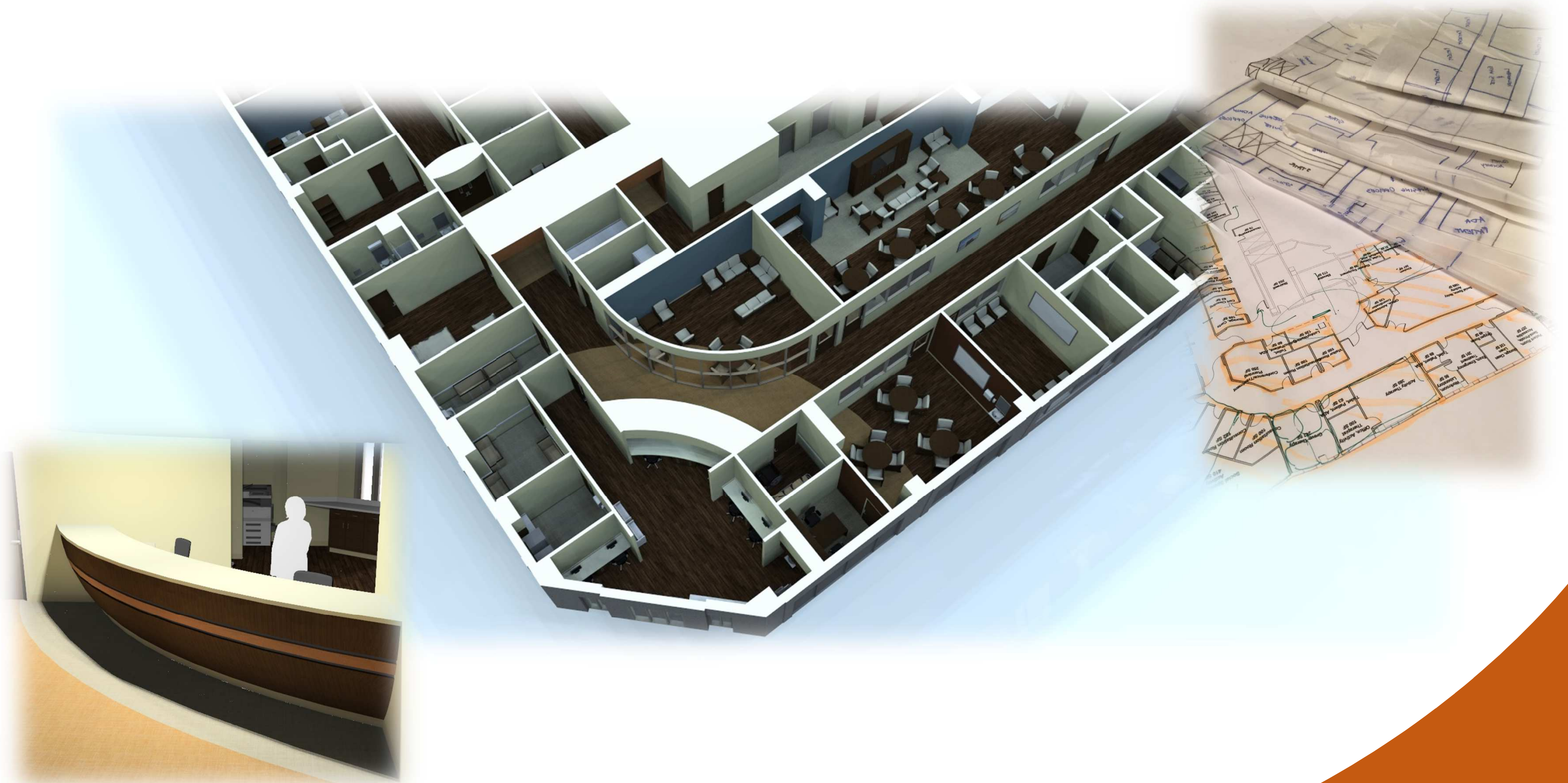


Architectural Design in Healthcare

University of Cincinnati Honors Program
Self-Designed Experiential Learning Project



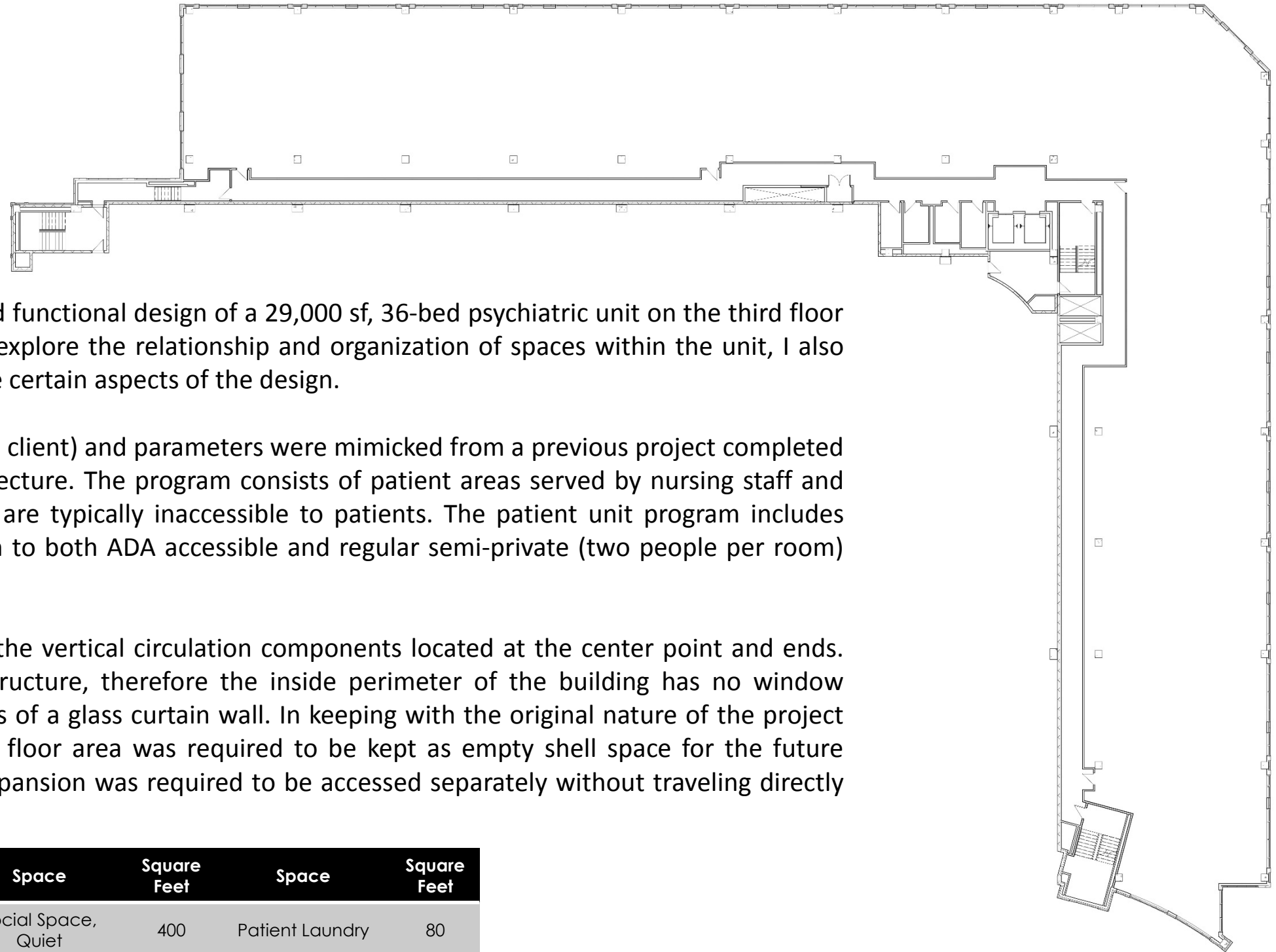
J. Andrew Fraser, Architectural Engineering 2016

Project Overview

Unit Type: Psychiatric Therapy

Project Location: Frisco, Texas

Project Size: 29,000 SF



In this project, I created and revised the spatial and functional design of a 29,000 sf, 36-bed psychiatric unit on the third floor of an existing three-story hospital. Not only did I explore the relationship and organization of spaces within the unit, I also generated a cohesive interior scheme to emphasize certain aspects of the design.

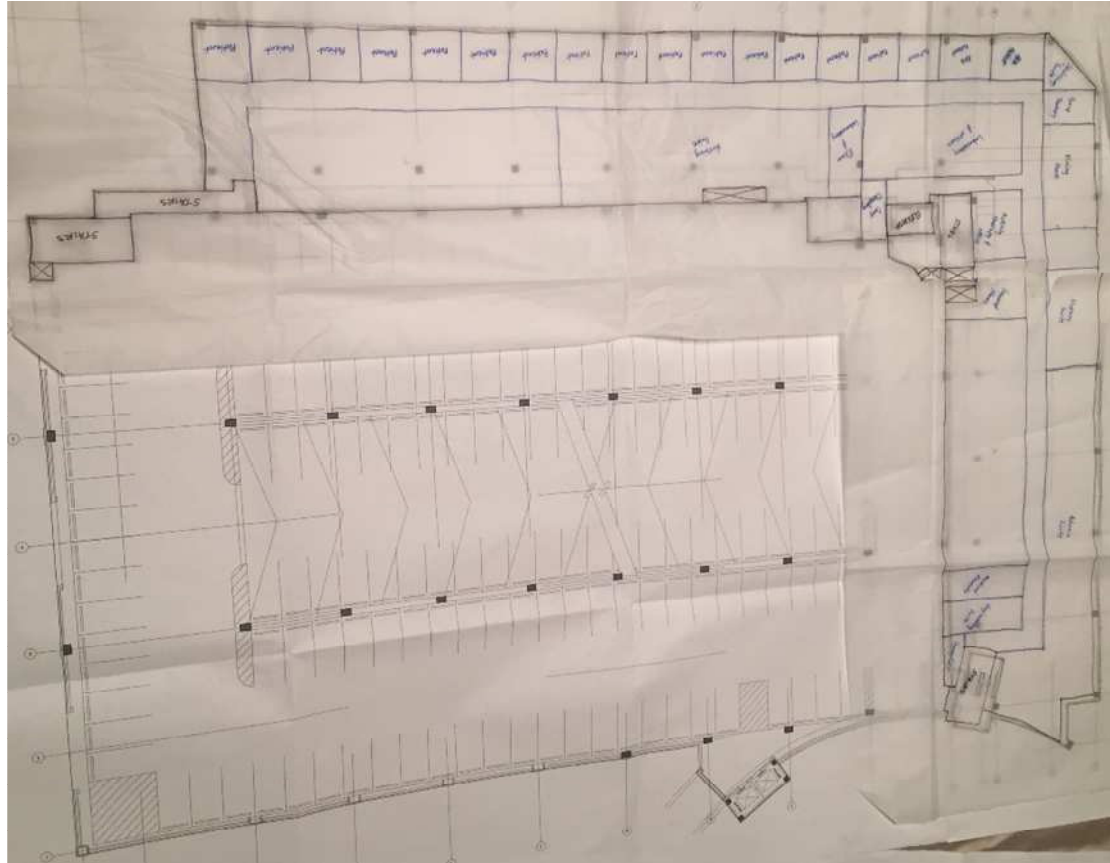
The project programming (spaces requested by the client) and parameters were mimicked from a previous project completed in 2006 by my co-op employer, Stengel Hill Architecture. The program consists of patient areas served by nursing staff and doctors in addition to administrative spaces that are typically inaccessible to patients. The patient unit program includes many large activity and therapy spaces in addition to both ADA accessible and regular semi-private (two people per room) patient rooms.

