Innovative Care Flexible Facilities
Part B Report, 31 May 2013

Prepared by William Nycum & Associates Limited and Smithgroup AEIP International Inc.
for Capital District Health Authority

Final Submission: 21 June 2013

Appendix A Updated: 25 June 2013

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Integrated Modular Furniture & Modular Medical Solutions Consultants:

Atlantic Business Interiors, with Nurture by Steelcase

Table of Contents

Introduction

Common Considerations

Halifax Infirmary

Dartmouth General Hospital Addition

Dartmouth General Hospital Level 5 Renovation

Appendix A

Supporting Reports
(bound separately)

Business Case: Innovative Care Flexible Facilities, Version 1.1, Final
June 21, 2013

Full Scale Drawing Sets
(bound separately)

Halifax Renovations & Addition
31/05/13

Dartmouth Renovations & Addition
31/05/13

Space for Client Review Comments

Introduction

Executive Summary

Government Announcement – The Centennial Building

In December 2011, The Nova Scotia Government announced that the Centennial Building, long fraught with building infrastructure problems, was slated for demolition. The announcement triggered a series of events to prepare for the replacement of the inpatient beds and OR services that presently occupy the Centennial Building.

Design Team

In Summer 2012, William Nycum & Associates Limited (Nycum) was retained as Prime Consultant to lead the project that would quantify and qualify the replacement of the Centennial beds and operating rooms with new spaces at the Halifax Infirmary and Dartmouth General sites. Nycum's team includes:

- **William Nycum & Associates Limited** (Halifax) Healthcare Architects
- **SmithGroup AEIP International Inc.** (Phoenix) Healthcare Architects
- **O'Neil Scriven & Associates** (Halifax) Mechanical & Electrical Engineers
- **Pinto Engineering** (Halifax) Structural Engineers
- **CBCL** (Halifax) Civil Engineers
- **Hanscomb** (Halifax) Construction Cost Estimators
- **Dr. John Blake** (Halifax) Industrial Engineer
- **Tripp Umbach** (Pittsburgh) Economists
- **ABI/Steelcase/Nurture** (Halifax / Grand Rapids) Equipment/Furniture
- **Burst!** (Halifax) Community Engagement Specialists

This team has had the great privilege to work with the complex, dynamic and committed team at CDHA throughout the project, culminating in this report. Together it has been quite a fast paced and exciting journey and one that we all feel has strived to reach for the best possible outcomes. A great deal of credit and thanks are owed to the CDHA team and various stakeholders for its contribution to this effort.

The Project Deliverables

There are three components (and corresponding reports) to this project: Part A, Part B, and Decision Support Resources. These component are described in the RFP for the project as follows:

Part A:

The initial stage of the CDHA Project requires preliminary program development planning, building conceptualization and the preparation of an outline scope of work so that budget range and computer visualization can be produced. In particular, the successful Proponent will be required to:

- *Develop detailed program and net floor area requirements in conjunction with a review of current and best practice models of inpatient, ICU, IMCU, and OR Suite layouts configuration and components as well as a review of issues such as single patient rooms and acuity adaptable (universal) design for rooms.*
- *Investigate access, circulation impacts from a development of existing site conditions including grading, municipal streets, pedestrian, vehicular/ parking, site services, site lines and solar impact issues which will help to inform the building concept development.*
- *Conduct a preliminary review of mechanical, electrical, structural and site civil issues as to how the additions infrastructure requirements would be impacted and potential future developments.*
- *Develop preliminary concepts from the programming, investigation and review of the previous stages. Block floor plans will be developed, alternative configurations will be investigated and compared to their advantages and disadvantages against a set developed criteria by Capital Health. A block 3D computer model will be prepared to illustrate the selected alternative, suitable to illustrate the building from various viewpoints.*
- *Develop a preliminary scope of work and outline specifications for the project(s).*
- *Prepare an element budget range (Class D) for the project(s) based upon the preliminary information collected and prepared.*
- *Class D Definition: Based on the scope of work above, this estimate is an indication (rough order of magnitude) of the final project cost.*
- *Prepare and submit a report highlighting the findings of Part A.*

The intent of Part A is to develop a preliminary program, review key issues impacting optional solutions, prepare alternative concepts, prepare a budget range for the project, and illustrate in block form, the additions massing in context. This information will assist the decision making process of Capital Health, support internal and external reviews by key stakeholders.

