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**LIFE SAFETY ASSESSMENT
WESTERN STATE HOSPITAL
LAKEWOOD, WASHINGTON 98498**

**Prepared For
WASHINGTON DEPARTMENT OF SOCIAL
AND HEALTH SERVICES (DSHS)
1115 Washington St. SE
Olympia, WA 98504**

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1. INTRODUCTION

RPA, a JENSEN HUGHES company has been retained to provide a life safety assessment of healthcare buildings located on the Western State Hospital campus.

The purpose of this report is to highlight the areas of greatest concern with regards to life-safety to help the owner prioritize future maintenance or construction activity. A list of deficiencies found during the survey is attached as Appendix A.

Over the week of April 23-27, 2018, the survey team logged a total of 761 comments or deficiencies while surveying Buildings 6, 8, 9, 10, 15, 16, 17, 18, 19, 20, 21, 27, 28 and 29 at the Western State Hospital campus. Comments and deficiencies have been tabulated per building and per floor via PDF drawing markups and excel spreadsheets, consolidated within Appendix A.

2. FACILITY DESCRIPTION

Western State Hospital is a multi-building campus inpatient psychiatric hospital located in Lakewood, WA. Buildings have been constructed at various times over the past century. Healthcare-use buildings range from single story to 5-story. All buildings used for patient care have been retrofitted with fire alarm and sprinkler protection. Buildings with Business or other use occupancies have not all been sprinkler protected, but most buildings surveyed have a fire alarm system.

3. DOCUMENTS

3.1. Existing Life Safety Plans

A set of existing life-safety drawings, dated 04/12/2018 has been provided to JENSEN HUGHES in both PDF and AutoCAD formats. The life safety drawings cover Buildings 9, 17, 18, 19, 20, 21, 27, 28 and 29. The drawings were used for markup during the survey and will be modified according to discovered field conditions. The drawings include assumptions and/or direction regarding building geometry, number of floors, type of construction, occupancy, smoke compartments and wards served. See Figure 1 below for snip of the site plan from these drawings:

