

Hospital Planning: The What, Where, When, and Why?

Emily R. Mowry, BE

Programmer, Biomedical Specialist
HFR Healthcare Division
Brentwood, TN

James G. Easter, Jr., MA, FAAMA

Diplomate in Healthcare Administration
Principal & Director of Planning
HFR Healthcare Division
Brentwood, TN



Easter and Mason Healthcare Consulting Corporation (EMhc), Nashville, TN

Abstract

The economics of healthcare planning can either make or break a hospital. In addition to codes and regulations, hospital administrators have to consider the Return on Investment (ROI) for upgrading their facilities. The question we have to ask is what is the most cost efficient method of expansion: adding or renovating facilities?

The hospital administrator realizes that the hospital is part of the community, and the input from physicians, staff, and community leadership is vital to survival. If leadership chooses to build a new hospital based solely on financial feasibility numbers, there is no guarantee that the new hospital will bring in the same amount of business as the old one. On the other hand, many small hospitals cannot function properly simply due to the age and obsolete condition of the current building. Building a new hospital may be the more expensive route, but it may dramatically improve the efficiency and quality of health care over time. In this study, we take a look at one example of the hospital planning process in which we answer these important questions: Should we stay and expand, or should we relocate?

In 2004, Mercy Health Partners hired the EMhc/HFR planning team to conduct a campus master planning study for the Mercy Hospital of Tiffin, a small, rural hospital in central Ohio. The original hospital building was over 90 years old, and leadership was facing problems such as crowded and inefficient departmental spaces, outdated engineering systems, and growing patient volumes in limited space. With a limited budget, Mercy Tiffin had to expand its facilities to accommodate for the growing patient volumes. After a thorough analysis of the building, EMhc concluded that it was time for the hospital to phase out of the old facility and relocate, in phases, to a new site.

Introduction

In 2004, Mercy Health Partners hired EMhc to conduct a campus master planning study for the Mercy Hospital of Tiffin, a small, rural hospital in central Ohio with a strong leadership team. The original hospital building was over 90 years old and in need of repair and expansion. Significant portions of the facility were built in 1912 and 1947. Leadership was facing problems such as crowded and inefficient departmental spaces, outdated engineering systems, and growing area-wide opportunities within the regional network. The inpatient bed units consisted of mostly semi-private rooms, and the leadership hoped to upgrade to all private rooms, suitable for family support and patient care. The hospital was also faced with growing patient volumes and limited space to provide diagnostic treatment. With a limited budget, Mercy Tiffin had to expand their facilities to accommodate the growing patient volumes, recruit high-quality physicians, and retain staff that had been working for years in very inadequate spaces.

Progress was taking place, but it wasn't enough! Access and image became the key "watch words" for the next steps in updating the facility. The vision was to create an efficient facility that fostered suburban renewal and family-friendly care. Before "blindly" proceeding ahead with designing a facility on paper, leadership wanted to hire a consultant to assess their space needs to determine the most financially feasible solution. The selection process for planning consultants was competitive, but balanced and thorough. EMhc and HFR Architects were engaged as the planning consultants, and the team initiated the planning process.

Planning Methods

The team (planner, A/E, owner) followed a ten-step master planning process, normally completed within a 12 to 15 week time frame. Timing depended on the size and complexity of the project. In the Mercy Tiffin project, a little more time was needed to determine if a replacement hospital was more cost-efficient than renovating the older facility. We also involved the community in a series of community awareness and feedback meetings. The following steps were completed:

STEP 1: PROJECT START UP SESSION AND QUESTIONNAIRE

In this first step, EMhc needed to assess the hospital's present situation and compare the situation with area-wide and national trends. We suggested that Mercy Tiffin create a Planning Committee with five to seven executive leadership members to direct the planning efforts. Membership normally consists of hospital senior leadership, such as board members, medical staff, and administrative leadership. The Mercy Tiffin Planning Committee included the hospital's Chief Executive Officer, Chief Financial Officer, VP Human Resources, VP Clinical Services, VP Physician Relations, and the Director of Engineering.

