

Supplementary Materials for Assessment of Space Utilization Plan

An Interactive Qualifying Project
submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfilment of the requirements for the
degree of Bachelor of Science

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Date:
21 June 2019

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Abstract

CENTRO is a fast growing, non-profit organization planning to hire more employees than their building can comfortably hold. Our group conducted research through focus groups, interviews, and observational studies to understand CENTRO's current space utilization. We discovered that CENTRO faces environmental distractions, imperfect space utilization, and insufficient meeting spaces. We recommended creating more meeting spaces, rearranging furniture and department locations, and removing environmental distractions. We also suggested low-cost technology solutions, such as a VPN for security, updated phones, and software collaboration tools to facilitate work-from-home policies. We believe these suggestions will increase CENTRO's employee capacity, and modernize the organization.

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Authorship

Chapter	Primary Author	Editor
Introduction	C.K.	A.D.
Background	A.D.	C.K., I.M.
Our Approach	A.D.	C.K., I.M.
Findings	For each category under findings, all of us worked on the related discoveries of each floor. I.M. worked on the basement; C.K. worked on the first floor; A.D. worked on the second floor	All of us edited on each others' work
Recommendations	All of us worked on the recommendations of each floor that each of us was responsible for. I.M. worked on the basement; C.K. worked on the first floor; A.D. worked on the second floor	All of us edited on each others' work
Abstract	C.K.	A.D.

Appendix A: Additional Background Material

Space Utilization Plan Considerations and Guidelines

This section introduces technical considerations, or potential solutions, of improving the performance for employees and gives the techniques proposed by architects for improving the possibility of accommodating employees, which also considers to improve the productivity.

Environmental factors affecting efficiency in workspace

An office spot that optimizes comfort motivates people to be more efficient and productive when working. Chandrasekar (2011) and Court (2010) state that although the level of organizing personal items is important, the general environment is more influential to an appealing office space. Easy environmental factors to control are background noise and light. The studies point out background noises, such as the voices and footsteps of other employees, or noise from outside the building, can be hard to tune out, and can prove to be a major distraction. Court (2010) says that light and color influences the mental state of people since white-collar workers spend an average of 90% of their time indoors and most humans need natural light or any light imitates nature light to energize their mind, and lack of natural light inside daylit office environments can cause eyestrain, headache, and blurred vision symptoms. To avoid the problems above, Court (2010) mentioned the following can be considered for a workspace: “Blue-enriched” light bulbs with 17,000K largely improve work performance through providing people a “happier, more alert and less eye-straining” sense. Adequate natural light can be obtained by appropriate design of windows and office layout, making the workplace comfortable and environmental-friendly. However, some people prefer working in a brighter environment while some prefer a darker environment, so adequate survey shall be conducted before arranging the office space.

Spatio-functional features

Physical properties of the building itself both inside and outside affect the realization of functions of the space. an der Voordt et al. (1997) says there are three different levels distinguished for the building characteristics and functions. The 1997 study states that the most general level is the site, namely the location of the building and its intermediate surroundings, which influences inner design of the building by bringing in considerations about natural light, scenery, and noise. The second factor is the building itself, which has its own outline, material, number and positions of entrances and access, influencing ways of zoning places of similar functions, designing internal layout, and structure of management. The most specific or smallest level for consideration is the rooms inside the building, which have their shape and define their size of spaces.

Ergonomics of office design

Margaritis et al. (2007) make reference to handbooks and standard guidelines like ANSI/HFES 100-1988 for human factors engineering. The researchers conclude that the ergonomic requirements for computerized offices should address 4 major elements: the *office equipment* requires for computers, desks and seats; the *environmental condition* requires for the lighting, noise, thermal environment and static electricity; the *software* comprises of usage-related issue; the *work organization* comprises of macro-ergonomics issues.

To meet the requirements above, Marmaras et al. (2003) points out appropriate workstation layout is essential in addition to simply including the elements in an office. Also, the 2003 study refers to *Handbook of Human Factors & Ergonomics (third edition)* by Marmaras et al. published in 2006 for the requirements to meet the general ergonomics needs. Margaritis et al. concluded that for individual workstations, there should be no annoying reflections or glare in the working area; the room must have appropriate lighting, comforting to the tasks' need that are uniform throughout the person's visual field; there should be unobstructed and safe access to the workstation for every employees; the cooperation between the employees in and out of the room should be facilitated; the privacy should be protected if required by employees' expectation and the tasks' needs; lastly, the access to windows and air conditionings, etc. for manipulation or maintenance should be facilitated.

Appendix B: Sponsor Description

CENTRO was formed to serve the immigrant community, and provide services such as emergency food supplies, foster care, and generally helps to transition immigrants from life in their home country to life in Worcester. However, as CENTRO's programs have continued to expand, so has their client base, which has introduced a variety of growing pains for the organization. This short section provides a brief history on the formation of CENTRO, and describes its current situation, along with the problems it now faces as an organization.

History of CENTRO

CENTRO was originally founded in 1977 in order to serve Puerto Ricans under the name Centro Las Americas (CENTRO, 2015). Overtime CENTRO's focus shifted, now not only do they serve the Latino community, but they serve a wide variety of immigrant communities in Worcester as well, including immigrants from South America, Central America Africa, Southeast Asia, and the Middle East. In these decades, CENTRO has grown to be the "largest minority led, community based, multiservice, multicultural, multilingual, nonprofit organization in Central Massachusetts" (CENTRO, 2015).

Current situation of CENTRO Inc.

Contemporarily, CENTRO's mission is to assist families and individuals from any background in the community to attain self-sufficiency and lead successful lives. As of today over forty percent of those participating in their program are non-Latino individuals and families, which is a dramatic change from when they were originally founded, as stated in CENTRO's official website. The diversity of the programs that CENTRO runs allows them to help a variety of locals. These programs are aimed towards supporting individuals and families in many aspects such as adult foster care and family services. These programs are also described on their official website as the following (CENTRO, 2015)..

Family Support Services, which help families adjust to life in America. A CENTRO employee talks to the family in need, and provides specialized services for that family, mostly relating to guidance for housing options or job options.

Adult Foster Care is a system which provides a place for adults age 16 or older that are disabled, elderly, or sick, a caregiver to assist with daily tasks. This program is designed to help such individuals live safely in their homes.

The Latino Elder Program provides Latino individuals over the age of 60 a place to participate in programs such as English classes, recreational activities, and health screenings.

Community Based Services are split into two categories: the Community Support Services (CSS), which help immigrants with issues such as applying for citizenship, permanent residential renewal, and translation services, and the Emergency Food Pantry Services, which provide families in need with emergency food supplies.

Behavioral Health Services are split into two categories, under the Children's Behavioral Health Initiative (CHBI) program, which aims to assist children with special needs. The first of these services is the Therapeutic Mentor service, which helps behaviorally challenged children, and the In Home Therapy service, which is an extreme version of the first program, sending a personal mentor to meet with the child in their home.

Children and Family Services are split into four different services. The first of these services is the Youth Support Program, which helps troubled youths with academic support, life-skills training, or introducing them into community service. The Intensive Family Stabilization (IFS) program helps families with internal struggles adapt and overcome their personal conflicts. The Parent Support Services (PSS) helps parents that face challenges while parenting. The Outreach and Tracking program is similar to the Youth Support Program, but focuses on higher risk youth, such as those with criminal backgrounds.

Intensive Foster Care (IFC) provides foster care to children with traumatic pasts, which may include rape, abuse, or teen mothers.

Institute of Latino Arts and Culture is a program that helps to preserve the history of Latinos in Worcester by collecting art and photos, and hosting Latino style feasts.

Moving forward CENTRO's goal is "To create a fully-integrated multi-cultural, multi-linguistic health and human services delivery system, while developing long-term economic strength and sustainability." (CENTO, 2015)

Appendix C: Additional Reference

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Appendix D - Focus Group and Semi-Formal Interview Questions

This appendix contains the informed consent forms and questions we gave during focus groups and semi-formal interviews. As we promised the confidentiality of the participants, we do not publish the collected informed consents here.

Informed Consent

Informed Consent Agreement **Assessment of Building Space Utilization for CENTRO** ***an Interactive Qualifying Project (IQP) in WPI***

Introduction: You are participating in a human-centered design project where you will be asked a few questions on experiences working at CENTRO, and your expectations of your workspace. Our study hopes to figure out the most suitable environment for people to work and enjoy.

Purpose of the research studies: We will ask you to participate in focus groups over the course of our project. These discussions will be designed to help our group understand the current situation of CENTRO's buildings, and develop new floor plans that provide a more comfortable working environment for all current and future CENTRO employees.

Alternatives to participating in studies: If you do not wish to participate in the focus groups, but are interested in helping to improve the workplace, you can contact us and we will send you the list of questions we ask during the focus groups. You can also contact us with any other questions or concerns. Our contact information is listed at the bottom of this page.

What you will be required to do in these studies: There will be 2 focus groups. The first focus group we conduct is intended to gather information about your current view of the workplace, and your expectations or wishes for the workplace. The second focus group will be designed to obtain your feedback on our design plans. Each time we meet, you will be using a voting software called Poll Everywhere on your phone or computer to select or type in your answers, while you can talk with your colleagues about expectations and ideas.

Time required: You will participate in the focus groups for 20 – 30 minutes. The second focus group would be held 1 to 2 weeks after the first one, between which we develop the possible redesign plans based on your opinion.

Risks to participants: A WPI Institutional Review Board (Ethics Board) has reviewed and approved the study with ethical considerations, the protection of human participants, and minimizing risks to participants. Your answers and opinions in the interview and focus group will not have negative affect on your career and life.

Benefits to participating: The major benefit to participating in these studies is to have your preference considered for the redesign of your office space.

Confidentiality: The information you give during the two focus groups will not be entirely anonymous. You are not required to write your name in any forms other than the informed consent. To optimize the possibility of creating a comfortable workspace, your position and room number of your office will be recorded, but names will never be used in any report.

Voluntary participation: Your participation in the focus groups is completely voluntary. There is no negative effect on your job if you decide not to participate. If you do not wish to participate, you may leave the focus groups at any time.

Right to withdraw from the studies: You have the right to withdraw from any study at any time without any penalty.

How to withdraw from studies: If you decide not to have your opinions considered, you may inform us by email or phone call and we will delete your answers from records in the focus groups.

Obligation to appear for appointments: Once you decide to participate in the focus group, you have an obligation to appear at proper time and place. If you decide not to participate before the appointed time, you may inform us 24 hours in advance. The only negative effect is that your opinions or preferences will not be considered in the future design of the workspace.

Payment: There is no payment in any form.

Whom to contact if you have questions about the studies:

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Agreement: I agree to participate in the studies described above. [If you do not agree, simply do not return this form]

Your name (printed): _____

Signature: _____ **Date:** _____

Employee focus group questions on experience and expectations for office

“We really appreciate you for coming to this focus group. We are students from WPI doing a project with CENTRO to figure out a rearrangement plan that improves the comfortability and efficiency in the building. This is completely voluntary, you may leave at any time. For the next 20 minutes, we would like to figure out your ideal workspace. We value your answer, and will try to make improvements based on the survey results.”

Section I. Experience about the current office plan

- Warm-up: Which one do you prefer as a pet?
 - Cat
 - Dog
- What department do you belong to?
 - Marketing
 - Finance
 - Program
 - Compliance
 - Maintenance
- Do you like your current office space?
 - Yes
 - No
- Is your office always easy to get to? (not obstructed, near to corridors/stairs)
 - Yes
 - No
- Is your work area quiet?
 - Always
 - Sometimes
 - Never
- Does your office space promote your collaboration with others?
 - Yes
 - No
 - Not sure
- Do you feel a sense of community in this office building?
 - Always
 - Sometimes
 - Not sure
- Do you have enough space in your office?
 - Yes
 - No

- Do you think this building have some of its space wasted? If so, where is the space being wasted?
 - Yes
 - No
- In general, what's the best thing you feel about your office?
- What is the worst thing about this office building?

Section II. Expectation for new office plan

- Is having a window for your office very important?
 - Yes, definitely
 - No, not really
 - Depends
- Is being near your colleagues important for your work?
 - Yes
 - No
 - Not sure / Sometimes
- If you have your own office, do you want to move to a larger office where you share the room with others?
 - Yes
 - No
 - Depends
- If you are sharing an office room with others, it's good to have some movable partitioning walls?
 - "Yes, I prefer more privacy"
 - "No, I prefer communicating with my colleagues easily"
 - "Does not matter for me"
- If you are sharing an office with others, do you want to move to a smaller office and have your own room?
 - Yes
 - No
 - Depends
- What do you think can be improved for your office?
- Do you think CENTRO needs to reorganize this building? Why or why not?
 - Yes
 - No

Semi-formal interview about room usage

1. What department are you working in?
2. How often are you and your colleagues using this office?
3. Are you able to do your work on your laptop?
4. Why do you need to come to your office?

Email interview questions

About Numbers of Employees

1. Total number of CENTRO employees?
2. How many employees work in each department?
3. How many are full-time employees (employees that are in their offices five days a week)?
4. How many are part-time employees (employees that are mostly in their field)?
5. How many volunteers does CENTRO have?
6. How many potential employees will CENTRO plan to hire within these few years?

About Usage of Activities and Conference Areas

1. How often is the space, especially the Auditorium in the 1st floor, used by activities like the LEP and so on?
 - a) How many days a week?
 - b) How much space is actually used?
 - c) How many people usually come for the activities?
2. How often are conference rooms used by meeting with clients?
 - a) How many clients does CENTRO have currently?
 - b) How long does a meeting usually last?
 - c) In a range from small to large, how many clients are there for one meeting?

Appendix E - Raw Data from Focus Groups and Semi-Formal Interviews

Summary of Focus Group Responses

Introduction of the Participants

Which department of CENTRO do you belong to?

- 1 person oversees the 3 departments: Compliance, Marketing, and Maintenance.
- 1 person for Programs.
- 1 person for Finance.
- The 3 participants cover all the departments listed.

Opinions about the Current Workspace of CENTRO

Do you like your current office space?

- 2 out of 3 participants answered YES, and the other one answered NO.

Is your office always easy to get to?

- All participants thought accessing their office is not obstructed at all, since they “already get used to it”.

Are there any distractions near your working area? If so, where do those distractions come from?

- All participants thought there is distraction in the building. They all agreed on each other’s responses.
- The main distractions are identified to be hallway noises, e.g. footsteps, sound of printing machine working, music from elder program, and neighbors talking. Noise outside the building is also counted.
- The causes of the distractions come from the improper architectural design, e.g. thin walls and leaky windows.
 - The current allocation of offices results from several times of subdividing larger rooms during previous renovations, so there are 2 participants who share the same window with a wall between the window for partition. The wall does not seal the space, so the voice from one room goes to the other room, leaving no privacy but distractions.
 - The leaky windows also cause noise from outside to get into the room.
 - The thin walls make hallways and neighbor noises evident.
 - In the hallway between the reception desk and the office space, there are chairs for elders and AFC clients waiting, whose conversations are “loud and long”.

Does your office space promote your collaboration with others?

