Fire Protection and Life Safety Systems

PSE provides consulting engineering and design services for complete fire detection, suppression, and life safety systems. Our services encompass signaling, sprinklers, monitoring, proprietary command centers, NFPA code requirements, and related components.

Led by nationally recognized fire protection experts, PSE employs a uniquely qualified and technically diverse team. Collectively, our staff has more than two centuries of excellence on hundreds of projects. Our specialties include both new and renovated systems, multi-system integration, infrastructure design, and centralized control systems. PSE does not sell, supply, or represent any equipment manufacturer or vendor.

We specialize in systems design for major building campuses, theaters, high-rises, and unique building envelopes. PSE has considerable experience in universities, corporate campuses, performing arts centers, justice and government facilities. We are in our third decade of providing solutions for:

- Large-scale, networked fire detection system renovations
- Fire alarm specifications that meet or exceed NFPA codes
- Proper phasing of large-scale fire alarm/fire suppression projects
- Seamless phased replacement of existing systems to new systems
- Construction administration expertise
- Thorough surveys encompassing all systems and requirements

PSE specializes in developing comprehensive Emergency Management Services. We ensure our clients are prepared to continue operating after a disaster or other emergency event. Our capabilities extend to operational support which includes: Continuity of Operations Planning (COOP), Emergency Operations and Preparedness, Contingency Planning, Policy and Procedures, and Training, Exercises, Drills, and Evacuation Floor Plans.

Our ability to meet the demands required by for Safety Planning and Evacuation Preparations are a testament to the capabilities we provide. By meeting the best practices and performance based standards required in each sector, PSE is capable of providing specific recommendations and operational documents. Our services ensure new and existing sites are prepared for natural and manmade disasters and crisis recovery regardless of the situation.
PSE provides a wide range of services for life safety and property protection including consulting, engineering, system design, construction administration, inspections and testing, and other related services. PSE designs fire and life safety systems that protect our clients from loss from fire, security issues, and other emergency situations.

**Code Compliance/Evaluation**
- IBC Architectural Evaluation
- Building Fire Code Analysis
- Fire and Life Safety Analysis
- JCAHO Standards Compliance Including Statement of Conditions
- Life Safety Plans
- Intellectual Property and Patent Claims
- Product Proof-of-Performance Evaluations and Claim Management

**Life Safety**
- High-Rise Compliance
- Fire Alarm
- Mass Evacuation
- Biological Hazards
- Chemical Agents
- Command Centers
- Stair Pressurization
- Smoke Containment
- Smoke Evacuation
- Smoke Detection
- Addressable Monitoring
- Evacuation Plans
- Brigade Manuals
- Commissioning and Testing

**Alarm/Evacuation**
- Audio Evacuation
- Wireless Mass Notification
- Bio/Chem Hazard
- LEL/LFL Alarms
- Nuclear Alert
- Audio Messaging
- Pager Integration
- Synthesized Response

**Detection Systems**
- Pharma and Electronics Fabrication
- Process Gas/Detection and Alarm Systems
- Bio/Chemical Introduction
- Organic/Inorganic Gases
- Smoke/Heat/Fire/Incipient
- Explosion Inerting

**Fire Protection**
- Wet Sprinkler
- Dry Sprinkler
- Standpipes
- Fire Pumps
- “Green” Inerting Gases
- Carbon Dioxide
- Purge Control
- Pre-Action/Single and Double Interlock
- Deluge

**Systems Management**
- Systems Integration
- Egress Plans Production
- Proprietary Monitoring
- Radio Control/Transmission
- Dispatch/Control Center
- Door Control
- Digital CCTV
- Card Access
- Environmental Monitoring
- Intrusion Detection
- Hardware Compliance
- Correctional Systems
- Parking Controls
- Fencing Systems
- Motion Detection
- Elevator Control
- Systems Testing

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**PSE**

PROFESSIONAL SYSTEMS ENGINEERING, LLC

Pennbrook Business Center 1010 Church Road Lansdale, PA 19446 Tel. 215-661-1600 www.profsyseng.com

30 YEARS + STRATEGY + SPECIFICATIONS + TECHNOLOGY
Richard Stockton University

Fire Alarm & Fire Suppression System Design/Commissioning

Pomona, New Jersey

Professional Systems Engineering, LLC met the project objective of installing a code-compliant fire suppression system on a tight schedule for theater, student library, media center, student residential facilities and academic buildings. All systems are concealed to reflect the aesthetic nature of the properties. PSE provided significant construction management expertise through full commissioning of all systems.

