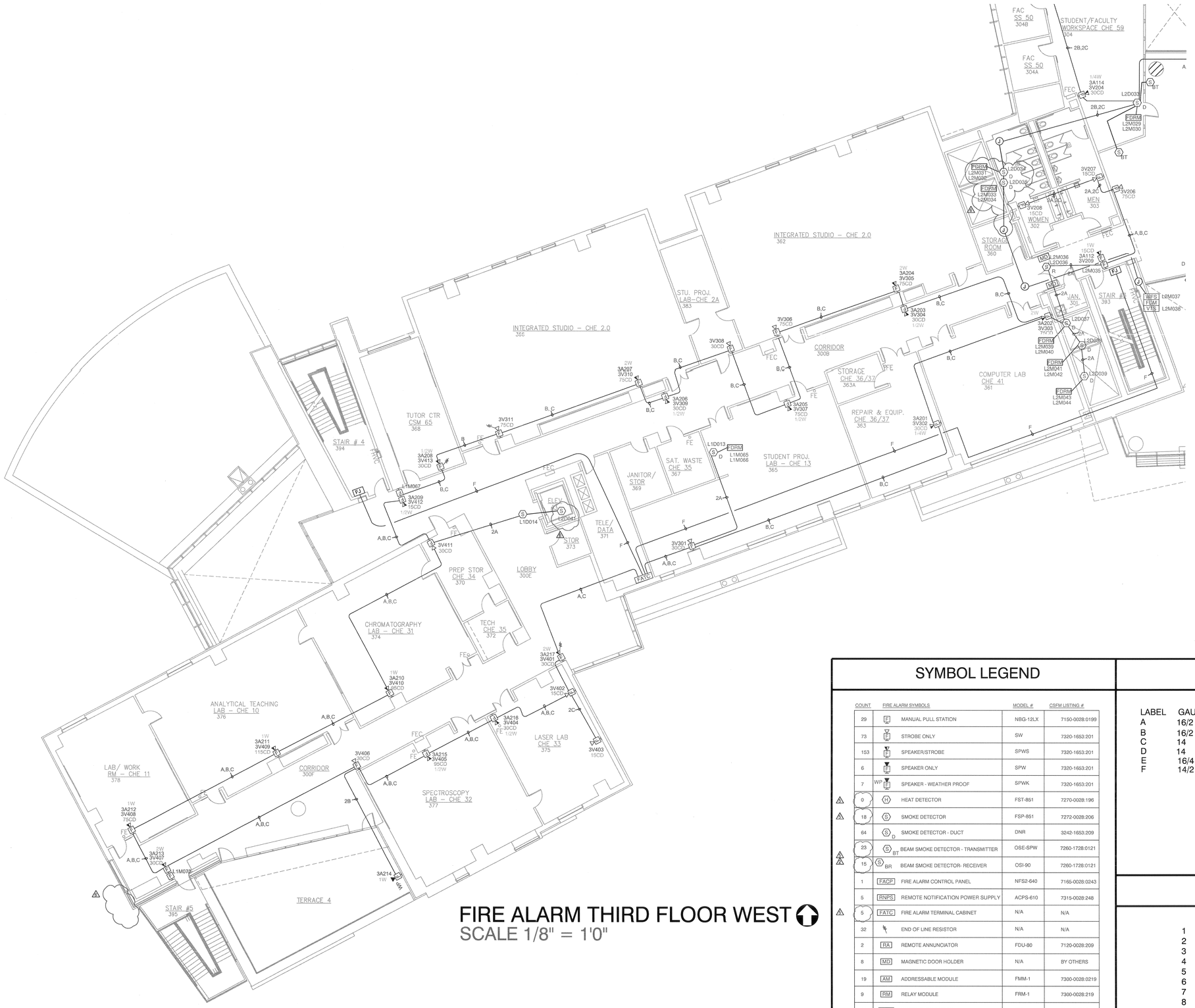
DESIGNED BY: Curtis Streeter
DRAWN BY: Derek Richardson
CHECKED BY: CURTIS STREETER, SET NICET IV #102872
PROJECT ENGINEER: Integral Design Associates INC.
DATE: 08/23/2013
SCALE:
DRAWING CODE: FA ALL DRAWINGS CPCFS

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.02E



FIRE ALARM THIRD FLOOR WEST
SCALE 1/8" = 1'0"

SYMBOL LEGEND

	COUNT		FIRE ALARM SYMBOLS	MODEL #	CSFM LISTING #
	29	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	153	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
4	0	H	HEAT DETECTOR	FST-851	7270-0028:196
4	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
4	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
4	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
4	5	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
	19	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
	9	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
4	22	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
4	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
4	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	8/14/2011	
2	CRS # 1993.1 & FI 99	5/16/2012	
3	SFM REVIEW COMMENTS	4/11/2012	
4	CRS 93.2	8/20/2012	
5	FA & SMOKE CONTROL SFM COMMENTS	1/15/2013	
6	AS-BUILT DRAWINGS	4/3/2013	
		8/23/2013	