- 1 participant thought their current office provides enough resources (space, devices, etc.), and 1 participant was not sure.
- For small meetings, the 3 participants all have their own offices in which they hold meetings.
- For bigger meetings, the problem occurs.
 - Only one conference room meets the need for a standard meeting with more than 2 -3 people.
 - The other conference room is right next to 3 office rooms, so the meeting would have no privacy and distract the staffs in the rooms.
 - The training room next to the kitchen is sometimes in other meetings/lessons, and when people access the kitchen, they have to go all around to the hallways otherwise they disrupt the meeting.

Do you feel a sense of community in this office building?

- All participants answered YES.

Do you have enough space in your office?

- 2 of 3 participants answered YES, the other one NO.

Do you think this building have some of its space wasted? By “space wasted”, we refer to any vacant rooms and conference rooms, which takes up large space.

- 2 of 3 participants agreed on the waste of space, and 1 disagreed.
- The 3 participants discussed the 4 locations below.
 - Main conference room (Room # 222): This space is definitely NOT wasted. Although its usage depends on the time of the day in which there are 4 - 5 hours that no one uses it, it is used everyday.
 - Small conference room (Room # 201): Usually smaller meetings are held here, but this space is kind of wasted because even for small meetings, this place is the last choice. The 3 offices right next to the meeting area were constructed because of architectural limitations. However, it would be better to move some of the employees with similar professions here and leave another medium-sized room for the small conference room.
 - Room # 107: This room is wasted for not being assigned, and it can be used well if prepared for the right purpose.
 - Basement: Participants who consider that this place is NOT wasted claimed that it should not be considered for office space. Shelves for storage purposes occupy 20% of the area. Also, converting it into office cost lots of money, because there is neither heating nor wiring for computers in the basement currently.
- The participants also agreed that there are other spaces being poorly used but were not very sure about the specific locations.

In general, what is the best thing about your office?

- The 3 participants agreed that having individual offices is most beneficial.
- 1 participant loved the fact that the office had good amount of space.

What is the worst thing about this office building?

- The 3 participants submitted 7 answers, 5 out of which complained about the air quality in terms of heating ventilation and cooling.
 - There are 5 furnaces in total, so it's hard to manage all of them well. There are areas being extremely hot while others being really cold. This problem results from the fact that the air conditioning room is in the large conference room. When the conference room is occupied with many people, it gets warmer and people autonomously turn the temperature so low that the people in other areas feel too cold.
 - The ventilation tubes are located mostly inside offices, so when all offices are closed, the hallways and other offices that are not closed into individual rooms are hot. At night, all offices are closed, so in the early morning when employees get into the building, it is hot but when opening the offices, it becomes very cold, which is not good for health.
- One answers that the building is too old to make renovation, and the other complained about the windows, as explained earlier.

Opinions about the expectations for future office

Having a window for your office is very important?

- 2 answered YES, and 1 NO.

Being near to your colleagues is always important for your work?

- 2 answered "YES", and 1 "Not sure / Sometimes".
- For other staffs, it may be very important for them to sit with others who do similar job. It is essential to ensure CENTRO's quality of service,

If you are having your own office, do you want to share the room with others?

- All participants answered NO because their positions create the demand for an individual office space.
- They pointed out that an "unassigned small conference room" would help the usage of space of building and free some space of their own offices for essential needs. This room can be used for client meeting and family meeting.
- Also, "floating rooms", i.e. not permanent place, can be considered. These rooms can have lots of positions put together and break up when they need privacy.

What else do you think can be improved for your office?

- No one answered this question, since they have said their advices in previous discussions.

Do you think CENTRO needs to reorganize this building?

- All of the 3 participants agreed on the need for reorganization.

Semi-formal Interview Summary

For the Basement

How much space does the food storage take?

There are 3 rooms for storage - 1 room of general storage for canned food, refrigerator for frozen food in the hallway, 1 room of short-term storage like vegetables, 1 room of packed food for distribution.

Does the food pantry program take up all the spaces that's currently assigned to it?

Yes, CENTRO gets food supply from Worcester County every Thursday, either by purchasing or being donated by others. When the food arrives, it takes up the whole room.

Are there any food wasted because of no one taking them?

No food is wasted, the packed food storage usually runs out in 2 -3 days. The food pantry feeds up to 700 - 800 people per month. Each family can come to get emergency food supply every month.

Are there anything besides food occupying these storage area?

CENTRO has toys donated by the U.S.Army and gives them out in special days.

For the First Floor

Auditorium

How often is the auditorium used?

Usually Wednesdays and Fridays. On Wednesdays there are usually more people than on Fridays.

How long does the event last?

8:10 - 12:30.

Is all the area occupied? Like, do they use all the tables?

Yes, all tables are used. They play dominos, cards, and other games; they talk and listen to music. They also have lunch from the kitchen.

Room 104 (AFC)

How often do you work in your office?

Basically everyday.

Do you have your assigned desk?

The 2 employees have their assigned desks. There are flexible workspaces, where people can come in and start working on the desktops.

How often do you use the printer? High printing workload?

Yes. There are many documents to print out everyday.

How often are the flexible workspaces used?

It depends. But sometimes there are not enough space for the employees, which usually happens once a month.

Is there any special reason that you have to work in your office instead of working on your laptop at home?

There are important files in the room, and they have to use those for working. So the employees must come to their office.

Why aren't the files digitized so that people can work at home and do not have to come to their offices everyday?

The earliest digitized files are the ones from June 2017. Also, there are many paperworks for us to do, so they need to work on both hard copies and digitized files.

Room 102B (Assistant Director of Community Support Service)

How often do you use this office?

Usually 2 days per week. This employee is temporarily working here for 2 months, the actual office is in the basement, but this one has more nature light thus more comfortable.

For the Second Floor

There are more offices on the 2nd than the other floors, so to improve the clarity, answers are shown in the table.

Table 1. Summary of Semi-formal Interviews of offices on the 2nd Floor.

Room Number	Number of Employees	Position & Department Affiliation	How often is the room used?	More comment
201A	1	GCF assistant director	2 days/week	Thu. in Fitchburg
201B	1	Manager of AFC, oversees GCF, CBFC	7 hrs everyday	
201C	1	GCF	2 days/week	Tue, Thu. in Fitchburg

206	1	President & Chief Operating Officer, NACDC		
207	1	Administration	Everyday	Works directly for CEO
208	2	Marketing	Everyday	1 vacant desk, 2 volunteer desks
212	2	DCF	Everyday	2/12 workstation occupied
214A	1	AFC Director	Everyday	
214	1	CBHI Director	Everyday	
215	1	Healthcare	Everyday	Mainly 4 days/week
216	1	Vice president	Everyday	
217	1	Finance Director, BPCFO	Everyday	
218	1	Director of HR	Everyday	
219		Accountant & Assistant	Everyday	4 days/week & 5 days/week
220	5	CBHI	Everyday	Used to be 8, now 5 staffs
224	5	Family Support Service		

Email Interview Report

I. About Employee Information

What is the total number of CENTRO employees?

54 Employees

How many employees work in each department?

Adm –Finance-HR : 8

AFC: 14

CBHI: 8

DCF: 11

DDS: 5

CCS : 3

Operations/Marketing : 5

How many are full-time employees (employees that are in their offices five days a week)?

52

How many are part-time employees (employees that are mostly in their field)?

2

How many volunteers does CENTRO have?

17 volunteers located in different departments

How many potential employees will CENTRO plan to hire within these few years?

II. About Space Usage Information

1. How often is the space, especially the Auditorium in the 1st floor, used by activities like the LEP and so on?

Roughly 3,000 sq feet. I can get the exact tomorrow when the facility supervisor is here.

a) How many days a week?

It is used at least 3 times a week. After June 30th it will change to being used once or twice a week if being rented for a party on the weekends and once every couple of months for staff meetings.

b) How much space is actually used?

The entire space.

c) How many people usually come for the activities?

Anywhere between 20-150.

2. How often are conference rooms used by meeting with clients?

At least four times a week.

a) How many clients does CENTRO have currently?

Ask in meetings with CEO.

b) How long does a meeting usually last?

It depends on the meeting. With clients up to an hour and a half. For staff, 2 hours, With our CPA's during audits, for days.

c) In a range from small to large, how many clients are there for one meeting?

1-3 for administrative meetings, 5-30 for department meetings, celebrations or trainings with clients.

Appendix F - Results from Measurement

Initial Floor Plans of CENTRO's Office Building

We measured the room size and furniture of every floor. Each of us was responsible for one of the three floors of CENTRO's office building. The following figures shows the initial results we got from the measurements.

Figure 1: Current floor plan of the basement

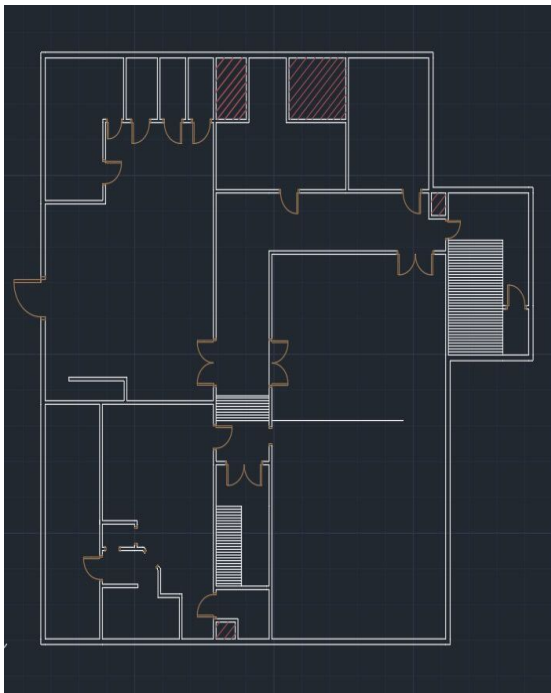


Figure 2: Current floor plan of the first floor

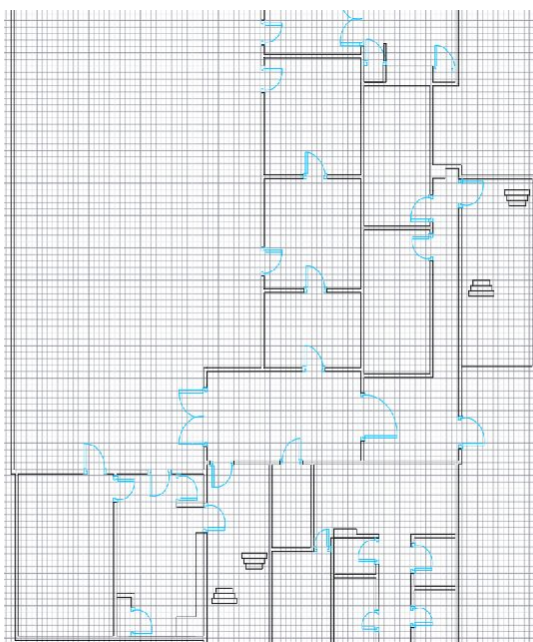
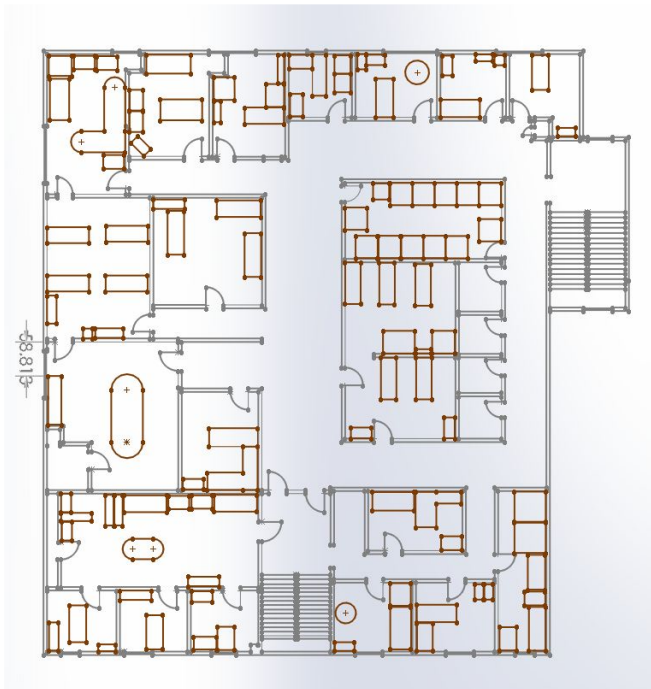


Figure 3: Current floor plan of the second floor



Appendix G - The Original Floor Plans and The Recommended Floor Plans

In this section, we have the detailed floor plans and highlight the areas with problems as explained in our report, and the recommended floor plan in larger size for better exhibition.

Basement

The basement has several problems most of which stem from inefficient usage of the available storage space, and the areas with problems are highlighted in Figure 4. We attempt to address this by rearranging certain rooms and adding additional storage space.

Firstly, we propose that in the short term Room B003 is used for additional storage. Most of this room is empty space that would be perfect for housing additional storage. If this is done the storage in Room B009 could be moved to Room B003 which would open up B009 to be used for an additional office space or additional food storage.

Our next change would be to move to food storage from B007 to B009 (if it is being used for food storage instead of office space) or B003. This opens up Room B007 to be used for additional storage or potentially office/ meeting room space if it is renovated. We also recommend that some of the furniture stored in Room B002 be used throughout the building which would free up storage space in Room B002.

In the long term we propose that Room B003 is renovated in order to accommodate additional office/meeting room space. We would recommend meeting room space because employees may have adverse reactions to having an office in the basement. If this room is used for meeting space then the some of the meeting rooms from floors one and two could be moved to B003 which would open up rooms on the first and second floor for additional offices as needed.

If B003 is renovated, and used for office/meeting room space, then the storage that was previously being held in B003 could be moved into room B002 or the areas next to the staircases which have empty floor space that could be used for storage. Figure 5 shows our proposed floor plan for the basement, the involved areas are highlighted.