EMhc conducted a preliminary meeting with the Planning Committee and hospital departmental directors (Figure 1). During this open forum, we discussed the planning process, outlined the project work schedule, and reviewed relevant trends in health care. Key staff helped us electronically distribute our departmental questionnaire (Q/A) form and general data requests (Figure 2) to each of the department heads. In some cases, one department head managed multiple departments, and we asked that one form be completed for each department separately. The Q/A forms helped us to identify key functional factors, client goals, and current conditions, staffing patterns, future trends and clinical volumes for each hospital department. Clinical volumes were needed to complete the workload projection calculations in Step 4. This interactive process is key to building consensus and justifications for change.



Figure 1 – Preliminary Meeting

DEPARTMENTAL INTERVIEW FORM	
Morroe County Medical Center	
Name of Service/Department:	Phone: _____ FAX: _____
Director/Manager:	Email: _____
Departmental Description	
Location	Floor: _____ Near: _____
Approximate Existing Dept. Size	DOSE: _____ (If Available)
General Staffing	(DOSE = Department Gross Square Feet / Area)
Volume Of Business/Services Provided	FTE: _____ Full Time Staff _____
Trends In This Department	NO: _____ Other: _____
Volume Up _____ Volume Down _____	Priority: _____
Goals & Objectives	
Operational	
Functional	
Functional and Space Issues To Be Addressed	
Access To Your Department	
Americans With Disabilities Act (ADA)	
Size/Location/Amenities	
Arrangement Of The Department	
Room By Room Fit	
Productivity Considerations	
New Rooms, Spaces Required	
Environmental Issues	
Image	
Color/Texture	
Sensory Factors	
Mechanical/Plumbing/Elect/Struct	
Equipment & Systems Issues	
Medical (Major & Minor)	
Communications	
Information Systems	
General Comments/Actions	
Note: Please attach Sketch Information and historical documents as may be required.	

Figure 2 – Sample Departmental Questionnaire Form

STEP 2: SITUATION ASSESSMENT AND AREAWIDE FACTORS

The purpose of Step 2 was to confirm the program and service scope for Mercy Tiffin and to develop a week-by-week project work plan for the duration of the planning project. Team member assignments were made in tandem with local and system-wide consulting partners on the master planning team, including planners, architects, engineers, demographers, etc. During this step, the EMhc team also prepared as-is composite site plans and building composite floor plans suitable for use during the first round of departmental interviews. Existing departmental boundaries and room sizes were crosschecked and noted on the existing plans. Everything was converted to automated one-line drawings.

Completed questionnaire forms were compiled, reviewed, and formatted for the first round of interviews. EMhc used the clinical data provided in the Q/A forms to determine workloads for each department and make linear projections for a ten-year time frame. These projections were later used to develop a phased room-by-room space program of the hospital and related functions that might be included on the new campus.

STEP 3: INTERVIEW SESSIONS WITH DIRECTORS

The purpose of the one-on-one departmental interviews was to integrate the perceptions of the board members, medical staff, senior management, and departmental managers into the campus master planning process. Physician involvement and input was also important to building consensus in the master planning process. During this phase of work, EMhc conducted interviews with the departmental directors and key staff to ascertain their opinions and guidance and to share ideas that may be of value as the upgrade of existing facilities is carefully considered and compared to new construction.

Options and concepts related to “new construction versus renovation” and “lease versus purchase” were tested and recorded. The interview sessions were divided into three separate three-day sessions with the following agendas:

- Session No. 1:** Record narrative input and confirm statistical data
Use interactive visuals to illustrate notes
Compare and contrast to other providers
- Session No. 2:** Review notes, test space and functional needs
Room-by-room analysis and functional factors
Test planning concepts with architect/engineer
Prepare site-planning options for review
- Session No. 3:** Present master plan zoning and site concepts
Master Plan options and recommendations
Pros/cons and Return on Investment (ROI)
New site versus existing (pros/cons and alternatives)
Short and long range implications

These interviews also allowed EMhc and the hospital to justify the quantity of diagnostic and treatment spaces based on historical utilization and projected needs. Based on the conversations, service lines were sized appropriately based on numbers and staff feedback. Acute inpatient rooms, for example, were reduced in quantity to permit more efficient use of private rooms and alternative “swing beds”.