Cultural, arts, and theater projects were installed and commissioned during full occupancy Housing Unit I consists of 255 garden apartments contained in 16, two-story buildings constructed in 1971 to house 1,020 students. Housing Unit II is a three-story dormitory that provides housing for 525 students. The complex consists of 11 connected modules. Housing Unit III is a three-story dormitory consisting of five modules housing 300 students. Academic buildings are comprised of over 200,000 SF of space that was renovated during full occupancy. This project consisted of three phases:

Planning/Testing: Conducted study to develop conceptual planning document including testing flows for campus’ potable water systems, hydraulic calculations, descriptions and plans for installation of required fire suppression infrastructure with costs and time schedules. Hydrant/supply testing was included.

Phase I: Design and development of contract documents for installation of automatic fire suppression system in Housing Units II and III during a three-month period.

Phase II: Design and development of contract documents for installation of automatic fire suppression system in Housing Unit I. Fire pump deficiencies were corrected.

Fire Protection / Suppression
❖ Fire suppression infrastructure
❖ Potable water systems
❖ Hydraulic calculations
❖ Hydrant/supply testing
❖ Fire alarm interconnections
❖ Fire pump redesign
❖ Design for installation of automatic fire suppression system

Services
❖ Program/study
❖ Schematics final design
❖ Bid/award
❖ Water supply flow test
❖ Electric supply test
❖ Water supply redesign
❖ Permitting
❖ Construction administration
Professional Systems Engineering, LLC provided new telecom/data site backbone network infrastructure, security, fire alarm, and audio for this 35-acre historical landmark. A keen sensitivity of site surroundings was required to blend systems with animal, vegetation, and human environments in America’s first zoo.

This project was also part of the on-going effort to provide fire protection for the Zoo including installation of smoke and fire detection and alarm systems. The long-term goal was a central site-wide fire alarm monitoring system. PSE helped to form the foundation supporting the Zoo’s Master Plan calling for the rehabilitation of buildings and other support infrastructure.

PSE supports the Zoo’s mission by providing investigative reporting, program development, design, bid documentation, award review, and construction services including testing, inspection, and commissioning.

**Telecom/Data Infrastructure**
- Aerial messenger backbone
- Underground duct bank
- Telephone, IDF, MDF
- Data network
- CAT 3, 5E, and fiber optics
- Phased transfer

**Audio**
- Wireless audio
- Site-wide distribution horns
- 800 MHz spread spectrum
- Recorded messages
- Frequency hopping
- Voice over FA amp

**Fire Alarm**
- Networked
- Central command
- ADA audio/visual
- External audio with override
- VESDA smoke sensitive areas

**Security**
- CCTV
- Digital video/recording
- Network video
- Master control
- Integrated systems
Professional Systems Engineering, LLC is the fire protection consulting engineer for the Rose Building Tower, which houses the student and administrative offices of The Juilliard School and the School of American Ballet, the balance of which houses students in the 31-story residential tower. PSE is serving as both fire protection and life safety consultant and the dormitory/high-rise classroom safety consultant for elevators, life safety, and evacuation controls. The square footage of the space totals 445,000 SF and the project budget is approximately $4 million.

Specially protected spaces include black box performance theater, ballet practice studios, rehearsal studios, and executive offices. Apartment suites are clustered on each of the high-rise floors.

PSE provided an in-depth program study evaluating new NYC 2014 codes, applying NFPA72 codes for new fire alarm engineering requirements. Evaluations included new infrastructure requirements, controls and cabling needs, and opinions of probable cost.

