

## **ARCHITECTURAL BUILDING CODE SURVEY**

# **TOWN OF VIENNA PARKS AND RECREATION FORMER FAITH BAPTIST CHURCH**

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## **EXECUTIVE SUMMARY**

The Town of Vienna has acquired the Faith Baptist Church building located at 301 Center Street South and intends to use the building for public use, potentially including a 3,000 square foot library, recreational use, and meeting spaces. At the time of this code review, the Town does not intend to renovate the building, or to make any significant modifications, though some minor changes will be needed. The Town is considering conversion of the existing sanctuary to library use, and this review assumes 3,000 square feet of the space will be used for stacks. This review also assumes that the existing classrooms are proposed to be used for similar purposes in future.

The purpose of this study is to provide the Town with the basic architectural building code requirements for the desired public uses, identify conditions that are not compliant with existing building codes or that would prevent obtaining a new Occupancy Permit, and to identify additional surveys or conditions that need to be analyzed prior to submission for permits. WRA has also provided survey and assessment (to the degree systems are accessible) of mechanical, plumbing, electrical, and fire sprinkler and alarm systems.

WRA has prepared building floor plans, based on existing drawings provided by the Town and field surveys performed by WRA. The code analysis data provided in this report is based on these plans and field observations. The report also includes rough order of magnitude costs for improvements anticipated to be required to obtain a Certificate of Occupancy from Fairfax County, and ventilation calculations required to be provided with the application.

### **Applicable Building Codes**

Buildings within the Town of Vienna and Fairfax County are required to comply with Virginia Uniform Statewide Building Code (USBC) and Statewide Fire Prevention Code (SFPC). The USBC consists of three components (Virginia Construction Code, Virginia Existing Building Code, and Virginia Maintenance Code) based on the International Codes Council (ICC) model codes, with Virginia-specific provisions and amendments. At the time of this report, the County is in transition between the 2015 and 2018 versions of the USBC. Until June 30, 2022 applicants for building permits may elect to comply with the technical provisions of either version of the code, though mixing provisions of the two versions is not permitted.

Because the subject building is existing, the provisions of the Virginia Existing Building Code determine what aspects of the existing building must be brought into compliance with the current adopted codes. Other building codes, including but not limited to mechanical, fuel oil, plumbing, and electrical codes will be applicable as referenced by the Existing Building Code and/or the Virginia Construction Code.

It is important to note, that local Building Officials and plans reviewers may require the owner of a building to bring some non-compliant elements up to code at their own discretion, even if not required by the Existing Building Code. Such requirements are typically unpredictable.

## **Survey Findings**

As detailed in this report, WRA has identified the following items that likely have to be addressed before a Certificate of Occupancy can be obtained.

- Provide a sprinkler system throughout the building. The existing fire detection and alarm system will be evaluated in the next steps but would need to be addressed if not compliant.
- Change the door swing and add a second door in the partition between the multi-purpose room and front foyer.
- Replace and/or upgrades existing HVAC units that do not provide adequate ventilation air to meet current minimums as required in the Fairfax County submittal checklist.

Additional issues, including janitor's closets and other storage in stairwells, ADA compliance issues, and configuration of partitions in the main lobby, have been noted within this report that are not compliant with current codes but are not required to be addressed for a Change of Occupancy per the Virginia Existing Building Code. Fairfax County could require these, or other items be addressed at their discretion.

## **Estimated Cost of Improvements**

As noted in Appendix A of this report, construction costs are currently difficult to estimate due to current market factors. The estimated cost for the required upgrades are currently estimated to be in the range of \$400,000 not including design fees or contingencies.

## **Next Steps**

WRA is working with a third-party industrial hygienist to provide sampling and testing for asbestos containing materials in portions of the building. The test reports will be appended to this report when received.

## **EXISTING BUILDING DESCRIPTION**

The former Faith Baptist Church building is located at 301 Center Street South, in Vienna, Virginia. The building consists of two large assembly spaces, a sanctuary and a multi-purpose room, connected and adjoined by support spaces including offices, classrooms, toilet rooms, and mechanical and electrical rooms. The building has a second story with additional classrooms and storage, accessed by a stair at either end of the story. The second story has no toilet facilities or other support spaces.

The Sanctuary primary structure consists of a glu-lam rigid frame infilled with brick veneer over concrete masonry on the exterior. The roof structure is unknown underneath asphalt shingles but is assumed to be wood framed and sheathed as well. The multi-purpose space is composed of load-bearing concrete masonry (CMU) walls and engineered roof trusses, with brick veneer on the exterior walls and an asphalt shingle roof. The adjacent supporting portions of the building are a combination of CMU with dimensioned lumber joists or steel joists (in areas supporting rooftop mechanical equipment). The roof over the support spaces appears to consist of varying thicknesses of rigid roof insulation (partially on sloped structure, partially tapered) with a membrane roof that has been covered and/or re-coated over the years. The second story has a concrete-filled metal deck floor supported by steel bar joists bearing on CMU walls. The second story roof is composed of engineered wood trusses with asphalt shingles.

## **EXISTING CONDITIONS ASSESSMENT**

WRA provided an assessment of the building based on the existing documentation available, and visits to the site. There is no documentation available to WRA that indicates what codes were applicable at the time the original building was constructed. The addition was constructed in 1988 and should have been constructed under the 1987 edition of the Virginia Uniform Statewide Building Code, which would've incorporated BOCA National Building Code (1984 Edition). The existing conditions assessment will review compliance with the most recently adopted code as this will be necessary to obtain a new Certificate of Occupancy, and most importantly best provides for the health, safety, and welfare of the future users of the facility.

### **Building Code – Classification and Use**

Use Group: Assembly (A-3)

Assembly occupancies in general as defined by the current code are those used for the “gathering of persons for purposes such as civic, social, or religious functions”. The previous use as a church and the proposed future use as library and community center would both fall into this category. A-3 is a sub-category of the Assembly occupancy that includes “community halls”, “gymnasiums without spectator seating”, “lecture halls”, “libraries”, and “places of religious worship”. According to the available record drawings, the addition was submitted for permitting as Use Group A-4. Under BOCA National Building Code, Use Group A-4 was a specific category for church buildings and is no longer separately categorized under modern building codes.

Construction Type: Type IIIB

According to available record drawings, the addition was submitted for permitting as Construction Type IIIB. No record drawings are available for the original building. Type III construction is defined as having exterior walls of non-combustible construction, which appears to be accurate for the addition. While there is little available information regarding the construction of the original building, limited field investigation confirms that exterior walls consist of brick veneer over a CMU back-up, which is consistent with Type III construction. The letter “B” in the designation indicates that building structural elements are not protected by fire-rated construction.

Building Height and Area Limitations:

The building height and area limitations are based on the occupancy and construction type as noted above, whether the building has a sprinkler system throughout, and how many stories the building has. Under the current codes, a building of Type IIIB construction, used for A-3 assembly, and without a sprinkler system installed throughout would be limited to the height and area noted below.

- Maximum Height Allowed: 55 Feet
- Maximum Stories Allowed: 2
- Maximum Area per Floor Allowed: 9,500 Square Feet



The current building height is estimated to be 40 to 45 feet, not including the steeple. The steeple is permitted to be 20 feet above the height limit if constructed of combustible materials and is not limited if constructed of non-combustible materials. The steeple materials are not known at this point. The existing building height is compliant (or very close) per current codes. The building has 2 stories, which is compliant with current code for Type IIIB construction. The existing building area is 18,702 square feet on grade, with an additional 2,511 square feet on the second floor. The ground floor area significantly exceeds the maximum allowable area per current code.

The building currently has sprinklers in limited portions of the addition, but current code does not consider a partially sprinklered building acceptable to increase the allowable area of the building. If a sprinkler system were provided throughout the building, the allowable area would be 28,500 square feet for Type IIIB construction which would make the building compliant with current codes.