The building shell is shaped in a rotated “L” with the vertical circulation components located at the center point and ends. Inside of the “L” is a concrete parking garage structure, therefore the inside perimeter of the building has no window openings. The exterior face of the building consists of a glass curtain wall. In keeping with the original nature of the project when it was completed by SHA, a portion of the floor area was required to be kept as empty shell space for the future addition of a separate medical unit. This future expansion was required to be accessed separately without traveling directly through the psychiatric unit.

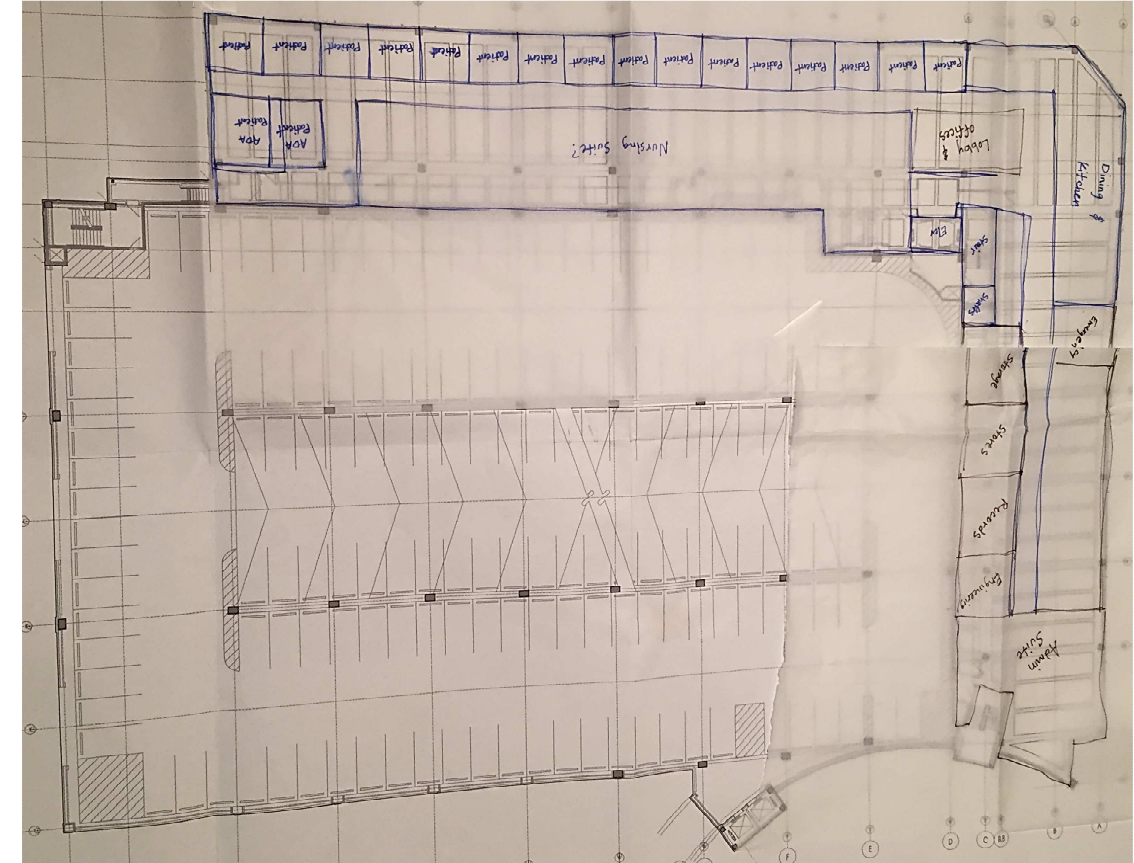
Space	Square Feet	Space	Square Feet	Space	Square Feet	Space	Square Feet
Lobby	1,800	Exam & Laboratory	300	Social Space, Quiet	400	Patient Laundry	80
Office Space	120	Staff Lounge/ Locker Room	330	Activity Therapy	375	Patient Effects	100
Conference Space	250	Unit Engineering/ Maintenance	340	Group Therapy	225	Clean Supply	120
Pharmacy	250	Medical Records	300	Nurse Station	360	Clean Linen Storage	120
Cart Cleaning/ Storage	160	Patient Rooms & Toilets	4,460	Social Work	400	Soiled Holding	120
Storage	500	Seclusion Suite	260	Medicine	120	Visitor Room	100
Kitchen	630	Social Space, Noisy (Dining)	1,040	Nourishment	50	Consultation Rooms	550

Pre-Design Exercises

As an initial effort to familiarize myself with the program and the relationships between spaces, I completed a series of massing sketches. I started by grouping the various spaces into more general chunks that were easier to work with on a conceptual level. At this point, I already knew a few necessary architectural strategies, such as placing patient rooms along the windowed exterior, grouping administration spaces and separating them from patients, and allowing support spaces to be accessed from outside the unit. From there, I was able to brainstorm a handful of different design themes and strategies for organizing the required spaces.

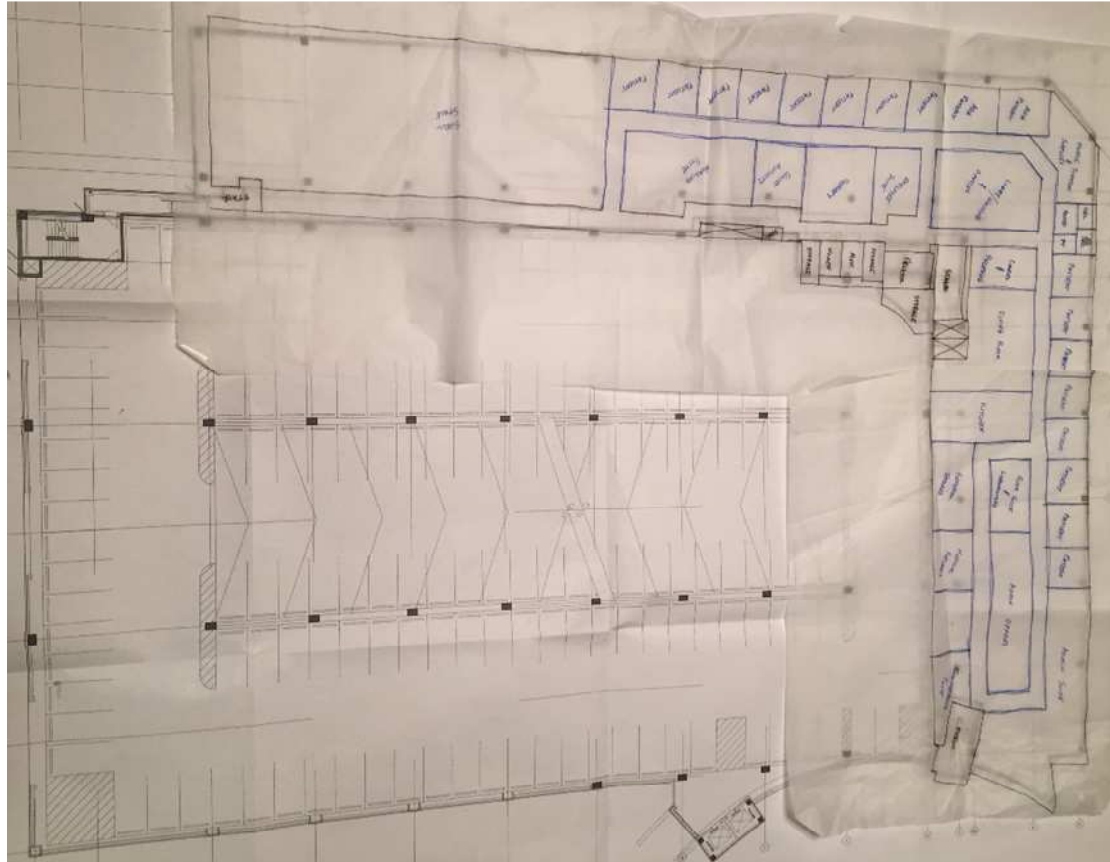


In this initial exercise, I placed all of the patient rooms along one side of the curtain wall exterior. My intent was to explore the possibility of completely separating patient room space from more public patient spaces. I also looked at maintaining a single central corridor for connecting all spaces. It was during this exercise that I also realized that I had an abundance of extra space and would need to maintain a portion of it as empty shell space for future expansion.