STEP 4: DEPARTMENTAL SPACE ALLOCATION PROGRAM AND MASTER PLAN CONCEPTS

In Step 3, all departments that were carefully studied to determine existing conditions and projected space needs over time. During Step 4, each service or department was tested for size and need and converted to net square feet (NSF), departmental gross square feet (DGSF), and building gross square feet (BGSF). These “building blocks” were used for the master zoning of each campus. Each room and/or space was carefully reviewed to consider:

- Human performance standards and needs
- Efficiency and staff interactivity plus flow patterns
- Furnishings, equipment and clinical factors
- Space functionality, flexibility and future growth

EMhc used recommended building standards from the Guidelines for Design and Construction of Hospital and Healthcare Facilities (1), published by the American Institute of Architects (AIA), to adjust the size and composition of each department. Functionality and size were reviewed carefully with the architect and engineer to ensure proper fit, design, and compliance with the hospitals expectations. The DGSF to BGSF factors were based on primary circulation, mechanical system needs and future infrastructure expectations. Future expansion was also a function of the construction cost and flexibility. During this phase, we also conducted research related to on-site ambulatory surgery and how the physician might participate as “vested” parties in the future business venture.

STEP 5: MASTER FACILITY PLAN AND BUILDING ZONING CONCEPTS

An Architectural Master Zoning diagram illustrated the zoning of each area of the building (existing site and new campus). The diagram used moveable blocks to represent each hospital department that were drawn to DGSF scale (Figure 3). Creativity was essential during this step, as EMhc required the input and guidance of the Planning Committee as the process evolved. Service re-alignments to economize on new efficiencies were tested at this phase of work. Building and site improvements were prepared for Planning Committee feedback and comment. In addition, we introduced the concept of placing non-clinical and “soft” functions into the Medical Office Building (MOB). This helped with initial capital costs and reduced costs per square foot in the “less technical” MOB.

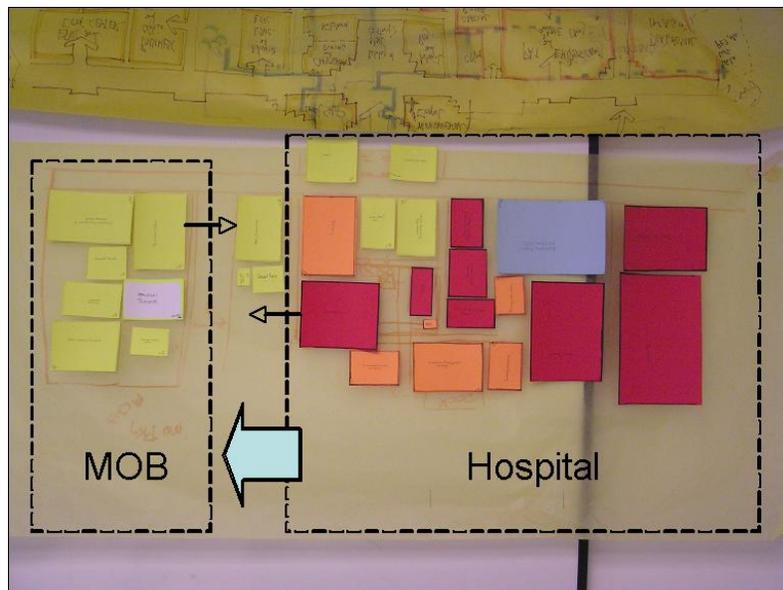


Figure 3: Sample Master Zoning Layout

STEP 6: DEVELOP SITE PLAN ALTERNATIVE CONCEPTS

The purpose of Step 6 was to develop a comprehensive site plan of existing (Figure 4) and proposed buildings (Figure 5).

The site plan diagrams illustrated the best use of land and the zones of growth for the future. Key factors to address

included image, access, and parking, building elements, future expansion, utility factors, and land value over time. In addition, we also consider possible sites for relocating the hospital (Figures 6 and 7). A civil engineer assisted and conducted numerous meetings with city planners in the Ohio Department of Transportation.