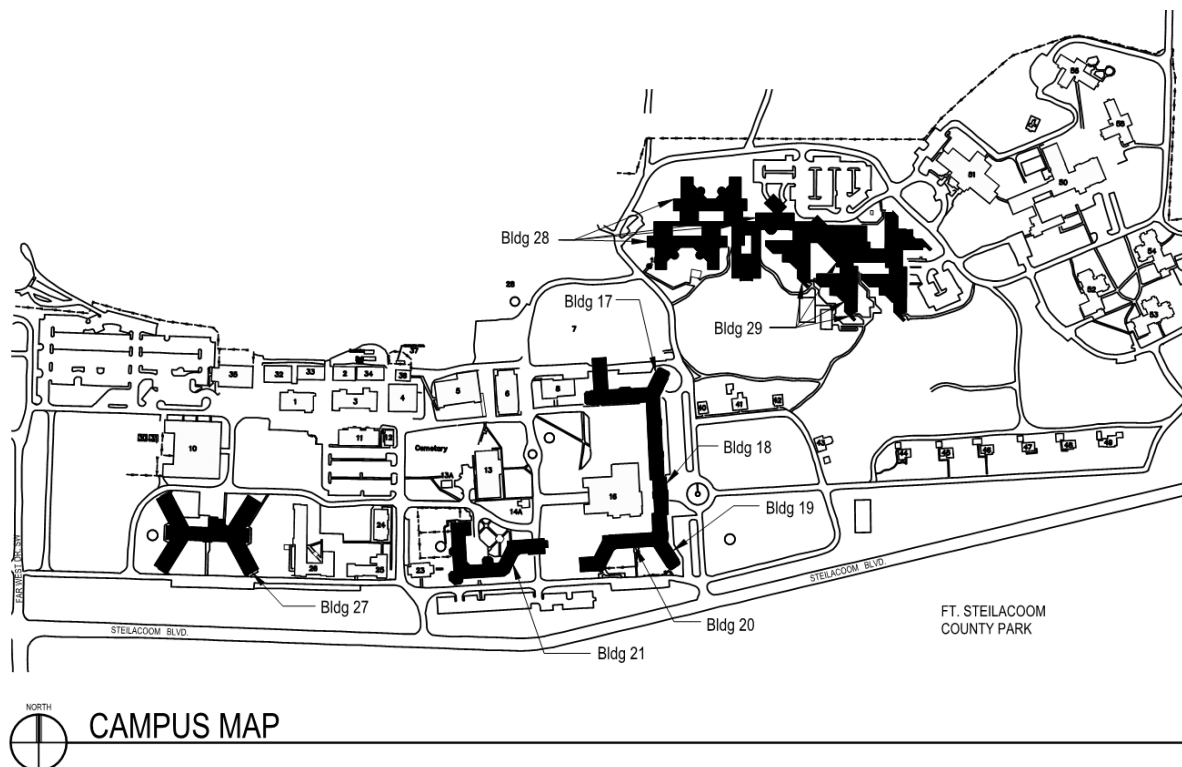


Figure 1: Site Plan snip from Existing Life Safety Plans cover sheet

3.2. West Pierce Fire & Rescue Occupancy Classification

The local fire rescue district has provided a list of all buildings on campus with building descriptions and their classification of occupancy based on the International Building Code (IBC). Buildings 6, 8, 10, 15 and 16 do not have existing life safety plans. These occupancy classifications informed the local jurisdiction's intent and assisted in the preparation of this report.

3.3. Applicable Codes

The applicable codes include:

1. The Life Safety Code (LSC) – 2012 Edition as adopted by the Centers for Medicare and Medicaid Services (CMS).
2. International Building Code (IBC) – 2015 Edition.
3. International Fire Code (IFC) – 2015 Edition.
4. National Electrical Code (NEC) – 2014 Edition.
5. NFPA 10, *Installation of Fire Extinguishers*, 2010 edition.
6. NFPA 13, *Installation of Sprinkler Systems*, 2010 edition.
7. NFPA 14, *Installation of Standpipe Systems*, 2010 edition.
8. NFPA 72, *National Fire Alarm Code*, 2010 edition.
9. NFPA 90A, *Installation of Air-Conditioning and Ventilating Systems*, 2009 edition.
10. NFPA 96, *Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2011 edition.
11. NFPA 99, *Health Care Facilities Code*, 2012 edition (referenced by LSC) except Chapters 7, 8, 12 and 13.

4. GENERAL COMMENTS

4.1. Automatic Sprinkler Systems

Sprinkler systems have been well maintained and all systems were tagged as being current with inspections. Not all systems contain hydraulic placards as required by NFPA 13 and 25. Future sprinkler system ITM programs should ensure that all system valves include design information.

4.2. Fire Alarm Systems

We observed some fire alarm panels, such as the Thorn Autocall in Buildings 17 and 18, which appear to be in excess of 20 years old. The TFX 500/800 systems are obsolete and beyond their serviceable life. Replacement parts are not readily available. As long as systems are maintained operational, there is no requirement to replace them. However, future budgeting should account for a replacement of these systems within the next 5 to 10 years.

The Fire Alarm ITM program should make an account of all fire alarm systems on campus and prioritize the systems that require repair or replacement.

4.3. Fire Walls

On the large inter-connected buildings: specifically, in between Buildings 28 and 29 and between Buildings 9, 17, 18, 19 and 20, a 4-hour fire barrier is listed on the existing life safety plans to separate each building. See Figure 2 below as an example (the navy-blue line type with 4 diamonds).