**Life Safety/Fire Protection**

- Fire detection systems
- New addressable fire alarm control panels
- Addressable initiating devices
- ADA horn/strobes
- Remote annunciators
- Computer networking/interface system
- Site-wide fiber optic network
- Access control review
- Proprietary receiving alarm system design meeting NFPA and UL
- Smoke evacuation control
- HVAC remote controls
- New fire command center layout/design
- New security desk design recommendations
The firm has been providing Plan and Code Review since 1980s, having served the Philadelphia High Rise Fire Board and Licensing and Inspection. Our cross training of engineering disciplines allows a thorough platform for protection and continuity of operations even under the most serious natural or man-made events.

**Life and Property Safety**

- Fire and smoke detection, containment, and suppression systems are the first line of defense in today’s building codes. No era in history has so remarkably changed the expectations and actions demanded of our fire protection, smoke and fire alarm systems, water pumps, emergency lighting, and exiting signage systems. Demands of code enforcement require a thorough and practical knowledge of systems, operation, and human interaction to demonstrate full compliance with legislative acts that bind a community with safe construction practices.

- Electrical systems and subsystems, power generation, grounding, and lightning protection systems now present enormous undertakings for the typical agency or department that has the knowledge, but lacks the manpower, to thoroughly inspect for unpredictable emergency events. It is just these events that challenge chances of blackouts and power losses at a site where personal safety is of utmost importance.

**Mechanical Standards and Regulations**

- Compliance with ASHRAE, NSA, local codes, and health standards predicates planning, evaluation, and support for smooth construction compliance. Especially difficult to analyze are control systems that can promote harmful or even fatal bacteriological or environmental conditions in buildings that had too little inspection by knowledgeable, trained technicians. Individual team members apply best practices to minimize the probability of conditions leading to restricted occupancy or closure.
Professional Systems Engineering, LLC provided design services for fire alarm, sprinkler, security, tele/data communications, audio/visual, and sound masking design services for this project for the International Communications Command and Control Center as well as Mobility Design Lab Phase 2 project. The project included the renovation of approximately 40,000 SF on the 7th floor of the Ronald Reagan Building which required both demolition and new construction plans. In addition to user workstations, collaboration space, and conference rooms, the project also included secure network rooms, SCIF spaces, and a new USAID Operations Center to monitor, provide situational awareness, and rescue coordination in spontaneous international events.

The renovations allow for a more flexible modern office work space that supports mobile users, yet allows for secure work spaces required by USAID’s various departments in addition to the entirely new operations command center.

### Security
- Access control hardware
- Card readers and keypads
- Video surveillance
- Motion detection
- Integration with existing systems

### Fire Alarm
- P100 GSA Standards-compliant
- Notification and initiating devices
- Integration into existing panels
- Secure network room requirements
- Input/output matrix

### Fire Protection
- Sprinkler head location
- Phased demo and install to existing mains and standpipes
- Secure network room requirements

### Audio Visual/Acoustics
- Video conferencing
- Sound masking system
- Conference room A/V systems

### Communications
- VoIP and data structured cabling system
- Fiber risers
- Multi-network infrastructure

### Operations Center
- Video wall
- A/V switching system
- A/V control system
- Sound reinforcement, audio selection
- Multisource inputs
- Secure use indication lights
Professional Systems Engineering, LLC is the fire protection consulting engineer for Alice Tully Hall’s fire curtain deluge system possible deactivation due to possibly detrimental activation in a false occurrence. The systems design was analyzed, as well as all detection systems as the activation would transition motorized acoustical clouds vertically, possibly causing operator interference.

In addition to the potential threat to operators, false activation of the deluge system would undoubtedly damage the rare materials used in construction. Through thorough research into the New York City Building and Fire Codes and in addition to fire modeling and response time calculations, a plan of action was developed and will be reviewed by FDNY and NYC DOB officials. The proposed actions, when brought to fruition, will mitigate the current risks without reducing the level of protection for the performers, staff, and audience within the theater.

Fire Protection Analysis and Renovations

- Fire curtains analysis
- Fire detection systems analysis
- Deluge sprinkler analysis
- Incipient smoke detention review
- Sprinkler and heat detector activation calculations
- NYC BC F1, F2, and A building code review
Testing, Commissioning & Inspections

Inspection Services
Whether code evaluation and enforcement issues or standards conformance, collaborative efforts of our staff with client and contractors produce safe and effective plans to allow judicious and respectful use of facilities for licensing and inspection. Compliance with local, state, and national codes as adopted is assured with our field-tested staff.

