Big Dreams, Small Site
Master Planning for Expansion on Small Sites

Prosperidad C. Luis

Abstract

The explosive development of new technologies in diagnostic and treatment services and the demand for the use of these technologies by doctors and patients alike, are two strong factors that have catalyzed the ongoing expansion and renovation activities among the bigger, private hospitals in the Philippines. People in respective communities and localities have demanded that their hospitals provide state-of-the-art facilities so that they need not leave their homes to avail of these services in far-away Metro Manila where they are provided by the more modern hospitals of the country.

An example of such a hospital is a private, general, and tertiary hospital in the mid-west region of the Philippines. It was founded in 1954 and has grown continuously and progressively from an 8-bed clinic to the 300-bed hospital that it is now. The community around it has transformed from a quiet residential neighborhood to a bustling residential-commercial area. This worked well for the hospital in terms of clientele, but the urban community has hemmed in the hospital in its site and has made physical expansion and development a difficult endeavor.

The hospital administration undertook a consultative exercise among its key medical and administrative personnel and consolidated a Wish List based on the staff's and patients' needs and requirements perceived from day to day operations. As expected, the Wish List represented the "dream" of everyone, big dreams that are difficult to accommodate within the site of the hospital.

This paper presentation will use this hospital as a model in presenting a process by which "big dreams" may be accommodated within a "small site."

Consolidating the Wish List

The hospital administration had consolidated a wish list derived from its consultation with various users and stakeholders – doctors, nurses, other medical and paramedical professionals, staff, patients, and the community in general. The wish list was a consolidation of big dreams, which are difficult to "squeeze into" the existing site:

1. A new linear accelerator and an Oncology Center that offers the 3 modalities for cancer treatment – radiotherapy, chemotherapy and surgery;
2. The upgrade of the Radiology Department to an Imaging Science Center;
3. A new Pharmacy Building with 24-hour service for the community;
4. A new Catheterization Laboratory;
5. A new Patient Wing for new private patient rooms;
6. A new Medical Mall that would contain hospital-related commercial concessions;
7. A new "Hospitel," a small hotel for families of patients;
8. A new Parking Building to save valuable site space and consolidate parking facilities within a smaller footprint;
9. Additional Doctors' Offices in the Medical Arts Building; and
10. A general expansion of all existing departments, averaging 1.5 times their existing areas.

Evaluating the Site

The site consists of three lots procured at different times. (See Figure 1: Existing Site and Site Development Plan.) The first lot contains the Hospital Building and its support Service and Engineering buildings; the second lot contains the Medical Arts Building, and the third, located at the rear of the first, serves as an open on-grade parking space. This site procurement situation had not made Master Planning possible and so, some buildings had been laid out in the past such that they are now barriers to a rational allocation of spaces for expansion for the future.

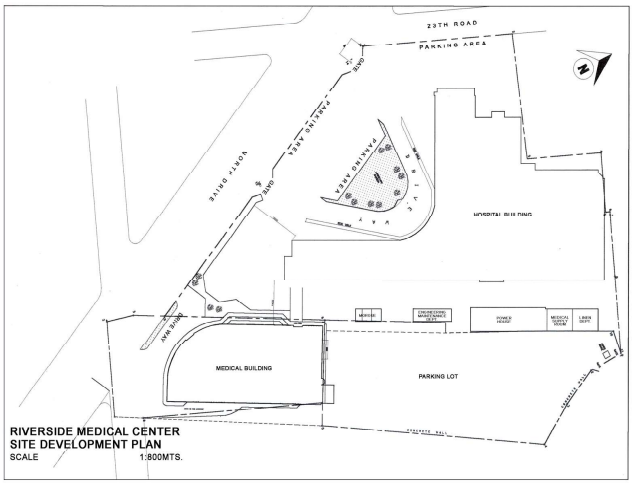

Figure 1 - Existing Site and Site Development Plan

The site, nonetheless, has potentials as well as limitations. (See Figure 2: Potentials and Limitations of Existing Site.) It offers options for outward growth, somehow. There are pockets of open spaces available, which can accommodate expansion through the manipulation of the relationship between the footprint of the building and its height or its number of storeys. The contiguous hospital complex site is a

"thru lot," which means that there are streets in front and at the rear from which the site can be accessed. As had been mentioned earlier, some structures such as the engineering and maintenance office, the power center, the linen and laundry department and the morgue are a line of service facilities that had earlier been constructed at the rear of the first lot but which now pose as obstruction with the availability of the third lot at the rear.