Figure 4: The original floor plan of the basement with details

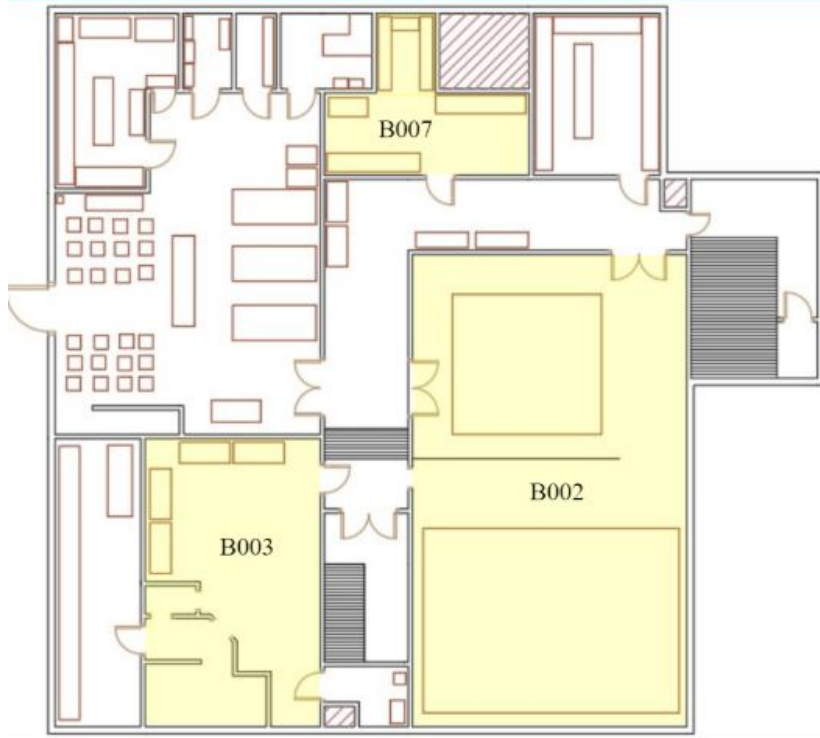
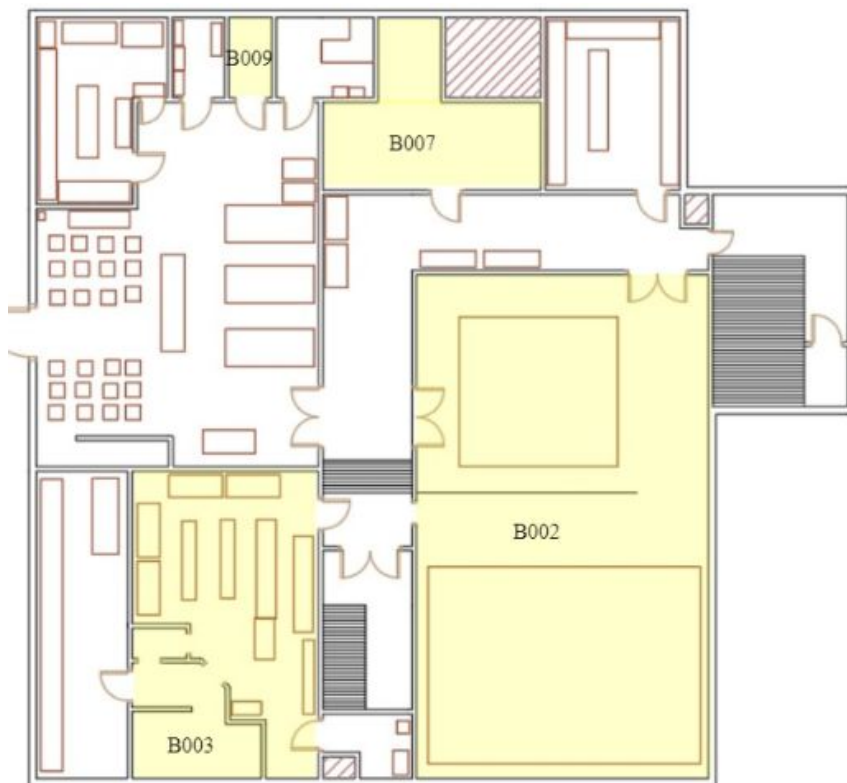


Figure 5: The proposed floor plan for the basement



First Floor

The main problems with the first floor were its underutilization of space, and its department allocations. Our report lists the locations with underutilization and allocation problem, and Figure 6, which is also shown in our report, highlights the areas with concerns.

To solve the problems, we recommend the following rearrangements and renovations. Firstly, we propose to clear out the storage inside Room 105, and move the contents to the false wall inside of the staircase closest to the main entrance. This will free up room 105 for another use, potentially as another office space.

Our next change will be to rearrange the locations of the offices inside the three subrooms inside Room 104, Room 107, and Room 108. We propose to move the health clinic CENTRO is preparing to create from Room 108 to Room 104C. This change moves the clinic closer to the main entrance, which helps potentially less-abled clients reach the clinic more easily. Additionally, the hallway outside the clinic can be used as a waiting room. The two employees currently inside Room 104C would move to 107 and 108, effectively giving them more office space. However, when first proposing this change to the workers inside 104C, we were informed that a convenient part of their current location inside 104C was the ability to quickly access the file cabinets located inside 104B. Therefore, we propose to switch the location of Rooms 104B and 104A, which in turn moves the file cabinets next to the employees to be inside 107. An optional change to further help the employees inside 107 would be to add a door connecting Room 107 and 104A, which would provide even easier access to the file cabinets. The location and dimensions of this proposed door can be found in the floorplan.

Our final two changes hope to address a prevailing concern we found during our research: the lack of reliable meeting spaces. We hope that these two changes provide CENTRO with reliable, convenient, and modernized meeting spaces. Our first proposal is to make some minor changes to the furniture inside the training room to convert it into a meeting room. Firstly, we propose to have only two tables instead of four. We will push these two tables together, such that they are parallel to the back wall, and arrange the remaining chairs around these tables. These small changes will allow the room to be utilized as a meeting room whenever there is not an event happening inside the auditorium. Whenever CENTRO needs to use the room as a training room, they can simply rearrange the tables and chairs to their current formation. Lastly, we propose to add some spaces to the auditorium. We created three extra spaces inside the auditorium, two small meeting spaces, and a break room. The exact locations of each space can be found on the updated floor plan. Each meeting space will have a table and six chairs, with a movable partition closing off the space for an element of privacy, and a shield against outside noises. Our break room is intended to give CENTRO employees that work in open offices all day a place to relax in comparative privacy. Figure 7 shows our proposed floor plan for the first floor.

Figure 6: The original floor plan of the first floor

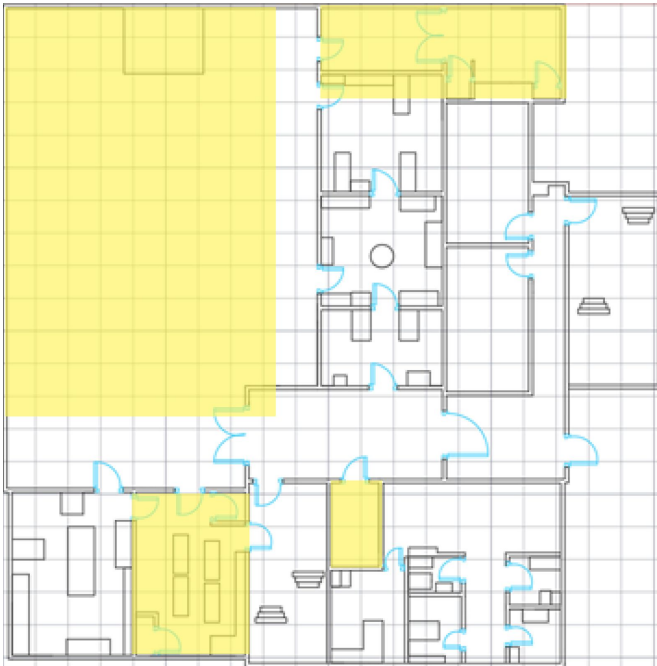
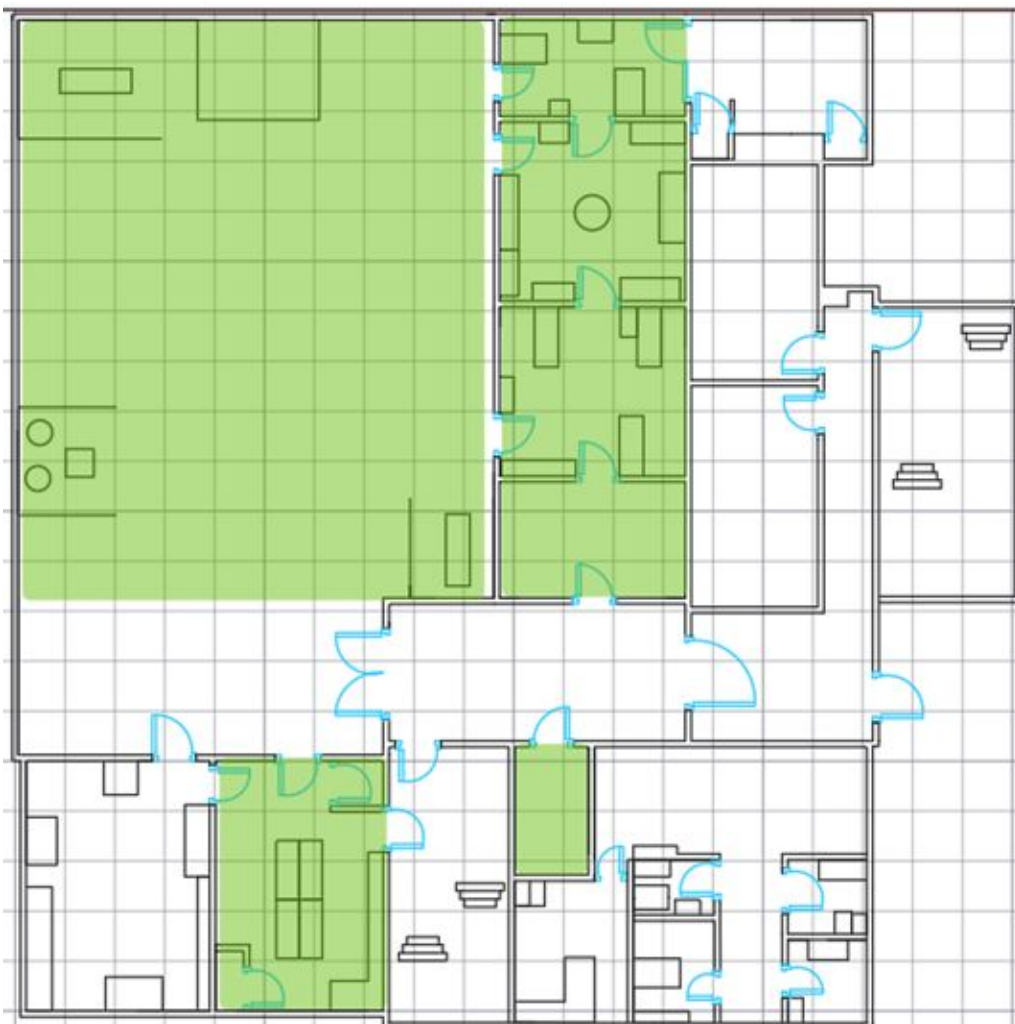


Figure 7: Proposed floor plan of the first floor.



Second Floor

For the second floor in specific, our findings show that it had all the issues we encountered - lack of conference room, underutilization of space, and environmental distractions. Figure 8 shows the original floor plan with concerns highlighted. To solve the problem, we recommend CENTRO to take the actions discussed below.

Arrangement of Offices by Department

As one of our conclusions, the improper allocation of department caused inefficiency by hindering collaboration, so we recommend to rearrange the offices according to the departments and their functions.

The two departments concerning this issue were the DCF and the Marketing. For the DCF department, we suggest to move its office of its Assistant Director to Room 216, the office of the Director to Room 218, and the DCF staff to Room 224, so that both offices of the supervisors keep being close to each other with a decreased distance to the office of the staff. For the Marketing department, we found that its staff were diagonal to its supervisor (the VP & COO) on the current floor plan. So, we recommend CENTRO to move the office the Marketing Department staff to Room 219, and move the office of VP to Room 217. Then, CENTRO has its VP, who oversees the Marketing Department, much closer to the Marketing Department staff with just one room in between.

With the movement of the two departments, the locations of some other offices also need to be rearranged. We recommend to move the office of the Finance Director to Room 201C, with the other two Finance Department employees moved to Room 201, so that the whole Finance Department, along with the Biller whose office keeps in Room 201B, are together. For the office of the Director of HR, we suggest to move it to Room 206, which is unassigned now but have enough space for storing the employees' stuff and a brighter environment for working. It is also more accessible to the entrance and meeting rooms. By doing so, we have Room 201A unassigned, which can be used for the new incoming director or for small meetings held by the Finance Department.

The movements recommended above work to gather the employees of the DCF, Marketing, and Finance departments together respectively, increasing the possibility of collaboration. The rearrangements now including 9 rooms also solve other problems explained in the next sections, with rearrangements of other rooms.

Addressing Environmental Distractions

From our research, we concluded that the environmental distractions including noise and lack of privacy are one of the causes affecting productivity. Here we have recommendations for CENTRO to solve part of this issue by rearrangement of offices, and the rest needs to be solved by fixing the utilities.

The rearrangements suggested previously, actually, have addressed the environmental distractions. For Room 201 and its affiliates, where the Financial Department should locate, there is no longer an open meeting room, thus the noise from meetings is eliminated. Specifically, for Room 201C the suggested office for the Finance Director, the complaint about noise coming from sharing a window is addressed, because the room itself contains a four-foot-wide window. Similarly, Room 206, which is the recommended office for the Director of HR, also eliminates the noise from the shared window of the current room (Room 218). Fortunately, the 2 rooms with the issue with noise from a shared window, mainly Room 217 and 218, have the distraction greatly reduced. Because we suggest Room 218 for the Director of DCF, who only works twice a week in the office, both the director and the VP in the next door experience much less noise than the current situation. Moreover, the VP is assigned office larger than the current one, which reduces the amplitude of voices, making the surrounding environment quieter. With these changes, we have the environmental distraction problem, i.e. noise pollution, of the individual offices solved.

Next, our recommendations aim to eliminate the noise pollution problem for shared office. One of our previous suggestions associated with moving the DCF staff and the flexible workstations to Room 224, in which there was a wall partially separating the large space. Noise pollution of irrelevant conversation is solved here by having workstation of the DCF Department staff in one side, preferably the inner part, and the open workspace in the other. Locating the DCF staff in the inner part would minimize the noise from outside, which mattered less for the open workspace. Next, our new recommendation is designed for the Department of Family Support Service and the Department of CBHI, which both had shared workspace for the employees. For the 5 Family Support Service staff, we recommend to move the office to Room 220, so that outside noise could be reduced for not being surrounded by hallways. Finally, through moving the office of the CBHI staff to Room 222 in which the current large conference room located, these employees would no longer suffer noise from meetings as before, plus they would have a larger space with a window. Moving the large meeting room away from the air conditioning room in Room 222 reduced the distraction overall, as explained below.

While the meeting rooms required high level of privacy and quietness, they were also one source of noise pollution, as we found out during the focus group. Putting meeting rooms in the proper location could greatly solve this problem. We recommend CENTRO to have its large meeting room in Room 212 and the small meeting room in Room 208. For the large meeting room, noise outside would be totally eliminated by not having a large and leaky window, and the two doors in the opposite direction to the hallways could reduce the noise of footsteps inside the room by offering an easier access. More importantly, as inconsistent control of air conditioning in the current room distracted the second floor, exchanging the conference space with a constant workspace reduced the distraction of AC overall. For the small meeting room, it would not be right next to three offices as before but had an individual quiet space while not distracting the neighbors.

Heretofore, our recommendations had covered all the rearrangements of each department on the second floor and solved problems of department location and some of the

environmental distractions. To strictly reduce environmental distractions, speakers of the phones in the shared offices must be turned off in order not to disrupt other employees in the room. After proposing recommendations about the general arrangement, we look into the specific aspect - furniture arrangement.