Systems Testing and Commissioning
Our staff knows operations of mission critical facilities for emergency operations, high security detainees, maximum security prisons, nuclear facilities and transportation hubs, major project coordination for test and acceptance have been accomplished by our staff.

Testing Services
- Critical security electronics
- High security hardware
- High security fencing
- Fire pumps and sprinkler pipe/assemblies
- Emergency generators
- Switchgear and electrical distribution
- Emergency lighting
- Fire alarm/smoke detection
- Emergency evacuation
- Heating, ventilating, cooling and refrigeration systems
- Acoustical ratings
- Noise and vibration
- Control systems – pneumatic and electro-mechanical

Certification Programs
Deployment of gear and equipment in most technical facilities demands conformance to testing and certification programs for assurance of capital expenditures, life cycle cost maximization, least cost maintenance programs, operational requirements, and warranty response issues. Certification includes life safety, security, data and communications, acoustical and noise and vibration control issues.
Professional Systems Engineering provided design of security, fire detection, fire pump with multiple dry-pipe fire suppression systems, and radio systems for the Town of Oyster Bay’s Hicksville New Parking Facility. The facility is a 4-tier structure of approximately 122,000 SF per tier for a total of 488,000 SF. The new structure has two levels below ground, one at grade level, and one above ground. It parks approximately 1,400 vehicles.

The ground level contains offices for town officials who operate the parking garage, and contains the security control room and a security electronics equipment room. The equipment room houses the tele/data equipment, the telephone service, and Wide Area Network equipment.

Security
❖ Digital CCTV system
❖ Access control/video surveillance system and digital recording system
❖ Security gates
❖ Perimeter CCTV system
❖ UPS systems coordination
❖ Elevator security systems

Fire Detection
❖ Addressable fire alarm system
❖ Addressable smoke and CO detectors coordination
❖ Master fire alarm control panel designed to the latest NFPA 72, IBC, State of New York, and local standards for fire command

Fire Protection
❖ Class I standpipe system
❖ Dry pipe fire sprinkler systems
❖ Fire pump and fire pump controller system
❖ Dry deluge valve designs
❖ Supervised dry piping

Communications
❖ VoIP phone system
❖ Intercom paging emergency call
❖ Tele/data communications cabling infrastructure
❖ A full IP-based emergency call system with paging
❖ LAN and WAN coordination and link to the town’s public safety building
❖ 800 MHz in-building public safety/cellular distributed radio antenna system

Distributed Antenna System (DAS)
❖ Provided full cellular telephone services to parking areas and stair towers
❖ Provided public safety radio 2-way communication throughout the facility
With one of the largest ballroom theaters in the country, clear, and unique audio evacuation messaging was planned with full fire command approval.

Phasing was critical as the fire alarm system replacement occurred during occupancy. Removal and installation was performed on a fast-track schedule to minimize disruption to facility operations.

Professional Systems Engineering, LLC designed a new fire alarm and life safety system to replace the non-addressable 20-year-old existing system in a prestigious 26-story center-city hotel. PSE provided the one million SF high-rise with digital true-alarm, multiplex fire alarm/smoke detection featuring dual color graphic computers for fire command and maintenance. PSE also provided new high-pressure standpipe flow control. PSE interfaced systems in parking areas of the Wyndham and adjacent building where the two buildings share common areas.

Aesthetics was an important aspect of the fire alarm system removal and installation program at this prestigious facility required PSE to provide both design and commissioning services.

Fire Protection/Life Safety System

- Photoelectric smoke detectors for all areas per code
- Sprinkler flow and valve tamper monitoring
- Manual pull stations
- Speaker strobes, voice alarm/evacuation signaling per IBC
- Remote annunciation and communication
- Elevator recall to egress floors and power disconnect
- Air handling unit shutdown through interfacing to existing power supplying each respective unit
- Activation of existing atrium smoke exhaust systems where a fire alarm condition is detected through beam type detectors
- Replacement of door releases opened by magnetic door holders
- Installation of new monitoring for existing kitchen fire protection systems
- Monitoring of fire pumps
- Monitoring of emergency generator control
- Fire sprinkler valve replacement
This project allows the NYC DOC to implement temporary central admissions operations until a new facility with complete admissions housing is completed. PSE is also providing engineering services for Rikers Island’s new $500 million behavioral health facility.