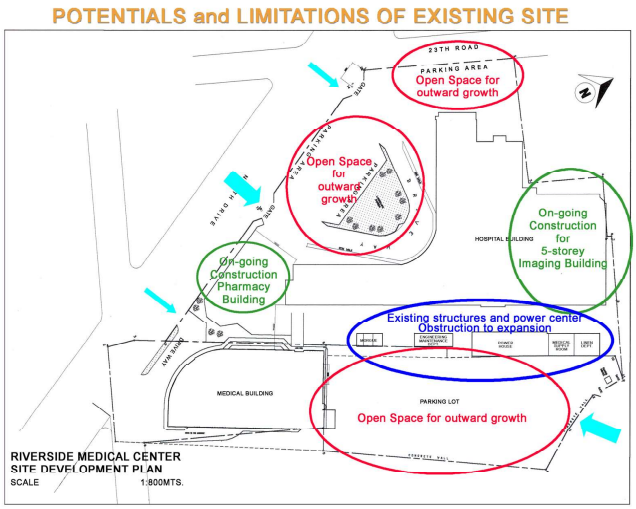

Figure 2 - Potentials and Limitations of Existing Site

Validating Needs and Requirements thru Hospital Statistics

Upgrading and expansion must be validated by supporting data. The hospital statistics is a source of invaluable information on current demand and usage, growth trends for projecting the future, and specific nuances of the growth of different services.

From an analysis of available statistics, the following pieces of information were confirmed:

- Patients come from all over the province and the region. It is true that the hospital services a clientele originating from a wide geographic circle.
- The demand for procedures for the following services is increasing on the average:
  - Radiology, by 3.9% per year;
  - Electrocardiogram, by 52.73% per year;
  - Laboratory, by 9.22% per year;
  - Endoscopy, by 22.25% per year;
  - CT Scan, by 15.98% per year;
  - Physical Therapy, by 12.25% per year;
  - Occupational Therapy, by 16.15% per year;
  - Hemodialysis, by 79.9% in one year of operation; and
  - Orthopedic, general decreasing but increased by 300% during the last year.

The demand for procedures for the following services is stable, neither increasing nor decreasing:

- Operating Room
- Delivery Room
- Ultrasound

Examples of statistical data converted into readily readable graphs are as shown in Table 1a-1c below:

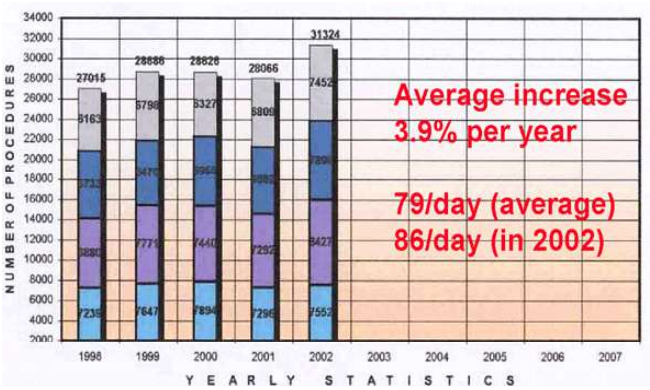

Table 1a - Increase/Decrease of Services in Radiology in Number of Patients from Year 1998-2002

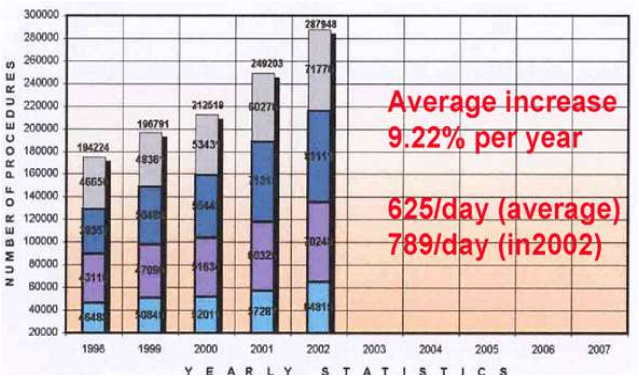

Table 1b - Increase/Decrease of Services in Laboratory in Number of Patients from Year 1998-2002