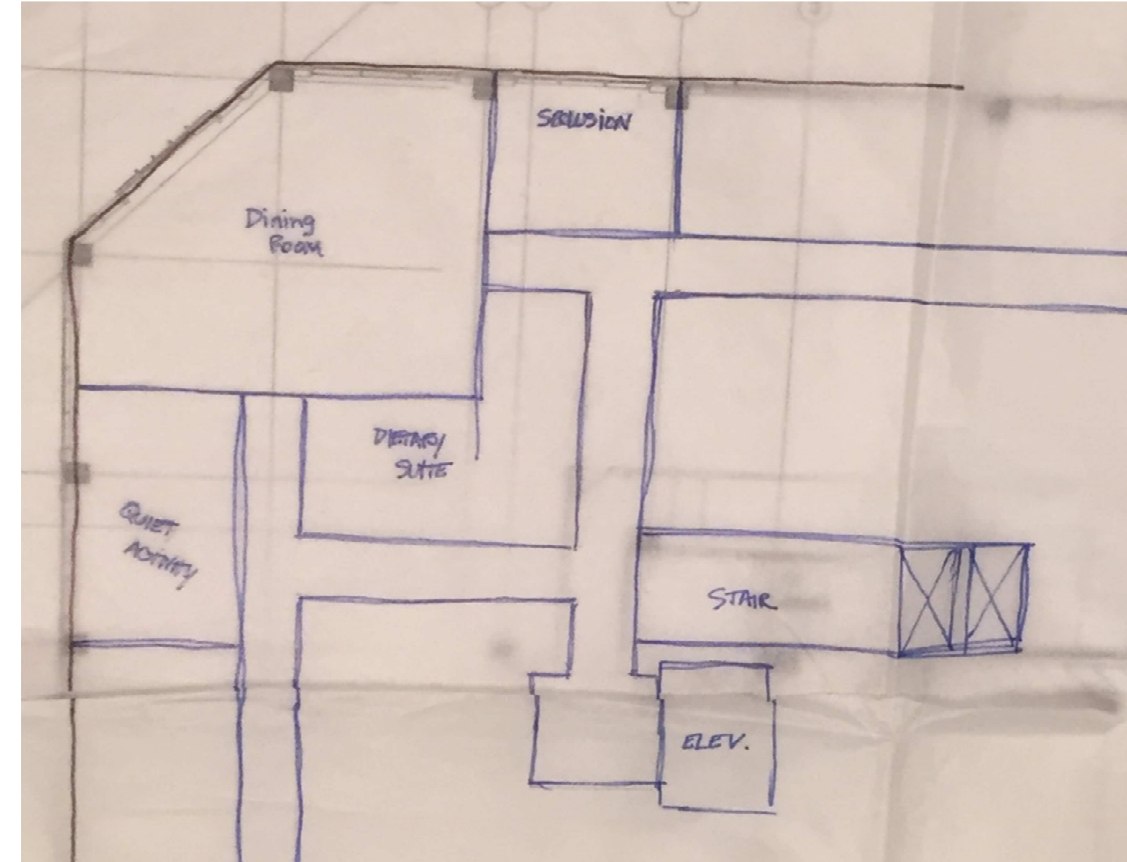


Here I looked again at loading the patient rooms on a single corridor with the nurse station centrally located among them. The social patient areas are placed on the corner of the "L" shape with special emphasis on making the dining area a focal point for patients. Administration and support areas are placed away from the patient rooms.

Pre-Design Exercises

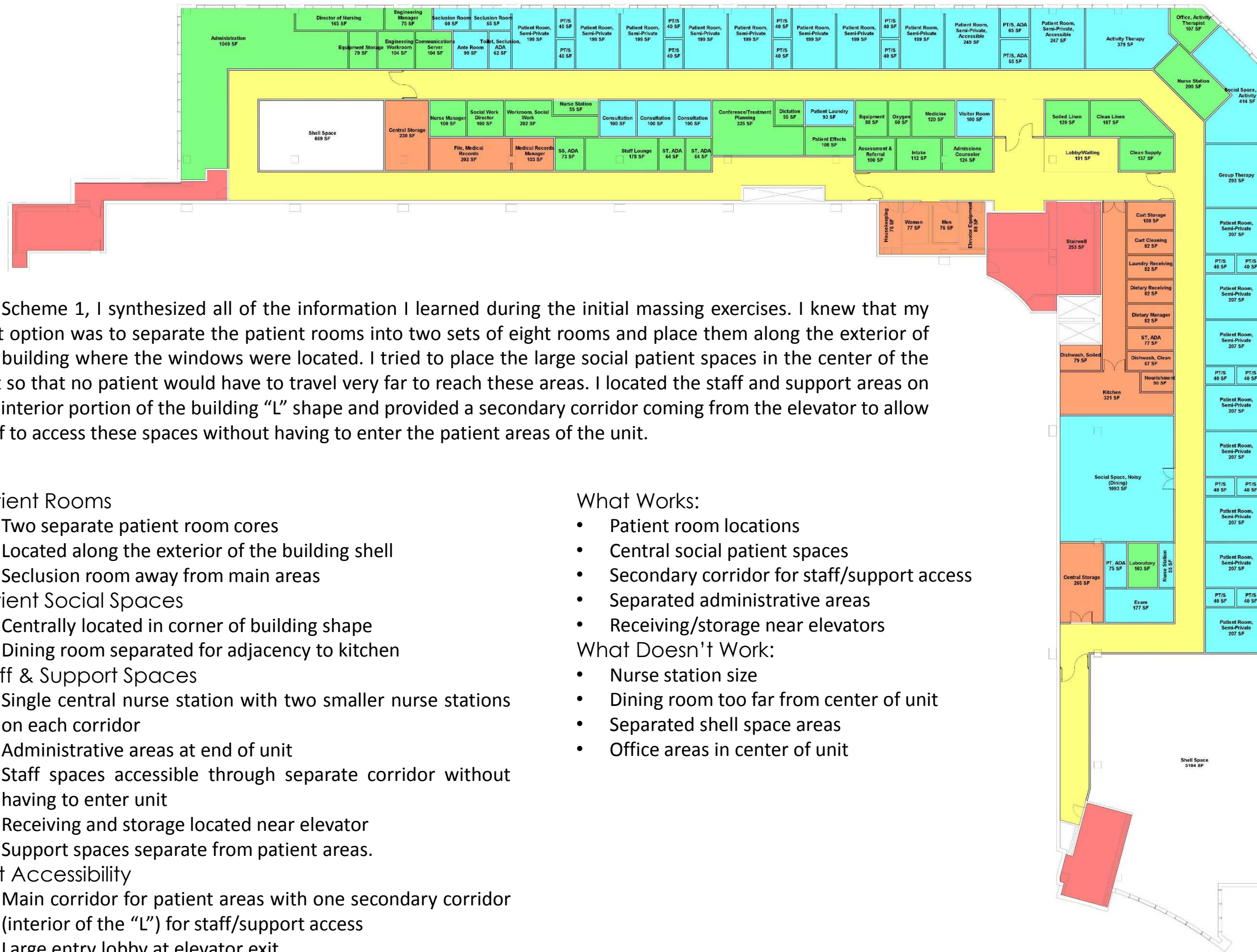


This design charrette focused on separating the patient rooms into two corridors centered around the corner point. In this scheme, I placed all of the public patient spaces in the central point, which would make these areas the most accessible for all patients. I also explored the concept of a single nurse station that would serve both corridors. I began to play with the idea of double corridors as a means to separate patient spaces from administrative and support spaces which would facilitate unit control.



I also completed a short exploration of an alternative central point that built on the scheme to the left. In this design, the single nurse station is replaced with a large dining room and its necessary support spaces in the center of the unit. This scheme would require two separate, smaller nurse stations on each corridor and would significantly fragment the two sides of the unit. Overall, this idea was not as clean as others since it requires patients to pass by the elevator and stairs to navigate the unit.

Scheme 1



- Patient Space
- Staff Space
- Support Space
- Horizontal Circulation
- Vertical Circulation

For Scheme 1, I synthesized all of the information I learned during the initial massing exercises. I knew that my best option was to separate the patient rooms into two sets of eight rooms and place them along the exterior of the building where the windows were located. I tried to place the large social patient spaces in the center of the unit so that no patient would have to travel very far to reach these areas. I located the staff and support areas on the interior portion of the building “L” shape and provided a secondary corridor coming from the elevator to allow staff to access these spaces without having to enter the patient areas of the unit.

Patient Rooms

- Two separate patient room cores
- Located along the exterior of the building shell
- Seclusion room away from main areas

Patient Social Spaces

- Centrally located in corner of building shape
- Dining room separated for adjacency to kitchen

Staff & Support Spaces

- Single central nurse station with two smaller nurse stations on each corridor
- Administrative areas at end of unit
- Staff spaces accessible through separate corridor without having to enter unit
- Receiving and storage located near elevator
- Support spaces separate from patient areas.

Unit Accessibility

- Main corridor for patient areas with one secondary corridor (interior of the “L”) for staff/support access
- Large entry lobby at elevator exit

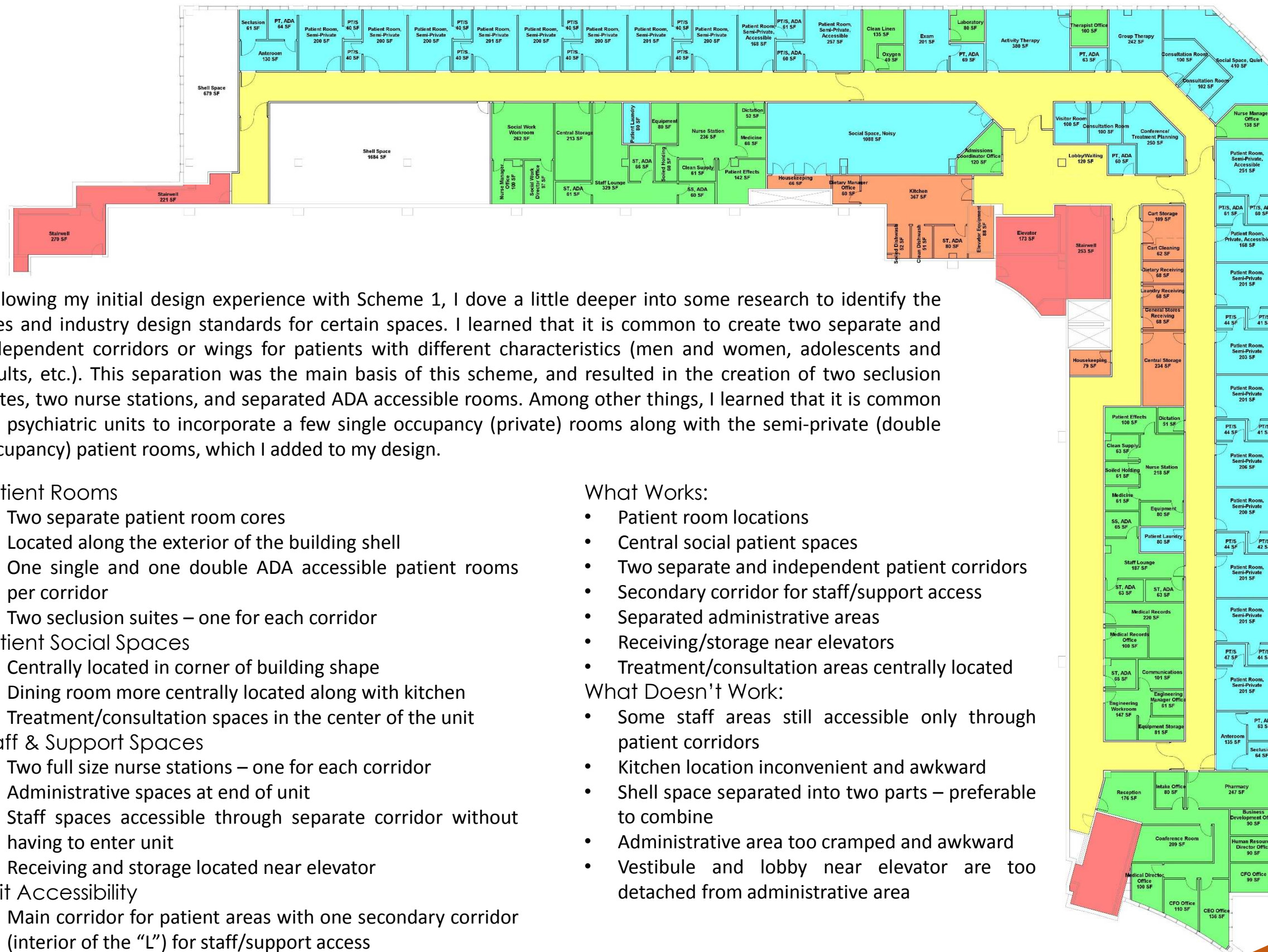
What Works:

- Patient room locations
- Central social patient spaces
- Secondary corridor for staff/support access
- Separated administrative areas
- Receiving/storage near elevators

What Doesn't Work:

- Nurse station size
- Dining room too far from center of unit
- Separated shell space areas
- Office areas in center of unit

Scheme 2



- Patient Space
- Staff Space
- Support Space
- Horizontal Circulation
- Vertical Circulation

Following my initial design experience with Scheme 1, I dove a little deeper into some research to identify the uses and industry design standards for certain spaces. I learned that it is common to create two separate and independent corridors or wings for patients with different characteristics (men and women, adolescents and adults, etc.). This separation was the main basis of this scheme, and resulted in the creation of two seclusion suites, two nurse stations, and separated ADA accessible rooms. Among other things, I learned that it is common for psychiatric units to incorporate a few single occupancy (private) rooms along with the semi-private (double occupancy) patient rooms, which I added to my design.

Patient Rooms

- Two separate patient room cores
- Located along the exterior of the building shell
- One single and one double ADA accessible patient rooms per corridor
- Two seclusion suites – one for each corridor

Patient Social Spaces

- Centrally located in corner of building shape
- Dining room more centrally located along with kitchen
- Treatment/consultation spaces in the center of the unit

Staff & Support Spaces

- Two full size nurse stations – one for each corridor
- Administrative spaces at end of unit
- Staff spaces accessible through separate corridor without having to enter unit
- Receiving and storage located near elevator

Unit Accessibility

- Main corridor for patient areas with one secondary corridor (interior of the “L”) for staff/support access
- Large entry lobby at elevator exit

What Works:

- Patient room locations
- Central social patient spaces
- Two separate and independent patient corridors
- Secondary corridor for staff/support access
- Separated administrative areas
- Receiving/storage near elevators
- Treatment/consultation areas centrally located

What Doesn't Work:

- Some staff areas still accessible only through patient corridors
- Kitchen location inconvenient and awkward
- Shell space separated into two parts – preferable to combine
- Administrative area too cramped and awkward
- Vestibule and lobby near elevator are too detached from administrative area

Research Resources

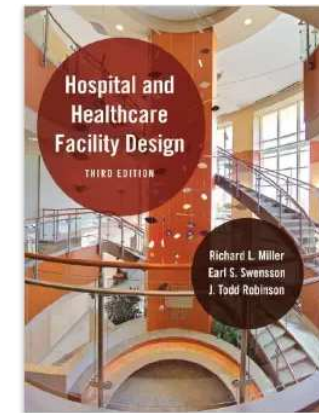
In addition to the architectural theory I had learned in the classroom and the practical knowledge I had gained from my co-op experiences, it was necessary for me to complete research to make this project as accurate and successful as possible. Much of the research revolved around code requirements for a psychiatric hospital, but also included an in-depth examination of typical design aspects of among leading facilities in the industry. As I dove deeper into the space planning of the unit, I realized that there were a handful of spaces with which I was not familiar and therefore had to research and discuss with my co-op supervisor. On the more technical side of things, I learned a great deal about specific equipment and fixtures that were designed specifically for patient use in a psychiatric setting. While much of that information was not immediately applicable to the scope of this specific project, it did help me to understand the special attention paid to patient safety in facilities of this type, and brought to my attention a few areas in which my design could be improved. Listed below are a few of the major references that helped to shape my understanding of psychiatric design:



Texas Administrative Code: Title 25, Part 1, Chapter 134, Subchapter G, Rule 134.123
Private Psychiatric Hospitals and Crisis Stabilization Units
Spatial Requirements for New Construction



Healthcare Design Magazine



Hospital and Healthcare Facility Design
by R. Miller, E. Swenson, T. Robinson



Building Design + Construction Magazine



The Center for Health Design
Design Research and Behavioral
Health Facilities



Department of Veterans Affairs
Mental Health Facilities Design Guide

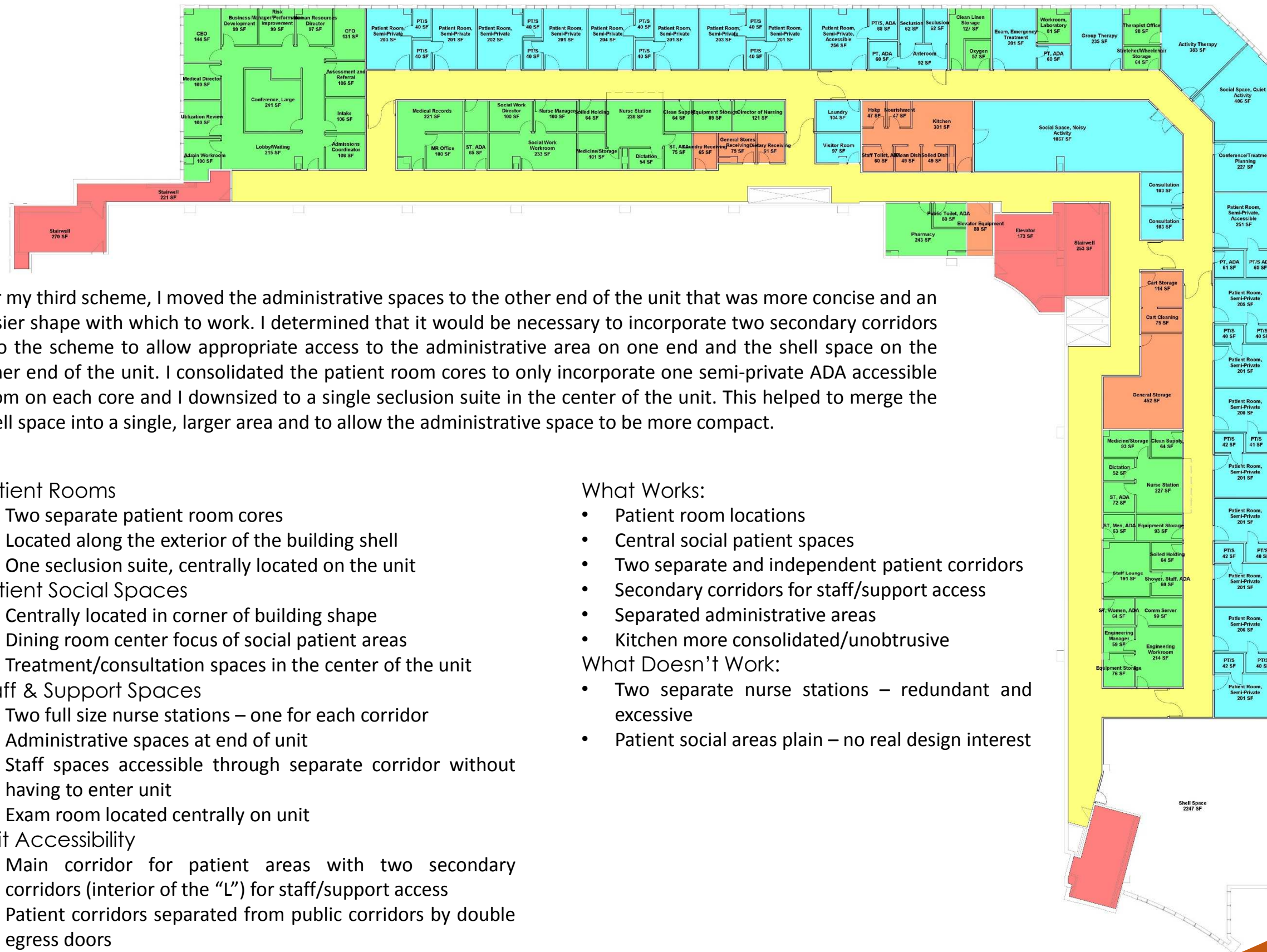


National Association of Psychiatric Health Systems
Design Guide for the Built Environment of
Behavioral Health Facilities



National Fire Protection Agency
NFPA 101 – Life Safety Code

Scheme 3



For my third scheme, I moved the administrative spaces to the other end of the unit that was more concise and an easier shape with which to work. I determined that it would be necessary to incorporate two secondary corridors into the scheme to allow appropriate access to the administrative area on one end and the shell space on the other end of the unit. I consolidated the patient room cores to only incorporate one semi-private ADA accessible room on each core and I downsized to a single seclusion suite in the center of the unit. This helped to merge the shell space into a single, larger area and to allow the administrative space to be more compact.