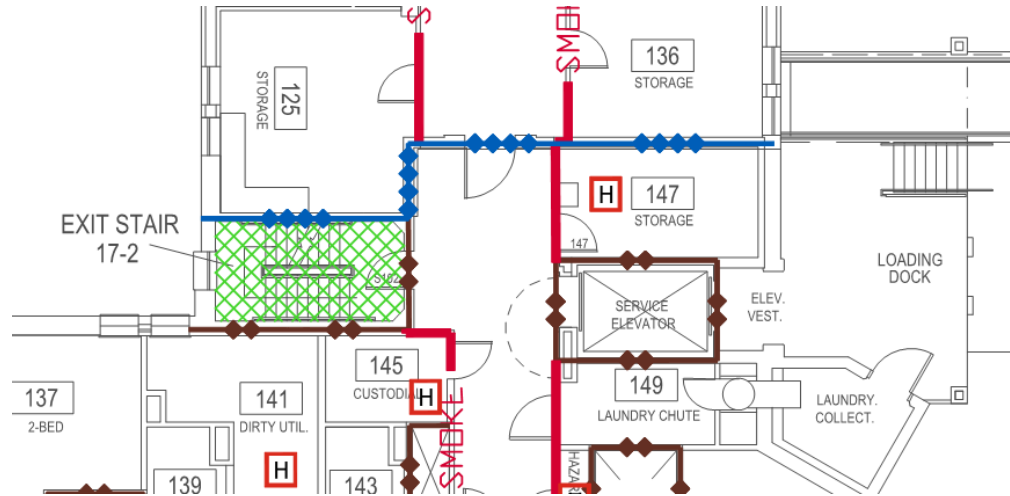


Figure 2: Snip from First Floor Bldg 9 to Bldg 17

We suspect this is an attempt to meet the requirements of the 2015 IBC in terms of allowable area by introducing a catch-all wall type that separates buildings into smaller floor areas that meet the IBC allowable area tables. In the case of the example above (Building 9), there are 3-hour fire doors and a cast-in-place concrete wall at each floor that appears thick enough to meet a 4-hour rating. However, the walls have been cast in between floors and this wall does not provide the structural independence required of a true fire wall. In other cases (such as at Building 28 to 29) the doors in this location are only 20 minute-rated and the wall is a combination of cast in place and framed wall, not meeting a 4-hour separation.

When establishing type of construction for existing buildings, the better practice is to classify a building by what it can be based on applicable codes as opposed to what the building looks like based on observed construction. Due to the type of construction listed for most buildings as Type II, (see further in this report regarding Building 28) we recommend that these fire walls be re-designated to 2-hour fire/smoke barriers in order to meet the occupancy separation requirements of the LSC and better represent what these walls are actually accomplishing.

The justification is that the LSC does not limit the allowable area of buildings, only the allowable height, per Table 19.1.6.1. Since these building are all existing, they should not be required to meet the most current edition of IBC or its allowable area tables. However, in light of attempting to provide some form of separation, the IEBC (International Existing Building Code) Section 10.12.5.1.1 allows existing buildings to have fire walls constructed as fire barriers to meet the intent of building area separation. Since these buildings are being considered as Type II via the LSC, a 2-hour fire wall, or fire barrier in this case is allowed. We recommend the additional designation of smoke barrier to ensure that existing smoke compartment boundaries are not being violated.

The risk being run by continuing to call these walls 4-hour fire walls is that they will continue to incur comments, both in terms of the actual rating and the continuity requirements for fire walls which is not possible given existing construction.

4.4. Dampers

We observed many fire dampers throughout all buildings and some smoke dampers on newer equipment and installations. Many of the fire dampers are no longer required. Because all of the facility healthcare buildings are fully sprinkler protected and compliance is driven out of LSC Chapter 19, the following general rules apply:

Corridors

During survey, we observed many corridors that were constructed as one-hour rated assemblies per legacy codes. In accordance with LSC Section 19.3.6.2.3 and 19.3.6.2.4, corridors in existing healthcare occupancies are required to be enclosed with construction that resists the passage of smoke only and such walls may terminate at a ceiling constructed to limit the transfer of smoke. Per the annex language and the NFPA Handbook, this includes lay-in tile ceilings with ducted HVAC. The following are examples of observed openings that do not require either fire or smoke dampers:

- Openings in a corridor wall occurring above the ceiling provided the interstitial space is not used as a plenum.
- Ductwork terminating at a wall with a register in the wall face on the room side.
- Any ducted penetrations that terminate at a register on either side.