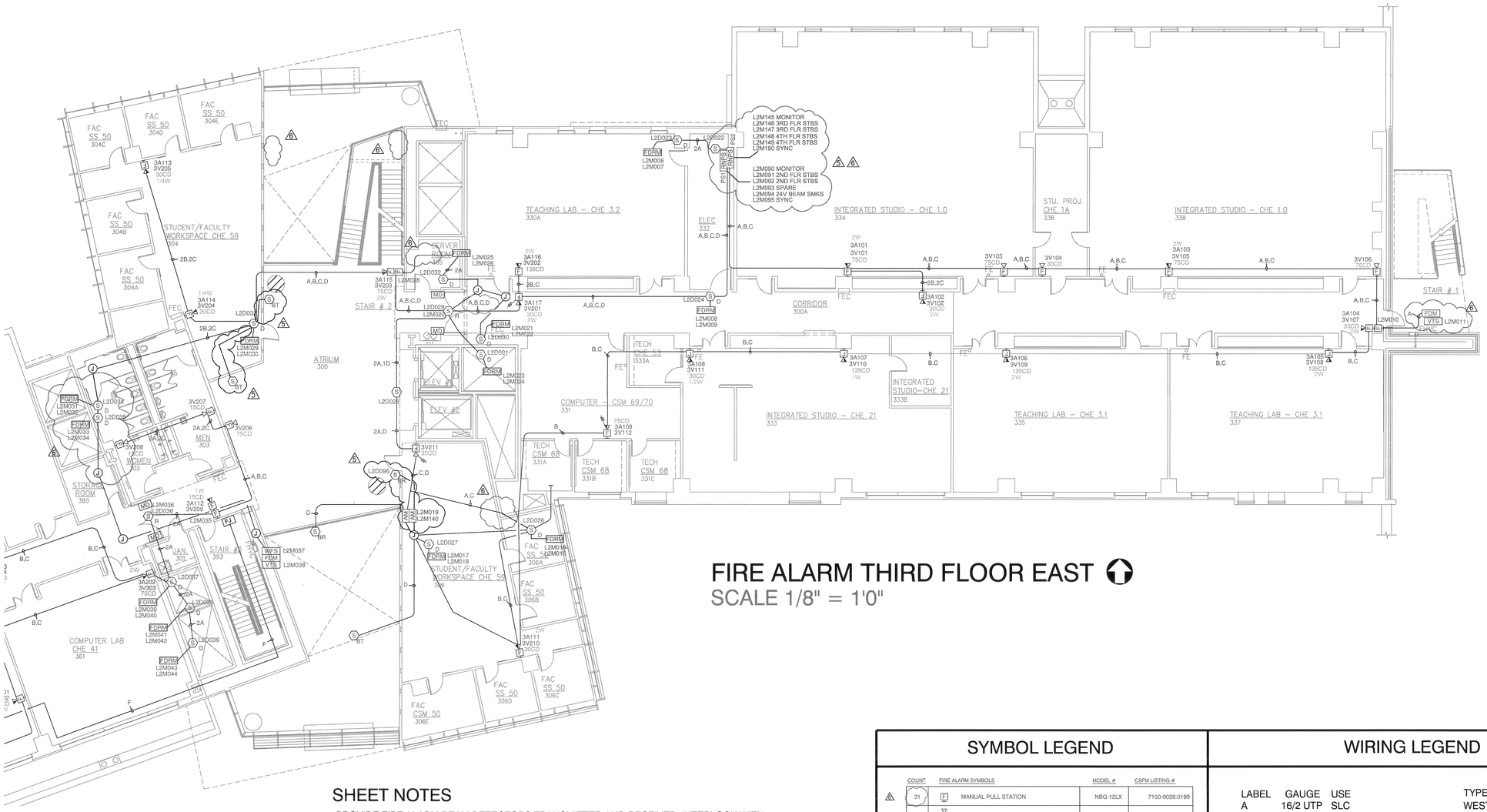
STYMROL

DATE: 08/23/2013
SCALE:
DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter
DRAWN BY: Derek Richardson
CHECKED BY: CURTIS STREETER, SET NICET IV # 102672
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA
CSFM #18-40-03-0001

SHEET ID
FA 3.03W



FIRE ALARM THIRD FLOOR EAST

SCALE 1/8" = 1'0"

SHEET NOTES

1 PROVIDE FIRE ALARM BEAM DETECTORS TRANSMITTER AND RECEIVER. INTERLOCK WITH SMOKE EVACUATION SYSTEM SUCH THAT WHEN BEAM DETECTOR IS ACTIVATED, SMOKE EVACUATION SYSTEM IS ACTIVATED. REFER TO DETAIL 4 & 5/FA5.0.

2 ACTIVATION OF A MANUAL PULL STATION, BEAM DETECTOR OR SPRINKLER WATER FLOW WITHIN THE ATRIUM SHALL ACTIVATE ATRIUM SMOKE EVACUATION SYSTEM. SMOKE EVACUATION SYSTEM SHALL FUNCTION AS DIRECTED BY MECHANICAL DOCUMENTS. REFER TO DETAIL 9/M5.05 FOR ADDITIONAL INFORMATION.

3 ACTIVATION OF AN ALARM ANYWHERE WITHIN THE BUILDING SHALL SHUT DOWN ALL AIR HANDLING UNITS.

4 ACTIVATION OF THE ATRIUM SMOKE CONTROL SYSTEM SHALL OPEN ALL ATRIUM DOORS WITH MOTORIZED DOOR OPERATORS.

SYMBOL LEGEND

SYMBOL	COUNT	FIRE ALARM SYMBOLS		MODEL #	CSFM LISTING #
	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
2	0	H	HEAT DETECTOR	FST-851	7270-0028:196
2	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
2 4	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
2 4	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
2	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
2	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
2	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
2	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
2	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
2	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#8864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

SYMBOL	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 1093.1 & FI 99	5/18/2012 4/17/2012	
3	SFM REVIEW COMMENTS	8/20/2012	
4	CRB 93.2	1/15/2013	
5	FA & SMOKE CONTROL SFM COMMENTS	4/3/2013	
6	AS-BUILT DRAWINGS	8/23/2013	

DATE: 08/23/2013

SCALE:

DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter

DRAWN BY: Derek Richardson

CHECKED BY: CURTIS STREETER SET NICET IV # 182872

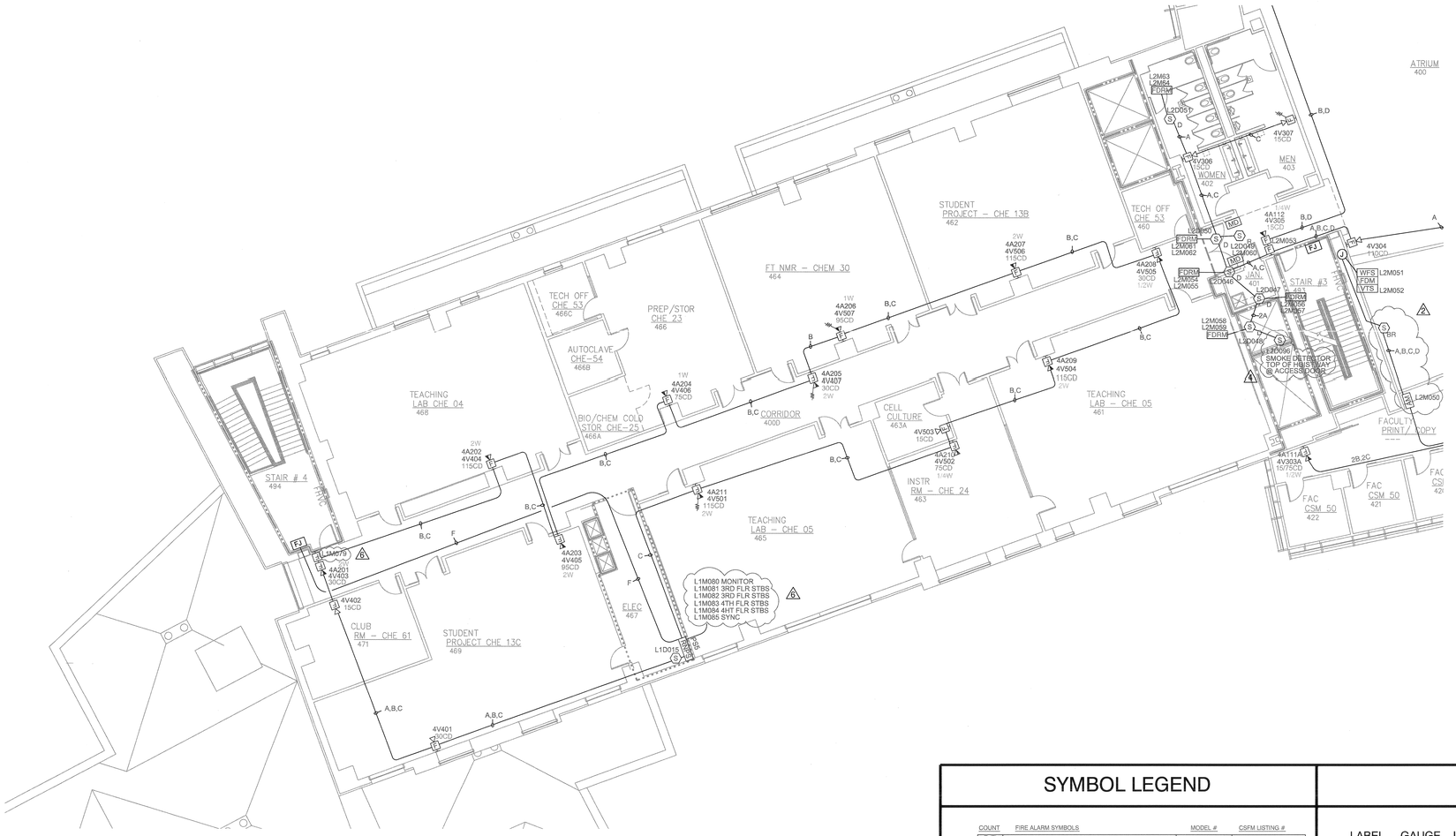
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.03E



FIRE ALARM FOURTH FLOOR WEST

SCALE 1/8" = 1'0"