**Building Code – Occupant Loads**

Occupant loads have been calculated based on the proposed future use of the building (library / recreation / meeting rooms) and as prescribed by the current code. The codes in effect when the original building and addition were constructed likely prescribed different ratios of occupants to square footage. The gymnasium has an existing occupancy limit sign posted by the Fairfax County Fire Marshal. The posted limit is dated 2006, identifies the use as a “Multi-Purpose Room”, and limits capacity to 800 persons. While it is not clear how this limit was calculated, it appears to be based on a load factor of 7 square feet per person, which is the code requirement for Assembly use with non-fixed seating. The room appears to measure 5,440 SF, which would result in an occupant load of 777 at 7 SF per person. This analysis will use the posted 800 to be conservative. The existing sanctuary is proposed to be converted to library space (assuming all stacks for the purposes of this report). The occupant load is calculated as shown in the chart below. The building includes several spaces that could be used for classrooms, offices, or a similar use. See the attached floor plans for the rooms that were calculated as classrooms for this analysis. All other spaces in the building (except mechanical and storage) have been calculated using the load factor for “business” use, assuming the remaining space is used for offices, small conference rooms, toilet rooms, and circulation which would be similar to other business functions. The chart below and on the attached plans provides the calculated occupant load for the building.

First Floor

Description	Area	Load Factor	Occupants
Library Stacks	3,253 SF	÷ 100 SF / Person =	33
Gymnasium / Multi-Purpose Room	5,440 SF	÷ 7 SF / Person =	(777) 800
Classrooms	1,757 SF	÷ 20 SF / Person =	88
Storage / Mechanical	300 SF	÷ 300 SF / Person =	1
Business	7,952 SF	÷ 150 SF / Person =	53
Totals	18,702 SF	=	975



Second Floor

Description	Area	Load Factor	Occupants
Classrooms	1,022 SF ÷	20 SF / Person =	52
Storage / Mechanical	305 SF ÷	300 SF / Person =	2
Business	1,184 SF ÷	150 SF / Person =	8
Totals	2,511 SF	=	62

**Building Code – Egress Requirements**

The building’s Means of Egress (routes to exit the building) are composed of several components – doors, corridors, stairs, ramps, and related components such as lighting and signage. The means of egress for this building were reviewed for compliance with current codes.

Required Exits:

The number of exits required is based on the occupant load and the travel distance to an exit. For the sanctuary (used as library stacks), two ways out of the room are required. There are two exits toward the front leading directly outside, and one at the rear through a foyer to an exit. The two doors at the front are too close together to serve as the only required means of egress from the room, making the door at the rear a required means of egress. The multi-purpose room is required to have at least three means of egress due to the occupant load. There are currently two exits directly to the outside, three doors together in the southeast corner (see additional comments in the “Capacity” section below), and pair of doors leads to a corridor and vestibule on the southern side of the room, for a total of four means of egress. The remaining individual rooms in the building only need one means of egress each. Two means of egress are required from the second story and are provided by the two stairs at each end of the second floor. For the building as a whole, the required number and configuration of exits meets current code.

Exit Access Configuration:

Exit access is defined as the route(s) through the building from an occupied space to an exterior door. The code sets limits on the length of the exit access (travel distance) and sets requirements for protection of the exit access. Because the existing building has no sprinkler system throughout, the allowable travel distances and protection requirements are more restrictive. Total travel distance from any location in the building to an exit is limited to 200 feet. The building is compliant in this respect. Travel distance from any point in the building to a point where two discernable paths to exits are available is limited to 75 feet. As noted on the attached drawings, the path from the front offices just exceeds this limit.

Exit Access Capacity:

The capacity of a means of egress component is defined as the width of the component divided by 0.3” for stairways, or 0.2” for other components (doors, corridors, etc.). With

sprinklers, a slight increase in capacity would be permitted. These capacities have been noted on the attached drawings. There is sufficient capacity for most means of egress components for the occupants loads.

As mentioned above and noted on the plans, there is an issue at the southeast corner of the multi-purpose room. One of the three doors is a required means of egress based on capacity. The two single doors to the exterior and the double doors to the corridor can provide egress capacity for 640 people. One of the three doors would provide the 160-occupant capacity necessary to provide for the posted occupant load of 800 for the room. The single door into the foyer across the corridor from these doors is therefore also required to maintain the capacity out of the multi-purpose room. However, this door is required to swing into the foyer instead of the corridor, and the corridor at this point is also too narrow. Where the existing doors swing out of the multi-purpose room, there must be a minimum of 48" plus the swing of the door, or else the doors must swing away from each other. Since other code requirements require both sets of doors to swing in the same direction, the 48" must be maintained.

While the existing stairs are located as required by code, and have sufficient capacity, the tread and riser dimensions do not meet current codes. Risers are limited to a maximum of 7 inches, and treads are required to be 11" minimum. The existing risers and treads are 7-1/2" and 10-3/4" respectively. Handrails are required to be located between 34 and 38 inches above the nose of the treads. Existing handrail heights were not measured but are believed to be less than the 34-inch minimum. The existing handrail profiles are not compliant with current code requirements, and though handrail continuity, extensions, and clearance from wall were not verified they also are not likely to be code compliant. The height of the existing guardrail at the top of the south stair is likely too short. These measurements will be confirmed during future surveys for mechanical, electrical, and plumbing systems.

Exit access corridors appear to have sufficient capacity and appear to be located in compliance with current codes. Corridors are required by current codes to have a 1-hour fire-resistance rating where occupant loads are over 30 persons, unless the building is provided with a sprinkler system throughout. Based on the record drawings for the addition, the corridor adjacent to the multi-purpose room, and the second floor corridor were intended to be constructed accordingly. However, field investigation indicates that these corridors do not meet requirements for fire rated construction. At a minimum, most doors to and from these corridors are not appropriately UL Listed and do not have the necessary hardware. The record drawings for the addition also appear to indicate that the corridor / foyer out of the rear of the sanctuary has a fire-resistance rating. Again, field investigations indicate that at a minimum, doors in these partitions do not meet the applicable requirements.

#### Door Hardware:

Doors serving rooms with an occupant load over 50 persons are required either to be non-latching, or to have exit devices. Doors located in fire-rated partitions (such as the corridors described above) are required to have doors that are self-closing and latching. For doors

that fall into both categories (i.e. doors leading from areas with over 50 people and into corridors) are required to meet both sets of requirements, which means that the occupant load requirement to be non-latching, is over-ridden by the requirement for latching of corridor doors, resulting in such doors being required to have exit devices. As noted on the attached plans, not all of the existing doors meet these requirements.

#### Accessible Means of Egress:

Each of the existing spaces on the first floor appears to have an acceptable, accessible means of egress as required by current codes.

The second floor of the building is not required to be accessible - see additional accessibility comments in "Accessibility / ADA Compliance" elsewhere in this report.

Were the second floor to be accessible, it would be required to have a minimum of (2) accessible means of egress. The stair adjacent to the Boiler Room has the required minimum width to meet the requirements of an accessible exit access stair, but the stair adjacent to the front foyer does not. Both stairs are also required to have an "area of refuge" which is a minimum clear space of 30" by 48" in addition to the required landing as well as be protected by smoke barriers, which are essentially the same as rated corridor walls. Neither stair appears to meet the requirements for an "area of refuge".

#### **Building Code – Fire Protection**

Current building codes would require this building to be provided with a fire protection system (sprinklers) throughout if it were being constructed today, based on the following:

- Size of the building: limited to 12,000 square feet per "fire area". The building is roughly 18,000 square feet on the first floor, and if the space were divided by a fire barrier of specific construction, each portion would be considered a "fire area" and could remain under the 12,000 SF threshold.
- The use of the building: For Occupancies of A-3 other than a place of worship with an occupant load over 300.
- The presence of a second story: fire areas located on a story other than those that exit to grade.

As previously noted, the building currently exceeds the maximum allowable square footage for type IIIB with no sprinkler system.