Furniture Arrangement in Shared Office

Furniture arrangement had caused space underutilization problems for shared workspace. In our findings, we concluded that how desks in rows led to lack of privacy, inconvenient access, and small personal space. Besides the personal space, this arrangement pattern also shrunk the shared space, contradicting the purpose of an open office. So, we strongly recommend not to put desks in rows but arrange them corresponding to the shape of the office in order to enlarge both personal and shared space. For the square-shaped rooms, we suggest to arrange the desks in a circle, and for the rectangular ones, they should be facing walls. The five shared offices are the ones of Finance, Marketing, FSS, CBHI, and DCF, and we give specific recommendations to each.

In our rearrangement plan, only the Department of CBHI is located into a square room (Room 222), so we propose to put the 4 desks in a circle, with 2 of the corners on the longer side attached to each other, and the cabinets and shelves should be placed by the walls. In this way, employees would not see the monitor of others when working, which protects the privacy, and because they do not have any obstruction like desks behind them as before, they get more free space. Also, placing the desks in a circle improves the sense of community and level of collaboration for the employees.

The other four departments are all planned to move into rectangular rooms. The floor plans demonstrated that for each room, the wider side could accommodate up to two desks and the narrower side only one desk, while for some rooms such as Room 201 and 220 could have a cabinet between the two desks. For workstations, Room 224 can have up to four of them placed on the widest side, three at each side of the partitioning wall, and two near the entrance. Last but not least, we also suggest the internal arrangement of individual offices as shown in Figure _ to _, but it more depends on the employee assigned to the office.

Extra Conference Space

Another significant problem that our recommendations address is the lack of conference space. Although our suggestions on the basement and the first floor also add potential conference space, the meeting rooms on the second floor are still the top choices for more official affairs. Our reallocation plan on the second floor not just removed the noise pollution for meetings but could also create additional meeting rooms.

Originally, there were two meeting rooms with one barely used, but in the proposed plan, we could have two tables in the long Room 208 where the small meeting room should be moved to. We recommend adding a wall between the two tables to create two meeting space. We propose two options for the wall - a portable room divider or constructing of a permanent wall. With wheels, the portable room divider creates a flexible wall, which allows

holding two meetings simultaneously and for the meetings with more people, the wall could be disassembled. But, the portable room divider does not guarantee privacy within the room and cost \$600.00 on average, based on the typical products of Versare Portable Partitions. Alternatively, constructing the wall creates two permanent meeting space with more privacy but less flexibility, which costs \$945 - 2687, as calculated on the Homeadvisor website. Plus, to keep the accessibility, either the newly built wall or the wall next to the hallway must include an extra door, which costs an extra of \$120 - 200. Generally speaking, a portable room divider costs less and brings more flexibility, which we highly recommend for CENTRO. Finally, to improve its function as a flexible meeting space, we suggest to change the 2 tables to rectangular ones instead of the ones with semi-circles, so that the tables can be combined into one for meetings with more than 6 attendees at once. The two tables originally in Room 201 could be used for this small conference room.

Hitherto, our recommendations for rearrangements have increased the number of meeting rooms, improved the utilization rate of available space, and reduced the environmental distractions. Figure 9 explains our proposed floor plan for the second floor.

Figure 8: Original floor plan of the second floor

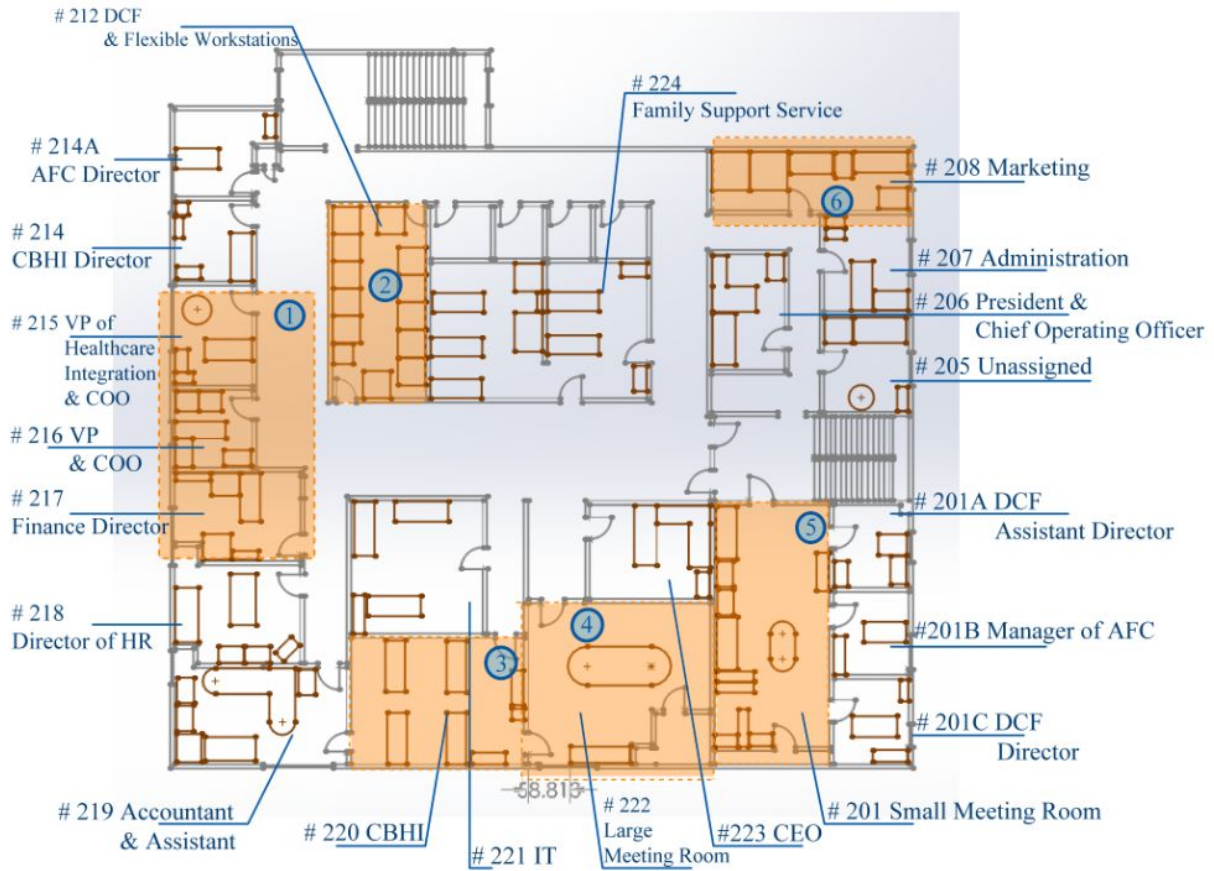
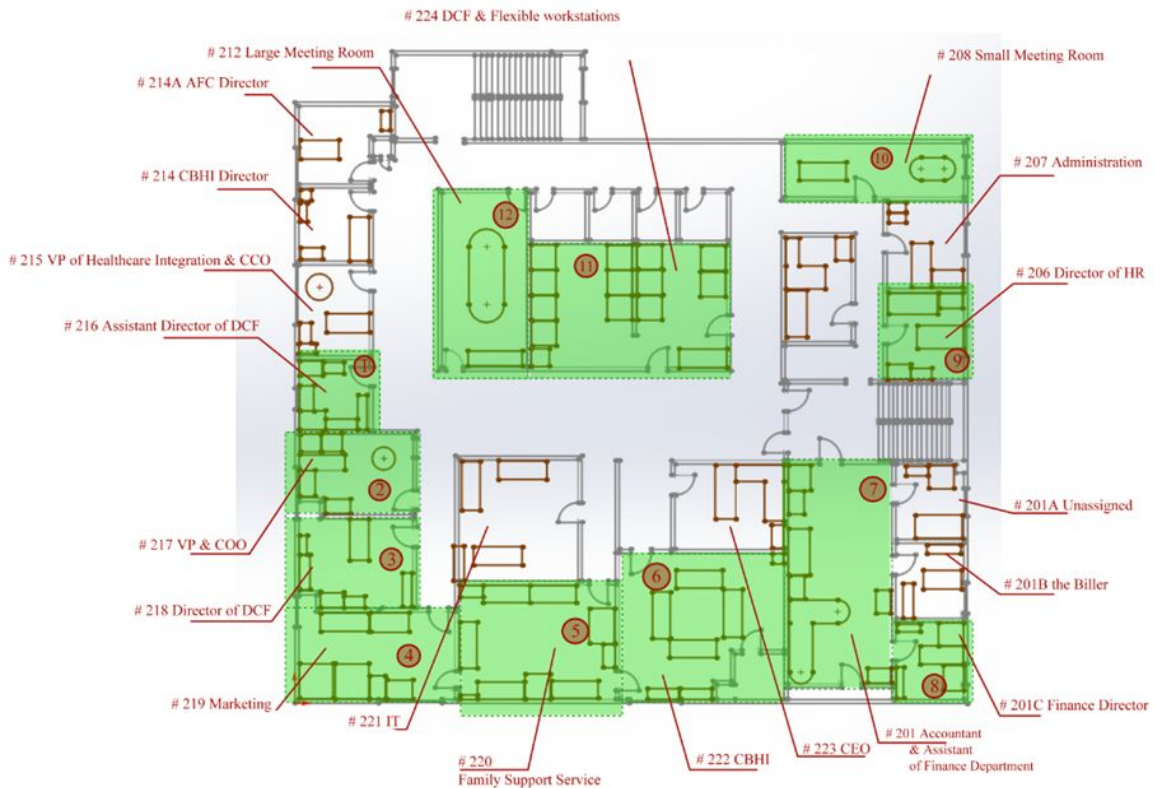


Figure 9: Proposed floor plan of the second floor



Appendix H - Work-From-Home Policy

This policy will be company wide for the Worcester location, as no research was done on other locations. This policy aims to give those who do not need to be at CENTRO five days a week the flexibility to work outside the office, as shown below.

Any employee wishing to work from home must first meet all five criteria:

1. They are not meeting with a client that day.
2. They do not need to access any documents that CENTRO has at the office.
3. They do not need to meet with any employees during the day, whether it be for a meeting, or for a progress report.
4. They are not needed to maintain the office of CENTRO. This pertains to IT, the front desk, janitorial staff, and other such maintenance staff that are needed during the day.
5. They must have a computer and an Internet connection independent of CENTRO.

If an employee meets all the criteria above, then they must speak with their manager about working from home. The manager has the final say in whether the employee can work from home, and must decide the employee's eligibility based on the employee's trustworthiness, and consistency in meeting the five criteria.

If the manager determines that the employee is eligible to work from home, then the employee must provide their phone number to their manager. Additionally, we recommend that CENTRO set up a cloud-based collaboration software, such as Slack, with which the employee must become acquainted with, and use regularly during their work hours.

If an employee is denied eligibility to work from home based on work performance, they will be eligible for reevaluation in six months.

We also suggest investing in a work Virtual Private Network (VPN). we recommend Hotspot Shield, as it is cheap and reliable. This will allow CENTRO employees that work from home to be able to securely log onto CENTRO servers.

Appendix I - Updated Evacuation Maps

We recommend to change the current evacuation maps to the updated ones as shown below. For each floor, we have the updated map as a simpler version of the floor plan, which can be used if the safety routes have to be changed in the future. CENTRO can just add different routes on our updated maps, if the general structure of the building has not been changed.