SYMBOL LEGEND

	COUNT	FIRE ALARM SYMBOLS	MODEL #	CSFM LISTING #
	31	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	STROBE ONLY	SW	7320-1653:201
	165	SPEAKER/STROBE	SPWS	7320-1653:201
	6	SPEAKER ONLY	SPW	7320-1653:201
	7	WP SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
4	0	HEAT DETECTOR	FST-851	7270-0028:196
4	18	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
4	23	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
4	15	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
4	4	FATC FIRE ALARM TERMINAL CABINET	N/A	N/A
	32	END OF LINE RESISTOR	N/A	N/A
	2	RA REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD MAGNETIC DOOR HOLDER	N/A	BY OTHERS
4	21	AM ADDRESSABLE MODULE	FMM-1	7300-0028:0219
4	12	RM RELAY MODULE	FRM-1	7300-0028:219
	16	WFS WATER FLOW SWITCH	N/A	BY OTHERS
4	10	VTS VALVE TAMPER SWITCH	N/A	BY OTHERS
4	21	FDM DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2 DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
4	1	XP10-M TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

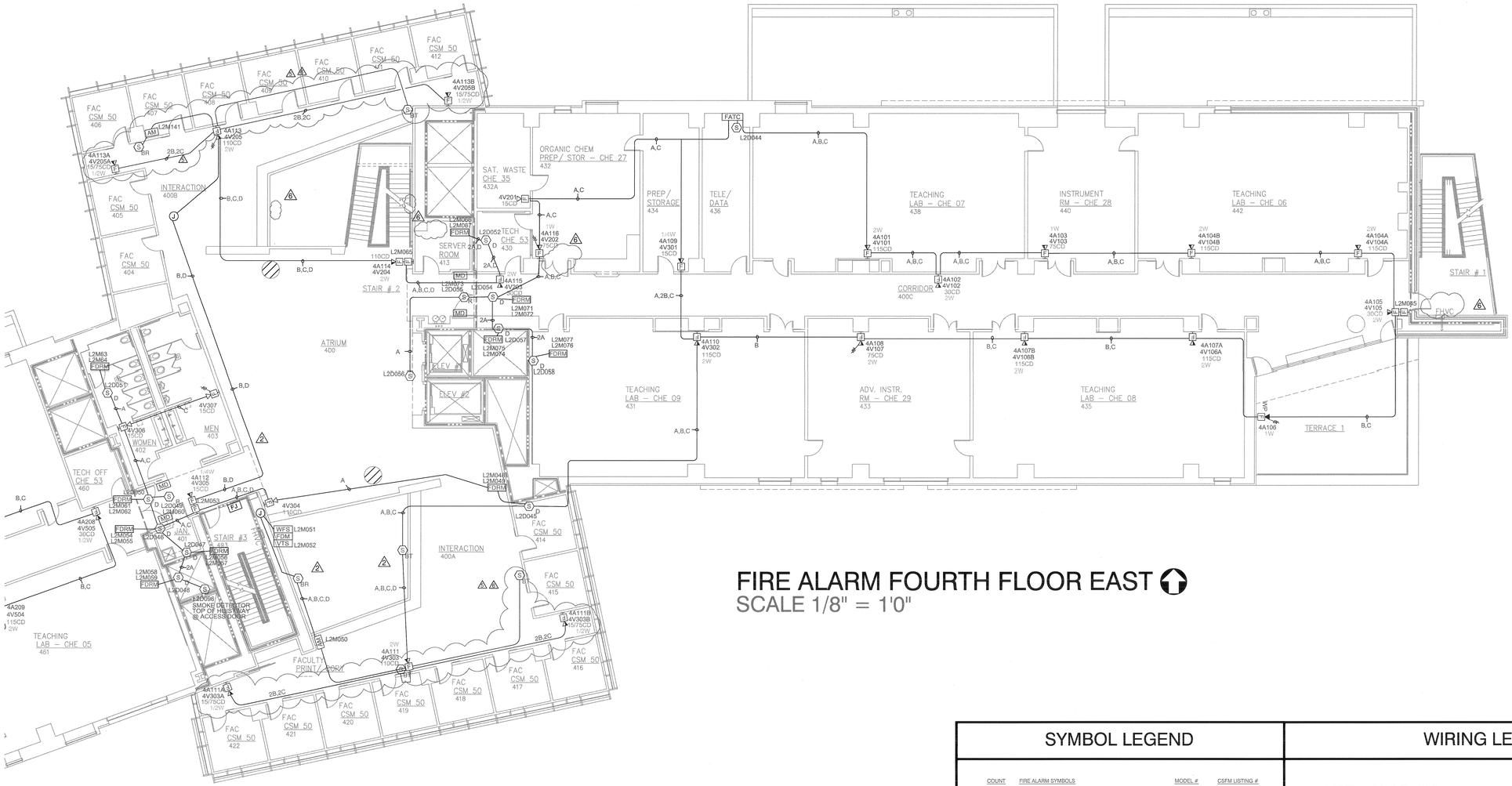
SYMBOL	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 1093.1 & FI 99	5/18/2012	
3	SFM REVIEW COMMENTS	4/11/2012	
4	CRB 95.2	8/20/2012	
5	FA & SMOKE CONTROL SFM COMMENTS	11/5/2013	
6	AS BUILT DRAWINGS	4/3/2013	
		8/23/2013	

DATE: 08/23/2013
SCALE:
DRAWING CODE: FA ALL DRAWINGS CPCFS
DESIGNED BY: Curtis Streeter
DRAWN BY: Derek Richardson
CHECKED BY: CURTIS STREETER, SET NICET IV # 102672
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID
FA 3.04W



FIRE ALARM FOURTH FLOOR EAST

SCALE 1/8" = 1'0"

SHEET NOTES

1 PROVIDE FIRE ALARM BEAM DETECTORS TRANSMITTER AND RECEIVER. INTERLOCK WITH SMOKE EVACUATION SYSTEM SUCH THAT WHEN BEAM DETECTOR IS ACTIVATED, SMOKE EVACUATION SYSTEM IS ACTIVATED. REFER TO DETAIL 4 & 5/FA5.0.

2 ACTIVATION OF A MANUAL PULL STATION, BEAM DETECTOR OR SPRINKLER WATER FLOW WITHIN THE ATRIUM SHALL ACTIVATE ATRIUM SMOKE EVACUATION SYSTEM. SMOKE EVACUATION SYSTEM SHALL FUNCTION AS DIRECTED BY MECHANICAL DOCUMENTS. REFER TO DETAIL 9/M5.05 FOR ADDITIONAL INFORMATION.

3 ACTIVATION OF AN ALARM ANYWHERE WITHIN THE BUILDING SHALL SHUT DOWN ALL AIR HANDLING UNITS.

4 ACTIVATION OF THE ATRIUM SMOKE CONTROL SYSTEM SHALL OPEN ALL ATRIUM DOORS WITH MOTORIZED DOOR OPERATORS.

SYMBOL LEGEND

	COUNT	FIRE ALARM SYMBOLS		MODEL #	CSFM LISTING #
⚠	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
⚠	0	H	HEAT DETECTOR	FST-851	7270-0028:196
⚠	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
⚠	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
⚠	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
⚠	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
⚠	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
⚠	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
⚠	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
⚠	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
⚠	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

SYMBOL	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 093.1 & FI 99	5/15/2012	
3	SFM REVIEW COMMENTS	8/20/2012	
4	CRB 93.2	1/15/2013	
5	FA & SMOKE CONTROL SFM COMMENTS	4/3/2013	
6	AS-BUILT DRAWINGS	8/23/2013	

DATE: 08/23/2013

SCALE:

DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter

DRAWN BY: Derek Richardson

CHECKED BY: CURTIS STREETER, SET NICET IV # 102572

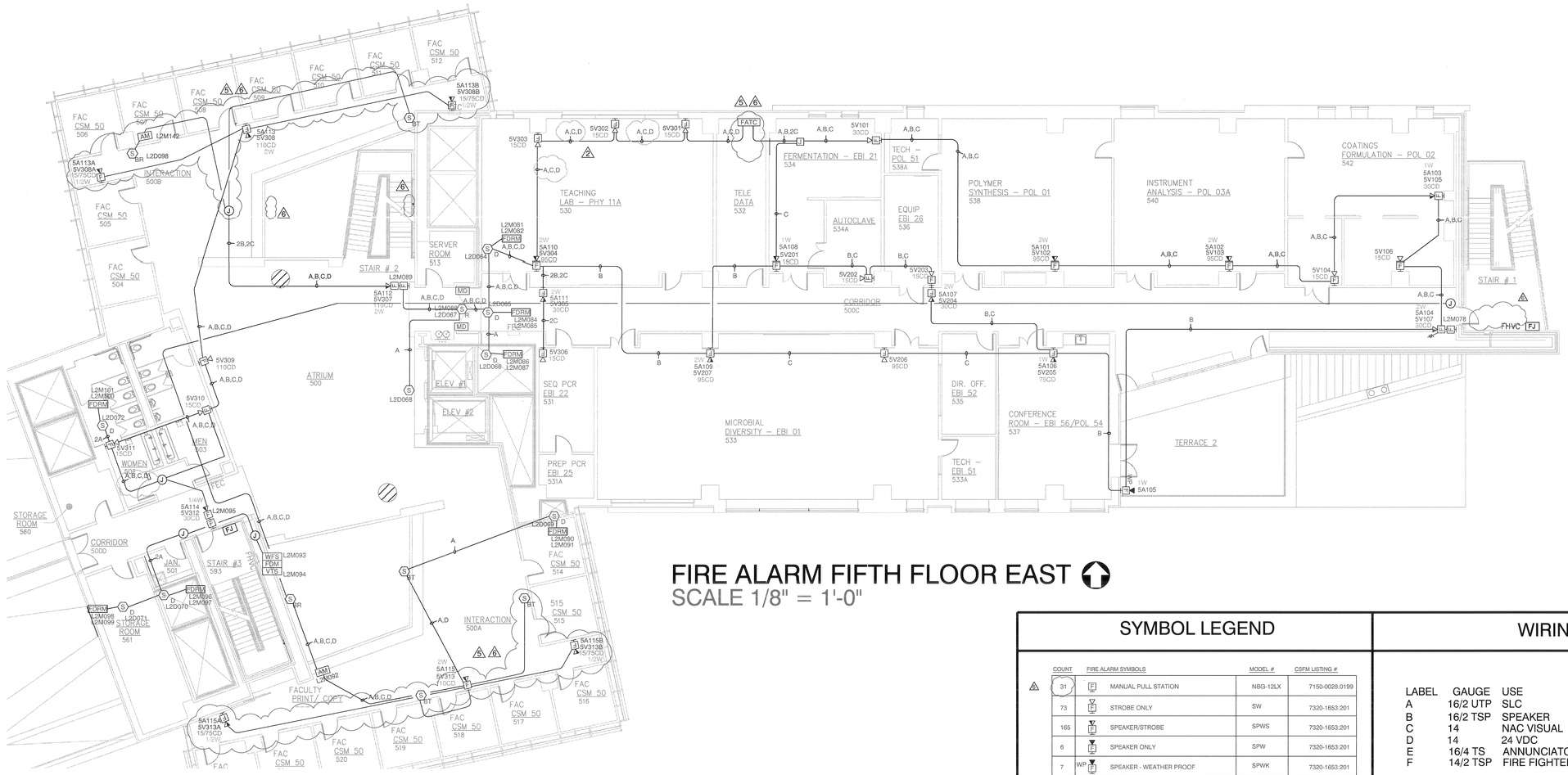
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.04E



FIRE ALARM FIFTH FLOOR EAST

SCALE 1/8" = 1'-0"

SHEET NOTES

1 PROVIDE FIRE ALARM BEAM DETECTORS TRANSMITTER AND RECEIVER. INTERLOCK WITH SMOKE EVACUATION SYSTEM SUCH THAT WHEN BEAM DETECTOR IS ACTIVATED, SMOKE EVACUATION SYSTEM IS ACTIVATED. REFER TO DETAIL 4 & 5/FA5.0.

2 ACTIVATION OF A MANUAL PULL STATION, BEAM DETECTOR OR SPRINKLER WATER FLOW WITHIN THE ATRIUM SHALL ACTIVATE ATRIUM SMOKE EVACUATION SYSTEM. SMOKE EVACUATION SYSTEM SHALL FUNCTION AS DIRECTED BY MECHANICAL DOCUMENTS. REFER TO DETAIL 9/M5.05 FOR ADDITIONAL INFORMATION.

3 ACTIVATION OF AN ALARM ANYWHERE WITHIN THE BUILDING SHALL SHUT DOWN ALL AIR HANDLING UNITS.

4 ACTIVATION OF THE ATRIUM SMOKE CONTROL SYSTEM SHALL OPEN ALL ATRIUM DOORS WITH MOTORIZED DOOR OPERATORS.

SYMBOL LEGEND

	COUNT	FIRE ALARM SYMBOLS		MODEL #	CSFM LISTING #
⚠	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
⚠	0	H	HEAT DETECTOR	FST-851	7270-0028:196
⚠	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
⚠ ⚠	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
⚠ ⚠	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
⚠	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
⚠	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
⚠	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
⚠	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
⚠	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0162
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
⚠	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 0951.1 & FI 99	5/18/2012 4/11/2012	
3	SFM REVIEW COMMENTS	8/20/2012	
4	CRB 93.2	1/15/2013	
5	FA & SMOKE CONTROL SFM COMMENTS	4/3/2013	
6	AS-BUILT DRAWINGS	8/23/2013	
SYMBOL			

DATE: 08/23/2013

SCALE:

DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter

DRAWN BY: Derek Richardson

CHECKED BY: CURTIS STREETER, SET NICET IV # 053572

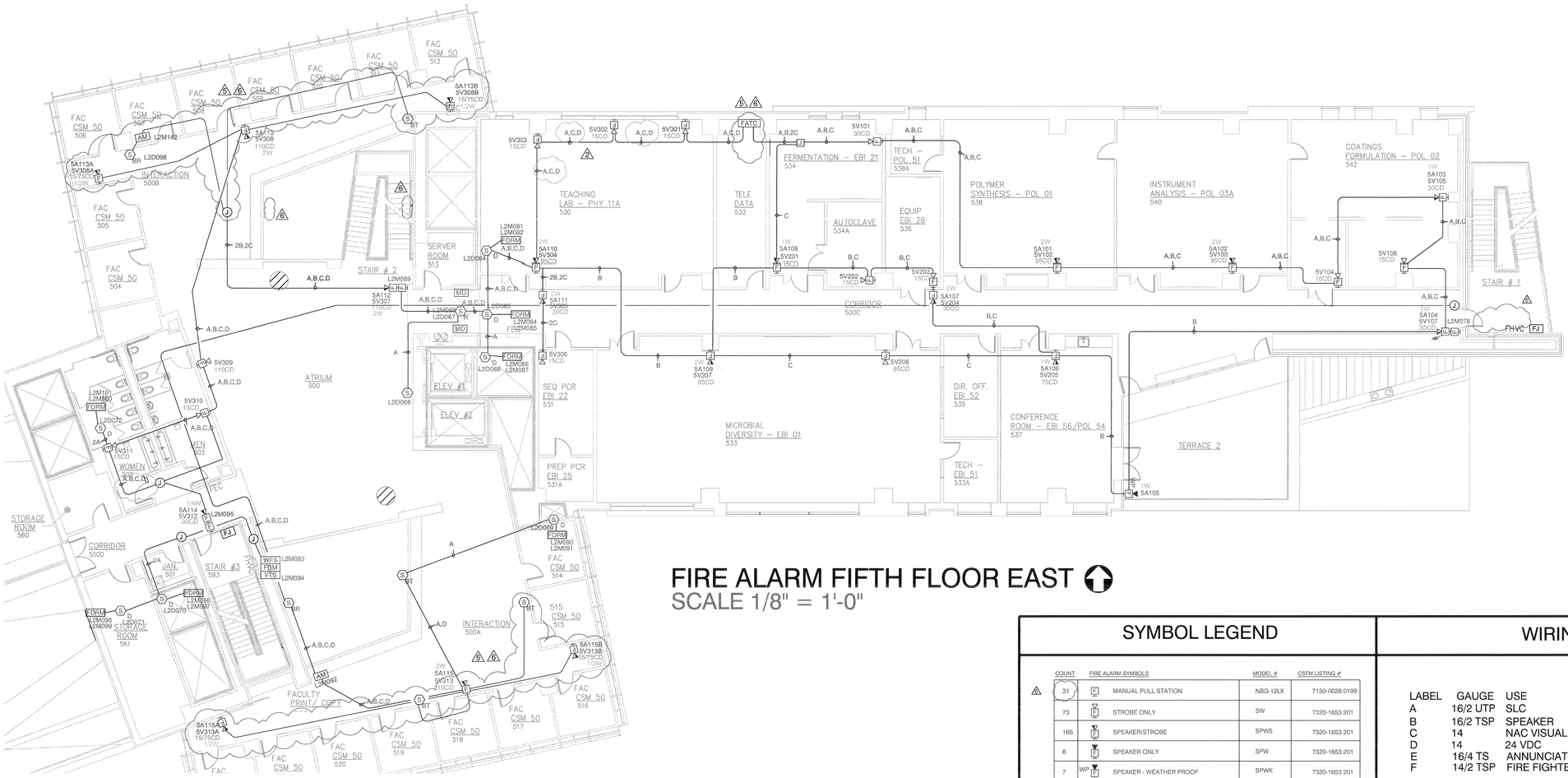
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.05E