#### **Building Code – Mechanical**

##### Mechanical Ventilation:

An analysis was done to confirm that all existing Air Conditioning units in the building provide sufficient ventilation air to conform with the proposed new use per the IEBC/VEBC. Since only minimal equipment capacity information existed on the drawings for the AC units, and only a few model/serial numbers were able to be pulled from a field survey, certain assumptions had to be made to approximate the amount of ventilation air that the AC units were able to provide. AC-4, however, was one exception, as it's Outside Air (OA) amount



was called out on drawing M2 of the 1988 Drawing Set. All assumptions and analysis methodology are saved in Appendix B - HVAC Ventilation Analysis – Calculations.

The following AC Units were determined to be non-compliant with current code mandated ventilation requirements:

- AC-1: RTU located on building roof. Serves 1st Floor Multi Use Room.
- AC-4: Indoor unit located in attic of 2nd Floor; outdoor unit located on building roof. Serves 2nd Floor Classrooms.
- AC-5: RTU located on building roof. Serves 1st Floor Offices.
- (2) Sanctuary AC Units: Located behind and on either side of the Sanctuary Stage. Serve Sanctuary.

Additionally, the 1st Floor Classroom in the NW corner of the building is currently unconditioned and without ventilation air and is non-compliant from a ventilation air perspective.

HVAC Ventilation Analysis – Summary Chart

AC Unit	Code Required OA (CFM)	Unit Provided OA (CFM)	Sufficient Ventilation (Y/N)?
AC-1	8050	3150	N
AC-2	130	150	Y
AC-3	295	450	Y
AC-4	615	500	N
AC-5	665	600	N
Sanctuary-1	423	0	N
Sanctuary-2	423	0	N
1st Floor-NW Classroom	205	0	N

If desired, space usages can be adjusted for units that are relatively close in terms of OA requirements. Classrooms can be changed to an Office usage, as one example, to bring down the OA required to the associated AC Unit.

**Building Code – Plumbing Fixtures**

Current building codes would require the new occupancy type of this building to provide one water closet per 65 female users and one water closet per 125 male users, where additional urinals cannot exceed 67% of the total required water closets for male users. One lavatory per 200 male/female users is required. One drinking fountain per 500 people is required, and one service sink must be provided.

The existing service sink, lavatory, and male water closet fixtures currently meet these minimum count requirements.

There are currently two drinking fountains, which fall just short of the requirement to provide a minimum of three drinking fountains for the calculated total occupant load at 1037 people. The Virginia Plumbing Code does allow for a water dispenser to be substituted for a drinking fountain, provided it does not account for more than 50% of the required count, which may be a compliance alternative to the installation of an additional drinking fountain.

Based on the occupancy count, the minimum required female water closet fixtures is eight (8). Currently there is a single fixture unisex restroom, a women's restroom with six (6) water closets, and a girl's restroom with two (2) water closets. While this accounts for nine (9) total water closets that women may access, the two girl's restroom water closets are designed for children's use and are significantly smaller and lower to the ground than the typical adult water closet fixtures. Without these fixtures, there only seven (7) water closets for female use which does not meet the minimum. The Code does not specifically address whether child-sized toilet fixtures are permitted to count toward the total required, but it is assumed they do not.

As noted in the following section regarding Accessibility / ADA Compliance, the existing restrooms do not meet current accessibility requirements. If it is determined through the Change of Occupancy Assessment that the children's water closets cannot be used toward the minimum fixture count, it may be easier to renovate the children's restrooms with accessible fixtures than to renovate the existing men's/women's restrooms to provide accessible water closets. If the main restrooms are renovated, multiple water closet fixtures will be lost in order to provide the sufficient clearances and it may be challenging to maintain the minimum fixture counts.

Alternatively, the existing showers may potentially be removed and replaced with water closets which could address the minimum fixture counts and/or accessibility access.

### **Building Code – Electrical**

#### Emergency Egress Lighting:

Emergency battery units are utilized to provide emergency egress lighting throughout most of the building. They include both emergency battery units and combination exit/emergency battery units to provide the emergency egress lighting. However, there are a few areas noted as non-compliant for providing emergency egress lighting:

- Foyer at Sanctuary and classrooms
- Vestibule next to Stairs
- Corridor where Electric Room is located.
- Second floor Corridor.

#### Equipment Requiring Service:

HVAC unit located on the exterior of the building adjacent to the Sanctuary does not have the code required receptacle provided within 25 feet of the unit.

## **Accessibility / ADA Compliance**

The Virginia USBC (which references the 2009 version of ICC A117.1) and the Department of Justice Accessibility Standards (ADA) requirements are generally the same, as they are applicable to the existing building.

The second floor of the building, and the spaces behind the stage in the sanctuary are not accessible. With the building no longer used as a place of worship, the baptistry behind the stage no longer serves any kind of accessible purpose and can be treated as inaccessible mechanical space. The second floor is not required by USBC or ADA to be accessible, so long as no necessary functions (such as the only toilet facilities) are located on that story, and persons with disabilities can be accommodated (such as relocating classes to a first floor space).

The first floor of the building must be compliant with USBC and ADA for accessibility. This floor is generally compliant in the sense that all areas used by employees or visitors can be reached and that pathways meet minimum clearances. A few items were noted as non-compliant:

- Most significantly, none of the existing toilet rooms in the building meet current requirements. The Men's and Women's toilet rooms do not have compliant accessible stalls and fixtures. Detailed field survey to determine compliance of other aspects of the toilet rooms such as counter heights, toilet accessory mounting locations, and turning clearances were not performed as part of this assessment.
- While toilet facilities sized for children are appropriate in a community center use, the existing facilities do not provide the necessary clearances required as configured.
- Several doors were noted to have non-compliant hardware: specifically door knobs which are not permitted.

## **Additional Code Compliance Observations**

Field surveys noted that there are janitor's closets on both stories of the stair adjacent to the Boiler Room. Egress stairs are not permitted to have any other rooms or storage within them, except in very limited cases and with specific fire-ratings on those spaces. These janitor's closets do not meet such criteria.

There is storage shelving installed in the other stairwell which is not permitted.

There were multiple deficiencies noted for door assemblies within fire-rated corridors or exit stairs. Record drawings indicate 20-minute fire rated door assemblies along exit corridors, while field investigations noted many doors were missing UL labels or lacked closing or latching hardware. Stairway doors, noted as 1-hour door assemblies on record drawings, had painted UL labels or lacked latching or closing hardware in many instances. These deficiencies should be corrected to restore the necessary fire ratings. Please note, where automatic sprinkler protection is added the corridor fire ratings would no longer be applicable.

The Town has indicated that there is no intent, at this point, for use of the existing kitchen. If used simply as a place to serve prepared food, and not as a prep kitchen, there are no

significant code implications. If used for food prep – particularly use of the oven / range may require specialized commercial appliances with built-in fire suppression systems and increased ventilation air among other things. The specific circumstances would need to be reviewed and implications determined.

There are two modifications to the building that have been made since the record drawings for the addition were prepared. Two walls have been added to the front of the addition that change the original circulation pattern. They impact the flow of egress through the building from the original intent and consideration should be given to removing them.

- The first is the wall that separates the front foyer from the multi-purpose room. As noted previously in this report, this wall is too close to the doors leading out of the multi-purpose room, and a second door is needed in the wall to meet the egress capacity requirements from the multi-purpose room.
- The second is the wall subdividing the front lobby into a foyer and vestibule. The way this wall is configured, it lengthens the travel distance from the front office to a point where there are two paths to exit the building. Without the wall, that path would be right at the limit to meet code, but as constructed that path now exceeds the code limit (as shown on the attached plans).