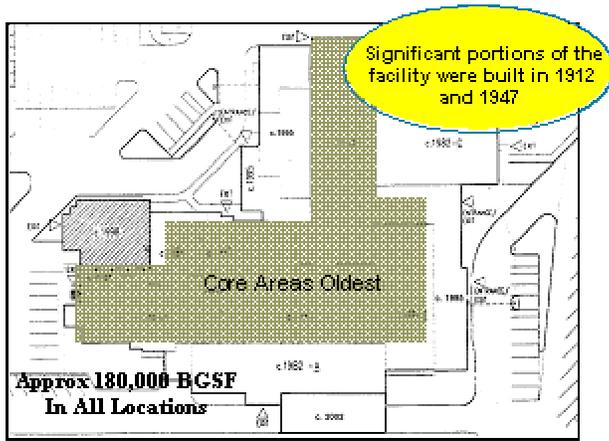


Figure 4 – Mercy Tiffin Existing Facility

Figure 5 – Proposed Replacement Facility Site Plan



Figure 6 – Relocation Site

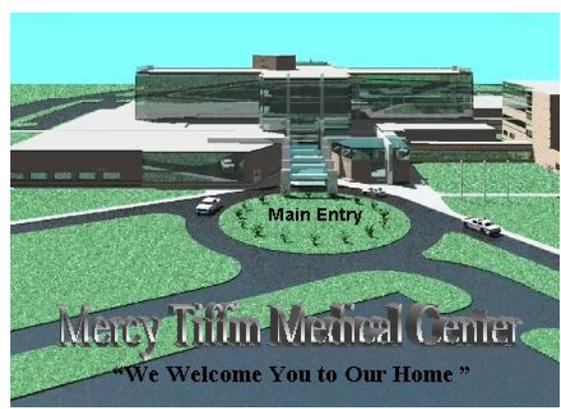


Figure 7 – “Fly By” Computer Simulation

STEP 7: TOTAL PROJECT BUDGET, SCHEDULE AND PHASING

Once the Planning Committee approved the preliminary site plan, a preliminary project budget was developed for planning and phasing purposes (Figure 8). This budget was also tested with the architect, engineer, construction advisor, and Planning Committee prior to the presentation to the Board of Directors. Upon approval, the phase one schematic design (first phase of basic A/E services design work) was initiated to further fine-tune the space layouts and room-by-room design details. The project budget outlined the projected construction costs estimated on a per square foot basis, equipment budgetary ranges on a percentage basis, empirical site development costs, estimated professional fees, contingencies and inflation factors. The Planning Committee and departmental leadership played key roles in this phase of analysis as local conditions were considered and costs compared to other projects of similar size.

EXECUTIVE SUMMARY			
A Replacement Facility for Marcy Hospital		New Construction	\$9,360
Trin, OH		Relocation	0
Conceptual Estimate		Materials	1,428
January 21, 2008		TOTAL	\$44,678
SCOPE ITEM	NEW CONSTRUCTION	\$/SF	TOTAL
Main Hospital	\$45,814,815	\$237.77	\$45,814,815
Medical Office Building	\$10,027,169	\$102.95	\$10,027,169
Sitework	\$4,272,679	\$17.40	\$4,272,679
Total	\$60,114,664	\$245.69	\$60,114,664
Accepted Budget Transfer Items (see Tab #8)		(\$4.67)	(\$1,117,744)
Revised Total		\$241.12	\$58,996,970

Figure 8 – Preliminary Budget

STEP 8: PRESENT MASTER PLAN OPTIONS TO HOSPITAL LEADERSHIP

Once the budget was fine-tuned, EMhc presented the “preferred” campus master planning options developed during the previous Steps 5 – 7 to departmental leadership. In previous projects, we also summarized the analysis of the existing facility master plan to illustrate the differences for background purposes. Directors were encouraged to share ideas, opinions and comments during the presentations. All comments and feedback were tested with the Planning Committee and incorporated into the campus master plan.