Patient Rooms

- Two separate patient room cores
- Located along the exterior of the building shell
- One seclusion suite, centrally located on the unit

Patient Social Spaces

- Centrally located in corner of building shape
- Dining room center focus of social patient areas
- Treatment/consultation spaces in the center of the unit

Staff & Support Spaces

- Two full size nurse stations – one for each corridor
- Administrative spaces at end of unit
- Staff spaces accessible through separate corridor without having to enter unit
- Exam room located centrally on unit

Unit Accessibility

- Main corridor for patient areas with two secondary corridors (interior of the “L”) for staff/support access
- Patient corridors separated from public corridors by double egress doors
- Patient room corridors separated from patient social areas by double egress doors

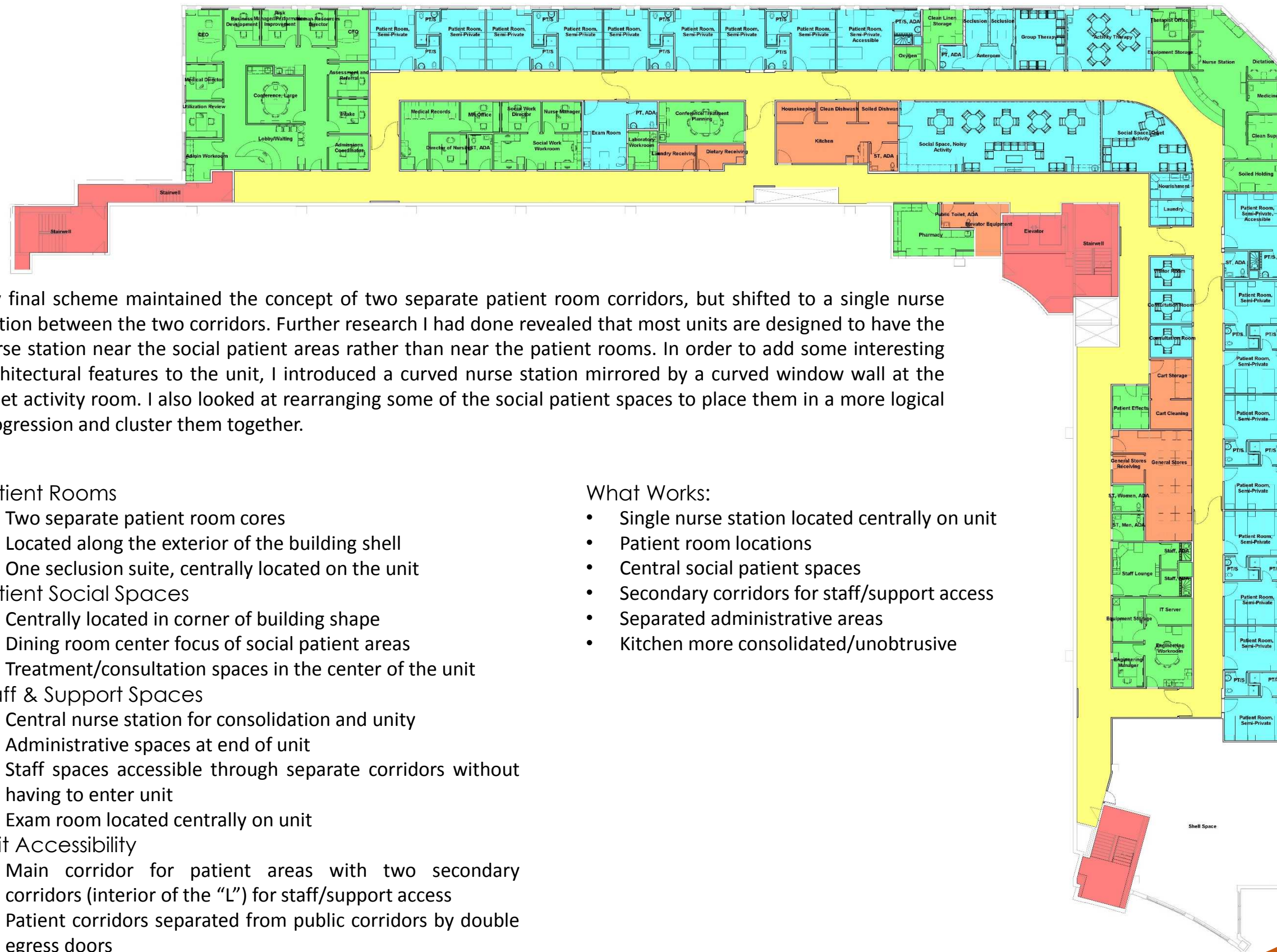
What Works:

- Patient room locations
- Central social patient spaces
- Two separate and independent patient corridors
- Secondary corridors for staff/support access
- Separated administrative areas
- Kitchen more consolidated/unobtrusive

What Doesn't Work:

- Two separate nurse stations – redundant and excessive
- Patient social areas plain – no real design interest

Scheme 4 – Final Design



- Patient Space
- Staff Space
- Support Space
- Horizontal Circulation
- Vertical Circulation

My final scheme maintained the concept of two separate patient room corridors, but shifted to a single nurse station between the two corridors. Further research I had done revealed that most units are designed to have the nurse station near the social patient areas rather than near the patient rooms. In order to add some interesting architectural features to the unit, I introduced a curved nurse station mirrored by a curved window wall at the quiet activity room. I also looked at rearranging some of the social patient spaces to place them in a more logical progression and cluster them together.

Patient Rooms

- Two separate patient room cores
- Located along the exterior of the building shell
- One seclusion suite, centrally located on the unit

Patient Social Spaces

- Centrally located in corner of building shape
- Dining room center focus of social patient areas
- Treatment/consultation spaces in the center of the unit

Staff & Support Spaces

- Central nurse station for consolidation and unity
- Administrative spaces at end of unit
- Staff spaces accessible through separate corridors without having to enter unit
- Exam room located centrally on unit

Unit Accessibility

- Main corridor for patient areas with two secondary corridors (interior of the “L”) for staff/support access
- Patient corridors separated from public corridors by double egress doors
- Patient room corridors separated from patient social areas by double egress doors

What Works:

- Single nurse station located centrally on unit
- Patient room locations
- Central social patient spaces
- Secondary corridors for staff/support access
- Separated administrative areas
- Kitchen more consolidated/unobtrusive

Final Scheme – Finish Plan



- Vinyl plank flooring with cream or accent painted walls
- Grey sheet vinyl flooring with cream painted walls
- Tan sheet vinyl flooring with burnt orange painted walls
- Carpet tile with cream painted walls

Once the layout of spaces was finalized, I looked more closely into a design of the interior of the unit. In my research I found that great emphasis was placed on making psychiatric spaces feel more like a comfortable residential setting for patients than an institutional hospital. As a result, I selected a dark vinyl plank flooring that has a hardwood appearance for the main flooring and accented it with two different sheet vinyl flooring colors that resemble woven mat. The walls are a soothing cream color and each patient room is accented with a blue wall above the beds. In social spaces, I accented with various colored walls and floor patterns to make the spaces more interesting.

A special feature I incorporated into the design was a focus on the entrances to access the patient areas and the doors that separate between clusters of patient rooms. At each short passageway that connects the secondary corridors to the main patient corridors of the unit, I created a special color scheme to signify the transition. In addition to the different colored floor and walls, I dropped the ceiling down to a lower height to give the feeling of compression as a person moves from the public to the patient areas. I also widened the walls at the end of each of these bands to help break up the corridors and add visual interest.