Where a corridor in a healthcare occupancy uses the space above the ceiling as a return air plenum, existing fire dampers alone are not adequate because they will not resist the passage of smoke.

Hazardous Rooms

Hazardous rooms in existing healthcare occupancies are required to be enclosed with smoke partitions in accordance with LSC Section 8.4. This means the walls within the hazardous room must resist the passage of smoke and be free of any penetrations or unprotected openings. Walls above the lid are only required to continue to deck if the HVAC system is an open plenum system. A compliant lid may either be a hard-lid (such as gypsum board) or a lay-in tile ceiling provided there are not damaged tiles and no holes in the ceiling, such as openings around sprinkler escutcheons. Otherwise, walls must continue to deck and resist the passage of smoke.

In buildings with fully ducted HVAC supply and return systems, hazardous room walls are not required to continue to deck per LSC Section 8.4.2 (3).

In buildings with plenum return air systems, hazardous room walls must continue to deck with air transfer openings protected by smoke dampers in accordance with LSC Section 8.4.6.2.

Smoke Barriers

In accordance with LSC Section 8.5.2, smoke barriers must extend from outside wall to outside wall and from floor to ceiling. Unlike corridor walls or smoke partitions, smoke barriers may not terminate at a ceiling, regardless of its ability to control smoke. Per LSC Section 19.3.7.3, smoke barriers in existing hospitals are also required be constructed of minimum ½ hour fire rated walls.

However, per LSC Section 19.3.7.3 (2) smoke dampers are not required when penetrating a smoke barrier provided:

- HVAC is fully ducted from source to register
- The building is sprinkler protected

The snip below in Figure 3 shows the intent of omitting dampers at smoke barrier walls. It should be noted that standard response sprinklers are permitted where quick response sprinklers were not listed for use in such locations at the time of installation (LSC Section 19.3.5.8).

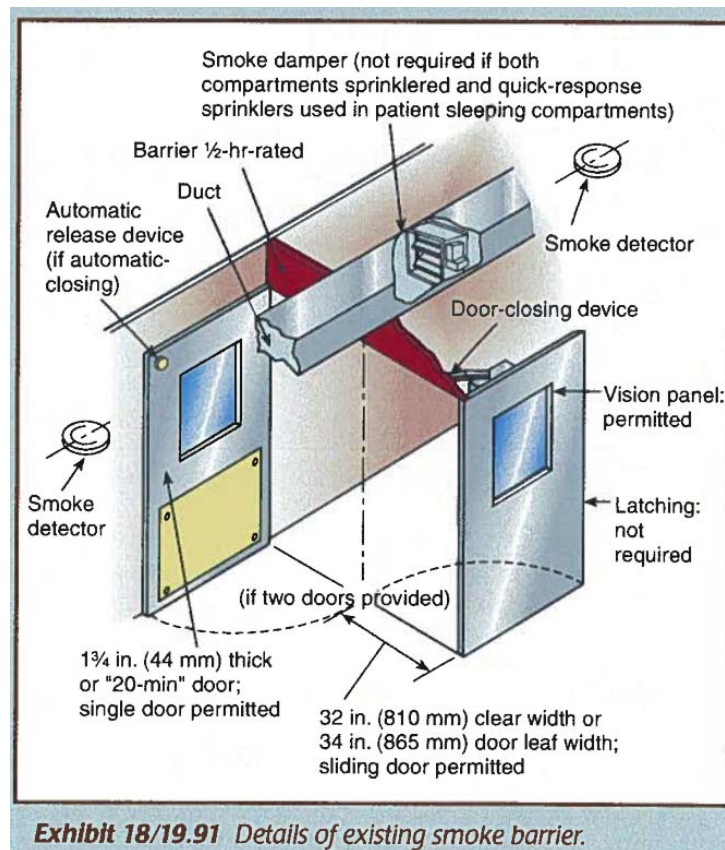


Figure 3: Excerpt from NFPA 101 Handbook

Fire Barriers

NFPA 90A Section 5.3.1.1 only requires fire dampers for ducts penetrating walls of 2-hour fire resistance or greater or to protect open transfer grilles in other fire-rated walls and partitions.