Specific issues aside, the apparent intent of the addition design was to make the corridor behind the multi-purpose room contiguous with a new (at the time) front lobby / foyer space. This assumption is based on the drawings of the addition and the fire ratings listed in the door schedule. Considering the occupant load of the multi-purpose room, it is preferable for life safety as well as for logical functioning of the building to allow egress out of the multi-purpose room to flow into the large, open foyer, than into a cramped corridor and directly into another set of doors before being able to freely egress, both on a regular basis and especially in an emergency. A hundred or more people exiting that large room into a tight hallway causes confusion and panic (even if only momentarily) and could lead to people heading down the corridor to the back exit, which as noted on the plans, is already at maximum safe capacity. Ingress from the foyer directly to the multi-purpose room is also clearer and smoother for larger numbers of people without that partition in the way. Removing the wall would also provide better access to the only public toilets in the building. The walls that form a vestibule at the front not only impact the travel distance from the front offices, they also obscure the route to the exit for people coming from the multi-purpose room, and force those people into a narrow corridor (though it does meet capacity requirements) to get to the exit. Since there is only a single door into the vestibule, the egress capacity at the main entrance is reduced to the least of most secondary exits from the building.

It was observed on site that the domestic hot water system does not contain any hot water recirculation. This is a requirement based on current energy codes but was not a requirement at the time of installation. Should the Change of Occupancy assessment determine that this item must be brought into current code requirements, compliance would entail the installation of a new hot water recirculating pump and hot water return piping from the farthest plumbing fixture back to the domestic water heater.

## **CERTIFICATE OF OCCUPANCY ASSESSMENT**

The Virginia USBC, Part II, Existing Buildings (the Virginia Existing Building Code, or VEBC) sets forth various requirements for bringing existing buildings into compliance with current codes, depending on the extent to which changes to a building are being made. The changes made to a building are grouped into categories which include “Repairs”, “Alterations”, “Change of Occupancy”, and “Additions”. Each category requires different levels of compliance with current codes. According to VEBC, any “change in the purpose of, or a change in the level of activity within a building” constitutes a “Change of Occupancy”, so in order to obtain a new Certificate of Occupancy, the building must be at least compliant with the requirements for this category.

There are three possible methods to determine compliance with the code for any category:

- **Prescriptive:** If the building is already compliant with the International Fire Code, then only the requirements for “Repairs” in the VEBC must be met.
- **Work Area:** The VEBC prescribes a set of requirements that have to be met in order to be compliant.
- **Performance:** The building must meet the requirements of a separate set of referenced industry standards.

The VEBC also offers an alternative evaluation method for Change of Occupancy compliance, whereby many of the evaluations presented previously in this report are given a numeric score related to how closely they meet (or don’t meet) current codes. The scores are aggregated into a final score which results in a pass/fail determination.

Determining compliance via the Prescriptive or Performance methods are complex and time consuming. The scorecard method may demonstrate the existing conditions as a whole are ‘good enough’ to warrant no further work, but not enough information is available about the existing building to utilize this method. The Work Area method identifies specific aspects of the building that must meet minimum standards or be brought into compliance. This method has been utilized for the purposes of this report.

### **Work Area Method (VEBC Chapter 7 – Change of Occupancy)**

Following this method, compliance with current codes is only required as prescribed in Chapter 7 of the VEBC. The following areas are addressed by Chapter 7:

Interior Finishes:

Interior finishes of walls and ceilings must be compliant with current codes for the new occupancy. As no deficiencies have been noted, no changes would be required.

#### Stair Enclosures:

If the change of occupancy is to a higher hazard category as defined in the VEBC, protection of stairs must comply with VEBC. As the occupancy type is not changing to a higher hazard, no changes to the stair enclosures are required.

#### Fire Protection Systems:

If the new occupancy type for the building would require a fire sprinkler system under current code, then a fire sprinkler system must be provided throughout. Current code for Assembly A-3 occupancies requires the building to be protected with an automatic sprinkler system. It's important to note that BOCA National Building Code (1984), which was applied under the previous major building renovation project, did not require automatic sprinkler protection as Group A-4 (Church Bldgs.) were exempted.

If the new occupancy type for the building would require a fire alarm and detection system under current code, then a fire alarm and detection system must be provided throughout. Current code for Assembly A-3 occupancies requires the building to have a fire alarm and detection system. A fire alarm and detection system is currently provided for the facility.

#### Means of Egress:

If the new occupancy type is of an equal or lesser hazard classification as defined by the VEBC, only the egress capacity and occupant-load-based provisions of the current code are required to be compliant. For this building, the new occupancy type is of an equal hazard classification. The issue with the swing of the door into the lobby from the corridor at the multi-purpose room described previously would need to be corrected as the swing direction is related to occupant load. The space requirement between the three doors out of the multi-purpose room and the wall of the lobby would not be required to be corrected as that requirement is not based on capacity or occupant load. However, Fairfax County may require this issue to be addressed. The previously noted issues with door hardware do not need to be addressed, based on the following:

- Occupant-load-based provisions of the code: The doors referenced are non-latching and therefore compliant in this regard.
- If a sprinkler system is added (as required) the corridor fire ratings are eliminated, and thus the latching and self-closing requirements are also eliminated.

#### Height and Area Limitations:

If the new occupancy type is of an equal or lesser hazard classification as defined by the VEBC, the existing height and area of the building are deemed acceptable. For this building, the new occupancy type is of an equal hazard, so the existing conditions should be deemed acceptable to the code.

### Exterior Wall Fire Rating:

If the new occupancy type is of an equal or lesser hazard classification as defined by the VEBC, the existing exterior walls, including openings, shall be accepted. For this building, the new occupancy type is of an equal hazard, so the existing conditions should be deemed acceptable to the code.

Openings in exterior walls are required to be protected as required by current codes. For this building, no issues were noted with the existing openings in exterior walls.

### Accessibility:

Per VEBC, buildings that undergo a Change of Occupancy are not required to be provided with additional accessibility features. However, any alterations that are made as part of the Change of Occupancy are required to be accessible for their part.

The ADA does not have requirements for existing buildings that undergo a change of occupancy without alterations. The ADA requires that any alterations made to the building be compliant, and advises that under the ADA, reasonable accommodations are required to be made if a facility or portion thereof are to be used by persons with disabilities. This could make it necessary to make improvements to accessibility in the future.

The one area that may need to be addressed at this time would be the lack of accessible toilet facilities. It may be necessary to make the appropriate changes to the Men's and Women's toilet rooms or replace the children's toilets with accessible toilet rooms.

### Mechanical:

The following AC Units were determined to be non-compliant with current code mandated ventilation requirements: AC-1, AC-4, AC-5, and Sanctuary AC Units 1 & 2. Additionally, the 1<sup>st</sup> Floor NW Classroom space is without ventilation air and non-compliant.

AC-1 does not provide the code mandated amount of ventilation and would need to be replaced to comply. It should be noted that this analysis used the occupancy posted by the Fairfax Count Fire Marshal of 800 people, which is consistent with the occupancy used in the Architectural review as well. This is a high occupancy for the space, and reflects more of an Assembly usage, resulting in very high ventilation air requirements. If the owner is open to considering a different usage type (Gym space or otherwise) then the ventilation requirements could be lowered. Further analysis would be required to determine if the existing AC-1 would be allowed to remain at that point.

AC-2 & 3 are providing the code mandated amount of ventilation and can remain. It should be noted that building personnel are currently looking into replacing both of these units due to operational issues.

AC-4 does not prove the code mandated amount of ventilation and would need to be replaced to comply. It should be noted that building personnel are currently looking into replacing this unit (both indoor Fan Coil and outdoor Condensing Unit) due to operational

issues. The replacement should reflect the additional OA required in the selection of the new unit.

AC-5 does not prove the code mandated amount of ventilation and would need to be replaced to comply. The replacement should reflect the additional OA required in the selection of the new unit.

Sanctuary AC Units 1 & 2 do not currently supply any ventilation air. They are recirculating, cooling units only. Heat is provided in the Sanctuary space by hot water baseboard radiators. Since retrofitting these units with OA could prove problematic, an additional outside air unit should be selected and installed to provide ventilation air to the space, along with a relief louver to release the additional pressurized air.