Part B:

The next stage of the CDHA Project expands or builds upon the work achieved in Part A. The successful Proponent will be required to:

Develop preliminary findings and solutions into a more detailed program and design; in particular, further investigation and review of best practices and evidence based design solutions for inpatient room and units, ICUs, ORs and supporting services.

Prepare a Master Program including a Functional Program.

- *Develop a preliminary equipment list.*
- *Review concept design alternatives and refine into a selected schematic design solution and outline specifications.*
- *Prepare Class "C" construction cost estimates and project schedules and review options for construction services.*
- *Class "C" Construction Definition: Based on the scope of work above, a Class "C" estimate is based on a full description of the preferred option, construction/ design experience and market conditions. Use professional estimator.*
- *Prepare a more refined 3D computer modeling of patient rooms, OR suites, buildings and site depicting various viewpoints.*

Decision Support Resources:

In consultation with the various stakeholders including the operating rooms, recovery, critical care, inpatient and support services, develop business cases to support decision-making strategies such as where particular services are best located. These business cases to be analyzed based on sound financial and quality based indicators such as patient safety, access and affordability.

- *Analysis of changes in operational costs as a result of revised health care delivery models or processes.*
- *Provision of analysis of economic impact of projects for the HRM area and the province.*

About the Content

This report contains design solutions, pros, and cons for each project component resulting from the refinement of work done on options presented in the *Part A Report*, dated 22 February 2013.

Given the nature of this project, the designs presented in this report are preliminary. The selected options from *Part A* evolved to incorporate the best elements from various previous options, tempered by new ideas and evolving requirements that emerged through consultation and discussion with stakeholders.

Due to the evolving nature of the Clinical Services Plan throughout the project (and upon preparation of this Report), different areas/departments within the scope of this project are presented to varying degrees of detail. The level of detail presented largely reflects the level to which the physical space can be reasonably designed given the clinical information available (i.e. which departments and services will be located in which building). Presenting more detailed layouts in the absence of a finalized Clinical Master Plan would create a false sense of resolution for all involved.

For the Halifax Infirmary (HI) addition, the floor layouts are more diagrammatic than those for the project components at Dartmouth General (DGH) – sufficient to represent the space required to support the preliminary Space Programs and illustrate the preferred/ suggested arrangement of key spaces relative to each other. Development of plans resolved at a room-by-room basis would be speculative, as the relationships between rooms is dependent on the function of the departments and relies on input from stakeholders of those specific departments. While the overall floor plans for HI represent a preliminary/concept level of detail, key rooms are developed to a much greater detail (including enlarged plans, 3D representations and detailed room data sheets) in order to capture the aspects of innovative and evidence-based design presented and discussed through the course of Part B. This detail, along with conceptual exterior elevations and 3D renderings, has allowed a "Class C" cost estimate to be developed to the level of accuracy expected at this stage of the project.

For the Dartmouth General Hospital (DGH) addition, the drawings were able to be developed to a more detailed level as a result of the limited number of variables at play at this site and the higher degree of resolution of the Clinical Services Plan with respect to DGH. The lower level of acuity of services offered at DGH precludes the potential for the many highly-specialized units and

spaces that may be required at the HI. The smaller size of the facility at DGH allowed the establishment of comprehensive Inpatient and Perioperative user groups, allowing stakeholder-specific input to be integrated into Schematic floor plans for the addition, the 5th floor inpatient fit-out and major impacted support services.