For the Basement

Figure 10: Evacuation map for B002

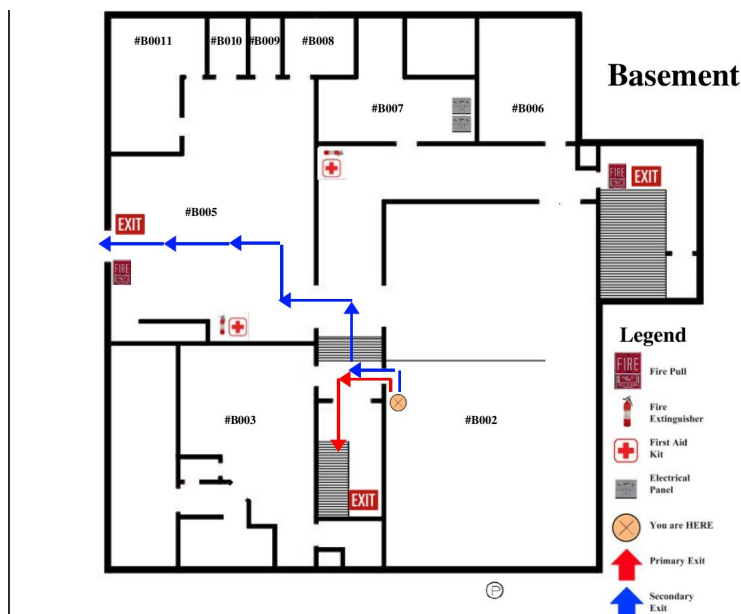


Figure 11: Evacuation map for B005

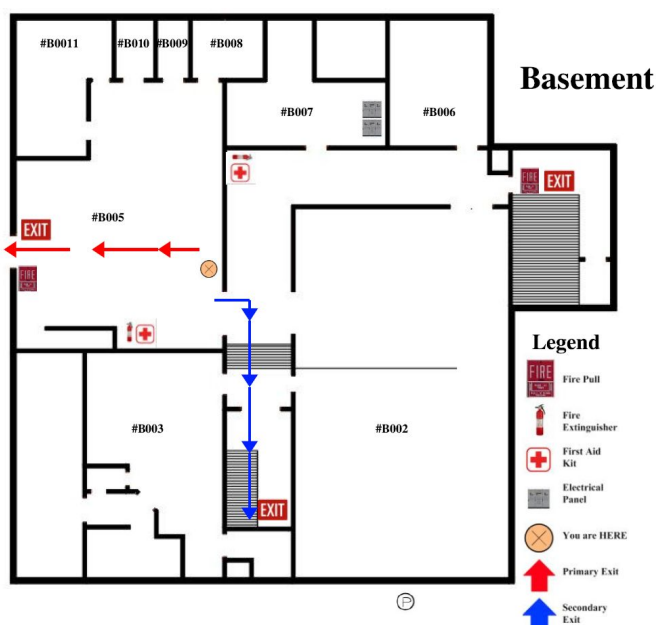


Figure 12: Evacuation map for B006

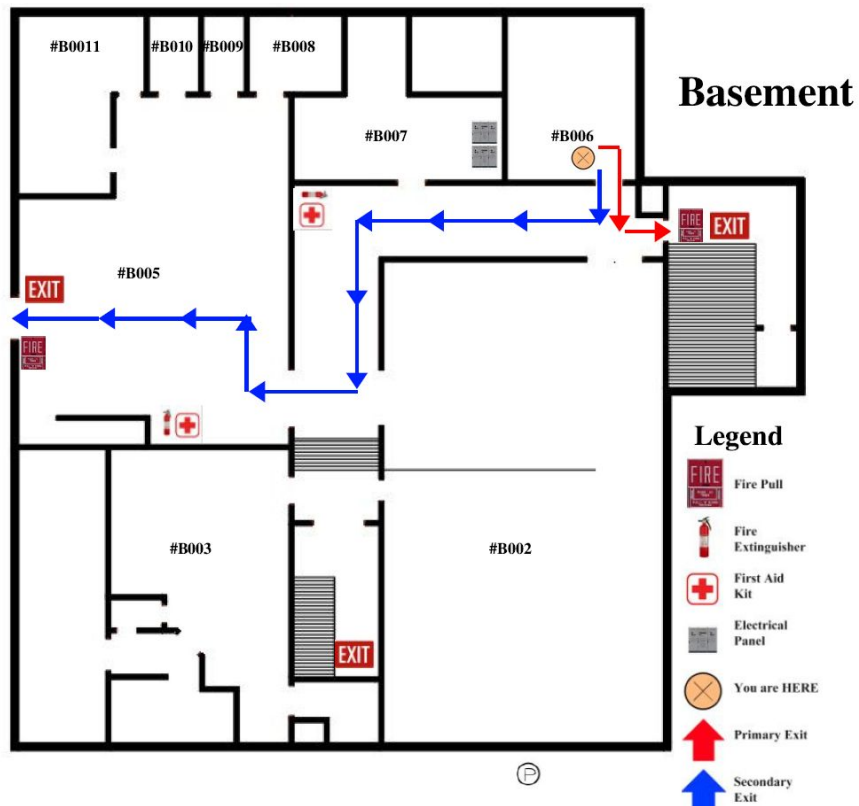


Figure 13: Evacuation map for B003

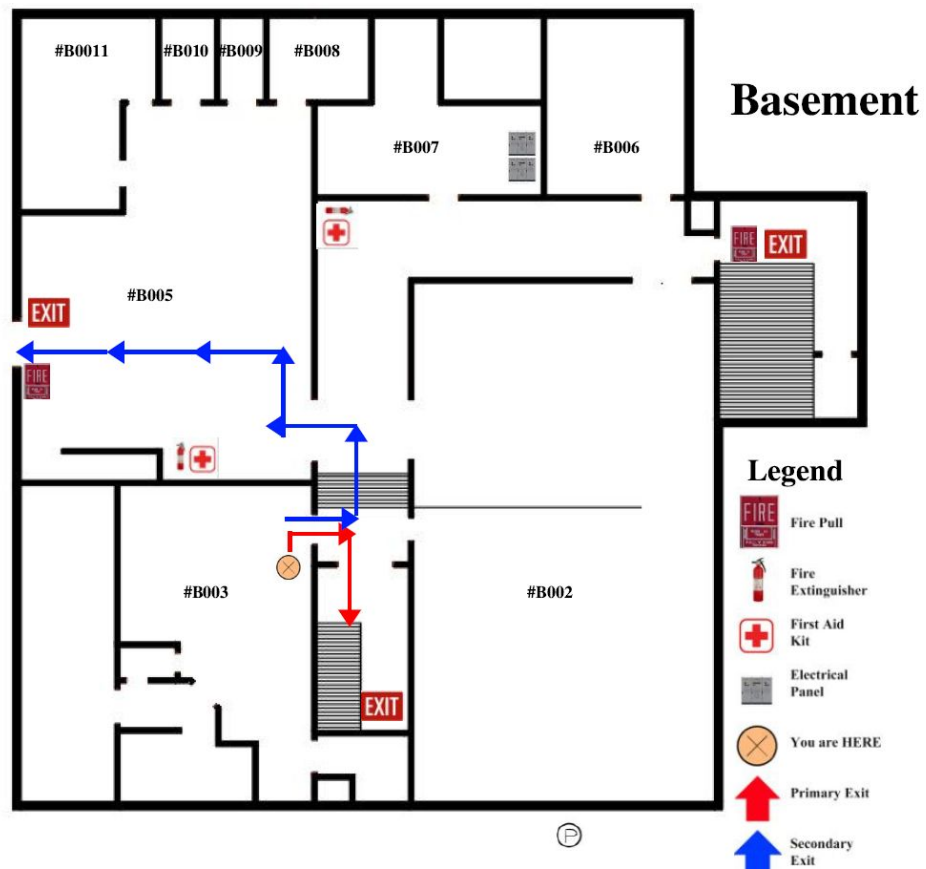


Figure 14: Evacuation map between B007

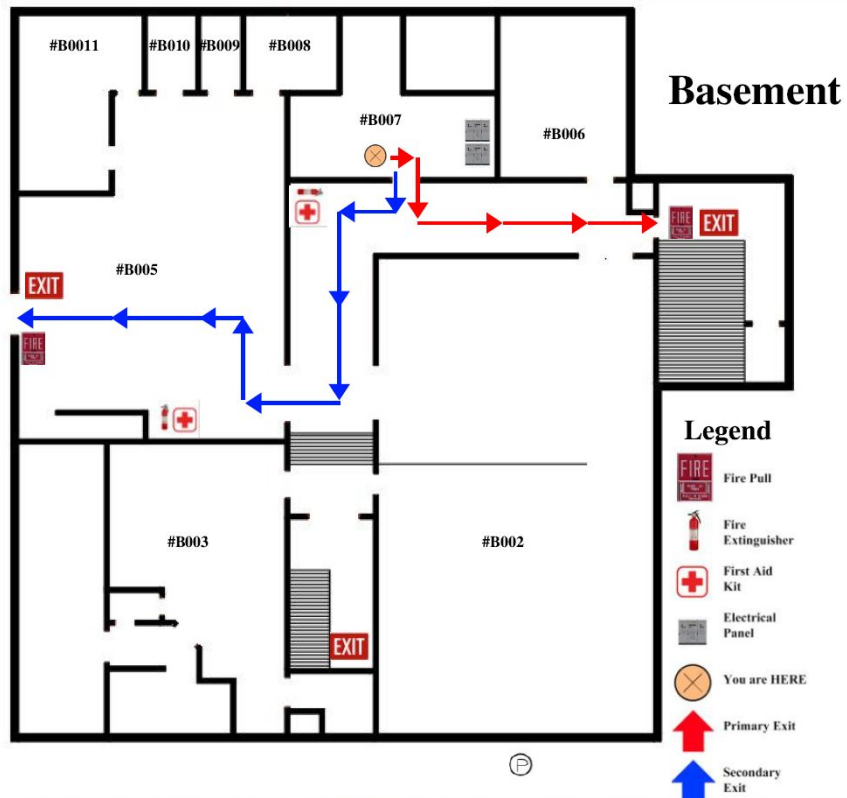


Figure 15: Evacuation map between B002 and B006

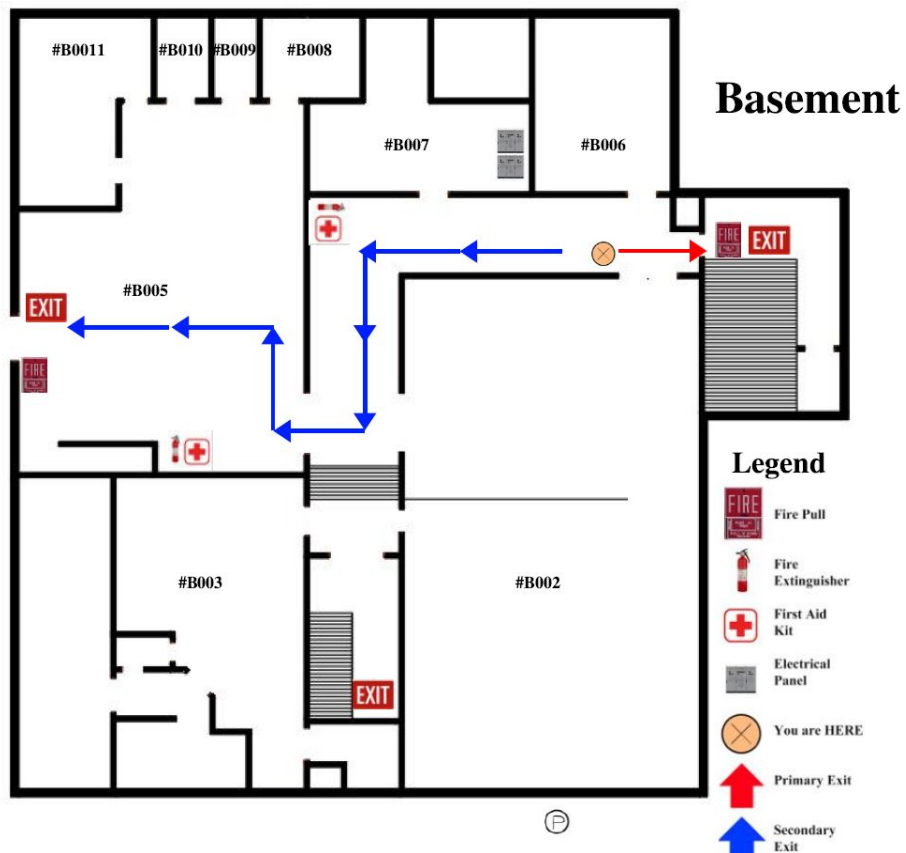


Figure 16: Evacuation map between B002 and B005

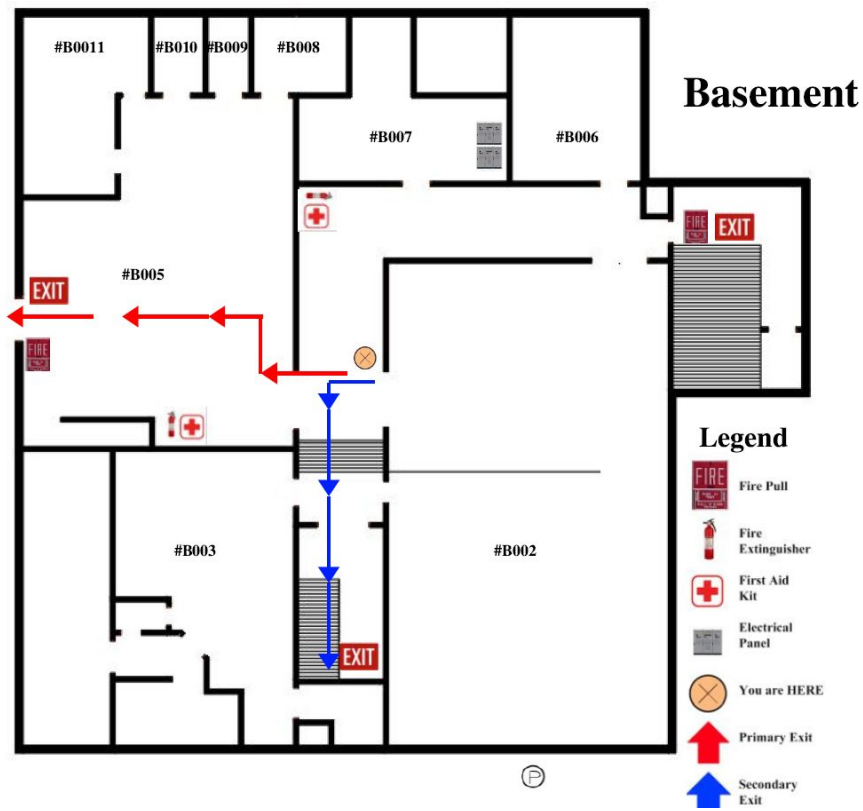


Figure 17: Evacuation map for B008

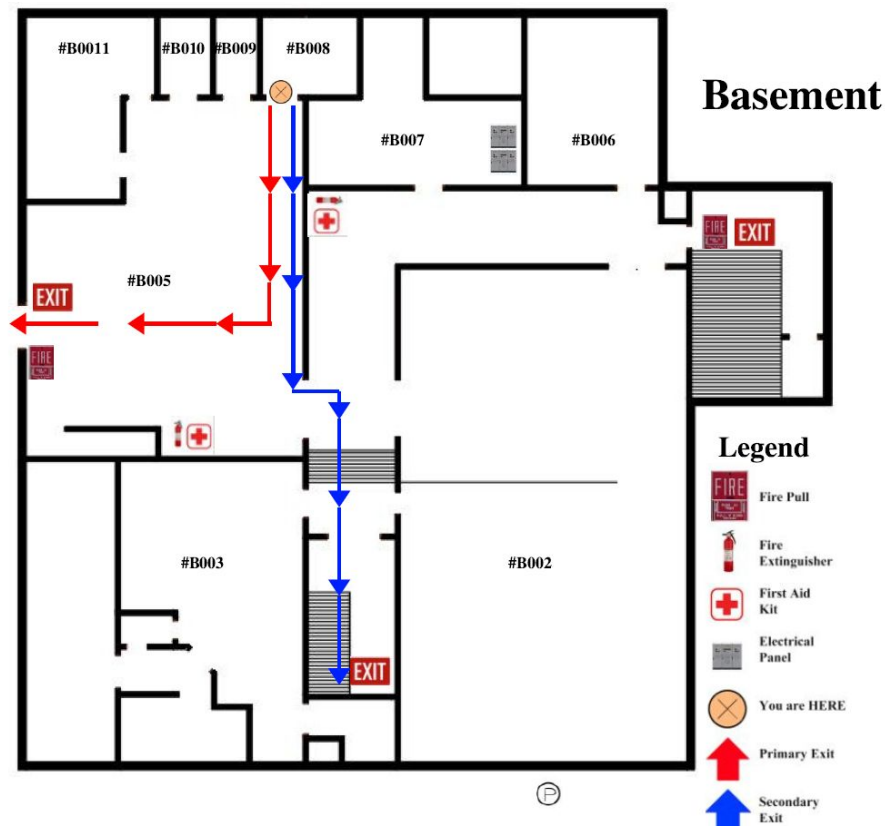
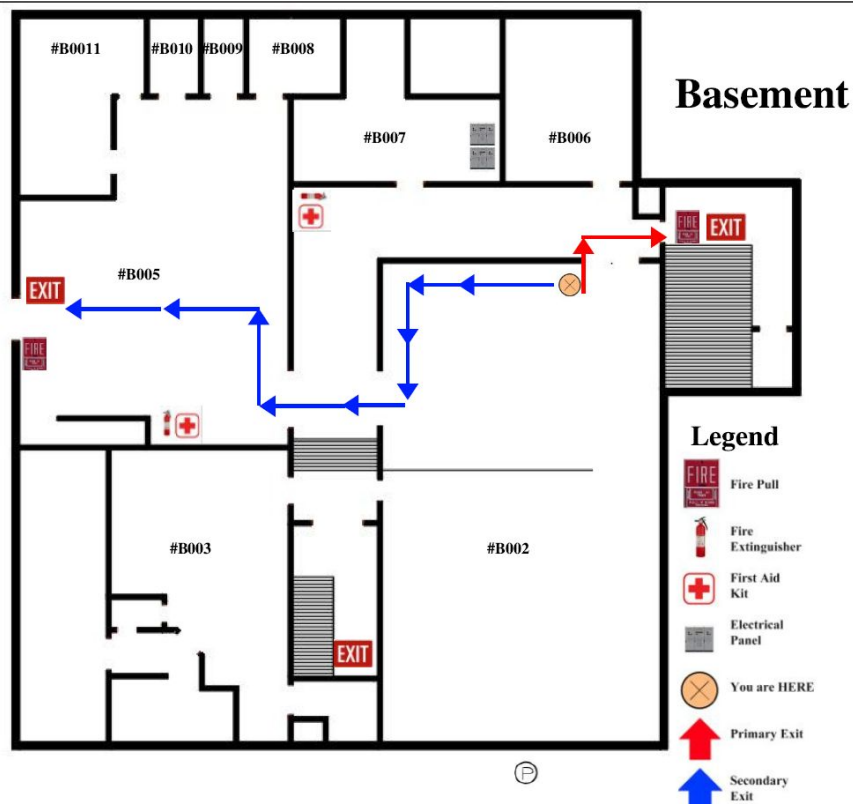