The 1st Floor NW Corner Classroom is unconditioned and without ventilation air. There is no AC unit that currently serves the space. The Classroom requires 205 CFM of OA to meet code requirements. Because of the small load here and minimal square footage, and factoring in the current approach by building personnel to replace AC-3, it would make the most sense to increase the size and ventilation capacity of the AC-3 replacement unit to include capacity for this Classroom.

#### Electrical and Lighting:

Per VEBC, buildings that undergo a Change of Occupancy must comply with the Number of electrical outlets and Lighting. The number of electrical outlets shall comply with NFPA 70 and lighting shall comply with the requirements of the VCC.

Based on these requirements the following items likely have to be addressed before a Certificate of Occupancy can be obtained, unless exempted by Fairfax County.

- Provide emergency egress lighting throughout entire building.
- Provide electrical outlet within 25 feet of exterior HVAC unit.

The existing electrical power distribution system appears to have capacity to adequately support the proposed change of occupancy. It appears all panelboards have spare circuit breakers for any new loads. A visual inspection of the existing wiring method for the building shows that the existing wiring can support proposed change of occupancy.

#### Summary:

Based on this compliance analysis, the following items likely have to be addressed before a Certificate of Occupancy can be obtained, unless exempted by Fairfax County.

- Provide a sprinkler system throughout the building.
- Change the door swing and add a second door in the partition between the multi-purpose room and front foyer.
- Mechanical:

- Replacement of AC-1, AC-4, and AC-5 with units sized to the code mandated OA CFM.
- Introduction of the code mandated amount of ventilation into the Sanctuary via a new 100% outside air DOAS Unit, along with a relief damper to relieve this additional ventilation air.
- Factor in capacity in the new AC-3 unit replacement selection to accommodate the 1<sup>st</sup> Floor NW Classroom heating, cooling, and ventilation requirements.

Fairfax County could also add items to this list at their discretion. The mechanical and electrical assessment could identify other deficiencies that need to be addressed as well.

As noted previously in this report, there are issues with some doors that are indicated to be fire-rated on the As-built plans for the addition. It should be noted that these are not issues to be addressed as a result of Code-required improvements for a Change of Occupancy permit, but rather are required to be maintained as part of a fire-rated system. Fire codes require that fire-rated partitions must be maintained over the life of the building, or until such time as other modifications remove the requirement for them to be fire-rated. In this case, adding a sprinkler system as recommended herein would make the requirements for fire rating corridor walls obsolete, and therefore the hardware compliant. Otherwise, the hardware needs to be brought back into compliance as a function of maintaining existing ratings.

## **ADDITIONAL ASSESSMENT COMMENTS**

As part of the architectural assessment of the building, a few additional items were noted, and are worth passing on to the owner, though not necessarily directly impacted by building codes.

The sanctuary includes an existing baptistry consisting of a fiberglass pool and associated plumbing and equipment. If the intent of the Town is to convert the facility to a community center / recreation center, and the sanctuary will no longer serve a religious function, the Town may want to consider removal of the baptistry. The existing spaces housing this function are in mediocre condition, and unused and unneeded equipment pose a failure hazard that could be costly and damaging in the future.

There are materials within the building that raise concerns about the potential for hazardous materials within the building. Based on the apparent age of the building and the types of floor tiles and stair treads present, it is possible that some of the mastics used to install these materials could contain asbestos. WRA has enlisted the assistance of a third-party industrial hygienist, licensed to perform testing for asbestos-containing-materials. Their test reports are provided as an Appendix to this report.

WRA briefly surveyed the immediately accessible existing roofs and did not note any obvious defects in the steeper, shingled roofs. There is a section of lower-sloped shingles that has been re-coated at some point. No defects were noted in this area either, though the gutters along the perimeter show signs of aging and minor damage. The “flat” roof areas did show some areas of concern. It appears that in addition to the same coating that was applied elsewhere, sprayed foam insulation has been added at the perimeter up to the metal coping, with the coating overlapping the insulation and coping. In experience with other roofs that used similar techniques, problems have been identified. While there is no immediate indication of leaks, the condition of the flat roof areas should be monitored regularly. There was also at least one large blister with some cracking in either the coating or an existing membrane underneath toward the front of the building.

The existing fire alarm and detection system is obsolete and beyond its useful life. The system was installed in 1988 and is a conventional, hard-wired system. Replacement parts will be very difficult to find should any major components fail. A new addressable fire alarm system is recommended to replace the existing system. The new fire alarm system should comply with current codes and could re-utilize the existing Silent Knight autodialer panel. In accordance with Section 907.2.1.1 of the VCC, the fire alarm system must incorporate an emergency voice and alarm communications system (EVACS) that complies with the requirements of Section 907.5.2.2.

The existing gas domestic water heater located in the boiler room was manufactured in 1989 and is beyond its expected life. Current operation of the heater is unknown, however it should be anticipated that this equipment will need to be replaced in the near future.

All existing building AC Units are original and installed during the construction of the Addition Building in 1988 and well beyond their useful life. A number of these units currently have operational issues, and all should be replaced in the near future.

The boiler, pumps, and all associated heating and controls equipment in the Boiler Room is original to the construction of the Addition as well, and all equipment is also well past it's useful life and should be replaced in the near future. The room itself is overall in poor condition. The exterior door does not appear to close all the way.

Currently there are spaces on the first floor along the Plan North perimeter that do not have any conditioning. Girls and Boy's bathrooms, a Classroom, some storage rooms, and a single use bathroom all do not have any conditioning. The Classroom, large Storage Room, and Girls and Boy's bathrooms all have a perimeter wall. These spaces have hot water baseboard heat for heating, but no cooling. A new AC Unit could address these issues, or these spaces could perhaps be added onto an upsized replacement of AC-3.

There are residential type AC units (window shakers) currently installed in the 2<sup>nd</sup> Floor Classrooms. They were installed due to issues with cooling from AC-4. These window units should be removed after the replacement of AC-4.

The through the wall exhaust shown on the 1988 Drawing Set for the kitchen was never installed. Exhaust should be installed in this space to remove cooking odors and to ensure negative pressurization in the space to prevent odors from escaping.