Damper Maintenance and Decommissioning

Existing fire dampers are required to be tested and maintained in working condition in accordance with NFPA 80 Section 19.4.1.1 on a 6-year frequency. However, if dampers are not required, a decommissioning plan should be considered to lower future maintenance costs.

Decommissioning procedures are not specifically codified and therefore up to the applicable authority having jurisdiction (AHJ). LSC Section 4.6.12.3 states: "existing life safety features obvious to the public, if not required by the Code, shall be either maintained or removed." Since it is costly to physically remove damper assemblies, the AHJ should be consulted as to approved methods to take systems out of service. Any such program should accomplish the following:

- The public should not be presented with a false sense of security (system is not obvious to the public)
- It should be obvious to an inspector that the damper is not functioning. i.e. the fusible link has been removed and if a motorized damper, the motor and power have been removed, and the vanes have been secured in a permanently open position.

5. BUILDINGS 6, 8, 10, 15 & 16

Buildings 6, 8, 10, 15 and 16 were surveyed after the healthcare building surveys were concluded. There are no current life safety plans for these buildings. Each of these buildings has some varying level of inpatient occupancy, but none of these buildings house patients for care or sleeping. The following are the areas of greatest concern:

Building 6 was originally constructed as an auditorium but is now used for storage. The lower level contains arts and crafts areas which patients participate in. WPFR has classified the building as a Group S-1 or storage occupancy, however it more closely resembles a Business or possibly an Assembly occupancy on the lower level. The primary concern is the locking of doors in the direction of egress in a building that is not classified as institutional. LSC Chapters 19 and 23 allow the locking of egress doors for clinical or security purposes, but Chapters 13, and 39 make no such provision. Alternately, special locking arrangement complying with Section 7.2.1.6 such as delayed egress locking systems and access-controlled egress door assemblies may be used when complying with these sections.

Building 8 is a three-story building of wood and masonry construction classified as a Business occupancy. The building has a manual fire alarm system but it not sprinkler protected. Most notably, the building houses an amphitheater on the Ground Floor, used primarily to screen movies, and a library on the 2nd Floor that patients have access to. Either of these two spaces could be classified as Assembly depending on the occupant load. When surveying the building to LSC Chapter 39, the most notable deficiency is a 3-story ramp that connects all three floors on the east side of the building. The ramp is open to the east side of the building with no independent enclosure or shaft protection. The stair on the west side of the building is slightly better protected; however, the doors on the 3rd Floor remain open during business hours. Closers do not keep the doors closed, leaving the 3rd Floor unprotected to vertical smoke travel. Since the building is not sprinkler protected, there are no current code paths in the LSC that permit this orientation. This building is highly susceptible to vertical fire spread.

Building 10 is a two-story building of concrete, masonry, and wood construction. The building is classified by WPFR as an assembly occupancy most likely because it houses a basketball gym and locker rooms, and is now used as a staff training. At one point in its history, the building had a bowling alley that is now in disrepair. That space is not used. A woodworking shop is located on the north side of the building. The wood shop is equipped with a sprinkler system and dust collection system that both appear to be functioning. This is the only portion of the building that is sprinkler protected.

LSC Section 13.3.2.1.2 (2) [existing assembly occupancies] requires that assembly occupancies with high hazards such as woodworking shops have sprinkler protection in the shop AND a 1-hour fire barrier in between the shop and the rest of the building. IBC Section 903.2.4.1 requires Group F-1 occupancies with woodworking operations over 2500 SF to be sprinkler protected throughout the fire area containing the woodworking. IBC defines a fire area as an area bounded by exterior walls, fire walls or fire barriers. If it is the intent to meet either of these codes, a minimum one-hour fire barrier should be constructed between the sprinkler-protected and unprotected portions of the building.