Stakeholder Involvement

This report summarizes activities and findings from Part B of the project, that have taken place between February 22, 2013, and May 31, 2013, as well as activities from Part A (November 2012 to February 2013). During this timeframe there have been many meetings, workshops, open houses, and presentations with Capital District Health Authority (CDHA) and Department of Health and Wellness (DHW) stakeholders, as well as the public. Each stakeholder has reviewed and provided feedback at presentations as well as in various written and verbal communications. This feedback has been compiled, evaluated and incorporated into the design where applicable to the scope of this project. Selected key issues and feedback are highlighted for each project component along with ways that this feedback has been incorporated into the layouts presented in this report.

Support Services Impacts

Much effort was involved in capturing the impacts to existing support services created by relocating services from the Centennial Building, to the degree possible given the current, evolving state of the Clinical Services Plan. These impacts are articulated in the Space Programs and in drawing/sketch format in this report. The costs associated with renovations or new construction required to satisfy the increased burden on these services have been captured in the Cost Estimates.

Given the current, evolving state of the Clinical Services Plan, some spaces (e.g. Diagnostic Imaging) are represented simply as blocks of space labeled for renovation, rather than developed in detail. The areas of these spaces were determined based on user feedback and metrics from other, similar, contemporary projects, but ultimate requirements will be determined by Clinical Services decisions. As the Clinical Services Plan is refined, the area of these spaces will need to be confirmed and further detailed design completed.

During the course of this work, it became evident that alterations or additions to certain areas outside the original scope of this project would need to be undertaken in order for the facility to function properly. A prime example of this is the new Main Entry and relocated ICU at Dartmouth General. While design of these items are outside the scope of this project, it is important to capture the costs of these elements in the overall project cost and Business Case. As such, they are represented diagrammatically on the drawings and the costs of these alterations and additions are captured in the Cost Estimates presented in this report.

Innovation in Hospital Design and Flexibility

The work represented in this report draws on the latest thinking in hospital design to inform the planning principles. Current and anticipated innovative developments, cutomizable for each site, are represented in detail later in the report. A primary component in this project is the concept of lifelong flexibility, in order to allow the hospital(s) to adapt to changing needs of the population, introduction of technology, and expansion and contraction of services over time. This aligns with the need for CDHA to have flexibility to manage its current and future needs. Many of the design solutions presented in this report embrace flexibility as a driving planning principle.

Cost

Class “C” Unit Rates cost estimates were prepared for each project area (HI Addition, DGH Addition and DGH 5th Floor Fit-out) by Hanscomb Limited. Class “D” estimates from Part A were updated and revised as the project progressed through Part B. The fundamental method of construction cost estimating for most aspects of the information shown in this report is cost per square foot, compiled using recent project cost data, assumed levels of complexity and discussions with construction contractors. Where possible, given the stage of the project, additional detail and other factors captured in the calculation of the underlying unit rates is provided in break-out tables.

Special attention should be paid when reviewing the costs shown, particularly when comparing to other projects. For example, construction costs and project costs are different: The former describes the costs associated with construction only and the latter describes the construction and associated costs (with the exception of costs, like internal staffing, not directly related to the project).

Renovation costs are based on two primary factors: the type of space being renovated, and the extent, or complexity, of renovation required for any given space. Renovation costs for different types of space are based on comparable cost data from other relevant and recent projects, while complexity of renovation required has been estimated by the design team, based on professional judgment and information provided by CDHA staff.