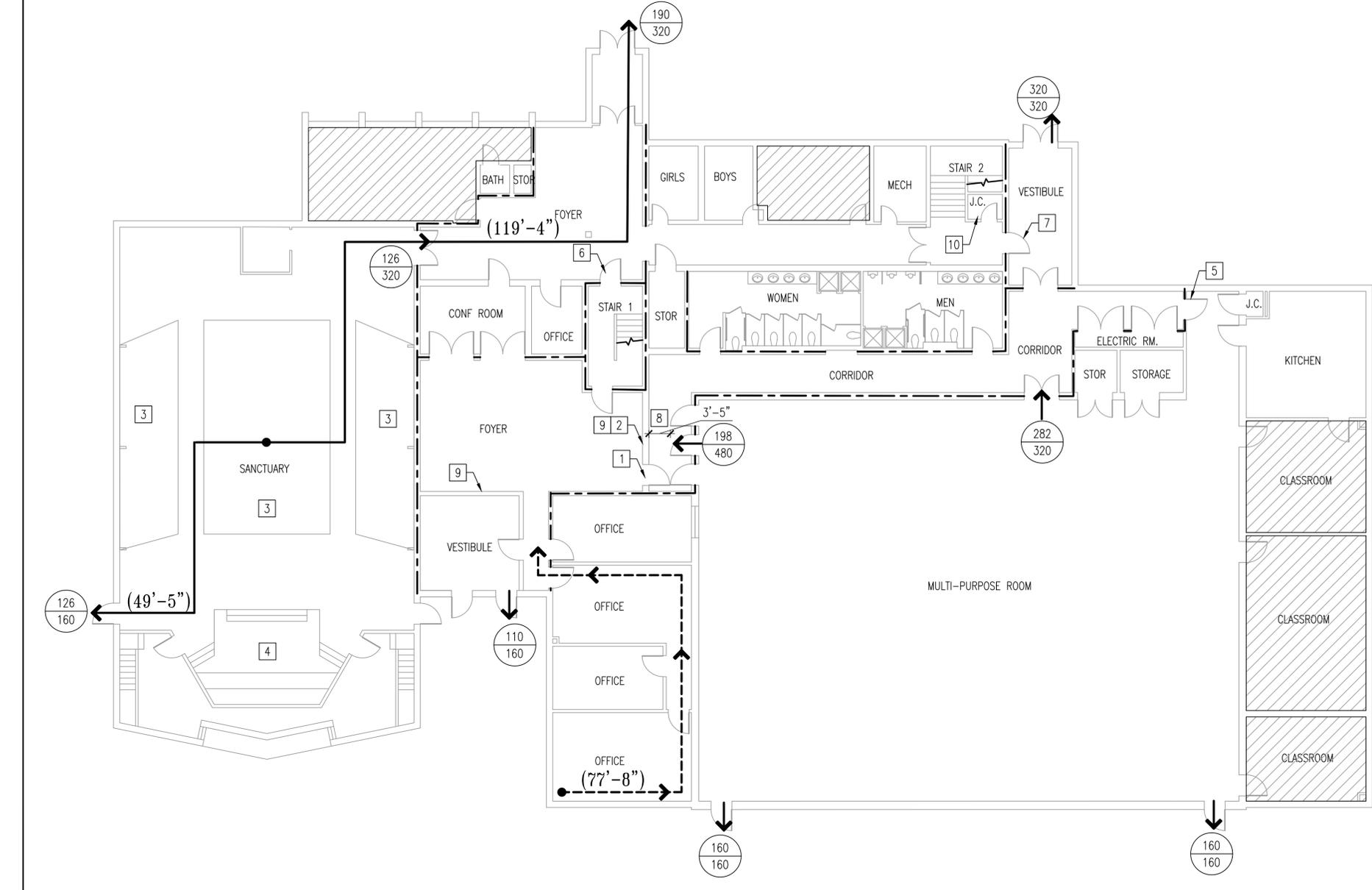
All hot water heating in building is controlled currently by a digital thermostat in a 1<sup>st</sup> Floor Corridor. This is not an efficient controls approach for a number of different zones in the building. If it's possible to resolve this item with a cost effective approach, this controls situation should be rectified if feasible.

Cooling is provided to the Sanctuary via (2) AC Units. The SA for these units is above the Stage Area of the Sanctuary. The RA is at a similar point behind the stage. This results in a lot of short cycling of air at the Stage Area, and does not allow for cool air to extend to the rear of the Sanctuary. Warm spots will emerge at the middle and rear of the Sanctuary seating. Heating for this area is also at the floor via hot water baseboard heating. A more updated approach to Sanctuary conditioning would be recommended. The current lack of ventilation issue could be combined with a new consolidated AC Unit approach here, one which would combine both heating and cooling, and one which could include some form of ceiling ductwork to extend to the rear of the Sanctuary to ensure proper air circulation and conditioning.



## **CODE ANALYSIS DRAWINGS**

The following drawing sheets are typical of the code analysis plans that would be submitted for permitting. These drawings are not intended to be submitted for a Change of Occupancy or new Certificate of Occupancy as they include information for the owner that would not necessarily be presented to Fairfax County Building Plan Review. These plans are provided for the owner's information only.



1 LIFE SAFETY - FIRST FLOOR PLAN  
G-101 SCALE: 3/32" = 1'-0"

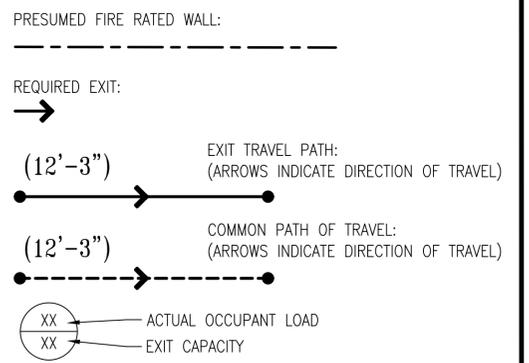
**GENERAL CODE REVIEW**

1. WORK IS CONSIDERED "CHANGE OF OCCUPANCY" PER VA UNIFORM STATEWIDE BLDG. CODE 2018
2. SOME EXISTING PARTITIONS ARE INDICATED ON AS-BUILT DRAWINGS AS HAVING A FIRE RATING, BUT DOORS IN THOSE PARTITIONS LACK THE REQUIRED HARDWARE.

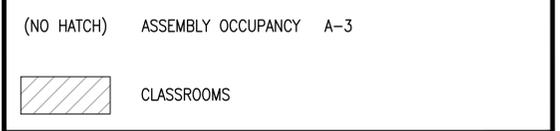
**SHEET KEYNOTES**

- 1 DOOR NOT PERMITTED TO SWING TOWARD THE MULTIPURPOSE ROOM.
- 2 ADDITIONAL DOOR IS REQUIRED IN THIS WALL TO MEET MINIMUM REQUIRED EGRESS CAPACITY.
- 3 SANCTUARY SEATING - BENCHES WITH OCCUPANT LOAD CALCULATED AT 1 PER 18" OR BENCH LENGTH.
- 4 EXISTING STAGE WITHOUT PROSCENIUM (ALTAR).
- 5 NOT A REQUIRED MEANS OF EGRESS
- 6 OCCUPANT LOAD FROM SECOND STORY = 31. EGRESS THROUGH FOYER.
- 7 OCCUPANT LOAD FROM SECOND STORY = 31. EGRESS THROUGH VESTIBULE.
- 8 MINIMUM 48" CLEAR FROM DOOR OPEN AS SHOWN TO OPPOSITE WALL NOT MET.
- 9 EXISTING WALLS DIVIDE WHAT APPEARS TO HAVE BEEN A RATED EGRESS CORRIDOR.
- 10 JANITOR'S CLOSET (OR ANY STORAGE OR OTHER FUNCTION) NOT PERMITTED IN STAIRWELLS.

**SHEET LEGEND**



**OCCUPANCY LEGEND**



**APPLICABLE CODES**

VIRGINIA EXISTING BUILDING CODE (VEBC), 2018  
VIRGINIA FIRE PREVENTION CODE.  
ICC A117.1  
AMERICANS WITH DISABILITIES ACT (ADA).

**BUILDING CODE SUMMARY**

BUILDING CODE	2018 VIRGINIA UNIFORM STATEWIDE BUILDING CODE		
FIRE RESISTANCE	REQUIRED	PROVIDED	UL
STRUCTURAL FRAME	0	0	
BEARING WALL (EXT/INT)	0/0	0/0	
NON-BEARING EXT WALL X>=10 FT	0	0	
FLOOR CONSTRUCTION	0	0	
ROOF CONSTRUCTION	0	0	
STAIR SHAFTS	1	2	
ELEVATOR & MISC SHAFTS	1	N/A	
CORRIDOR WALLS	0	0	

**BUILDING CODE SUMMARY**

BUILDING CODE	2018 VIRGINIA UNIFORM STATEWIDE BUILDING CODE	
TYPE OF CONSTRUCTION	TYPE IIIB, NON COMBUSTIBLE, UNPROTECTED	
OCCUPANCY	ASSEMBLY A-3	ALLOWED PROVIDED
STORIES	2	2
HEIGHT	55	40
FIRST FLOOR	9,500 SF	18,702 SF
TOTAL GROSS BUILDING AREA	FIRST FLOOR: 18,702 SF	SECOND FLOOR: 2,511 SF
	TOTAL: 21,213 SF	

**EGRESS SUMMARY**

BUILDING CODE	NFPA 101 2018 ED REQUIRED IBC 2018 ED REQUIRED
DOOR WIDTH IN INCHES ( MIN 32 INCHES)	32 INCHES
STAIR EGRESS WIDTH IN INCHES (MIN 48")	48 INCHES / 66 INCHES
MIN NUMBER OF EXITS	4
MAX EXIT TRAVEL DISTANCE IN FEET	(A-3) 200
MAX COMMON PATH OF TRAVEL IN FEET	(A-3) 75
MAX DEAD-END CORRIDOR LENGTH IN FEET	20 FEET