Building 15 is a single-story greenhouse with an attached office building. The greenhouse measures approximately 5800 SF and the attached office measures approximately 1,250 SF. The office is sprinkler protected but has no fire alarm. Patients are permitted in the greenhouse under supervision but are not permitted in the office. The egress doors from the greenhouse are locked in the direction of egress. As indicated above for Building 6, this type of locking arrangement is not permitted outside institutional use buildings. As indicated below for Building 9, if this arrangement is intended to continue, it should be documented and agreed to by applicable authorities having jurisdiction.

Building 16 is a 3-story masonry and concrete building housing offices and the campus kitchen. The building is classified by WPFR as a Group B occupancy per the IBC. The building is not sprinkler protected but contains a manual fire alarm system and partial smoke detection. The fashion center portion of the building located on the 1st floor is locked in the direction of egress. As indicated above for Building 6, this type of locking arrangement is not permitted outside institutional use buildings. As indicated below for Building 9, if this arrangement is intended to continue, it should be documented and agreed to by applicable authorities having jurisdiction.

6. BUILDING 9

Building 9 is part of a larger structure that additionally contains Buildings 17 through 20. Building 9 is being discussed separately because it is classified as a Business occupancy on the existing life safety plans; however, we understand that building service fire protection is shared between this and adjacent buildings and that customary access by inpatients is allowed, but that all such inpatients are fully capable of self-preservation when allowed into this building.

The survey for this building was conducted using LSC Chapter 39 based on facility guidance that patients are not treated in building. However, it should be noted that the WPFR District considers this building a Group I-2 occupancy. The following are the primary deficiencies in order of concern:

1. All egress doors from this building are locked from the egress side. We understand from consultation with staff that this arrangement is approved by the local officials; however, there is no code path that permits the locking of egress doors from the interior to the exterior in a Business occupancy, either in the LSC or the IBC in the manner observed.

In the LSC, Chapters 19 and 23 allow the locking of egress doors for clinical or security purposes, but Chapter 39 makes no such provision unless using the special locking arrangement options found in LSC Section 7.2.1.6.

In the IBC, Section 1010.1.9.10 permits locking rooms or spaces occupied by persons whose movement are controlled for security purposes; however, doors are required to unlock manually and by an automatic means such as fire alarm activation or a remotely controlled signal.

The egress doors from this building can only be unlocked via key and not even the same key is required depending on which doors is being accessed.

We suspect this building is not one of the buildings being surveyed by an accreditation authority or CMS due to being declared as Business occupancy and that this issue may therefore not routinely be called out. If it is the intent to continue controlling egress in the current manner, we recommend that clear documentation be kept via an approved fire plan and agreed to by all authorities having jurisdiction.

2. Existing plumbing chases in this building are not adequately protected as 2-hour shafts and plumbing penetrations are not adequately protected through the rated floor assembly. There are three locations in this building (near each restroom group) where existing plumbing chases were observed. Each location had varying degrees of deficiency with regards to pipe penetrations through the floor. While these plumbing chases are sprinkler protected, they do offer a vertical path of travel for smoke that can go undetected. The most obvious remedy is to seal each floor penetration with an approved firestop assembly.
3. The Lower Level / Basement should be reclassified as storage since all rooms appear to be used for that purpose. A museum is located in that level as well, but is used so seldom that it does not meet the intent of a Business use. As a storage use, the existing sprinkler system should be evaluated for ordinary hazard coverage, as the existing system appears to be designed for light hazard only.