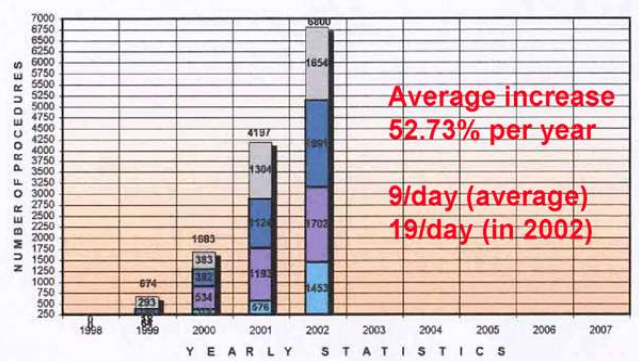

Table 1c - Increase/Decrease of Services in ECG in Number of Patients from Year 1998-2002

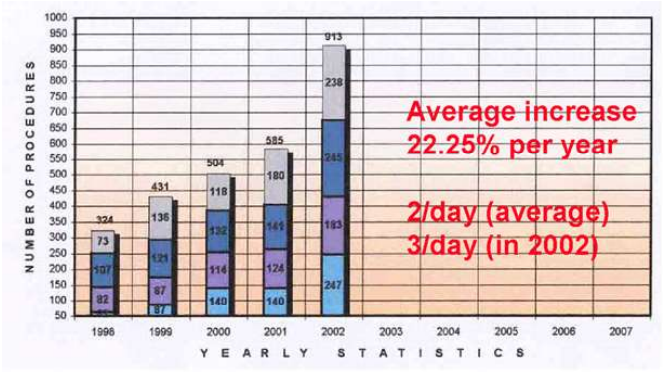

Table 1d - Increase/Decrease of Services in Endoscopy in Number of Patients from Year 1998-2002

The Average Length of Stay of Patients by Room Types was also studied. It was found out that patients, on the average, stay in the hospital for 4.48 days. This has a bearing on the bed occupancy rate in the different nursing units which on the average exceed the level of 100% by as much as 191.82%! (See Table 2: Range of Occupancy by Nursing Station for Year 2002).

Hospital statistics also showed what type of room accommodations are in demand. The small one-bed unit, with its own toilet and bath, has the highest occupancy rate. Further computations showed that the existing number of beds must be increased by 90 in order to bring down the bed occupancy rate to an optimized and flexible level of 80%.

Station	Number of Beds (capacity)	Location	Type	Range of Occupancy Year 2002	Equivalent no. of beds (range)
1	11	2F W Wing	LPR 5.0x5.0 toilet w/in rm	97-148%	11-16
2	19	2F N Wing	SPR 3.3x5.0 toilet at balcony	101-149%	19-28
3	29	3F N Wing	SPR 3.3x5.0 toilet w/in rm	116-151%	37-44
4	11	3F W Wing	SPR 3.3x5.0 back to back toilets bet rms	140-192%	15-21
5	24	4F W Wing	SPR 3.3x5.0 toilet w/in rm	120-151%	29-36
6	22	4W S Wing	SPR 3.3x5.0 toilet w/in rm	123-149%	27-33
7-A	36	4F N Wing	Ward 5.0x7.0 toilet w/in rm	85-108%	31-39
7-B	36	4F N Wing	Ward 5.0x7.0 toilet w/in rm	89-119%	32-43
8	16	5F W Wing	LPR 5.0x5.0 toilet w/in rm	104-109%	17-17
9	14	5F S Wing	LPR 5.0x5.0 toilet w/in rm	69-142%	10-20
10	32	5F N Wing	Semi-private, 5.0x5.0, toilet w/in rm	79-121%	25-39
Total	250				253-336

At lower range=3 beds
At upper range=86 beds

Table 2 - Range of Occupancy by Nursing Station for Year 2002

Space Programming

The Space Program was prepared in a comparative tabulation so that existing and the proposed may be conveniently compared, as shown. (See Table 3a, 3b, and 3c: Partial Comparative Master Space Program: Existing vs. Proposed).

SPACE OR ROOM	EXISTING	PROPOSED	REMARKS
MEDICAL ARTS BUILDING	5,341.19	6,423.36	5th Floor added
HOSPITAL BUILDING			
Outer Zone			
Administration (public)	421.13	534.20	
Emergency	154.55	435.00	
Physical Medicine & Rehab	281.15	480.08	
Hemodialysis	166.77	240.86	
Pastoral Service	329.50	334.91	
Public Toilets	24.22	24.22	
Medical Mall		444.00	
	1,377.32	2,393.27	
Second Layer Zone			
Radiology	285.20	866.44	
Catheterization Lab		72.50	
Laboratory	309.45	545.45	
Pharmacy	69.31	272.25	
PARKING BUILDING		4,151.00	
HOSPITEL		1,174.00	
GRAND TOTAL	18,094.43	30,843.19	

Table 3a - Partial Comparative Master Space Program: Existing vs. Proposed Requirements

The total area of the existing facilities is 18,094.43 square meters while the total area for the expanded and upgraded hospital totals 30,843.19, an expansion of 12,748.76 square meter or 70.45% over the existing facilities.