**CODE OCCUPANT LOAD - FLOOR 1**

SPACE FUNCTION	AREA	OCCUPANT /SF	OCCUPANCY
SANCTUARY (ASSEMBLY W/ FIXED SEATING)	3,523 SF	N/A	252
GYMNASIUM / MULTI-PURPOSE	5440 SF	7	(700) 800
CLASSROOMS	1757 SF	20	88
STORAGE	300 SF	300	1
BUSINESS	7,952 SF	150	53
TOTAL	18,702 SF		1,194

REVISIONS

NO.	DESCRIPTION	DATE

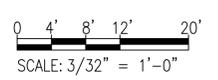
CLIENT INFORMATION  
**TOWN OF VIENNA  
PARKS AND  
RECREATION**

**FBC CODE REVIEW**

KEY PLAN



GRAPHIC SCALES



SIGNATURE

PROFESSIONAL CERTIFICATION.  
I CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED ARCHITECT UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 12345  
EXPIRATION DATE: XX/XX/XXXX



**Whitman, Reardon & Associates, LLP**  
801 South Caroline Street, Baltimore, Maryland 21231

**FIRST FLOOR  
CODE ANALYSIS PLAN**

DRAWING NO.

**G1.01**

SCALE: 3/32" = 1'0"

DATE: SHEET 1 OF 2  
DES: EL DRAWN: AJM CHECK: EBL

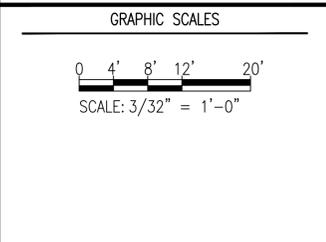
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REVISIONS	

CLIENT INFORMATION  
**TOWN OF VIENNA  
 PARKS AND  
 RECREATION**

**FBC CODE REVIEW**

KEY PLAN



SIGNATURE

PROFESSIONAL CERTIFICATION.  
 I CERTIFY THAT THESE DOCUMENTS WERE  
 PREPARED OR APPROVED BY ME, AND THAT I AM  
 A DULY LICENSED ARCHITECT UNDER THE LAWS OF  
 THE STATE OF MARYLAND, LICENSE NO. 12345  
 EXPIRATION DATE: XX/XX/XXXX



**SECOND FLOOR  
 CODE ANALYSIS PLAN**

DRAWING NO.  
**G1.02**

SCALE: 3/32" = 1'0"

DATE: SHEET 2 OF 2

DES: EL DRAWN: AJM CHECK: EBL

**GENERAL CODE REVIEW**

1. WORK IS CONSIDERED "CHANGE OF OCCUPANCY" PER VA UNIFORM STATEWIDE BLDG. CODE 2018
2. SOME EXISTING PARTITIONS ARE INDICATED ON AS-BUILT DRAWINGS AS HAVING A FIRE RATING, BUT DOORS IN THOSE PARTITIONS LACK THE REQUIRED HARDWARE.

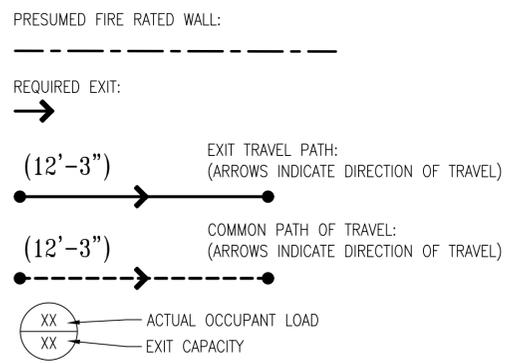
**SHEET KEYNOTES**

- 1 NON-RATED STORAGE ROOM NOT PERMITTED WITHIN RATED EGRESS CORRIDOR.
- 2 WALL DOES NOT APPEAR TO BE RATED AS REQUIRED FOR STAIR ENCLOSURE.
- 3 JANITOR'S CLOSET (OR ANY STORAGE OR OTHER FUNCTION) NOT PERMITTED IN STAIRWELLS.

**APPLICABLE CODES**

VIRGINIA EXISTING BUILDING CODE (VEBC), 2018  
 VIRGINIA FIRE PREVENTION CODE.  
 ICC A117.1  
 AMERICANS WITH DISABILITIES ACT (ADA).

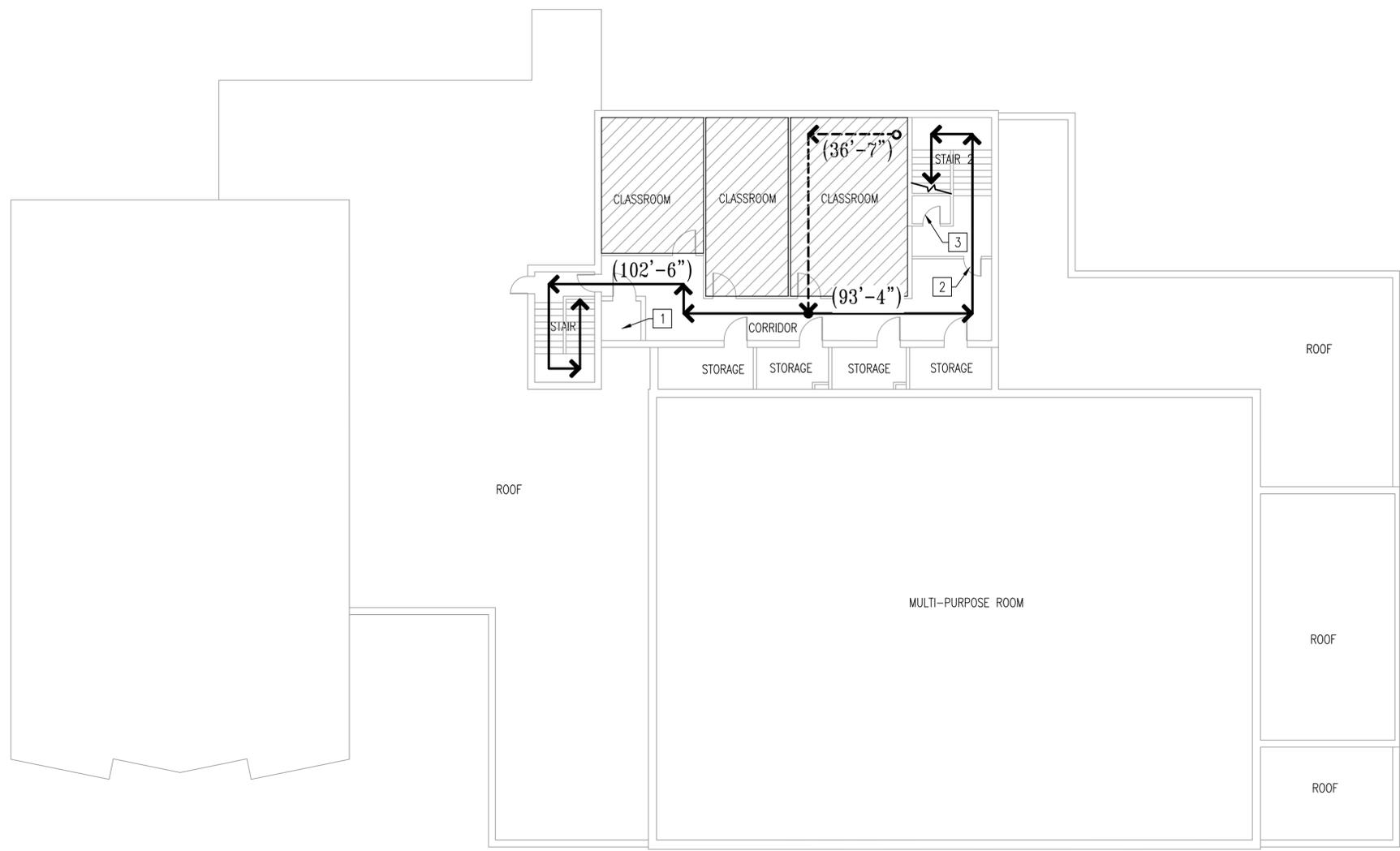
**SHEET LEGEND**



**OCCUPANCY LEGEND**

(NO HATCH) ASSEMBLY OCCUPANCY A-3

CLASSROOMS



**1 LIFE SAFETY - SECOND FLOOR PLAN**  
 G-101 SCALE: 3/32"=1'-0"

BUILDING CODE SUMMARY			
BUILDING CODE	2018 VIRGINIA UNIFORM STATEWIDE BUILDING CODE		
FIRE RESISTANCE	REQUIRED	PROVIDED	UL
STRUCTURAL FRAME	0	0	
BEARING WALL (EXT/INT)	0/0	0/0	
NON-BEARING EXT WALL X>=10 FT	0	0	
FLOOR CONSTRUCTION	0	0	
ROOF CONSTRUCTION	0	0	
STAIR SHAFTS	1	1	
ELEVATOR & MISC SHAFTS	1	1	
CORRIDOR WALLS	0	0	