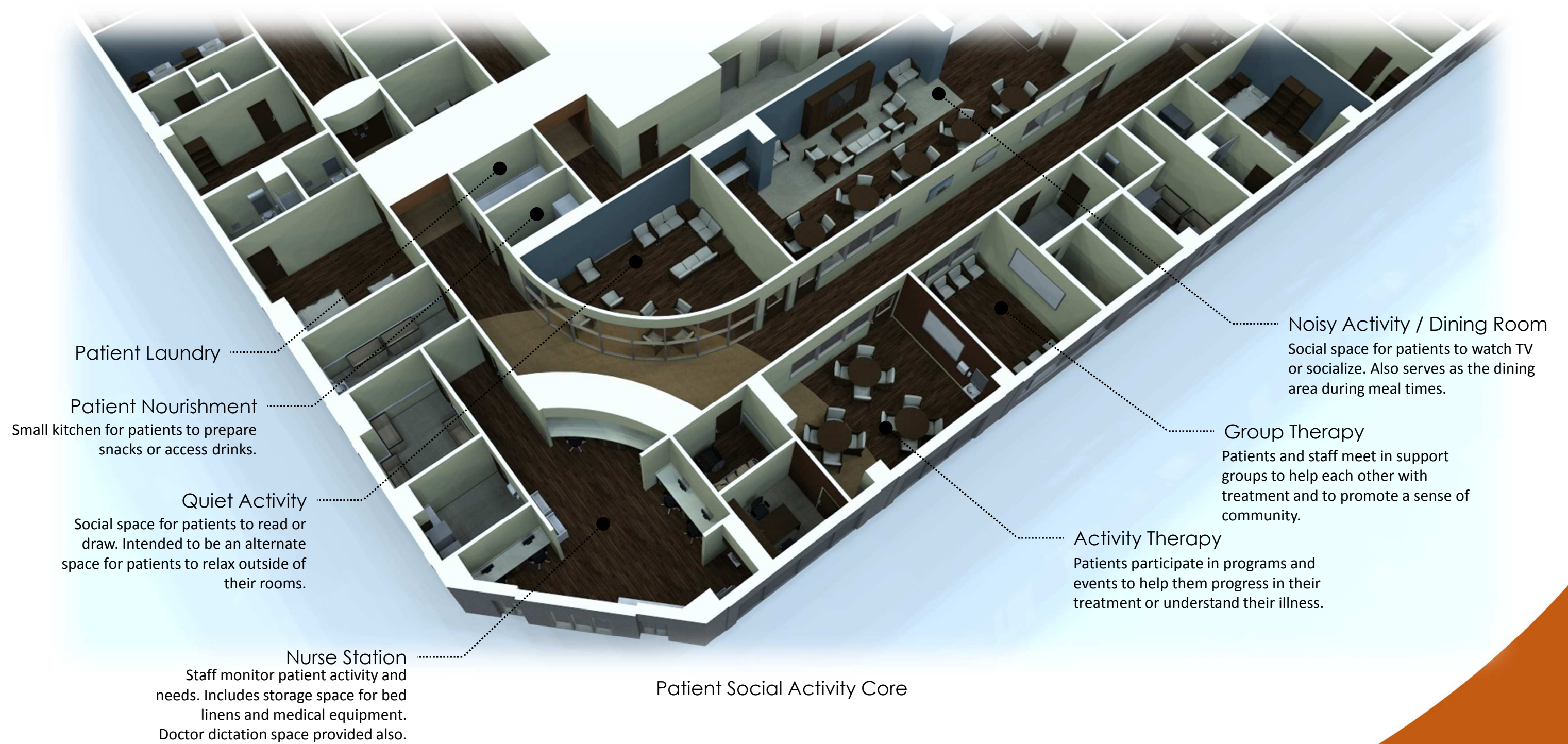


Patient Corridor Entry

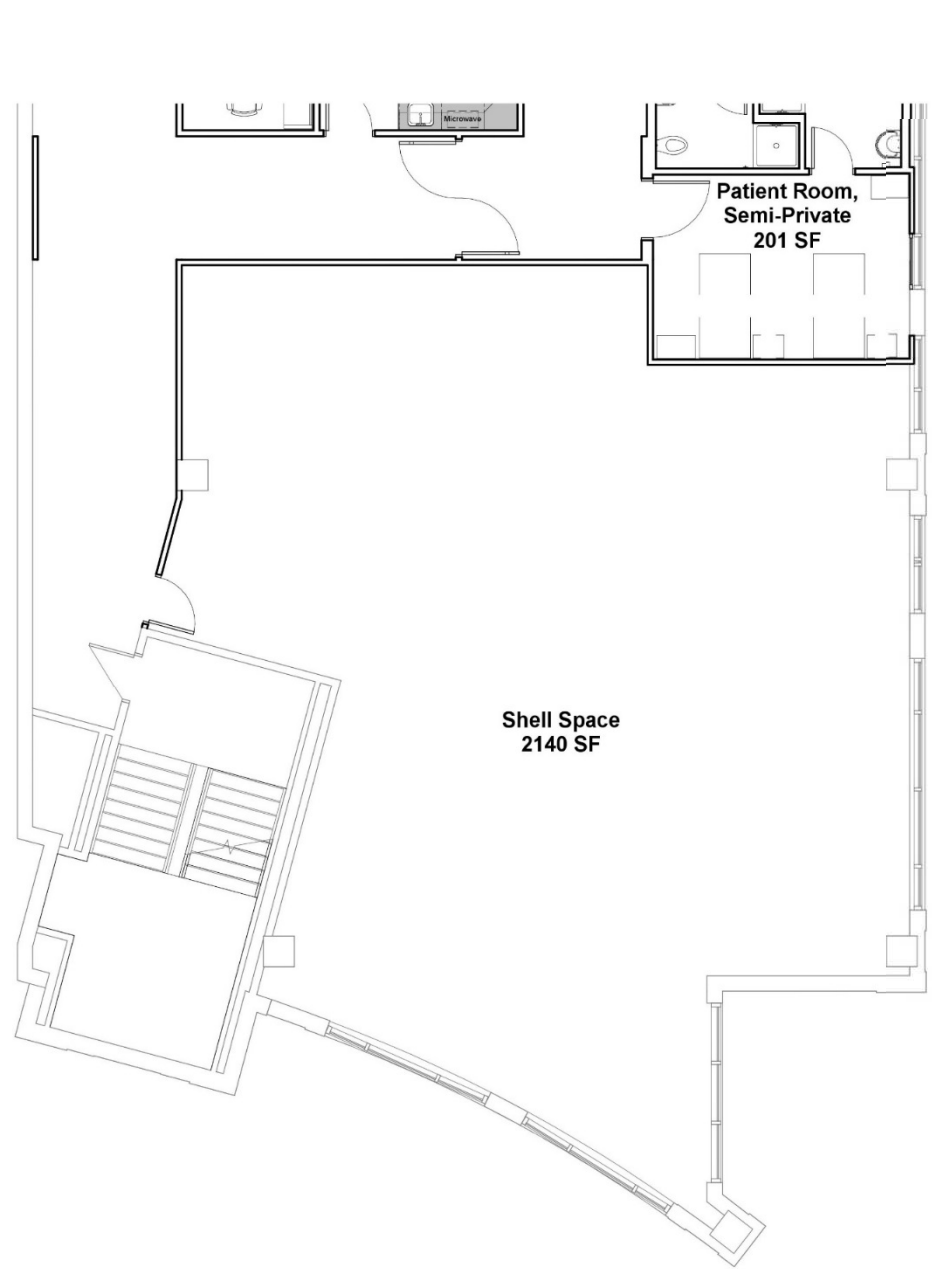
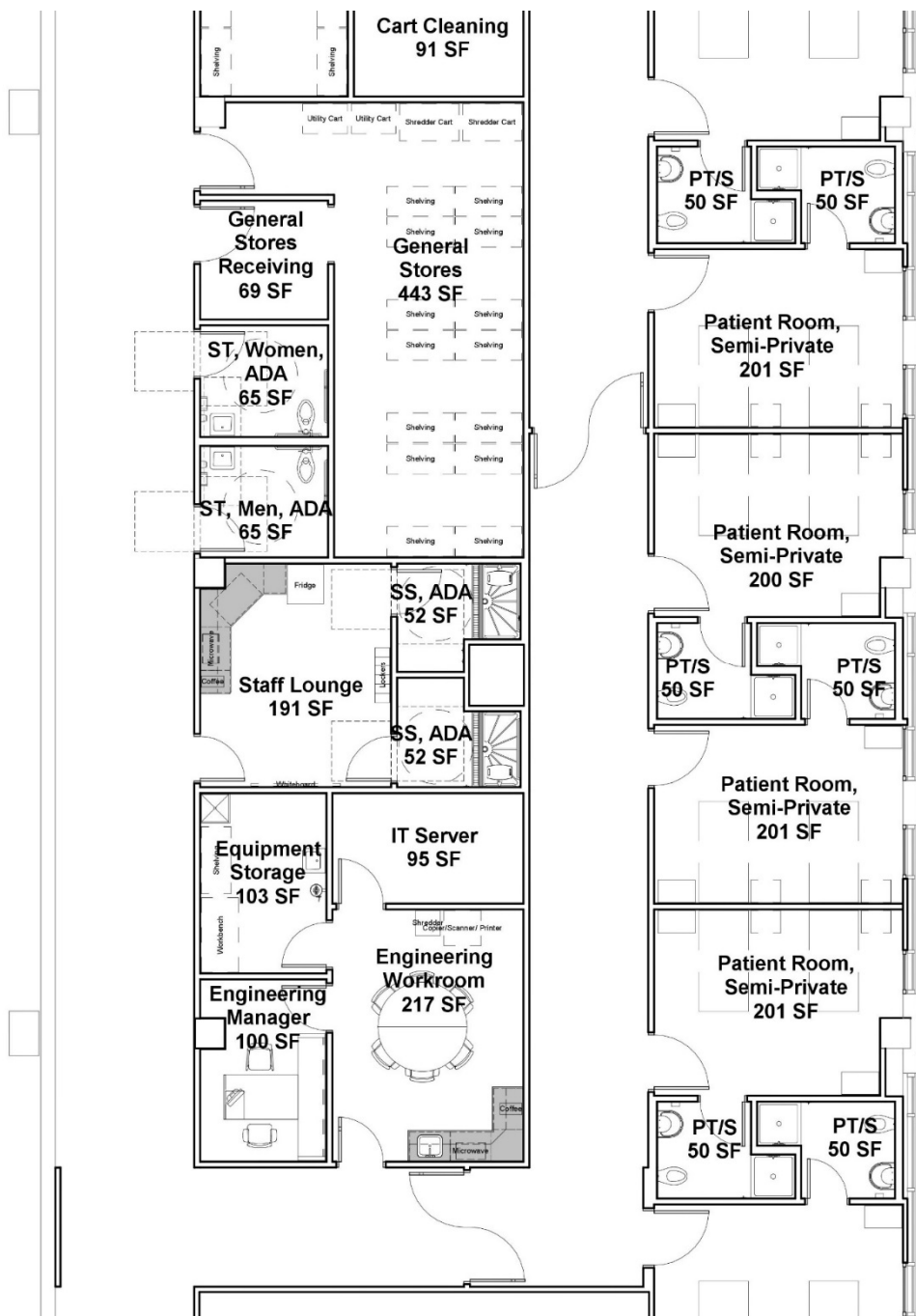