STEP 9: FINAL BUDGET/PHASING OPTIONS

At the conclusion of Step 8, the Planning Committee was asked to approve the preferred master plan direction prior to presentation to the Board of Directors. Staff comments were incorporated into the work effort and new ideas reviewed briefly for their appropriateness. The final master plan building zoning and campus site plan were compiled following this

review and included: site plan concepts, sketches suitable for board comment, renderings as required, budgetary ranges, and project phasing.

STEP 10: FINAL PRESENTATION TO THE BOARD OF DIRECTORS

In the final step, EMhc presented the recommended master plan to the Board of Directors for comment. Members of the Planning Committee were invited to participate in the presentation process as well. Since Mercy Hospital of Tiffin was owned and operated by Mercy Health Partners, members of the Planning Committee also presented our recommendations to executive leadership for the entire hospital system. The project was funded, and the final architectural and construction designs were scheduled to be completed by 2006.

Results

The space program prepared for the existing building demonstrated a shortage of approximately 20,000 BGSF necessary to meet current hospital standards. Properly expanded space permitted the hospital's transition to an "all private" and "family-focused" hospital design. Future analysis suggested the current room sizes in the existing facility were too small (diagnostic/treatment and patient care areas primarily) and in many cases the room layouts were not functionally appropriate to meet current standards of design, life/safety, and operation. Another major inhibiting factor was the very restrictive floor-to-floor heights, which prevented proper access for heating, ventilation and air conditioning equipment (HVAC). These limiting factors were most prevalent in the 1912 and 1947 portions of the existing hospital.

After a thorough analysis of the building, EMhc concluded that it was time for the hospital to phase out of the old facility and relocate, in phases, to a new site. Due to the condition of the hospital, it turned out to be more cost and time-efficient to build a new facility than to renovate the older one. EMhc's team worked with hospital staff to complete a full-scale master plan and schematic design for the new campus. Users, patients, staff, physicians, planners, architects, and engineers made good "decision-making" partners in completing the design.

Although EMhc did not participate in the ultimate site selection process, we were asked to provide an objective assessment of the site selected by the Planning Committee. The new site, located at the intersection of Highway 18 and 224 in Tiffin, was selected as an alternative site for development representing approximately 76 acres of available property. The land for the new site was relatively un-encumbered, had a gentle slope toward the major intersection, and was bounded on one side by trees, residential property on a second side, and a church on the third side. Access routing at Highway 18 and 24 was required with some street improvements that were submitted to the city for consideration. The

fourth quadrant was also relatively un-encumbered and provided convenient service access as well as potential access points for other site tenants, including, for example: Senior Housing, Skilled Nursing, YMCA, Ambulatory Care Services, and Medical/Professional (MOB) office space. The hospital master plan was created to fit the acreage on this alternative site.