7. BUILDINGS 17, 18, 19 & 20

Buildings 17, 18, 19 and 20 form a single connected structure that is the largest building on campus. The buildings consisting of four floors and encompass approximately 245,000 SF. The buildings are listed as a Type II (111) construction, which meets the minimum required type of construction. The following are the primary deficiencies or comments in order of concern:

1. The Ground Floor of these buildings contains office space that is classified a Business occupancy and has been converted in some cases from healthcare. It should be made clear if it is the intent to continue applying LSC Chapter 19 to these spaces or if Chapter 39 should be used, as is the case with Building 9. The buildings were surveyed as if they were healthcare due to smoke-rated corridors and hazardous room designations.
2. A mixture of institutional style, standard response and quick response sprinklers were observed. As part of the sprinkler ITM program, any standard response sprinklers within smoke compartments should be identified and targeted for replacement.
3. As discussed in Section 4.2 of this report, the fire alarm systems in two of these buildings are aging and will need to be replaced within the next 5 to 10 years.
4. As detailed in Section 4.4 of this report, these buildings are separated, at least on plans, by 4-hour fire walls. These walls are not required to be 4-hour and do not meet the fire wall requirements of the building code for structural independence. We recommend these be treated as 2-hour fire/smoke barrier assemblies.

8. BUILDING 21

Building 21 is a 5-story healthcare building measuring approximately 127,000 SF. This is the only healthcare building on campus that is taller than 4 stories and therefore requires a minimum Type II (222) construction. The existing life safety plans accurately show this type of construction. The following are the primary deficiencies in order of concern:

1. The building is not constructed as a fully non-combustible building. While the floors and walls are concrete and masonry, the roof structure is unprotected wood construction with wood overhangs.
2. A recently installed smoke detection system still had packaging covers on each smoke detectors at the time of survey, indicating the system may still have been under test. However, newly installed notification devices were installed in ceiling mounted locations where the appliances were intended for wall-mount.
3. Standpipes are not provided at each stair. When standpipes are provided, NFPA 14 requires a minimum spacing of 200 feet and hose outlets in each exit stairway. Since Class I standpipes are for the sole use of the local fire department, WPFR should be consulted as to their adequacy.
4. Quick response and standard response sprinklers were found mixed within the same smoke compartment.

9. BUILDING 27

Building 27 is a single-story healthcare occupancy measuring 37,980 SF. At the time of survey, the west portion of the building was not being used and was under remodel. The following are the primary deficiencies in order of concern:

1. Smoke barriers continue to deck but are not sealed at the ceiling due to the fluted metal pan deck above. An attempt has been made in some cases to stuff mineral wool into the fluted space; however, the mineral wool is not held in place by any means, such as a head-of-wall assembly. Due to the type of construction and interstitial space above the ceiling, products of combustion can travel un-detected from one smoke compartment to another.

2. Hazardous rooms do not have fire-resistance-rated construction that continues to deck in many cases. A lay-in tile ceiling may serve as a smoke-tight assembly provided there are no HVAC return grilles into a plenum system.
3. Exit signs are not visible in some cases.

The building is listed on the code plans as being of Type II (111) type of construction, but the roof/ceiling assembly does not appear to be 1-hour rated. The existing type of construction appears closer to a Type II (000). This is permitted in accordance with LSC Table 19.1.6.1 and would additionally meet the allowable area listed in IBC Table 506.2 for a single story, sprinkler protected Group I-2.

We recommend the Type of Construction be reclassified to a Type II-B / Type II (000) to align with actual observed conditions.

10. BUILDING 28

Building 28 is a two-story healthcare occupancy with a basement measuring 161,832 SF. The building is listed on the life-safety plans as being of Type I (443) construction. This type of construction is not required since the building is only 2-stories above grade plane. Even for new healthcare, the worst-case LSC Type of construction is a Type II (111) – which is what Building 29, a similar size building, has been classified. It is prudent to keep in mind that per IBC, a Type II-A building would not be permitted due to size if the building were built today; however, in terms of compliance with the LSC, Type II (111) is permitted.

If Type II (111) construction is acceptable, the 4-hour fire wall described in Section 4.3 of this report is not required and may be re-designated to a 2-hour fire/smoke barrier wall.