Intermediate Egress Door

Final Scheme – 3D View



Final Scheme – Enlarged Plan



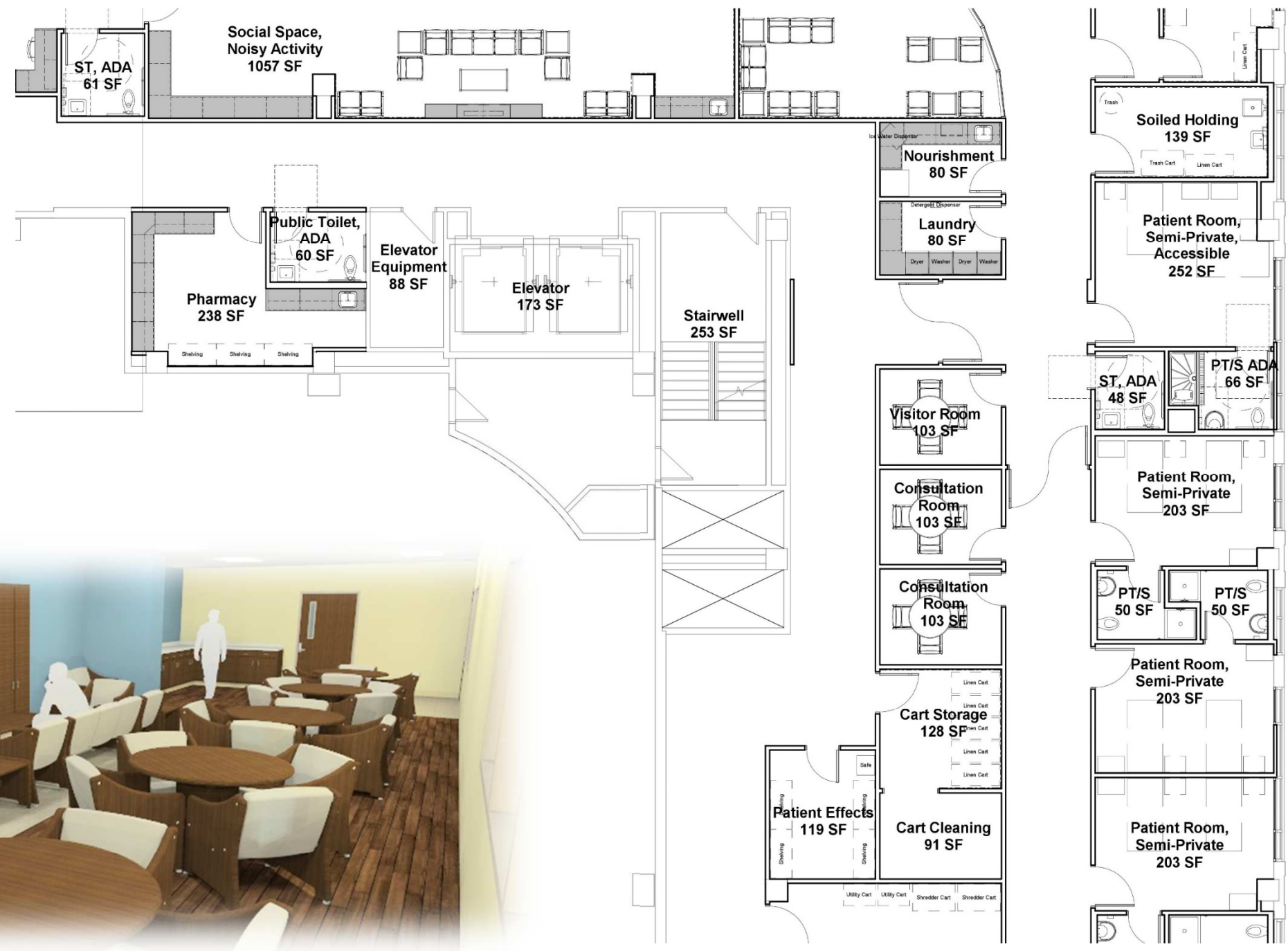
Patient Corridor

Area A



Final Scheme – Enlarged Plan

Area B

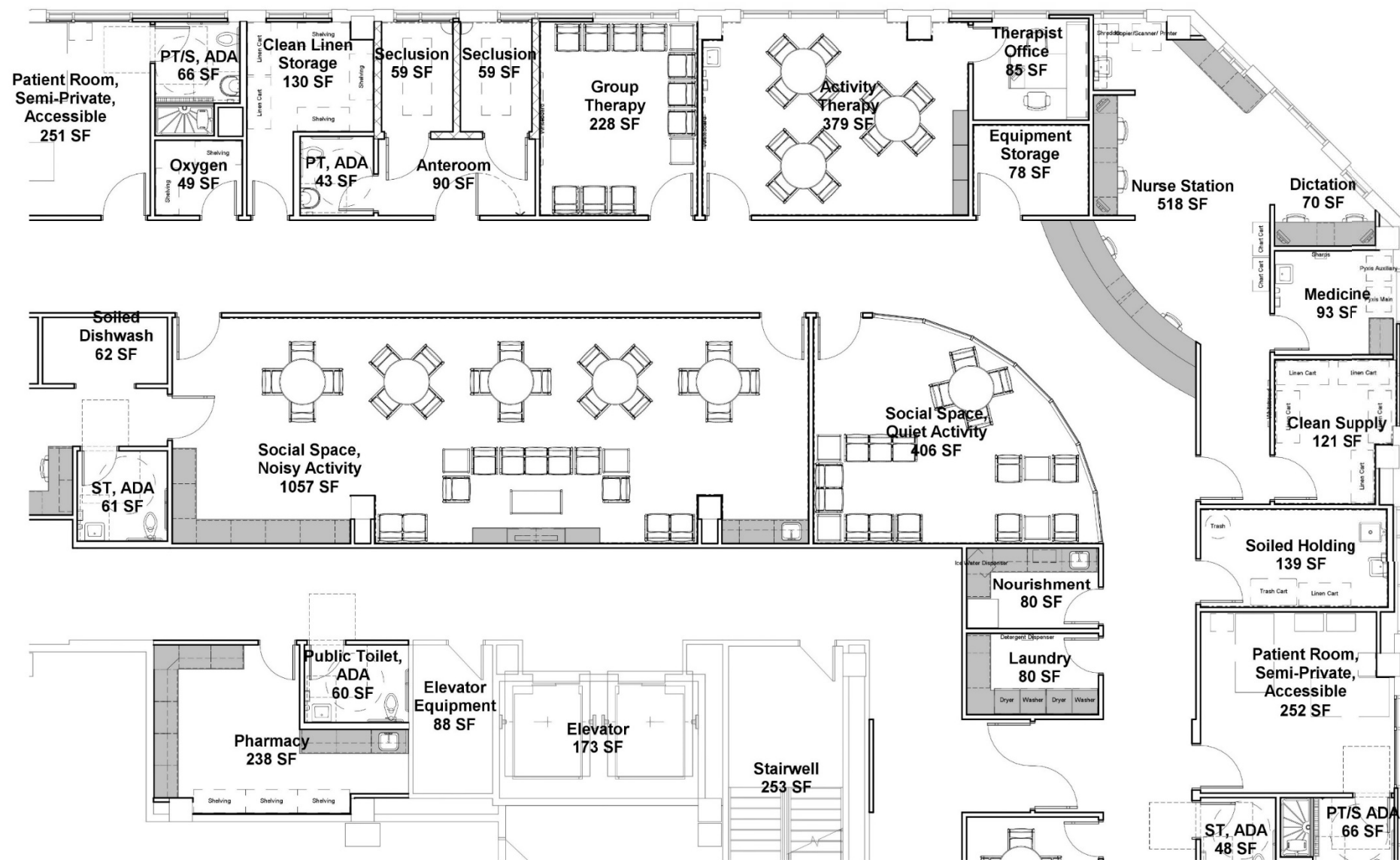


Noisy Activity Room / Dining Room

Final Scheme – Enlarged Plan



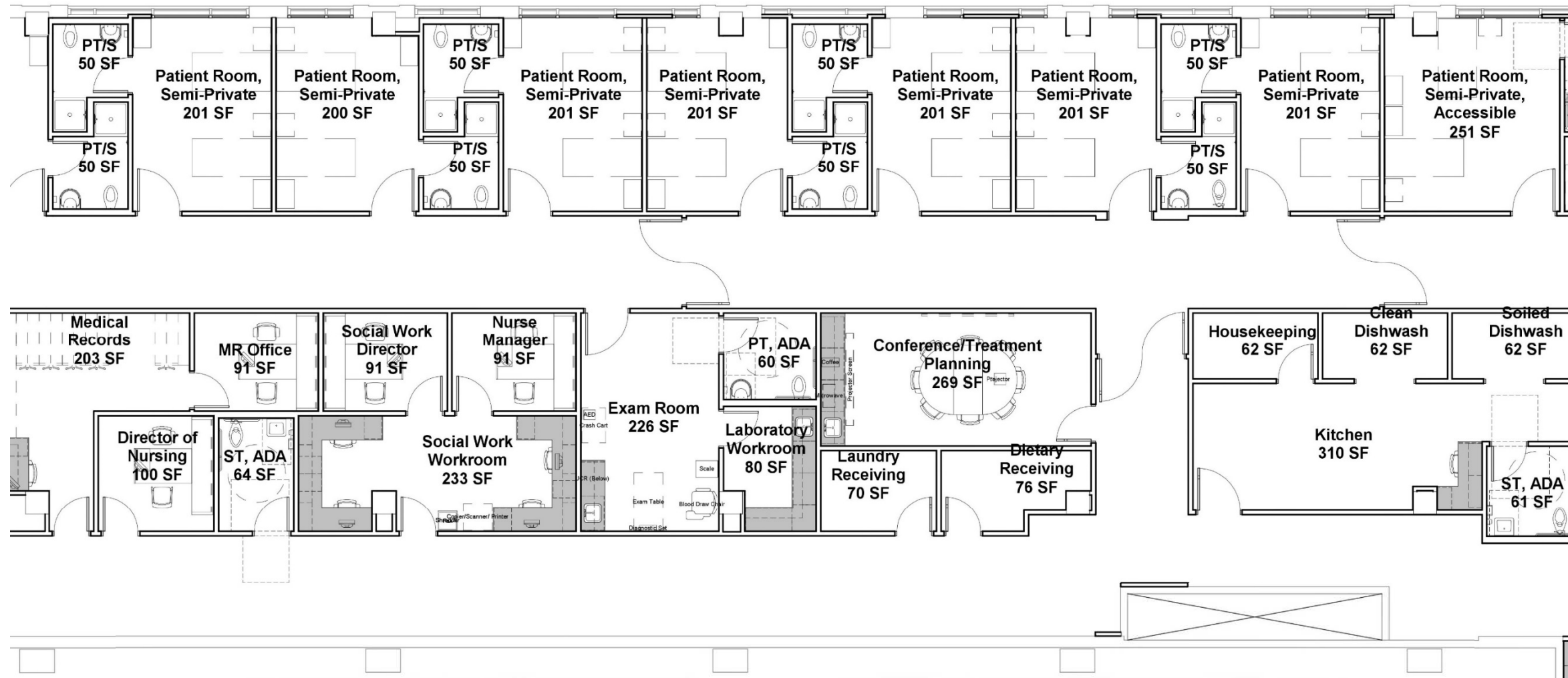
Nurse Station Exterior



Nurse Station Interior

Final Scheme – Enlarged Plan

Area D

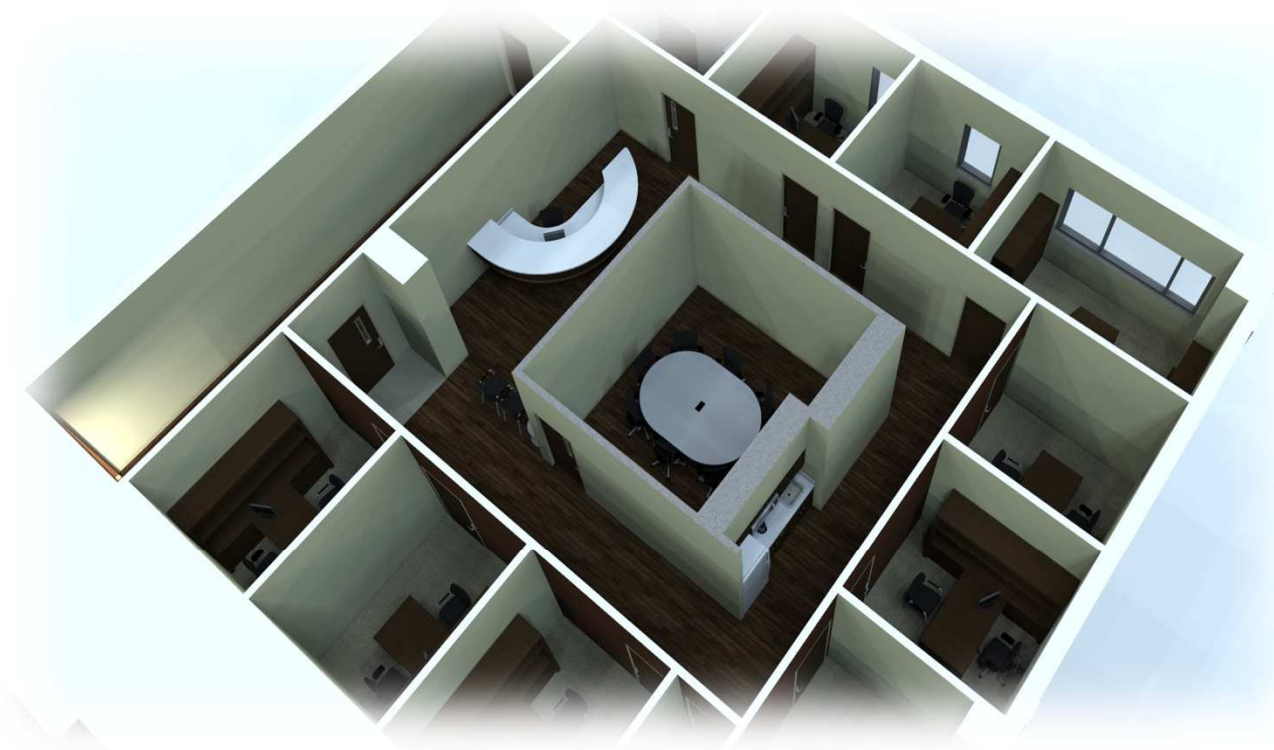


Typical Patient Room

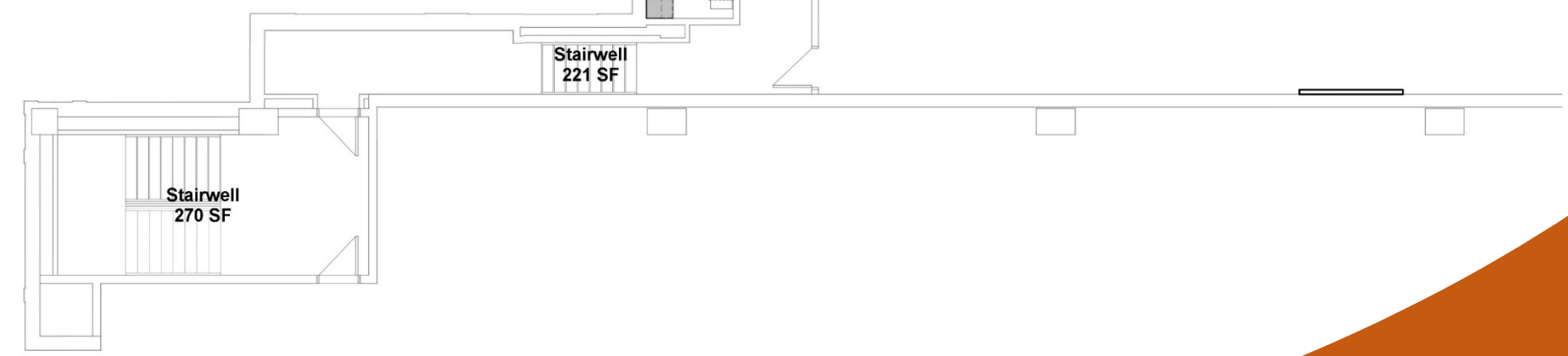
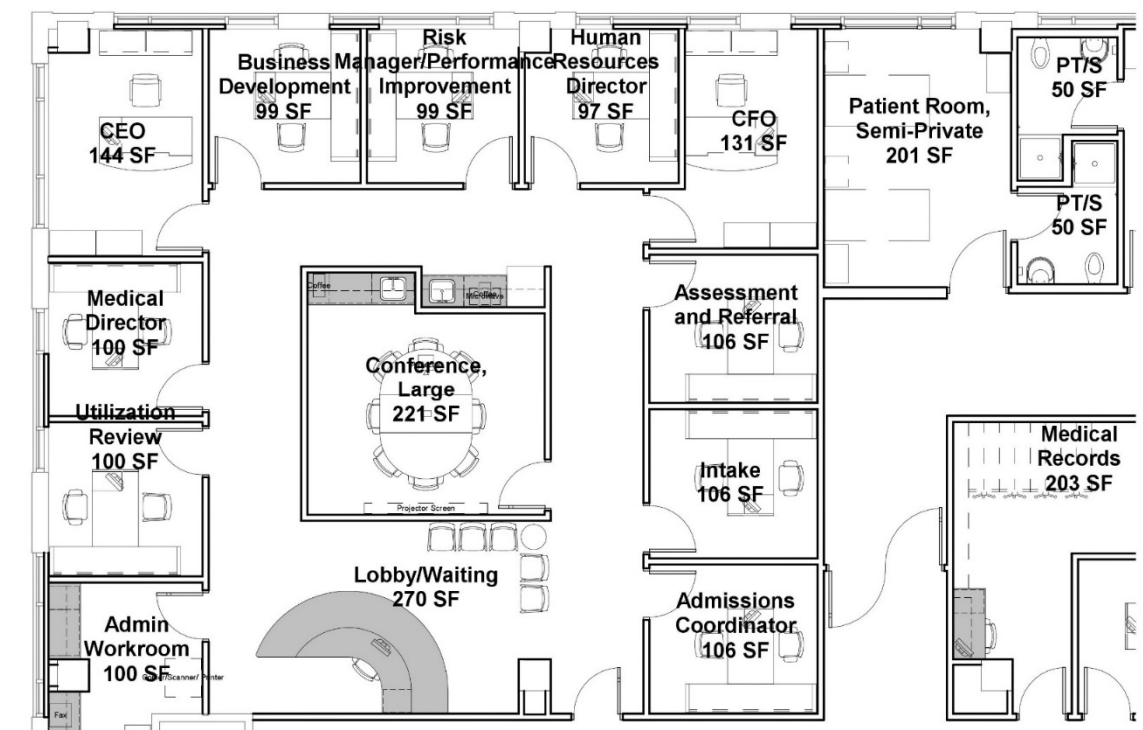
Final Scheme – Enlarged Plan



Administration Waiting



Administration Suite



Reflective Essay

Going into this experiential learning project, I had no idea how different designing for the “real world” would be from the theoretical design I had previously done in architecture studios. I figured that I would be able to apply what I had learned in class, mixed with a little common sense and intuition, and have a relatively straightforward go of it. I never imagined that the design of a psychiatric unit, the least “medical” of any type of healthcare project, would require so much research, creative problem solving, and working within constraints. I quickly realized that, as a person with (relatively) sound mental health, I had no idea how a psychiatric unit looks, feels, and functions. It was extremely necessary, therefore, for me to turn to resources, such as magazines, industry standard design guides, and my co-op supervisor, Todd, to help me determine the use of each space and identify required or desired relationships between spaces. I then had to take what I learned about the characteristics of the various spaces and problem solve to come up with a logical design that was not only aesthetically and architecturally pleasing, but that could function practically and efficiently as a psychiatric unit. It was this blend of form and function that particularly set this experiential learning project apart from projects I have completed in the past. Never before have I had to take into account, to such a high degree, the *function* of a building, within the constraints of code and industry standards, as the main focus of a project.

As with any design or creative process, a cyclical process of revision and reflection developed as the project progressed. I began the project by recording and organizing all of the information I knew about the spaces and the relationships between them. I then took a “first stab” at creating a design based solely on my initial instincts – no research or investigation involved. This design was extremely rudimentary and, quite frankly, bad. The spaces were the wrong size, things were in the wrong place, and there was an abundance of unused space scattered all over the building. But I had something on paper that I could build on and manipulate – the first lesson I learned throughout the course of this project. It was immensely easier for me to get an idea of what I was working with just from a rough design on paper than it was for me to try to design spaces in my head and come out with a polished, working plan from the start. I’ve learned from doing this experiential learning project that sometimes it’s best to start a project by simply letting all of your thoughts and ideas, in whatever form they take, out on paper. Only once you know what you have to work with can you begin to vet out the mediocre ideas and focus on the promising.

Once I had laid all of my options out on the table, I then moved on to selecting and refining certain aspects of my design. It was at this point that the role of research and additional information gathering really began to affect the design process. I listed all of the spaces about which I was unsure and headed to find answers, advice, and examples. I quickly found numerous design guides published by various authorities that outlined the use of particular spaces, things to keep in mind during design, and even what type of equipment and fixtures are best suited for safe and efficient use. For example, it was my research that gave me the final push to focus on a single nurse station for my design, as it was noted in many of the design guides that nurses prefer a nurse station centrally located near the patient social spaces. Since it was my intention to make this psych unit as realistically functional as possible, the research helped to round out many of the details. I’ve learned that referencing the designs and