FIRE ALARM FIFTH FLOOR EAST

SCALE 1/8" = 1'-0"

SHEET NOTES

1 PROVIDE FIRE ALARM BEAM DETECTORS TRANSMITTER AND RECEIVER. INTERLOCK WITH SMOKE EVACUATION SYSTEM SUCH THAT WHEN BEAM DETECTOR IS ACTIVATED, SMOKE EVACUATION SYSTEM IS ACTIVATED. REFER TO DETAIL 4 & 5/FA5.0.

2 ACTIVATION OF A MANUAL PULL STATION, BEAM DETECTOR OR SPRINKLER WATER FLOW WITHIN THE ATRIUM SHALL ACTIVATE ATRIUM SMOKE EVACUATION SYSTEM. SMOKE EVACUATION SYSTEM SHALL FUNCTION AS DIRECTED BY MECHANICAL DOCUMENTS. REFER TO DETAIL 9/M5.05 FOR ADDITIONAL INFORMATION.

3 ACTIVATION OF AN ALARM ANYWHERE WITHIN THE BUILDING SHALL SHUT DOWN ALL AIR HANDLING UNITS.

4 ACTIVATION OF THE ATRIUM SMOKE CONTROL SYSTEM SHALL OPEN ALL ATRIUM DOORS WITH MOTORIZED DOOR OPERATORS.

SYMBOL LEGEND

	COUNT		FIRE ALARM SYMBOLS	MODEL #	CSFM LISTING #
	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
⚠	0	H	HEAT DETECTOR	FST-851	7270-0028:196
⚠	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
⚠	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
⚠	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
⚠	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
⚠	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
⚠	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
⚠	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
⚠	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
⚠	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 093.1.6 FI 99	4/11/2012	
3	SFM REVIEW COMMENTS	8/20/2012	
4	CRB 93.2	1/15/2013	
5	FA & SMOKE CONTROL SFM COMMENTS	4/3/2013	
6	AS-BUILT DRAWINGS	8/23/2013	

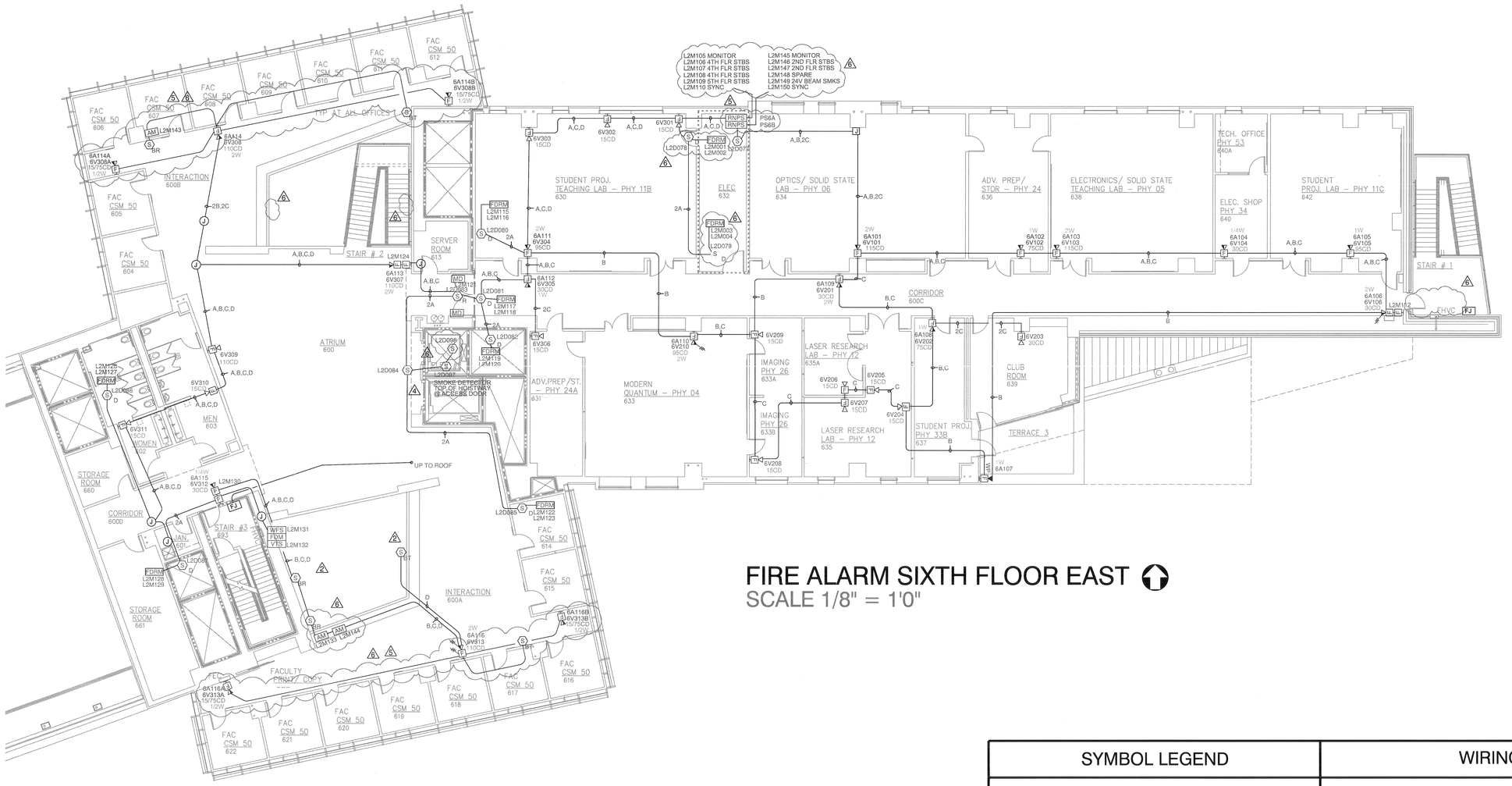
DESIGNED BY: Curtis Streeter
DRAWN BY: Derek Richardson
CHECKED BY: CURTIS STREETER, SET NICET IV #102872
PROJECT ENGINEER: Integral Design Associates INC.
DATE: 08/23/2013
SCALE:
DRAWING CODE: FA ALL DRAWINGS CPCFS

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.05E



FIRE ALARM SIXTH FLOOR EAST

SCALE 1/8" = 1'0"

SHEET NOTES

1 PROVIDE FIRE ALARM BEAM DETECTORS TRANSMITTER AND RECEIVER. INTERLOCK WITH SMOKE EVACUATION SYSTEM SUCH THAT WHEN BEAM DETECTOR IS ACTIVATED, SMOKE EVACUATION SYSTEM IS ACTIVATED. REFER TO DETAIL 4 & 5/FA5.0.