SPACE PROGRAM SUMMARY - Mercy Hospital of Timon						
Department Name						
Department Name	DASH		E-GGP		Comments	
	Existing	Prop.	Proposed	Existing		
Inpatient Care Units						
Patient Care Unit, Med-Surg (PHU)	24	36	7000	6,166	1, 12-Bed Post-Concept with Common Corridor	
Patient Care Unit, Med-Surg (Semi-Private)	24	14	11,774	6,166	10 Beds to Allocate for Day Surgery	
Patient Care Unit, PHU (16 Telehealth)	22	Webcam	Webcam	2,766	22 Beds Plus 4 Private	
Patient Care Unit, Semi-Private (TCU)	16	16	2,567	1,766	16 Beds Existing in Break-Ever	
Critical Care Unit (CCU)	5	6	1,631	1,666	65 Beds Existing	
OB/GYN and Nursery	4	4	1,661	1,666	2 OB/GYN + 1 Postpartum - 2 Suite Rooms	
AMBulatory Surg (Surgical) and OB/GYN Clinic	16	16	16,226	1,666	62 Postpartum Suite Plus 16 to 12 OB/GYN Obs.	
Sch Total Inpatient Units	122	122	46,760	27,666	60 C = 26.1%	
Diagnostic and Treatment						
Surgery Recovery (SIR)			1,666	6,166		
Imaging Suite			1,666	1,666	Include Possible MRI Unit Plus Storage	
Laboratory			6,661	6,166		
Imaging Suites			16	166	Possibly 20 Beds Storage and Cold Room Only	
Emergency Services (ES)			1,154	6,666		
Occupational and Employee Health			6,661	2,666	Existing Program	
Physical Occupational Therapy and TCU with Support			2,611	1,666	Located in TCU	
Cardio-Pulmonary/Respiratory Therapy			1,721	1,666		
Dr. Thru Cardiology Clinic			1,661	1,666		
Cardiac Rehabilitation			2,661	1,666		
Pharmacy			1,661	2,666		
Pharmacy/Wellness and Outpatient Physical Medicine			1,111	1,666	Located Off-Site in Private Time	
Sch Total Diagnostic/Treatment			27,667	27,666		
Support Services						
Library			1,161	1,766		
Medical History and Storage			1,616	2,666	Include Book and Office	
Central Sterile Processing			1,666	1,666		
Mail and Coding/Labeling			1,666	2,166		
Endocrine Laboratory and Services			1,116	766		
Safety Security			1,66	1,26	Located in Plant Operations Area	
Sch Total Support Services			12,771	17,266		
Administrative and Public						
Central Billing/Registration			2,261	1,166		
Cardiovascular Suite			2,261	2,266	With Board Room Included	
Cardiovascular Functions (HR, HRV, HRV, Outreach, In Control)			1,662	1,666		
Patient Care History and Social Services			761	666	Social Worker Located on Unit	
Business Office			1,171	2,166	Off-Site Location	
Pharmacy Services			1,612	1,666		
Information Technology			1,616	1,666		
Medical Records			2,116	1,166		
Physician Lounge/Library			361	666		
Medical Staff Services			1,62	1,66	In Collaboration with Time	
Education, Development and Conference Center			1,666	1,666	Existing in Various Locations - Computer in	
Multi-Lobby/Hub			1,617	1,166	Existing Off-Site Education and Support	
Yoga/Wellness Shop			1,666	1,666	Existing Includes Business Storage	
Chapel and Pastoral Care			1,666	2,666		
Sch Total Administrative and Public Space			26,766	27,166		
TOTAL DEPARTMENTAL GROSS AREA			130,887	114,721		
General Power Plant/Boiler			1,666	6,120	To Be Determined by Engineer	
Mechanical Plant/Boiler			1,666	1,666	To Be Determined by Engineer	
Building Support Plus Primary Chiller			21,122	22,26		
TOTAL BUILDING GROSS AREA (SQUARED)			153,335	144,727		
					SUMMARY	
					Comments: 1. 12-Bed Post-Concept Program	
					2. OB/GYN + 1 Postpartum - 2 Suite Rooms	
					3. 62 Postpartum Suite Plus 16 to 12 OB/GYN Obs.	
					4. 60 C = 26.1%	

Figure 9 – Space Program Summary

In completing the master plan (Figure 9), EMhc addressed specific needs and problems associated with the older hospital and incorporated the following solutions into the design:

- Utilize less space to drive down the building costs
- Create better flow patterns between departments
- Convert from semi-private rooms to all private rooms
- Create a staff and patient-friendly work environment

- New design is fully code compliant

The original hospital housed 24 inpatient beds in semi-private rooms. According to our workload analysis calculations, the projected bed need for year 2009 was 36 inpatient beds. The new hospital allowed adequate space to convert to all private rooms as recommended in the AIA Guidelines for Design and Construction of Hospital and Healthcare Facilities (1). In order to cut down construction costs, space needed to be shared and utilized efficiently such that the new facility could still house and maintain the recommended number of private rooms. The preliminary schematic design utilized the “pod concept,” which divided the 36 beds into three pods with 12 beds each (Figure 10). These pods shared common support functions and were spatially arranged with the six-bed CCU/ICU to create maximum visibility for nursing staff.