outcomes of other people can show me what is typical in a certain type of construction and provide me with a benchmark to gauge whether or not my designs are on par with industry standards. In future design, I will definitely continue to look up similar projects as a part of my personal design process to use for inspiration, experiment, or reference.

A final aspect of this project that affected the design process in ways I had not experienced before was the influence of code restrictions in healthcare facilities. The Texas Administrative Code (more specifically: Title 25, Part 1, Chapter 134, Subchapter G, Rule 134.123) played an immense role in defining and confining the limits of design in this project. This particular section of the code focused on spatial requirements for new construction in psychiatric type facilities. It laid out Texas' requirements for everything from size of social patient spaces and staff support spaces all the way down to the minimum distance between patient beds. In addition to the Texas Administrative Code, I had to reference ADA requirements for particular spaces in the unit to make sure they were fully accessible to those with disabilities. Working within code was a new challenge for me. Having to reference back and forth to make sure that my design, and more importantly, changes I made to my design throughout the course of the project, still met the code requirements could sometimes be tedious. It was especially disheartening on a few occasions when I had put time and thought into a particular design change only to realize that it failed to satisfy the code and would need reworked again. However, I found that overall I actually enjoyed working within the boundaries set by code. In some cases, having the limitations made it easier to define and arrange spaces since the most logical, and only code satisfactory, solution was clear. From completing this learning project, I have been able to experience firsthand the influence code restrictions have on a design and I feel that I now have a basic understanding of how to research and apply code to a design.

The main purpose of this experiential learning project was for me to gain hands-on experience with the conceptual and schematic design phases of architectural design in hopes of helping me feel better informed as I contemplate my future career choices. As an intern, I have very few chances to contribute to the beginning stages of design and I am very pleased with the exposure I have gained from this project. While I am nowhere near definitively determining the path my career will take, and I understand that in most cases careers take surprising and unexpected turns, I do feel like I have a better idea, in part due to this project, of the path for which I would like to aim. I have really enjoyed my co-op experience at Stengel Hill thus far and I am excited about the opportunities I have had, including this project, while there. I feel like I have come back around to the path that I originally started out on when I enrolled at UC in Architectural Engineering – the course of becoming an architect. Although I spent many semesters focused on structural engineering, I feel like I have finally realized and embraced that architecture is the discipline that interests and excites me most. That being said, I feel that structural engineering will always play a part in my career, and I hope to one day be licensed in both and use them together. In the near future, I plan to finish my degree in Architectural Engineering and pursue a Master's of Architecture degree. With both of these degrees, and an intense amount of studying, I hope to one day be dual licensed and be able to use my skills to help with both the design and structural stability of a building.

This experiential learning project shed a new light on many aspects of design with which I had never worked before. I had the opportunity to experience the design process as independently as possible to work through issues on my own without having to defer to others. I had the freedom to try any design strategies I chose and, as a result, found out the necessity of comparing my design with those that are upheld as the industry standard. I realized the importance of research in the design process, both in the sense of understanding the space and its uses and in being aware of any applicable code restrictions. Overall, I am very pleased with the outcome of this experiential learning project and am excited about the possibility of doing projects that involve these same skills and processes in my future career.