2 ACTIVATION OF A MANUAL PULL STATION, BEAM DETECTOR OR SPRINKLER WATER FLOW WITHIN THE ATRIUM SHALL ACTIVATE ATRIUM SMOKE EVACUATION SYSTEM. SMOKE EVACUATION SYSTEM SHALL FUNCTION AS DIRECTED BY MECHANICAL DOCUMENTS. REFER TO DETAIL 9/M5.05 FOR ADDITIONAL INFORMATION.

3 ACTIVATION OF AN ALARM ANYWHERE WITHIN THE BUILDING SHALL SHUT DOWN ALL AIR HANDLING UNITS.

4 ACTIVATION OF THE ATRIUM SMOKE CONTROL SYSTEM SHALL OPEN ALL ATRIUM DOORS WITH MOTORIZED DOOR OPERATORS.

SYMBOL LEGEND

	COUNT	FIRE ALARM SYMBOLS		MODEL #	CSFM LISTING #
4	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
4	0	H	HEAT DETECTOR	FST-851	7270-0028:196
4	18	S	SMOKE DETECTOR	FSP-851	7272-0028:206
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
2 4	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
2 4	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
4	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
4	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
4	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
4	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
4	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
4	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation

Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

SYMBOL	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 093.1 & FI 99	5/18/2012	
3	SFM REVIEW COMMENTS	4/11/2012	
4	CRB 93.2	8/20/2012	
5	FA & SMOKE CONTROL SFM COMMENTS	1/15/2013	
6	AS-BUILT DRAWINGS	4/3/2013	
		8/23/2013	

DATE: 08/23/2013

SCALE:

DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter

DRAWN BY: Derek Richardson

CHECKED BY: CURTIS STREETER, SET NICET IV #120272

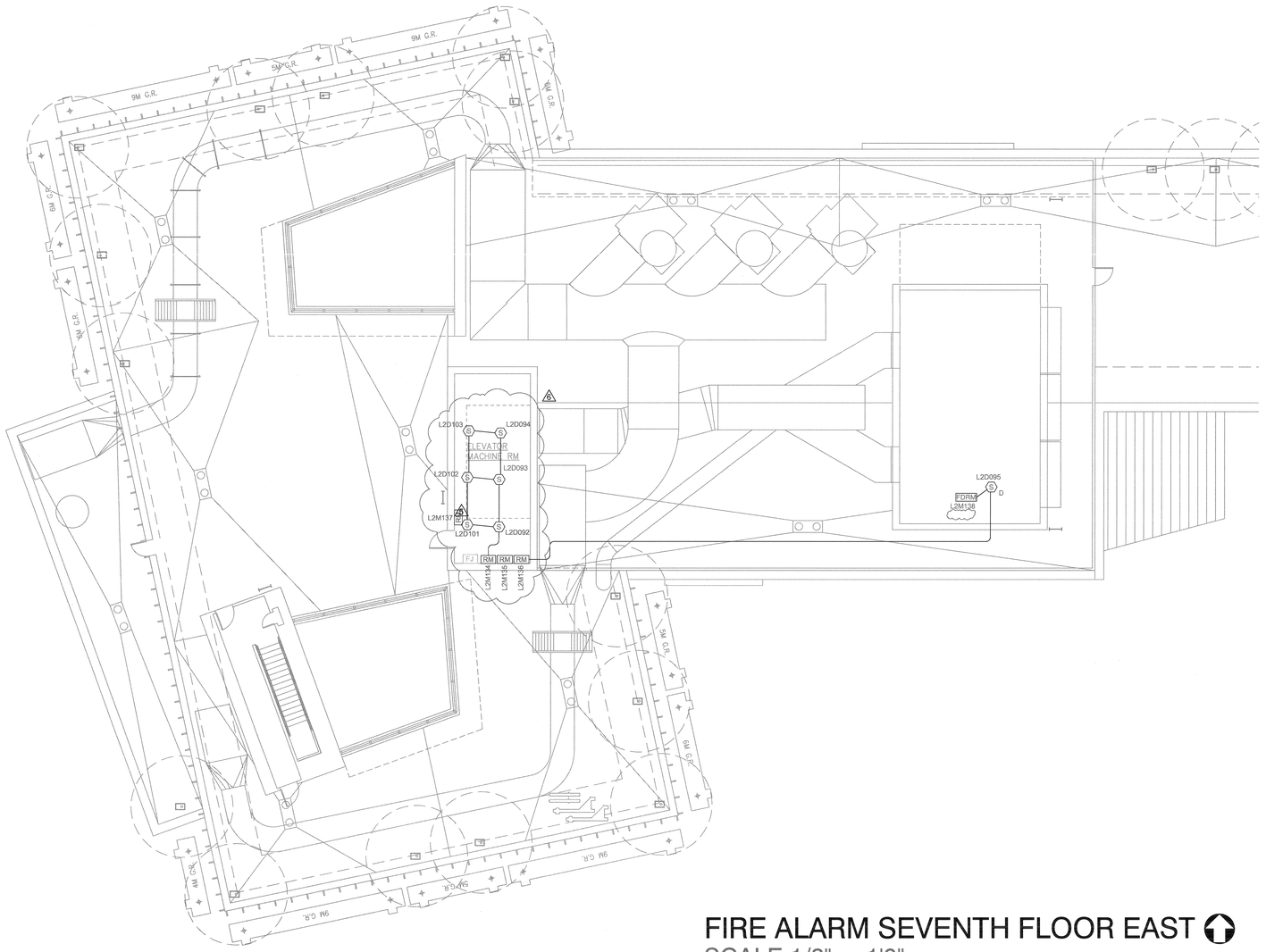
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.06E



FIRE ALARM SEVENTH FLOOR EAST

SCALE 1/8" = 1'0"

SYMBOL LEGEND

	COUNT		FIRE ALARM SYMBOLS	MODEL #	CSFM LISTING #
⚠	31	F	MANUAL PULL STATION	NBG-12LX	7150-0028:0199
	73	F	STROBE ONLY	SW	7320-1653:201
	165	F	SPEAKER/STROBE	SPWS	7320-1653:201
	6	F	SPEAKER ONLY	SPW	7320-1653:201
	7	WP F	SPEAKER - WEATHER PROOF	SPWK	7320-1653:201
⚠	0	H	HEAT DETECTOR	FST-851	7270-0028:196
⚠	18	S	SMOKE DETECTOR	FSP-851	7272-0028:208
	64	S D	SMOKE DETECTOR - DUCT	DNR	3242-1653:209
⚠ ⚠	23	S BT	BEAM SMOKE DETECTOR - TRANSMITTER	OSE-SPW	7260-1728:0121
	15	S BR	BEAM SMOKE DETECTOR- RECEIVER	OSI-90	7260-1728:0121
	1	FACP	FIRE ALARM CONTROL PANEL	NFS2-640	7165-0028:0243
	5	RNPS	REMOTE NOTIFICATION POWER SUPPLY	ACPS-610	7315-0028:248
⚠	4	FATC	FIRE ALARM TERMINAL CABINET	N/A	N/A
	32		END OF LINE RESISTOR	N/A	N/A
	2	RA	REMOTE ANNUNCIATOR	FDU-80	7120-0028:209
	8	MD	MAGNETIC DOOR HOLDER	N/A	BY OTHERS
⚠	21	AM	ADDRESSABLE MODULE	FMM-1	7300-0028:0219
⚠	12	RM	RELAY MODULE	FRM-1	7300-0028:219
	16	WFS	WATER FLOW SWITCH	N/A	BY OTHERS
⚠	10	VTS	VALVE TAMPER SWITCH	N/A	BY OTHERS
⚠	21	FDM	DUAL MONITOR MODULE	FDM-1	7300-0028:0219
	64	FDRM	DUAL RELAY / MONITOR MODULE	FDRM-1	7300-0028:0219
	12	FJ	FIRE FIGHTER'S PHONE JACKS	FTM-1	7300-1652:0182
	4	DAA2	DIGITAL AUDIO AMPLIFIERS	DAA2	7170-0028:223 7170-0028:224
	1	XP6-R	SIX RELAY CONTROL MODULE	XP6-R	7300-0028:0219
⚠	1	XP10-M	TEN-INPUT MONITOR MODULE	XP10-M	7300-0028:0219