SPACE OR ROOM	EXISTING	PROPOSED
Housekeeping	11.75	54.00
Central Sterile Supply	37.64	138.00
Central Supplies Room	32.96	80.00
Security	9.90	25.50
Electrical Room	21.96	21.96
Engineering/Maintenance	135.36	585.90
Storage	66.84	195.10
Powerhouse	172.10	50.00
	970.56	2,283.19
Twilight Zone		
Morgue	31.84	47.84
	31.84	47.84
General Circulation		
Lobbies, corridors, stairs	3,109.91	3,109.91
	3,109.91	3,109.91
TOTAL FOR HOSPITAL BLDG	12,753.11 (43 sq.m./bed)	19,094.83 (49 sq.m./bed)

Table 3b - Partial Comparative Master Space Program: Existing vs. Proposed Requirements

SPACE OR ROOM	EXISTING	PROPOSED	REMARKS
PARKING BUILDING		4,151.00	
HOSPITAL		1,174.00	
GRAND TOTAL	18,094.43	30,843.19	

Table 3c - Partial Comparative Master Space Program: Existing vs. Proposed Requirements

The Blocking Exercise: Allocating Required Areas in the Available Site

A Blocking Exercise was then undertaken. Using the Space Program and the knowledge gained from the evaluation of the site, blocks of departments were then fitted into the available spaces. There were four types of expansion schemes identified, depending on the situation:

- First, departments may merely repartition, adjusting the spaces without necessity of increasing them;
- Second, departments may grow where they are in existing spaces, expanding and pushing adjoining departments out of their location;
- Third, departments may be relocated and expanded within the building envelope; and
- Fourth, departments or elements may be entirely new construction;

The Site Development Blocking Plan was developed on the following concepts (See Figure 3: Concepts: Site Development):

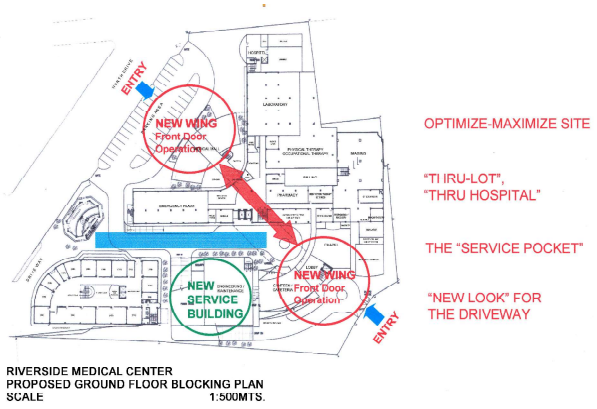

Figure 3 - Concepts: Site Development

- Optimized-maximized site: Without violating building codes and other relevant codes and guidelines, the use of the site was optimized, even maximized.
- "Thru Lot," "Thru Hospital": By removing the line of obstructing service buildings, the hospital becomes a "thru" space, with a main spine connecting two new wings of front door operation.
- Service Pocket: The service departments were tucked into a service pocket containing the Service and Parking Building.
- "New Look" for the Driveway: The back-door driveway formerly traversed by crisscrossing traffic is given a "new look" and vista, as it approaches a cul-de-sac that disembarks vehicle passengers at the minor lobby.

The site development concept then translates to the ground floor in the following blocking concepts (See Figure 4: Features of the Proposed Blocking Plan at the Ground Floor):