Figure 18: Evacuation map for B002 food storage area



For the First Floor

Figure 19: Evacuation map for Room 101

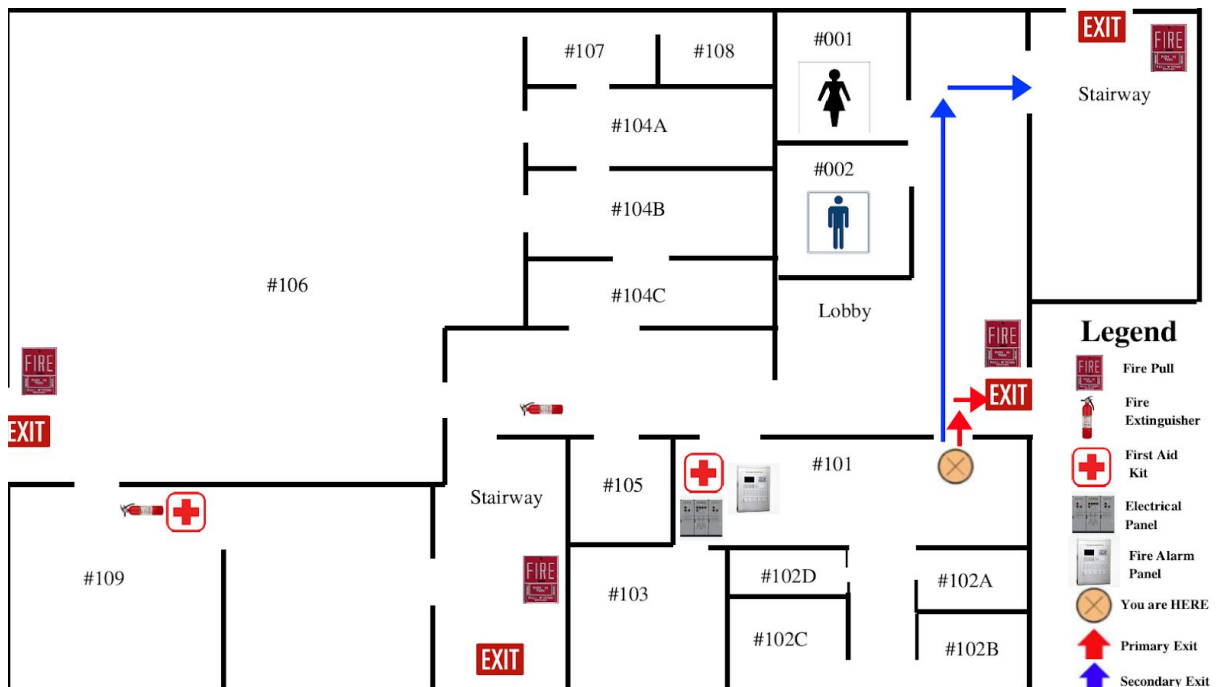


Figure 20: Evacuation map for Room 102

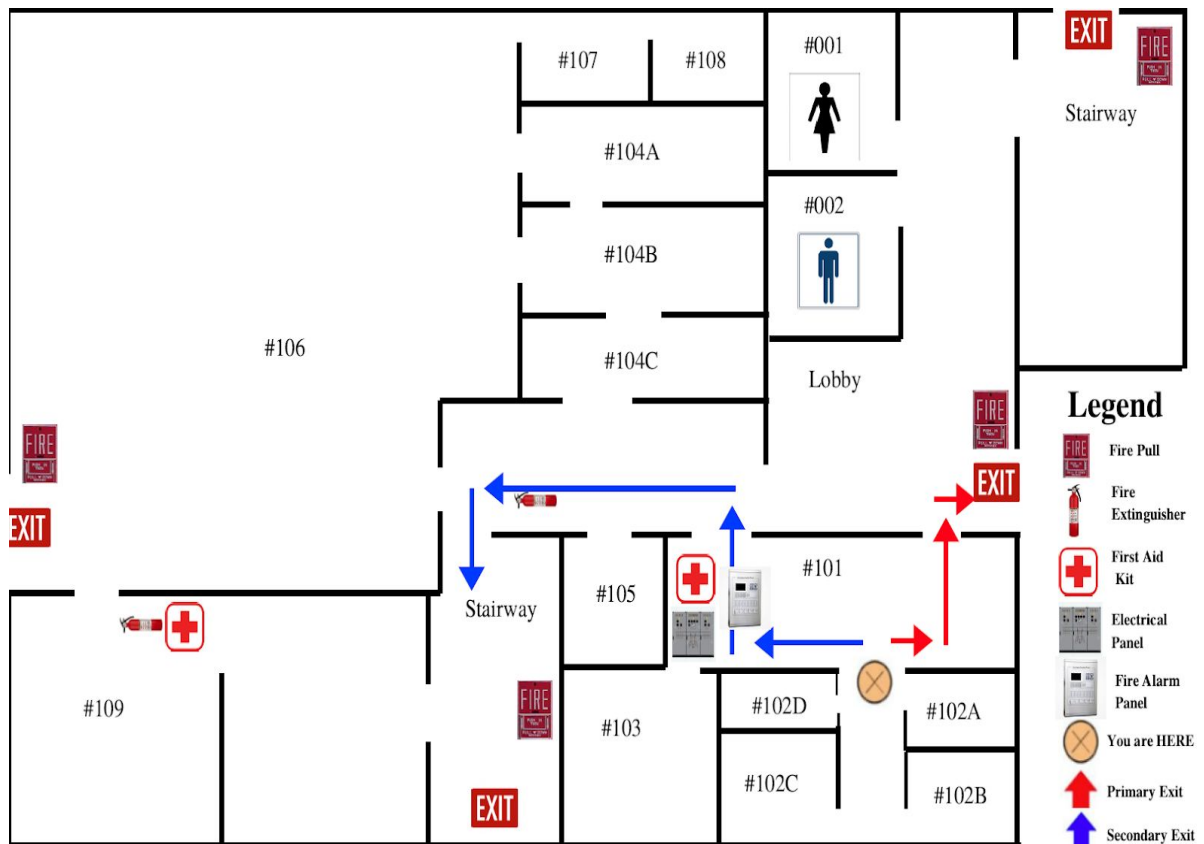


Figure 21: Evacuation map for Room 103

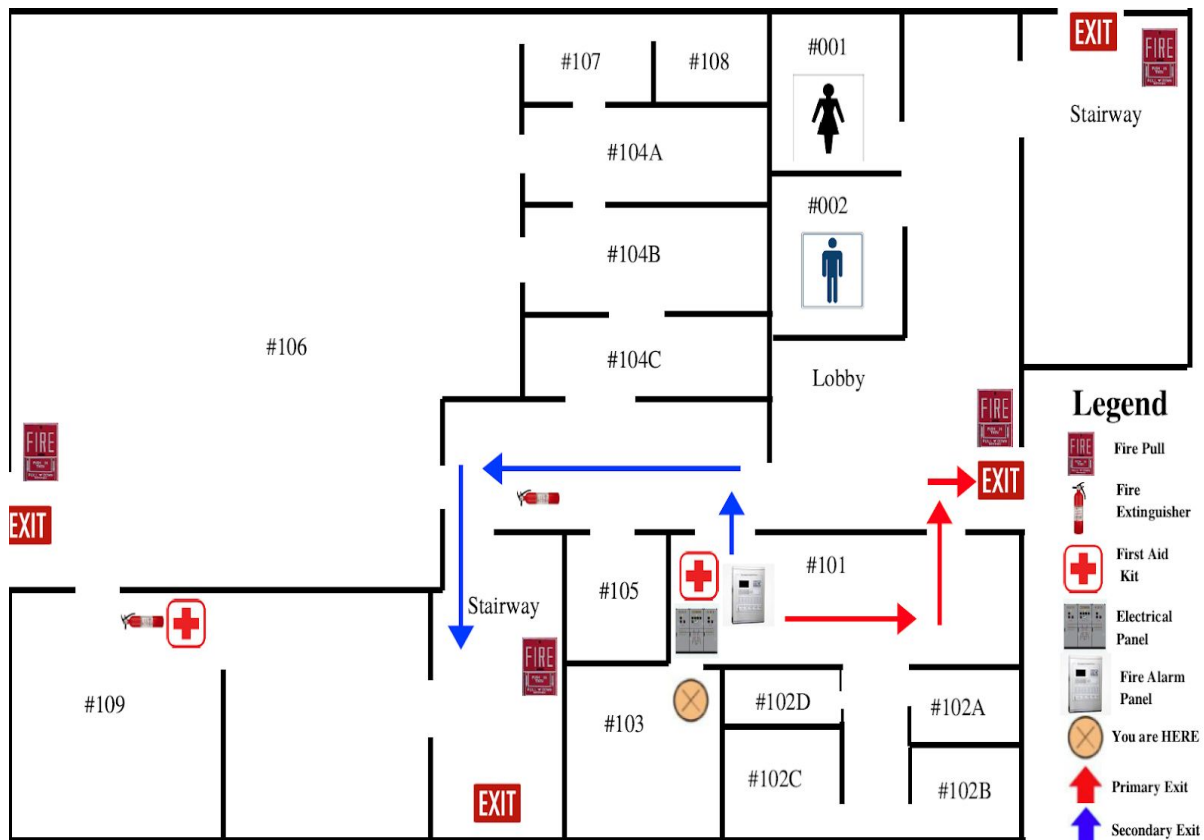


Figure 22: Evacuation map for Room 104A

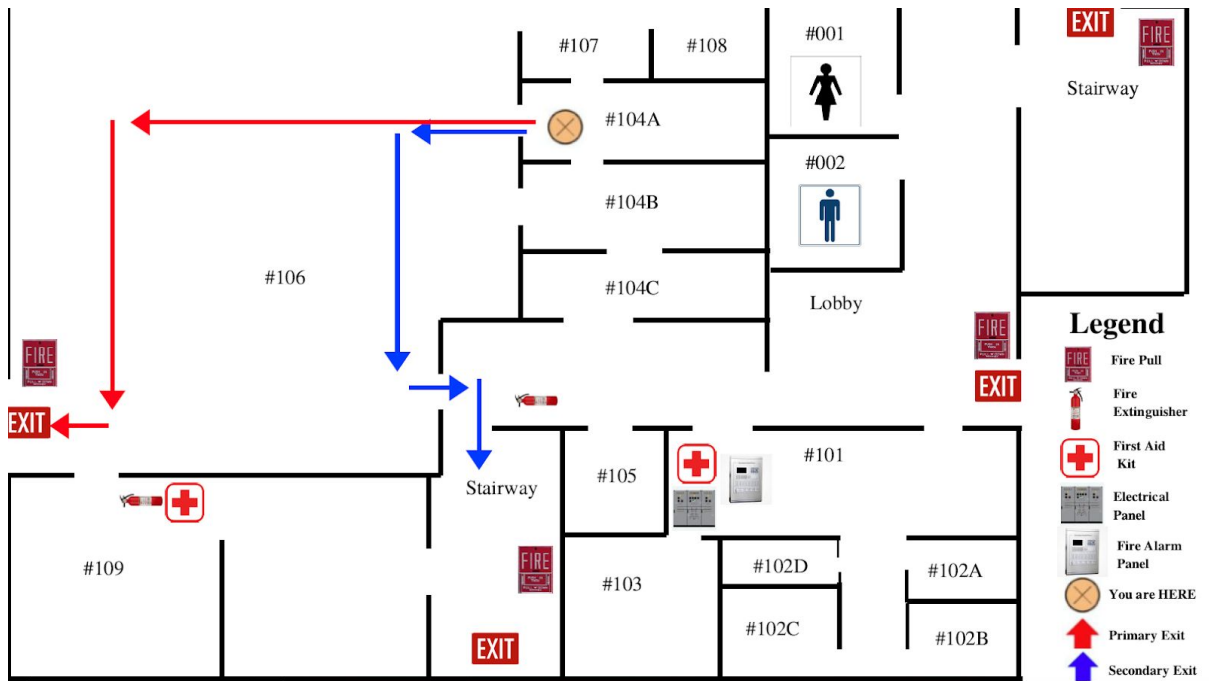


Figure 23: Evacuation map for Room 104B

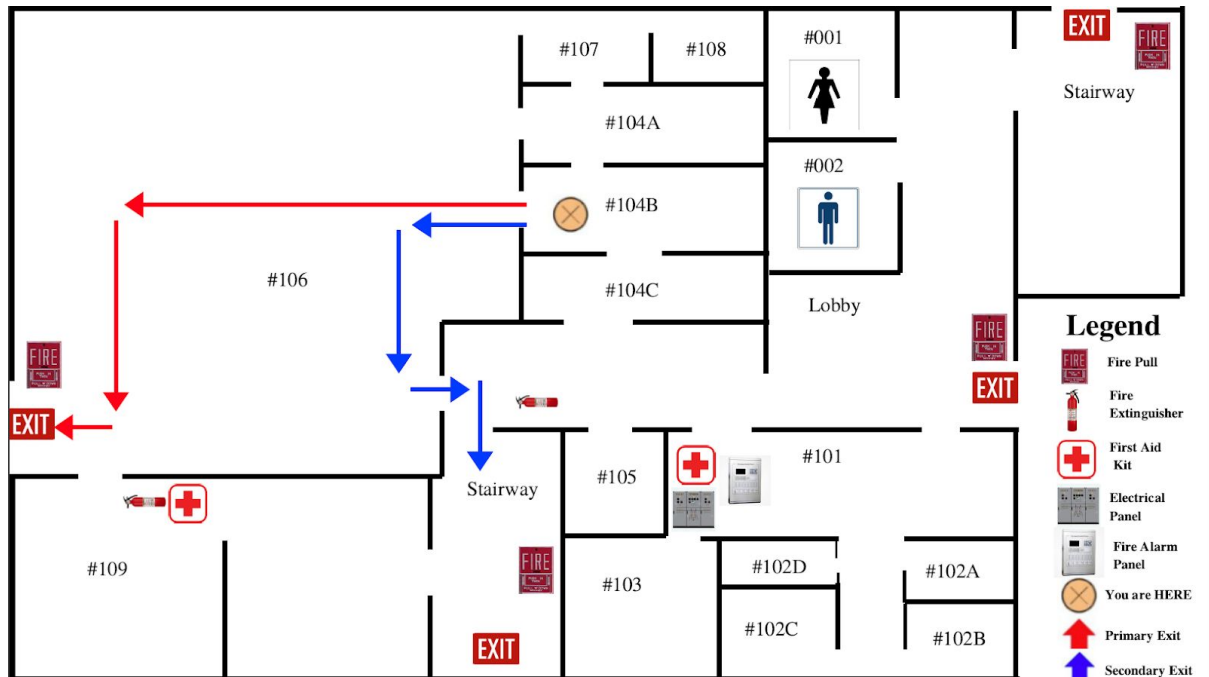