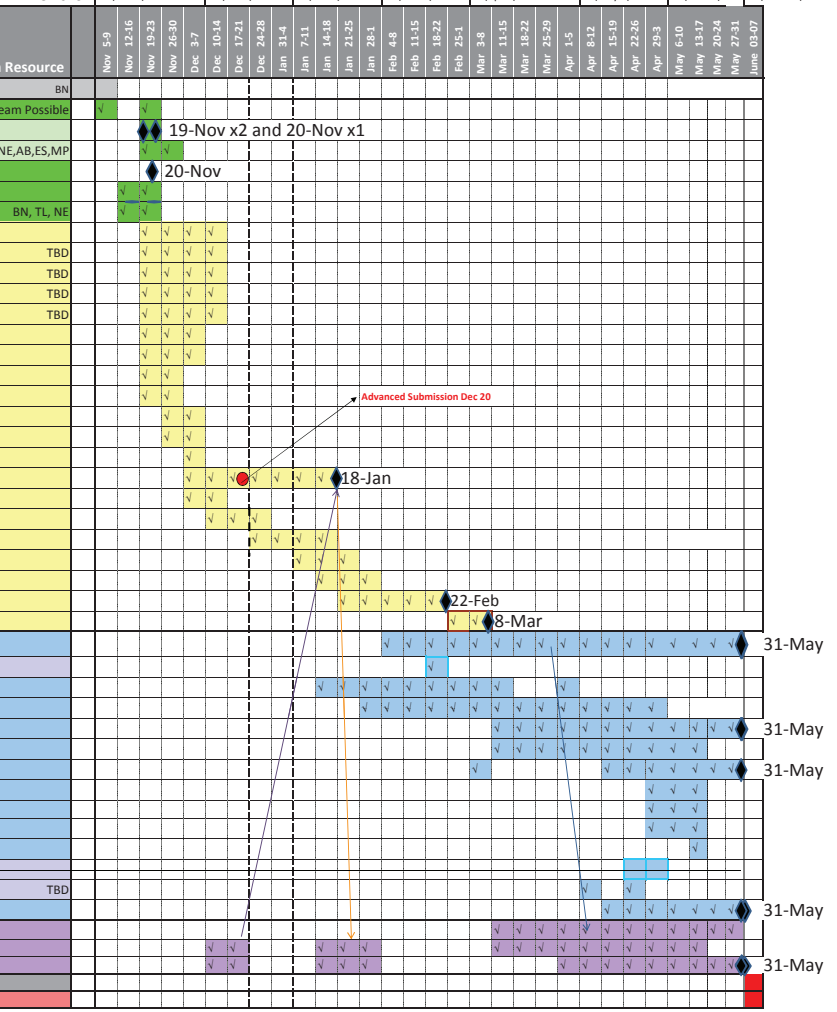
Detailed planning and design for the demolition of the Centennial Building is outside the scope of this project. Costing of the demolition work was requested by CDHA and provided in order to be factored into the Business Case. Costs of demolishing the Centennial Building alone (including capping and construction of new stairs, etc. to support the VG building) as well as the demolition of both Centennial and Victoria at the same time were provided. For the purpose of the Cost Estimate provided here, the latter cost has been included.

Project Timeline

The project timeline is shown on the following page with completed portions indicated, showing progress.