WIRING LEGEND

LABEL	GAUGE	USE	TYPE (OR EQUIVALENT)
A	16/2 UTP	SLC	WEST PENN D990
B	16/2 TSP	SPEAKER	WEST PENN D991
C	14	NAC VISUAL	THHN
D	14	24 VDC	THHN
E	16/4 TS	ANNUNCIATOR	WEST PENN 993
F	14/2 TSP	FIRE FIGHTERS PHONE	WEST PENN D995

DRAWING INDEX

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 093.1 & FI 99	5/18/2012	
3	SFM REVIEW COMMENTS	4/11/2012	
4	CRB 93.2	8/20/2012	
5	FA & SMOKE CONTROL SFM COMMENTS	1/15/2013	
6	AS-BUILT DRAWINGS	4/3/2013	
		8/23/2013	

SYMBOL

DATE: 08/23/2013

SCALE:

DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter

DRAWN BY: Derek Richardson

CHECKED BY: CURTIS STREETER, SET NICET IV #102872

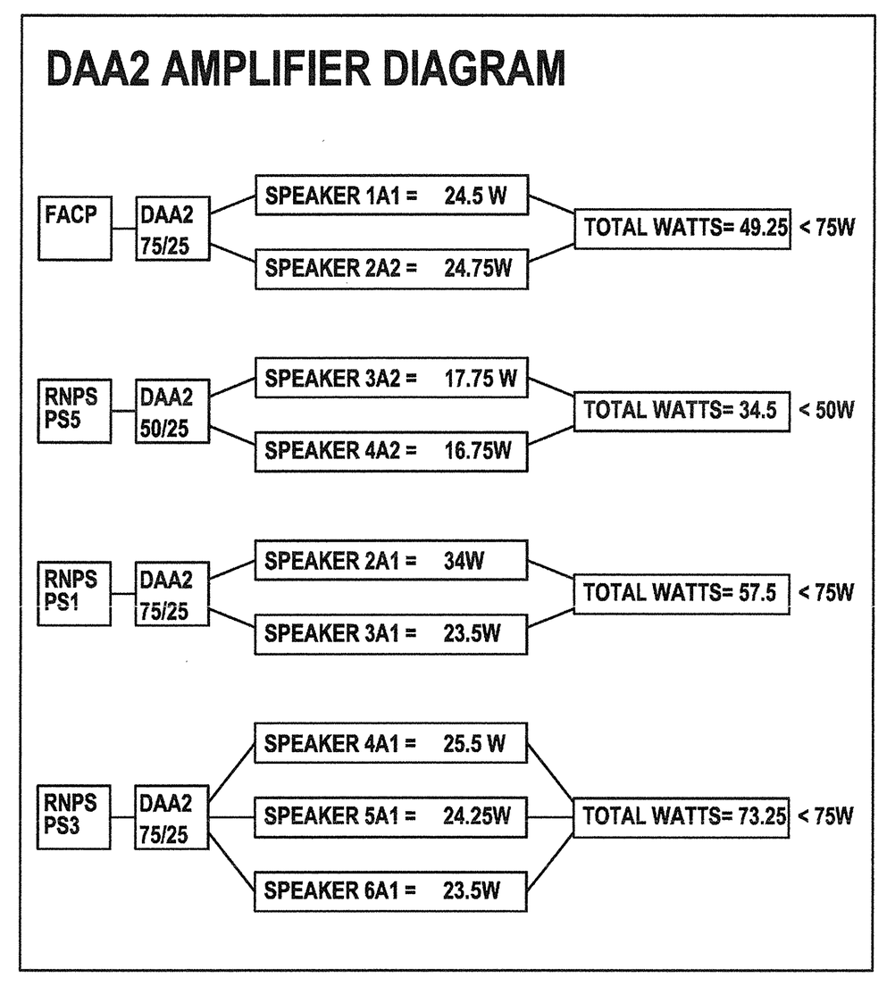
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 3.07E



SPEAKER CALCULATIONS

BATTERY CALCULATIONS

WEST

VOLTAGE DROP CALCULATIONS

EAST

DRAWING INDEX

CALCULATIONS

Deep Blue Integration
Consulting - Design - Installation
Service - Monitoring
Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

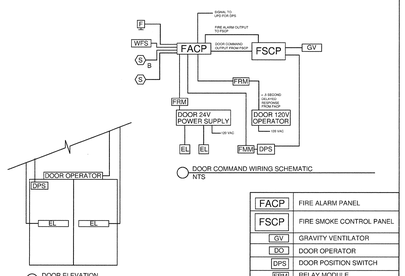
SYMBOL	DESCRIPTION	DATE	APPR.
1	REVIEW COMMENTS	6/14/2011	
2	CRB # 093.1 & FI 99	5/18/2012 4/11/2012	
3	SFM REVIEW COMMENTS	8/20/2012	
4	CRB 93.2	1/15/2013	
5	FA & SMOKE CONTROL SFM COMMENTS	4/3/2013	
6	AS-BUILT DRAWINGS	8/23/2013	

DATE: 08/23/2013
SCALE:
DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter
DRAWN BY: Derek Richardson
CHECKED BY: CURTIS STREETER, SET NICET IV #102672
PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA
CSFM #18-40-03-0001

SHEET ID
FA 4.0

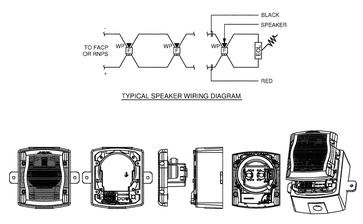


DOOR COMMAND WIRING SCHEMATIC
NTS

DOOR ELEVATION
NTS

FACP	FIRE ALARM PANEL
FSCP	FIRE SMOKE CONTROL PANEL
GV	GRAVITY VENTILATOR
DO	DOOR OPERATOR
DPS	DOOR POSITION SWITCH
FRM	RELAY MODULE
FMM	MONITOR MODULE
EL	ELECTRIC LOCK