The Ground Floor of the building accesses a corridor that is separated from the healthcare occupancy by 2-hour fire barrier construction. As such, the ADMIN portion of the Ground Floor may be reclassified as a Storage and Business occupancy. In accordance with LSC Section 19.1.3.6, the healthcare occupancies located on the Ground floor may traverse another occupancy provide it meets the egress requirements of healthcare, namely, corridor width, travel distance and protection from hazards.

11. BUILDING 29

Building 29 is a two-story healthcare occupancy with a basement measuring 151,567 SF. The building is listed on the life-safety plans as being of type II (111) construction; which is permitted by the LSC for a 2-story healthcare occupancy.

The following are the primary deficiencies in order of concern:

1. Warming kitchens are open to the corridor and separated by roll-up fire shutters that were originally intended to meet NFPA 80. However, spaces required to be separated from corridors require a smoke separation per LSC Section 19.3.6. Therefore, these shutters need to activate via smoke detection in accordance with NFPA 105 Section 4.5. Installation of smoke detectors shall be per NFPA 72 Section 17.7.5.6.

Alternately, kitchens may be open to the corridor in accordance with LSC Section 19.3.2.5.3 as follows:

- a. Within a smoke compartment with 30 beds or less
- b. Any working ranges are equipped with a range hood with a maximum airflow of 500 CFM. Hoods are not required to be ducted to the exterior but require a charcoal air filter.

- c. Any working cooktop ranges is protected with a UL 300 compliant fire suppression system complete with a manual release per NFPA 96 and an interlock to shunt equipment power or gas.
- d. No solid fuels.
- e. No deep-fat frying.
- f. K-type fire extinguishers are installed per NFPA 96 and NFPA 10.
- g. A locked switch is provided to manually deactivate power or gas flow to all equipment. The switch is on a timer not to exceed 2 hours.
- h. NFPA 96 procedure for ITM are followed.
- i. At least two smoke detectors are provided within 20 ft of any working ranges.
- j. The smoke compartment is sprinkler protected.

If cooking ranges are not intended for these kitchens and there is no working cooking equipment, then the hazards are similar to other spaces permitted to be open to corridors in accordance with LSC Section 19.3.6.1 (1) and the above specialized controls are not required. The space may then be open to the corridor with no separation, provided that warming kitchens are either equipped with smoke detection or quick-response sprinklers.

That being said, the large open spaces just outside the kitchens and nurses' stations are only protected along the corridor line. These areas should be evaluated for missing smoke detector coverage.

2. The enclosed stairway in between E-6 and E-8 has been used to route electrical conduit and feeders where electrical elements not serving the stair are prohibited within stairs per LSC Section 7.1.3.2.1 (10).
3. Hazardous rooms do not have fire resistance rated construction that continues to deck in many cases. A lay-in tile ceiling may serve as a smoke-tight assembly provided there are no HVAC return grilles into a plenum system. In this building several old tub rooms are being used as storage. These may continue to be used as storage if designated and protected as Hazardous rooms.
4. There is a large Business type use in between the E-2 and E-4 wings on the 2nd floor. If patient care is not provided, the entire space may be classified as non-patient care in accordance with LSC Section 19.2.5.7.4.

The existing life safety plans accurately depict corridors, smoke barriers, shafts and other rated walls assemblies. A few changes should be made to the drawings, and we plan to work with DSHS to make the most accurate designations. For example:

1. As discussed in Section 4.3 of this report, fire walls do not need to be 4-hour rated, nor do they appear to be such in the field. We recommend a 2-hour fire/smoke barrier at the separation between Building 28 and 29.
2. Stair, elevator and ventilation shafts have been designated as 2-hour throughout this building. LSC Section 8.6.5 only requires 1-hour fire barriers for shafts extending through not more than 4 floors. Since this is a two-story building of type II (111) construction, we believe 1-hour shafts are more appropriate.
3. Smoke compartments are not clearly identified with area tags. A few new locations have been recommended.

12. CONCLUSION

This report provides a general life safety assessment of the surveyed buildings at the Western State Hospital. Please contact JENSEN HUGHES with any questions or concerns.

APPENDIX A: SURVEY RESULTS