Update: 31 May, 2013

	Innovative Care, Flexible Facilities Project 1 & Project 2	Involvement of Stakeholder/Provinicial Resource	Consultant Task or CH/Provincial Resource Event	Team Resource
	Sign Service Argeement	CH Project Leader		BN
	Start up and Visioning; Orientation and Roles	Stakeholders, Decision Makers	1 Session 3 hr	All Team Possible
	Workshop/Meeting to update and advance **(updated Nov 15, 2012)**	CDHA to identify (Renewal team, Leadership)	1hr+1hr+1hr	
	Delphi Stakeholder Sessions **(updated Nov 15, 2012)**	Stakeholders	1 hr sessions for each	BN,TL,NE,AB,ES,MP
	CDHA to provide requested project information to Design Team	Decision Makers - as noted at kick-off	Capital Health work	
	CDHA to engage communications team	Decision Makers - Communication Team	Capital Health work	
	Meet with Clinical Services Group, Steering Cte	CSP Group	3 meetings	BN, TL, NE
Part A Prelim Program, Building Concept, Outline Scope, Budget	**Develop Detailed Program and Net Floor Area Requirements**		Task	
	Exercise/User Session: Review Best Practice Models **(updated Nov 15, 2012)**	Designated Stakeholders	2 to 3 meetings	TBD
	Exercise/User Session: ICU, IMCU, OR **(updated Nov 15, 2012)**	Designated Stakeholders	2 to 3 meetings	TBD
	Exercise/User Session: Patient Rooms **(updated Nov 15, 2012)**	Designated Stakeholders	2 to 3 meetings	TBD
	High - Level Client Review **(added Nov 15, 2012)**	experts from team as identified	several meetings	TBD
	Investigate Site Conditions		Task	
	Access, Circulation, Grading, Streets, Pedestrian, Vehicle, Parking, Services, Sun, Daylight		Task	
	Preliminary Review of Building Infrastructure		Task	
	Site Civil	Engineering Services	1 or 2 meetings	
	Structural	Engineering Services	1 or 2 meetings	
	Mechanical and Electrical	Engineering Services	1 or 2 meetings	
	Clinical Services Data	CSP Group	Task	
	Develop Preliminary Concepts (Program)		Task	
	Block Floor Plans	Decision Makers, Stakeholder Reps	Task and Charette	
	Investigate Alternative Configurations	Decision Makers, Stakeholder Reps	Task and Charette	
	Block 3D model of Selected Alternative	Decision Makers, Stakeholder Reps	Task and Charette	
	Develop Preliminary Scope of Work and Outline Specification		Task	
	Prepare Elemental Budget Class D		Task	
	Prepare Report		Task	
	Capital Health Review and Approval	Decision Makers, Stakeholder Reps	Review Process	
Part B Build and Expand on Part A	**Develop Detailed Program and Design**		Task	
	Community Engagement #1 (Updated Nov 15, 2012)	Decision Makers, Designated Stakeholders	Community Session	
	Review of best practices & evidence based design (Inpatient, ICU, OR, Support Svcs)		Task and Charette	
	Prepare Master Program and Functional Program		Task	
	Develop Preliminary Equipment List	Designated Stakeholders	Task, 1 or 2 meetings	
	Refine selected Schematic Design Solution and Outline Specifications		Task	
	Prepare Class C Estimate		Task	
	Prepare 3D Computer Model(s)	Decision Makers, Stakeholder Reps	Task and Charette	
	Patient Rooms	Decision Makers, Stakeholder Reps	Task and Charette	
	OR Suites	Decision Makers, Stakeholder Reps	Task and Charette	
	Buildings and Site	Decision Makers, Stakeholder Reps	Task	
	~~**Community Engagement # 2 (Updated Nov 15, 2012)**~~	~~Decision Makers, Designated Stakeholders~~	~~Task and Presentation~~	
	Bi-weekly updates - alternate HI and DGH sites **(added Nov 15, 2012)**	open invitation	bi-weekly event	TBD
	Final Report		Task	
Decision Support	**Develop Business Cases in Consultation with skateholders**	Decision Makers, Stakeholder Reps	Task and Meetings	
	Analysis of changes in operational costs as a result of revised delivery processes		Task	
	Analysis of economic impact of projects for the HRM and province		Task	
	Capital Health Review and Submittal for Decision Process	Decision Makers, Stakeholder Reps	Review Process	
Project Schedule Contingency (Objective is to complete in 6 months, with 7th month as contingency)		Contingency	Contingency	