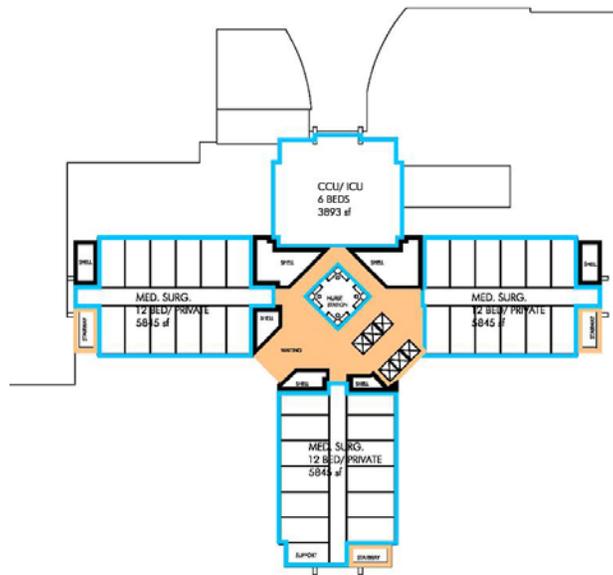


Figure 10 – 2nd Floor Schematic Design Study: Inpatient Beds and Critical Care Units

Due to the footprint of the facility, flow patterns were hindered between the diagnostic/treatment areas and support service areas. In particular, the surgery department was built into a very tight space in the old building, which created problems with patient transportation and holding. In addition, the building also had narrow corridor spaces that violated compliance codes. The space program increased circulation space and arranged the departments to allow for better flow patterns between departments. On the ground floor (Figure 11), surgery was placed adjacent to emergency to limit transportation time and distance between departments. The new facility (Figure 12) also allowed for growing departments, such as imaging and emergency, to expand over time.

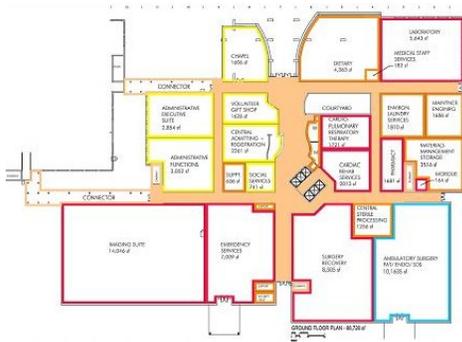


Figure 11 – Ground Floor Schematic



Figure 12 – Model of New Facility

Conclusion

The campus master plan developed by the EMhc team for Mercy Hospital of Tiffin, Ohio served as a road map to define the direction that the campus might evolve toward over time. One of the primary concerns was the amount of space required to operate effectively and meet the current standards of operation both in existing facilities on the main campus as well as a new campus being considered remote to the present location on the western edge of the Tiffin city limits. Our recommendations showed that the amount of space needed to increase efficiency in the hospital exceeded what the capacity of the existing facility. Our analysis also showed that renovation of the existing facility would not only be more costly over time, but also take more time to complete than building a brand new facility. It was imperative to relocate the hospital to a new site, even with the increased construction costs.

The hospital was an integral part of the community, and input from physicians, staff, and leadership was vital to its survival. Even though leadership chose to build a new hospital based on financial feasibility results, there was no guarantee that it would bring in the same amount of business as the old hospital. On the other hand, many small hospitals cannot function properly due to the age and obsolete condition of the current building. Traditionally, new hospital buildings attract more physicians, staff members, and patients, which serves as an excellent marketing strategy for administration leadership. For a rural hospital, marketing of service lines can be a difficult challenge due to the sparse population trends. The Mercy Tiffin Planning Committee thought a new hospital would encourage growth and expansion of their service lines over time, and perhaps bring in volumes from outside their primary service areas.

In this study, building a new facility proved to be a more cost-efficient solution than renovation. Over time, the new campus will improve efficiency and quality of healthcare delivery for the Mercy Hospital of Tiffin.

References

1. "Guidelines for Design and Construction of Hospital and Health Care Facilities." *The American Institute of Architects*. 2005. 13 December 2005. http://www.aia.org/aah_gd_hospcons.

© Copyright 2006, American Academy of Medical Administrators. All rights reserved.