Figure 24: Evacuation map for Room 104C

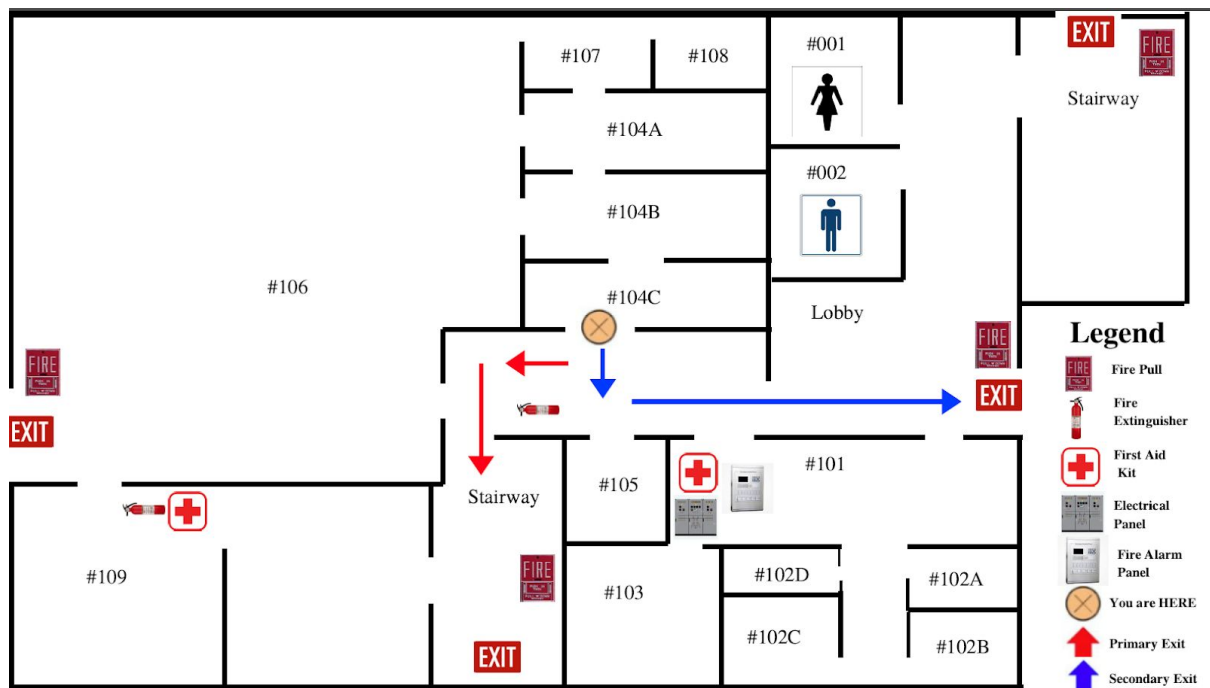


Figure 25: Evacuation map for Room 105

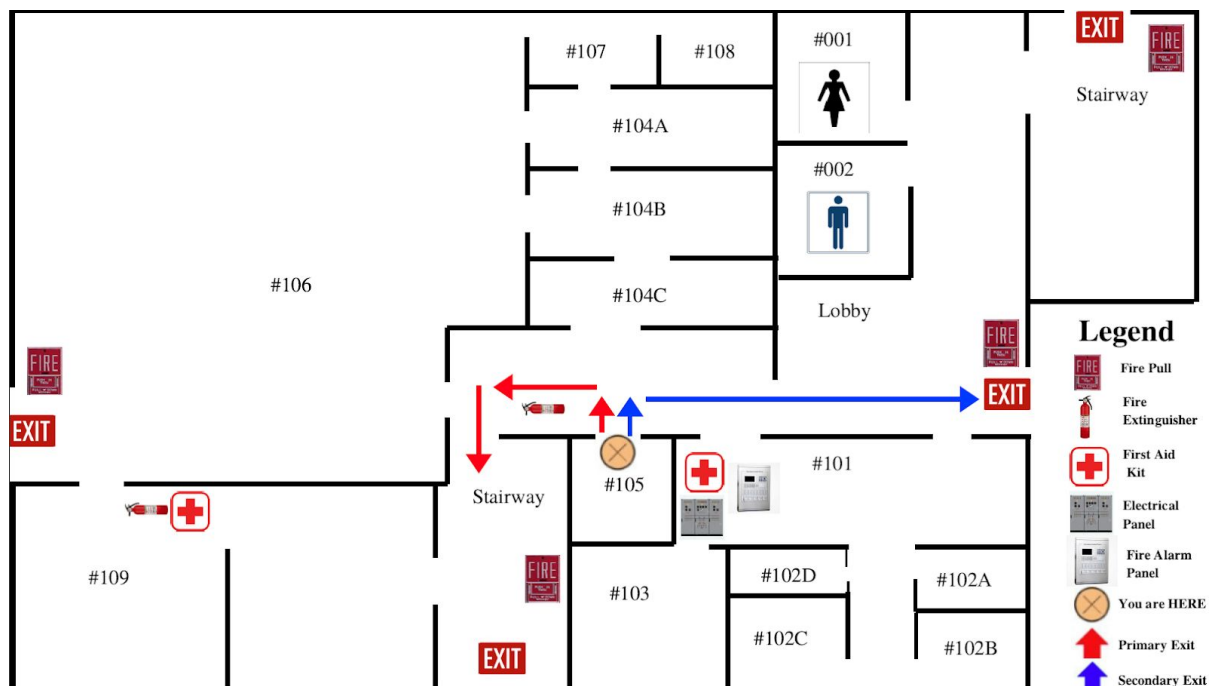


Figure 26: Evacuation map for Room 106

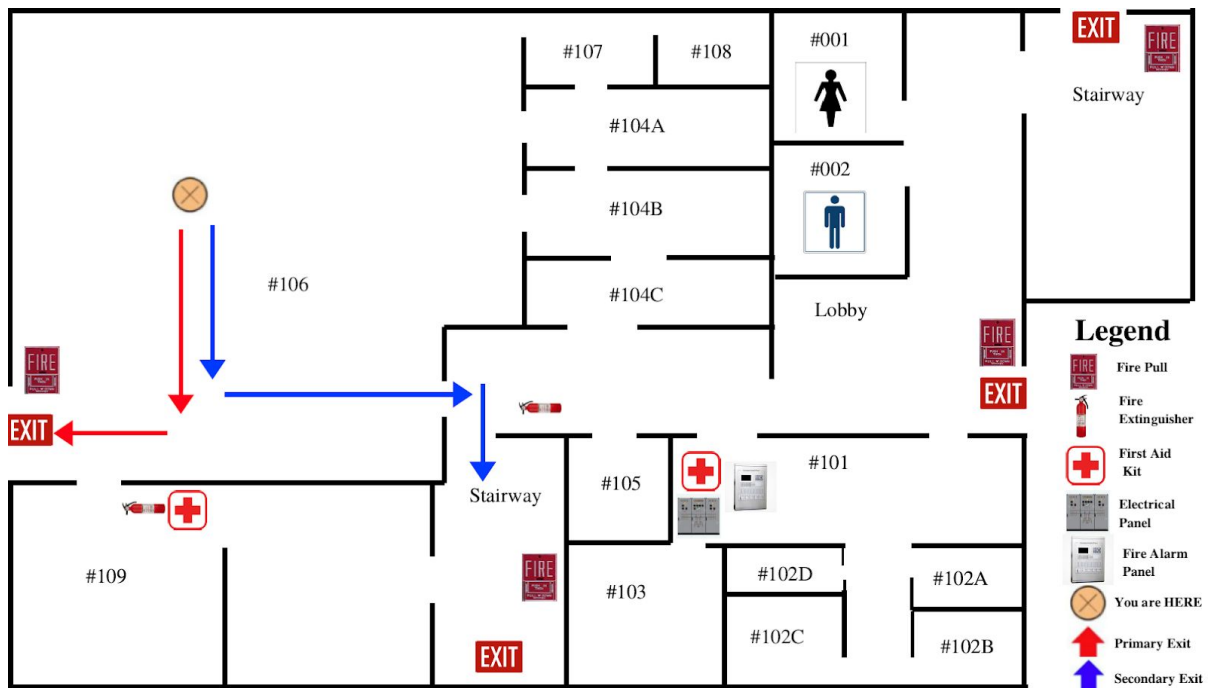


Figure 27: Evacuation map next to Room 107

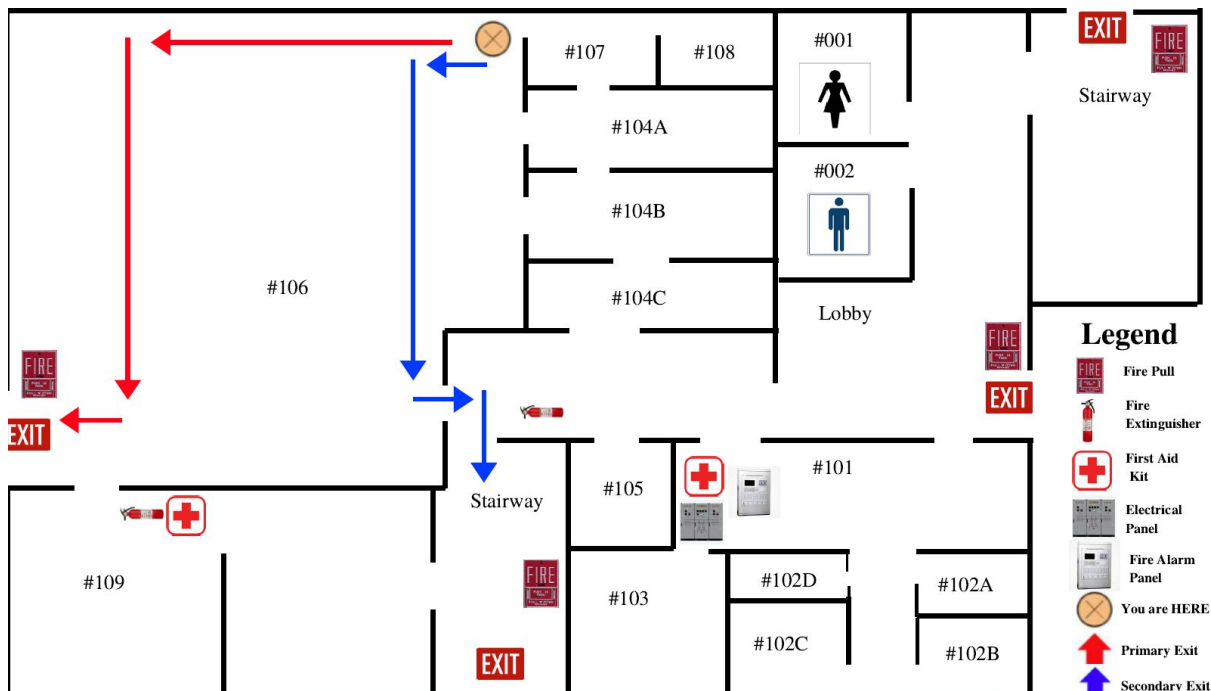


Figure 28: Evacuation map for Room 107

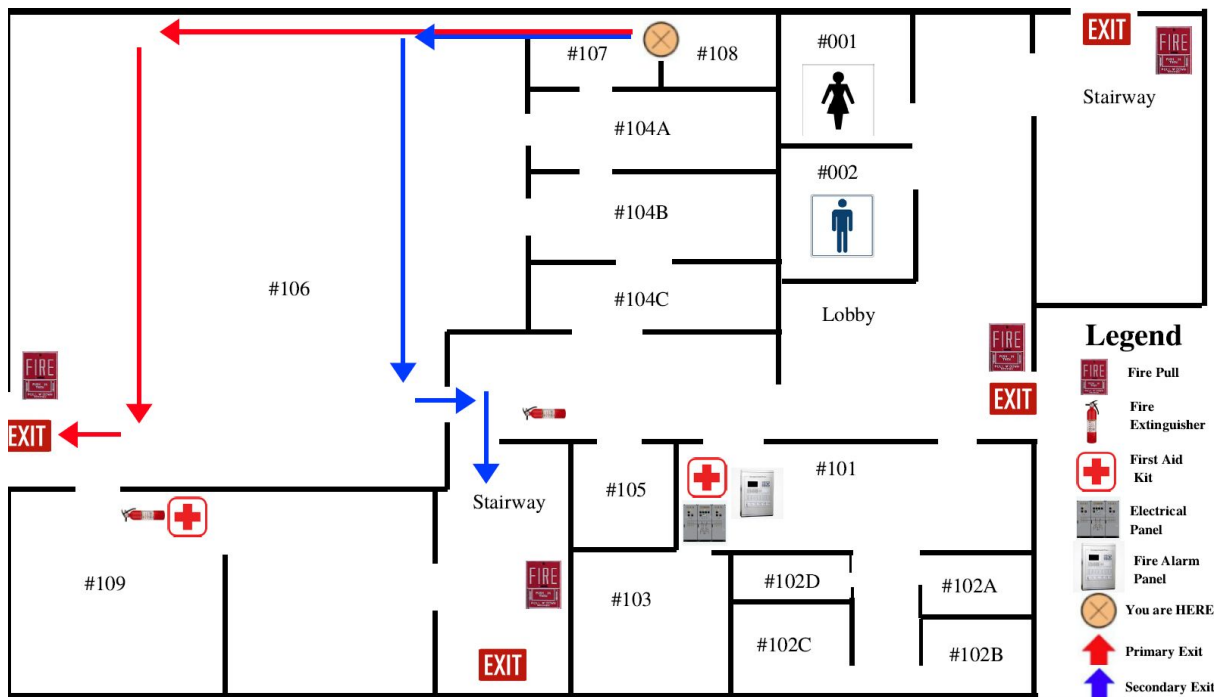


Figure 29: Evacuation map for Room 109

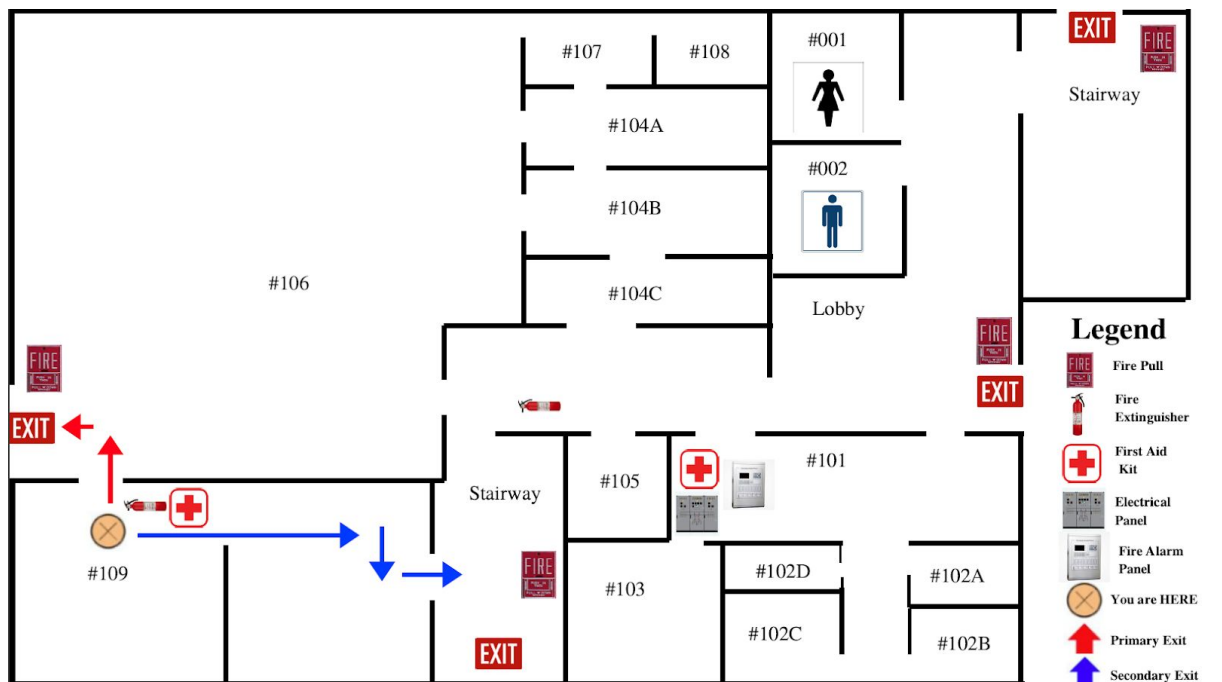