BUILDING CODE SUMMARY		
BUILDING CODE	2018 VIRGINIA UNIFORM STATEWIDE BUILDING CODE	
TYPE OF CONSTRUCTION	TYPE IIIB, NON SPRINKLERED, UNPROTECTED	
OCCUPANCY	ASSEMBLY A-3	ALLOWED PROVIDED
STORIES	2	2
HEIGHT	55	40
SECOND FLOOR	9,500 SF	2,511 SF
TOTAL GROSS BUILDING AREA	FIRST FLOOR: 18,702 SF	SECOND FLOOR: 2,511 SF
	TOTAL: 21,213 SF	

EGRESS SUMMARY	
BUILDING CODE	2018 VIRGINIA UNIFORM STATEWIDE BUILDING CODE
DOOR WIDTH IN INCHES ( MIN 32 INCHES)	32 INCHES
STAIR EGRESS WIDTH IN INCHES (MIN 48")	48 INCHES / 66 INCHES
MIN NUMBER OF EXITS	2
MAX EXIT TRAVEL DISTANCE IN FEET	(A-3) 200
MAX COMMON PATH OF TRAVEL IN FEET	(A-3) 75
MAX DEAD-END CORRIDOR LENGTH IN FEET	20 FEET

CODE OCCUPANT LOAD - FLOOR 1			
SPACE FUNCTION	AREA	OCCUPANT /SF	OCCUPANCY
CLASSROOMS	1,022 SF	20	52
STORAGE / MECHANICAL	305 SF	300	2
BUSINESS	1,184 SF	150	8
TOTAL	2,511 SF		62

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**Appendix A – Rough Order of Magnitude Costs**

The following table outlines rough costs for making the upgrades recommended as necessary to obtain a Certificate of Occupancy. As there has been no design effort associated with these upgrades, costs are only based on averages and historic data, and may not be complete. A single lump sum amount has been included to cover mobilization, general conditions, and overhead and profit. If the work recommended is divided between multiple contracts, additional costs beyond those estimated herein could be incurred. It should also be noted that construction costs are subject to historic rates of inflation, and volatility as a result of the ongoing pandemic, which frequently impacts construction costs in ways difficult to predict.

<b>Description of Necessary Improvements</b>	<b>Estimated Cost</b>
Mobilization, General Conditions, Contractor OH&P	<b>\$90,000</b>
Install Fire Sprinkler System	<b>\$90,000</b>
Install new 6” underground fire service line	<b>\$50,000</b>
Architectural support for sprinkler installation (ceilings, etc.)	<b>\$25,000</b>
Change Door Swings / Remove Partition	<b>\$2,000</b>
Replace HVAC Units	<b>\$130,000</b>
Miscellaneous structural support for new units	<b>\$8,000</b>
- TOTAL	<b>\$395,000</b>
Option: Upgrade Fire Alarm System	<b>\$70,000</b>
Design and Construction Contingencies	<b>\$100,000</b>

## **Appendix B – Ventilation Calculations**

### **General**

Since only minimal equipment capacity information existed on the drawings for the AC units, and only a few model/serial numbers were able to be pulled from a field survey, certain assumptions had to be made to approximate the amount of ventilation air that the AC units were able to provide. All units, outside of AC-4 and the two Sanctuary Units, were Rooftop Units, and as a result, it was not possible to get dimensions on Outside Air (OA) duct sizes. Only AC-4 and the two Sanctuary Units had nameplates that were legible in the field. That information was used to look up original submittal information via the manufacturer (Trane and York), but only the Trane unit (AC-4) came back with usable information.

In general, assumptions were used to approximate the percentage of OA from Supply Air (SA). SA amounts were provided by the 1988 Building Drawing set's AC Unit Mechanical Schedule. The one exception here was AC-4, as OA was called out on drawing M2 of the 1988 Drawing Set. Different OA percentages were used for different space types served, based on typical sizing approaches to different space types (Office, Classroom, Multi Use, etc).

### **Individual AC Units**

#### **AC-1**

A range of 30– 40% was used in this calculation, with 35% used as a specific targeted comparison point, as AC-1 serves just the single Multi Purpose Room. The calculated amount of OA, via the Ventilation Compliance Schedule, was 8,050 CFM. The existing unit currently provides 3,150 CFM, so this unit does NOT comply with existing code requirements.

#### **AC-2**

A range of 10 – 20% was used in this calculation, with 15% used as a specific targeted comparison point, as AC-2 serves all office areas. The calculated amount of OA, via the Ventilation Compliance Schedule, was 130 CFM. The existing unit currently provides 150 CFM, so this unit does comply with existing code requirements.

#### **AC-3**

A range of 10 – 20% was used in this calculation, with 15% used as a specific targeted comparison point, as AC-3 serves a combination of Office spaces, Foyer spaces, and Corridor spaces. The calculated amount of OA, via the Ventilation Compliance Schedule, was 295 CFM. The existing unit currently provides 450 CFM, so this unit does comply with existing code requirements.

#### **AC-4**

The OA amount was included on the design drawing set, so that figure was used in this analysis. The calculated amount of OA, via the Ventilation Compliance Schedule, was 615



CFM. The existing unit currently provides 500 CFM, so this unit does NOT comply with existing code requirements.

**AC-5**

A range of 25 - 35% was used in this calculation, with 30% used as a specific targeted comparison point, as AC-5 serves primarily Classroom spaces. The calculated amount of OA, via the Ventilation Compliance Schedule, was 665 CFM. The existing unit currently provides 600 CFM, so this unit does NOT comply with existing code requirements.

**Sanctuary 1 & 2**

Sanctuary AC Units 1 & 2 are recirculating units only. No OA is provided via these units, only cool air. The calculated amount of OA, via the Ventilation Compliance Schedule, was 846 CFM for the entire Sanctuary space. If applied to each of the two units, the OA CFM requirement for each would be 423 CFM. These existing units do NOT comply with existing code requirements.

**1<sup>st</sup> Floor NW Corner Classroom**

The 1st Floor NW Corner Classroom is unconditioned and without ventilation air. There is no AC unit that currently serves the space. The Classroom requires 205 CFM of OA to meet code requirements. Because of the small load here and minimal square footage, and factoring in the current approach by building personnel to replace AC-3, it would make the most sense to increase the size and ventilation capacity of the AC-3 replacement unit to include capacity for this Classroom.

HVAC Ventilation Analysis – Summary Chart

AC Unit	Code Required OA (CFM)	Unit Provided OA (CFM)	Sufficient Ventilation (Y/N)?
AC-1	8050	3150	N
AC-2	130	150	Y
AC-3	295	450	Y
AC-4	615	500	N
AC-5	665	600	N
Sanctuary-1	423	0	N
Sanctuary-2	423	0	N
1st Floor-NW Classroom	205	0	N