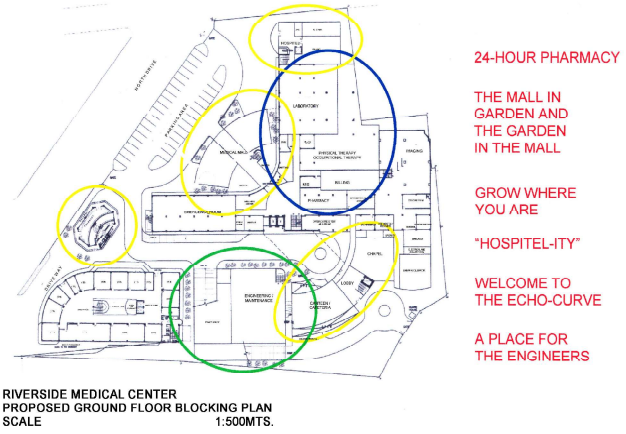

Figure 4 - Features of the Proposed Blocking Plan at the Ground Floor

- The Mall in the garden and the garden in the Mall: The open garden in front of the hospital is embraced by a new curved wing containing a Medical Mall at the ground floor and the Executive Offices at the second floor. It is a strategy to give the hospital a changed image. This wing will be given a very friendly and pleasant atmosphere – aroma of coffee from the café concession, smell of fresh flowers from the shops, sight of a beautiful garden, the sound of water from interior pools.
- The Echo Curve: A similar curve echoes the form of the Medical Mall. Front end public spaces such as the Dining Area and Chapel will be located at the ground floor. At the upper floors are the private rooms of the new nursing wing.
- Pharmacy for the Community: A Pharmacy that services the 24-hour requirements of a bustling community is located close to the main street so that customers do not have to penetrate into the hospital premises for the procurement of a pharmacy item.
- "Hospitel-ity": A hotel-type accommodation will give families of patients the convenience of a temporary home within the premises.
- Service Pocket: The demolished Service Buildings will be transferred to this service space.

The features of the second floor are as shown. (See Figure 5: Features of the Second Floor).

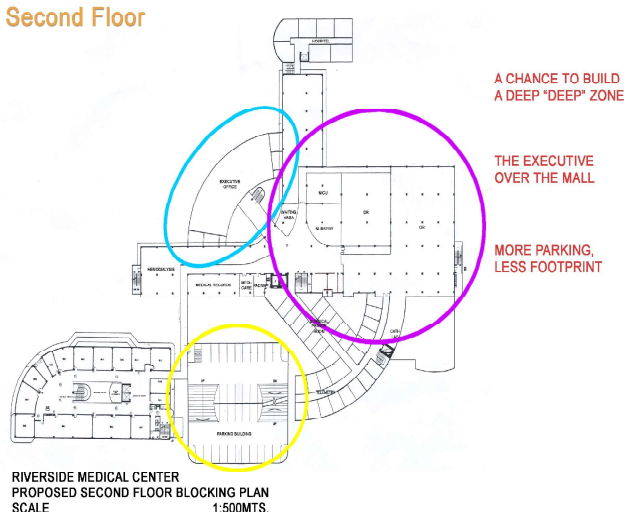

Figure 5 - Features of the Proposed Blocking Plan - Second Floor

- A Chance to Build a Deep "Deep Zone": Departments in the Deep Zone such as the Operating Suite, Delivery Suite, Intensive Care Units, and the Nursery should be clustered together, being departments with high engineering provision and stringent aseptic requirements. In the existing plan, these departments spread out in different areas and floors. In the new Master Plan, these departments are brought together in a contiguous space.
- The Executives over the Mall: On top of the Mall, at the second floor of the new wing, are the Executive Offices and amenities: the offices of the President, the Medical Director, the Nursing Director, the Board Room and the Medical Library.
- More Parking with Less Building Footprint: A service pocket is created to accommodate a multi-storey parking building. Even with less building footprint, more cars are accommodated than on the former ground level parking.

Not much upheaval occurs in the third, fourth and fifth floors. Mostly nursing wards, these floors will undergo repainting and refurbishing.

Checking the Zoning of Departments

The blocking exercise is always undertaken with zoning principles in mind – that departments must be clustered together in accordance with the closeness of their functional relationship with each other and predisposed on the site in accordance with their function in the total hospital operation. As shown in Figure 6: Zoning of the Master Plan, hospital departments belonging to the same zone are best clustered together in order to simplify circulation systems and prevent crisscrossing of user paths.

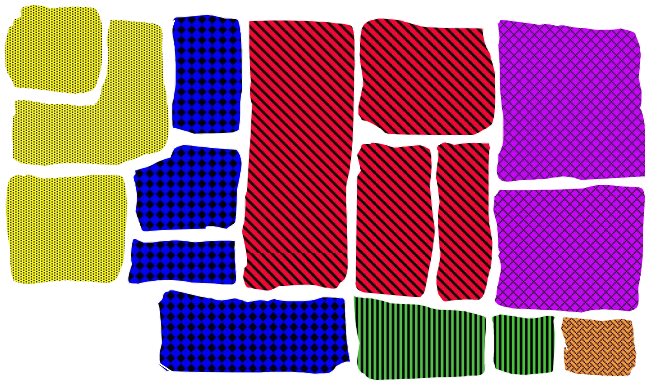

Figure 6 - Zoning of the Master Plan

Zoning principles may be briefly summarized thus:

- Departments like outpatient, emergency, rehabilitation, and administration which have much to do with the public belong to the Outer Zone and must be located close to the public entrance.
- Those that receive their workload from the first zone such as imaging, pharmacy, laboratory and other diagnostic sections belong to the Second Zone and must be located accordingly in relation to the outer zone.
- The wards that require peace and quiet for the patient belong to the Inner Zone and must be located where patients may be afforded the proper atmosphere for healing while being accessible to visiting family and friends.
- Departments that require aseptic conditions such as the operating and delivery suites, the intensive care unit, and the nursery belong to the Deep Zone and must be located at "end points" where no public traffic may penetrate.
- Departments that have service functions such as dietary, linen and laundry, engineering and maintenance, belong to the Service Zone. In these departments, constant delivery and collection activities occur and so, they must be given delivery, loading and unloading spaces.
- The Morgue is in the Special Service Zone. Its location and treatment must consider and respect the personal nature of grief.

The Zoning Check showed that in the proposed blocking, the departments belonging to the same zone are in general close or adjacent to one another.

Estimating Costs

As has already been mentioned, there are four types of schemes of construction activities:

- Remodeling in place within the same shell;
- Expansion in place;
- Expansion in another location; and
- New construction

These four distinct types also have different unit costs, remodeling being the least costly, and new construction the most expensive undertaking. Their total cost is the cost of the "big dream," which very often, is beyond the capability of hospital management to immediately fund in one salvo of releases.

Phasing the Upgrading and Expansion Program

And finally, the total upgrading and expansion project was then split into phases of manageable packages that can be implemented as funds become available. (See Figure 7: Strategy of Phasing).

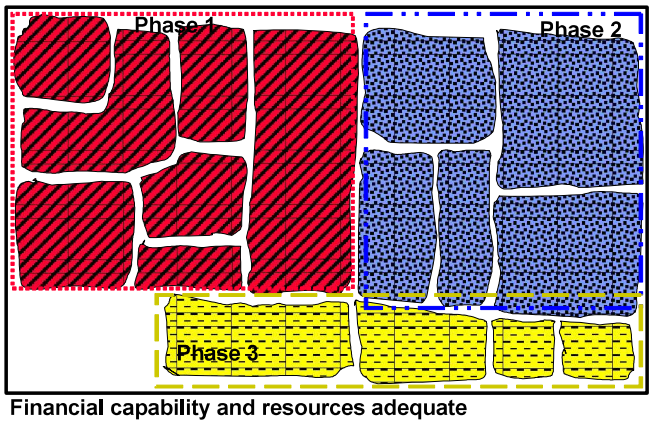

Figure 7 - Strategy of Phasing

Concluding Statement

A hospital is a living and dynamic organism. Even while the "big dream" is half-way through its implementation, another master planning for the next cycle must be undertaken, a never ending exercise to keep the hospital relevant, reliable and reputable in the community it serves.

References

American Institute of Architects. *Health Facilities 1995-96 Review*. The American Institute of Architects Press, Washington, 1996.

American Institute of Architects Committee on Architecture for Health. *Guidelines for Construction and Equipment of Hospital and Medical Facilities*. The American Institute of Architects Press, Washington, 1992-93.

Luis & Associates. *Master Plan for Physical Development of the Riverside Medical Center*. Unpublished Report, 2004.

Marberry, Sara O. Ed. *Innovations in Healthcare Design*. Van Nostrand Reinhold, New York, 1995.

Miller, Richard and Swensson, Earl. *Hospital and Healthcare Facility Design*. WW Norton & Company, NewYork and London, 2002.

Miquelin, Lauro Carlos. *Anatomia Dos Edificios Hospitalares*. Universidade de Sao Paolo, Brazil, 2004.

Tweet, Arthur and Gavin-Marciano, Karol. *The Guide to Benchmarking in Healthcare*. Quality Resources, New York, 1998.

Union Internationale des Architectes Public Health Group. *Continuing Updating and Upgrading of Existing Health Care Facilities*. Edizioni Polistampa Firenze, Florence, Italy, 1996.

Union Internationale des Architectes Public Health Group. *Hospital Design at the Beginning of the 21st Century.* University Studio Press, Thessaloniki, Greece, 1999.

Union Internationale des Architectes Public Health Group. *Programming, Guidelines and Masterplanning for Hospitals*. Dusseldorf, Germany, 2003.