Figure 30: Evacuation map next to the bathrooms

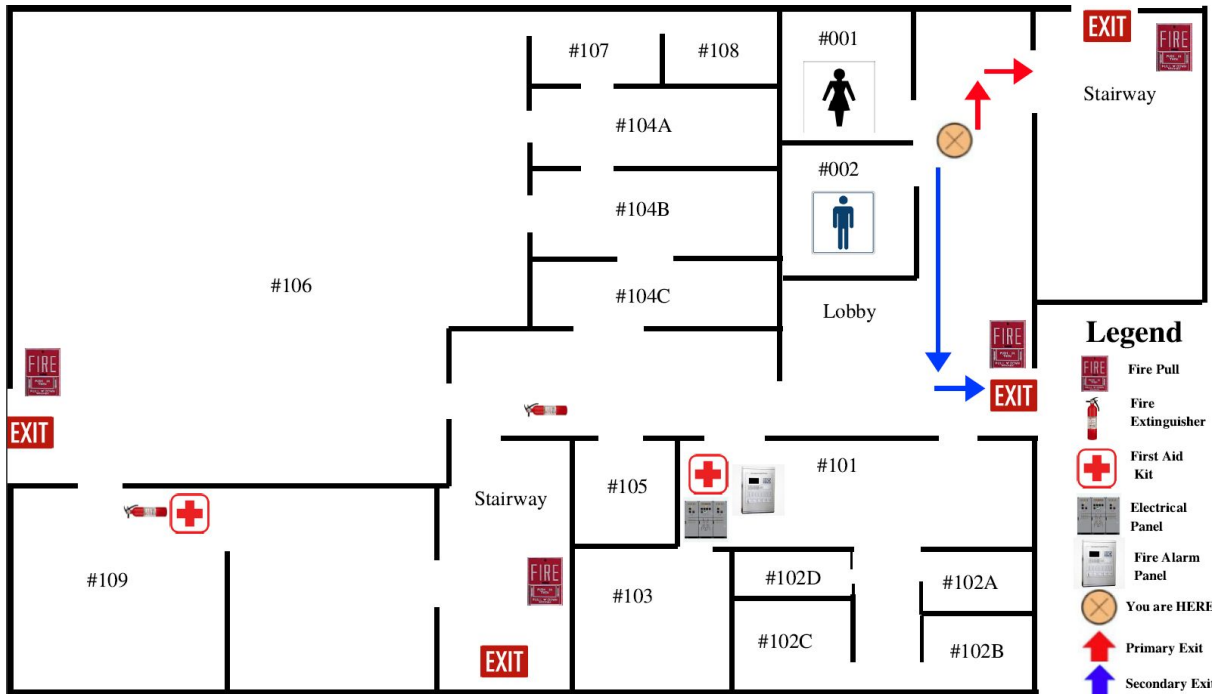


Figure 31: Evacuation map for training room

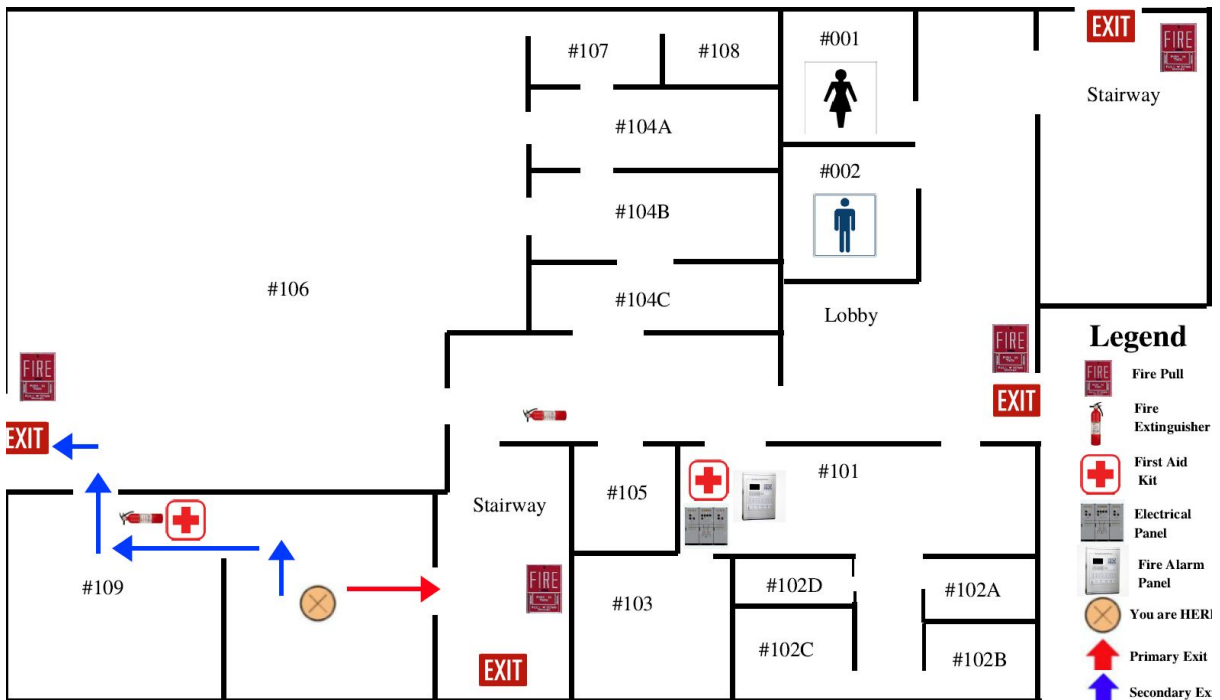


Figure 36: Evacuation map for Room 217

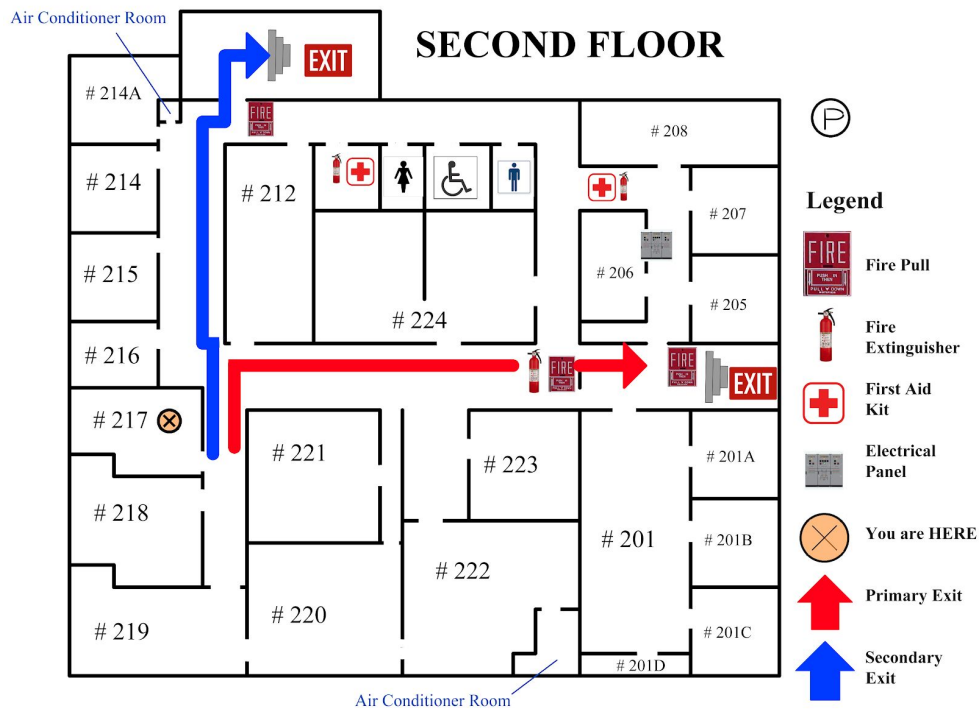


Figure 37: Evacuation map for Room 221

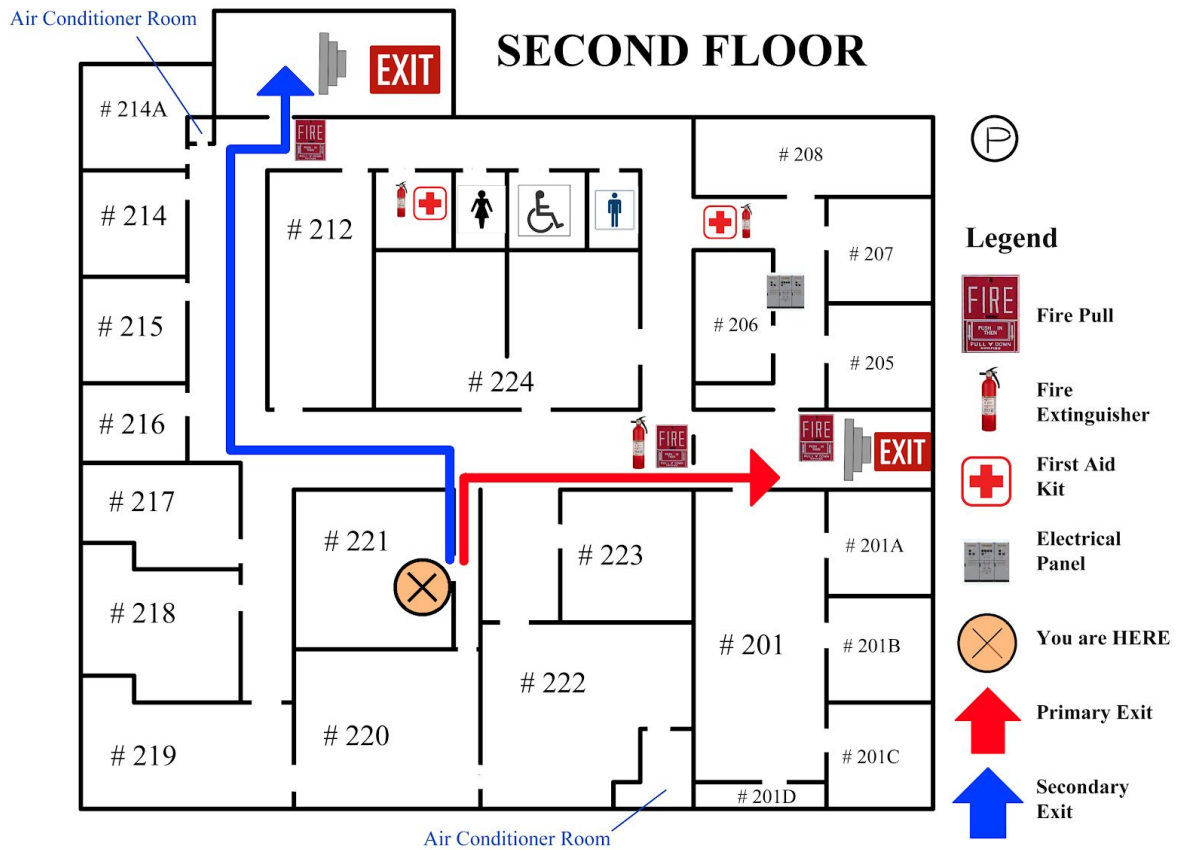


Figure 38: Evacuation map for Room 224

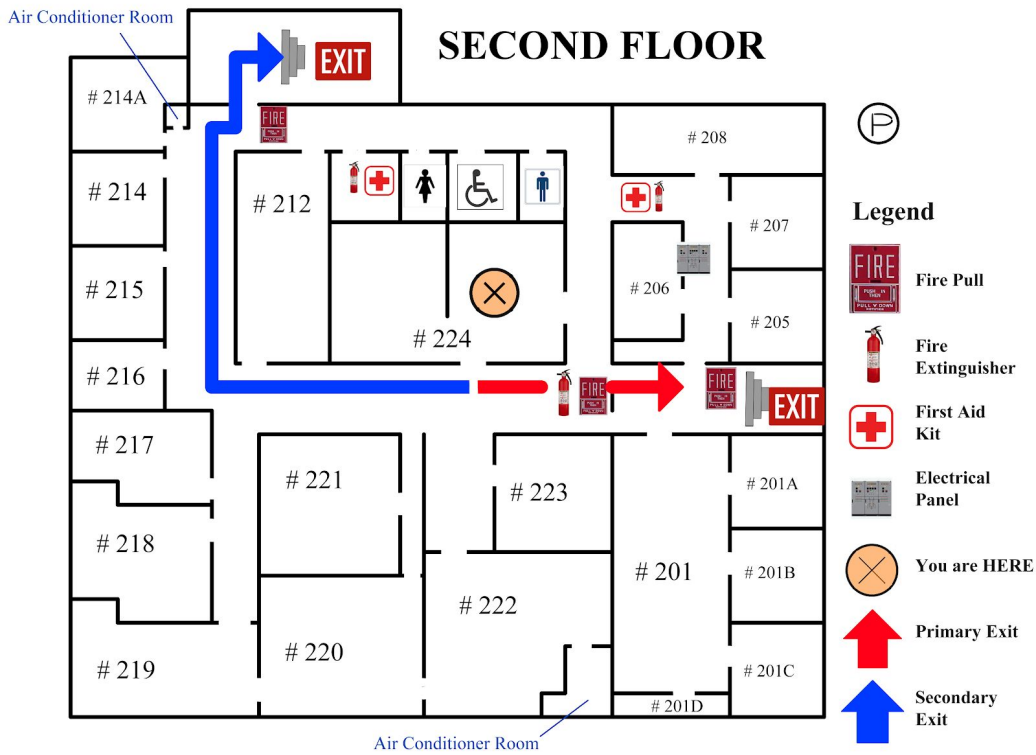


Figure 39: Evacuation map for Room 223