Professional Systems Engineering, LLC provided fire alarm, fire protection, electronic security, fencing/gates, and communications consulting, design, engineering, and construction administration services. This project involved the renovation of five existing Sprung structures at Rikers Island West Facility to create a new Central Admissions Intake for the New York City Department of Corrections (NYC DOC). All existing systems were demolished, as the renovations were total redesigns of the interior of the structures to meet the program requirements. The cost of project was $12 million.

**Fire Protection**
- Wet pipe sprinkler system
- Sprinkler risers, hose connections, valves, etc.
- Back low preventers for service connections
- Flexible connections requirements due to building structure and seismic concerns
- Coordination of water flow testing

**Fire Alarm**
- Smoke detection for multi-level ceilings
- Notification devices
- Fire alarm control panels
- Electromagnetic door holders
- Monitoring of sprinkler control valves and flow switches

**Communications**
- Tele/data structured cabling system
- Copper/fiber optic incoming service
- Network switches
- Network integration for video surveillance
- Wireless infrastructure

**Electronic Security**
- Door and gate control/monitoring with PLC integration
- Lock hardware coordination
- IP video surveillance
- Security paging system
- Touchscreen control station
- Site Security
- Site video surveillance
- Fencing
- Vehicle bi-fold gates
Saint Elizabeths Hospital was established in 1855 as the Government Hospital for the insane. It was the first and only federal mental facility with a national scope. The complex is situated on more than 300 acres, and in the 1940s, housed over 7,000 patients. Professional Systems Engineering, LLC staff established functional requirements for a new hospital security system including the grounds, and determined equipment re-use and integration with existing and new systems. The hospital now houses 600 patients.

PSE provided fire and life safety manuals including evacuation planning and training for the entire hospital. These services included Continuity of Operations Planning (COOP), disaster preparedness, and evacuation preparation. Training with hospital staff was extensive.

Our team provided safety and security policies and procedures including post orders for the Hospital’s Safety and Security Department. The policies, procedures, and post orders developed for Saint Elizabeths Hospital met the needs of this special forensic hospital. PSE has also provided training to the security staff on duty at the hospital on the newly implemented policies, procedures, and post orders. Ongoing training is still being provided to the Hospital’s Safety and Security Department.

**Life Safety Consulting Services**
- Fire safety plan
- Fire evacuation plan and signage
- Keying grouping and Hierarchy planning
- Training

**Perimeter Security Designs**
- Security fencing and gates
- Redundant perimeter detection systems
- Security lighting
- Site CCTV

**Safety and Security Services**
- Policy and procedures
- Post Orders
- Training

**Electronic and Security Designs**
- Access control and monitoring
- CCTV and digital video recording
- Security intercom
- Personal duress
- Central control console

**Physical Security Designs**
- Turnstiles
- X-ray package screening
- Personal search equipment
Professional Systems Engineering, LLC provided design and documentation for life safety code compliance for the entire complex. The renovation of this complex included medical suites and high-rise housing, mid-rise parking structure, and pedestrian bridge over 34th Street.

**Systems**
- Computerized fire alarm
- Air handling unit shutdown and control
- Audio evacuation
- Fire pump supervisory monitoring
- Floor-by-floor sprinkler alarm retrofit with tamper and flow monitoring
- Smoke detection using digital/analog detectors
- Fireman’s communication system
- Elevator recall
- Dry pipe sprinkler system monitoring
- Computerized monitoring
- Fire command center
- Evacuation alarms
- Multiple digital voice announcements
- Ballroom fire/smoke detection
- Commissioning oversight for city code compliance

A mixed use occupancy, medical suites and hotel completed all new fire protection of 22 floors, ballroom spaces and parking decks. It was first high-rise in the city to undergo such extensive fire/life safety remodeling.

**Parking Structure**
- 5 floors totaling 200,000 SF
- Complete fire alarm for mass evacuation
- Dry pipe sprinkler system monitoring