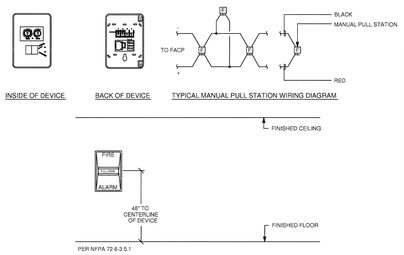
DETAIL 17 / FA-5



TYPICAL SPEAKER WIRING DIAGRAM

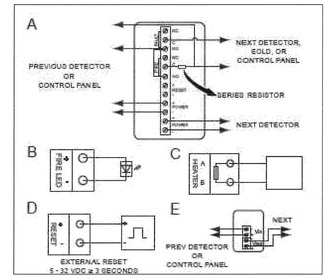
WP F

13 WALL SPEAKER OUTDOOR
SCALE 1:2

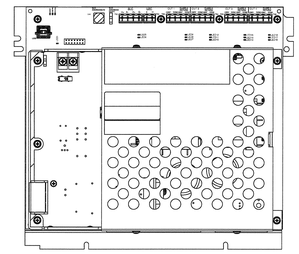


F

9 ADDRESSABLE MANUAL PULL STATION INSTALLATION
NOT TO SCALE

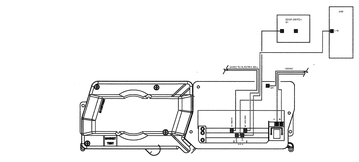


5 BEAM SMOKE DETECTOR WIRING
NOT TO SCALE



RNPS

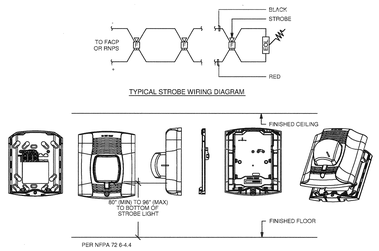
0 ACPS-610 POWER SUPPLY
NOT TO SCALE



TYP. SFD RELAY / POSITION INDICATION WIRING
NTS

TYP. SFD RELAY/SWITCH BOX LAYOUT
NTS

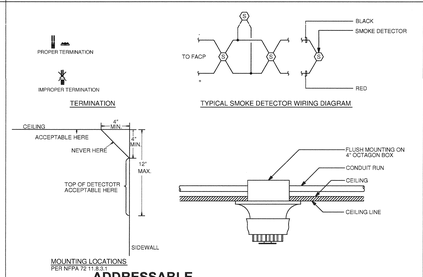
DETAIL 18 / FA-5 | CAL POLY CENTER FOR SCIENCE BLDG 52 | SMOKE FIRE DAMPER RELAY DETAIL | DATE: 11/01/12



TYPICAL STROBE WIRING DIAGRAM

F

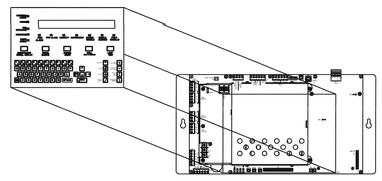
14 WALL STROBE INSTALLATION
NOT TO SCALE



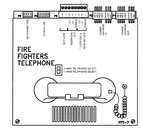
TYPICAL SMOKE DETECTOR WIRING DIAGRAM

S

10 ADDRESSABLE SMOKE DETECTOR INSTALLATION
NOT TO SCALE



6 NFS2-640 PANEL
NOT TO SCALE

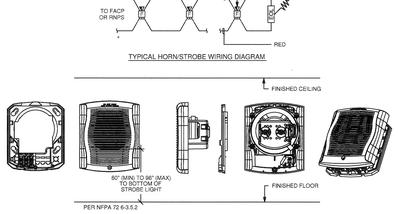


FJ

2 FFT-7 FIRE FIGHTER TELEPHONE
NOT TO SCALE

DUCT SMOKE DETECTOR WIRING DIAGRAM 120VAC TO 24VDC BELL
NTS

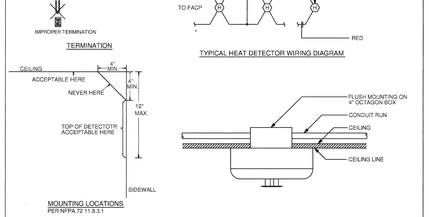
DETAIL 19 / FA-5 | REF. CWA 465 | CAL POLY CENTER FOR SCIENCE BLDG 52 | HVAC UNIT TEMP. DUCT DETECTOR SHUNT | DATE: 12/06/12



TYPICAL HORN/STROBE WIRING DIAGRAM

F

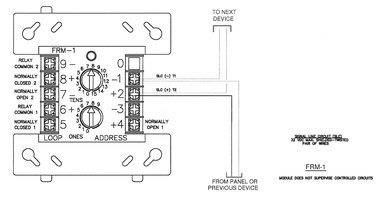
15 WALL SPEAKER STROBE INSTALLATION
SCALE 1:2



TYPICAL HEAT DETECTOR WIRING DIAGRAM

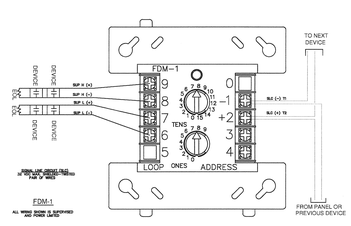
H

11 ADDRESSABLE HEAT DETECTOR INSTALLATION
NOT TO SCALE



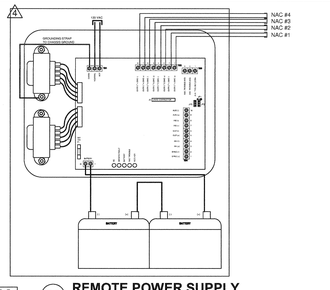
RM

7 FRM-1 MODULE
NOT TO SCALE



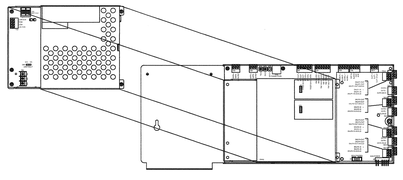
FDM

3 FDM-1 MODULE
NOT TO SCALE



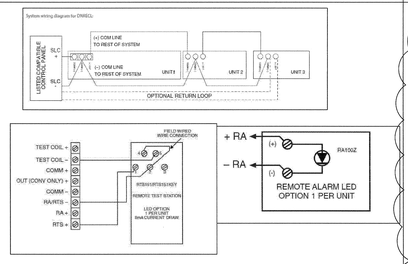
RNPS

20 REMOTE POWER SUPPLY
NOT TO SCALE



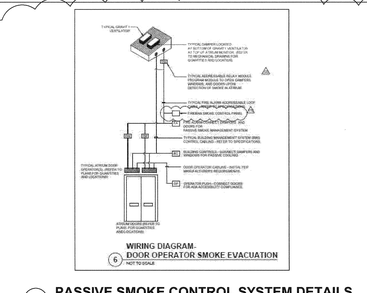
DAA2

16 DAA2 SERIES AUDIO AMPLIFIER
NOT TO SCALE

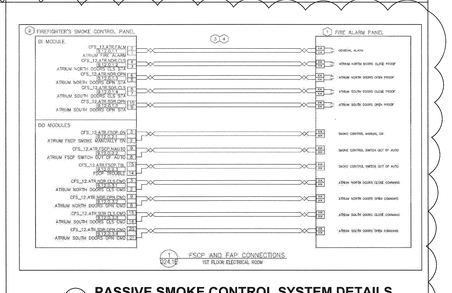


S D

12 DUCT DETECTOR WIRING
NOT TO SCALE



8 PASSIVE SMOKE CONTROL SYSTEM DETAILS
NOT TO SCALE



4 PASSIVE SMOKE CONTROL SYSTEM DETAILS
NOT TO SCALE

DETAILS

Deep Blue Integration

Consulting - Design - Installation
Service - Monitoring

Deep Blue Integration, Inc
3442 Empresa Drive Suite C
San Luis Obispo, CA 93401
C-10, C-16 #943465 ACO#6864
Toll Free: 888◆6000◆DBI FAX: 805◆791◆2037
www.deepblueintegration.com

Revisions

	SYMBOL	DESCRIPTION	DATE	APPR.
1		REVIEW COMMENTS	6/14/2011	
2		CRB # 095.1 & FI 99	5/18/2012	
3		SFM REVIEW COMMENTS	4/11/2012	
4		CRB 93.2	8/20/2012	
5		FA & SMOKE CONTROL SFM COMMENTS	1/15/2013	
6		AS-BUILT DRAWINGS	4/3/2013	
			8/23/2013	

DATE: 08/23/2013

SCALE:

DRAWING CODE: FA ALL DRAWINGS CPCFS

DESIGNED BY: Curtis Streeter

DRAWN BY: Derek Richardson

CHECKED BY: CURTIS STREETER, SET NICET IV #102672

PROJECT ENGINEER: Integral Design Associates INC.

CENTER FOR SCIENCE AND MATHEMATICS
CALIFORNIA STATE POLYTECHNIC UNIVERSITY
SAN LUIS OBISPO, CA

CSFM #18-40-03-0001

SHEET ID

FA 5.0

SHEET 15 OF 15