◆ = Major Milestones, refer to attached work plan for more details

List of Documents Received

1. CDHA Master Plan - Victoria Building
2. CDHA Master Plan - Centennial Building
3. CDHA - DGH Master Program and Plan
4. 1214 Bed-Service Map Nov 21
5. CH Master Planning Demand Projections Technical Appendix
6. Copy of District Amb Care Clinic Info Scan Global Summary SOC by Director Mar 29 12 MASTER
7. Length of Stay Report to August 2012 (values only) Nov 21 12.
8. Microsoft Word - CDHA programs services facilities profile - detailed Nov 20 12
9. Microsoft Word - Activity by Service Nov 21 12 – Snapshot
10. Microsoft Word - Bed Dashboard - VG Snapshot Nov 21 12
11. Microsoft Word - Bed Map - District - All Facilities -current capacity for CSP Services Alignment Discussion Nov 21 12
12. Microsoft Word - Capital District Profile Nov 21 12
13. Microsoft Word - Initial Dashboard View of Capital Health Bed Dashboard Nov 21 12
14. Microsoft Word - List of reports generated by Performance Excellence and Decision Support
15. Microsoft Word - P Bond- VP Acute Care - Surgical Service Slate Master Nov 21 12.
16. Microsoft Word - District Ambulatory Care Scan Summary Feb 22 12.
17. ICFF BLUE SKY THOUGHTS Dec 5
18. DGH and QEII Plan, Dec 4
19. OCCC Strategic priorities, Dec 4
20. Service Map- Halifax Infirmary 2012, Dec 5
21. Service Inventory - Dartmouth General – 2012, Dec 5
22. Service Map - Centennial Building 2012 Inventory, Dec 5
23. Innovative Care Flexible Facilities: Blue Sky Ideas, Dec 5
24. DGH Plan and QEII Bed Tower Full Platform, Dec 9
25. DGH Plan and QEII Bed Tower - Full Platform, Dec 13
26. Support Services Space Impact Survey for Innovative Care and Flexible Facilities Project – Phase I
27. Support Services Space Impact Assessment Survey Jan 31 1 - Food and Nutrition Services and Porter Services
28. Support Services Space Impact Assessment Survey Jan 31 13. Lab
29. Support Services Space Impact Assessment Survey Jan 31 13. Managed Services Feb 7.13
30. Support Services Space Impact Assessment Survey Jan 31 13. QEII SPD
31. Support Services Space Impact Assessment Survey Jan 31 13. Rehab and Social Work
32. Infrastructure renewal equipment Diagnostic - March 7th
33. Infrastructure Renewal Biomedical devices - March 7th
34. Building Infrastructure Overview - March 8th
35. 10Y projected Event Costs By Component - Centennial Building March 8th
36. 10Y projected Event Costs By Component - Victoria Building March 8th
37. Past 4Y Operational Cost to Centennial and Victoria - March 8th
38. Summery of Expenses at VG site - March 8th
39. VG Site Annual Utility (Heating, Electrical, Water) Costs per sq ft - March 8th
40. February Public Engagement Feedback Report - April 13th, 2013.
41. Conceptual Clinical Space Prototype Discussion Sessions April 9th and 10th, 2013 - Summary and Common Themes – April 17th, 2013.
42. Updated Cost/Sqft "estimates" for CH buildings along with same data for DGH and HI - April 30th, 2013.
43. Centennial Building - Condition Assessment / Preliminary Report – Brief, May 15th
44. Centennial Building - Facility Evaluation, May 15th
45. Centennial Summary, May 15th

Acknowledgements

The design team would like to acknowledge the participation and support of the following individuals and organizations:

Project Leadership Team

- Gail Blackmore, CDHA
- Cathy Brophy, CDHA
- Brian Butt, CDHA
- Susan Delaney,CDHA
- Denis Pellichero, DHW
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- Jane Pryor, CDHA
- Geoff Wilson, CDHA
- Robyn McIssac, CDHA
- Andrea Rose, CDHA
- Teresa Smith CDHA

Patient/Citizen Volunteers

[redacted] Exempt section 21(1)

Project Steering Committee

- Alan Harvey
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- Dr. Ward Patrick
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- Dr. David Barnes
- Dr. Rick Gibson
- Dr. Todd Howlett
- Vickie Sullivan
- Heather Francis
- Shauna McMahon
- Brian Butt
- Lori-Anne Jones
- Theresa Mitchell

Stakeholders Consulted

- Dartmouth General Hospital Foundation
- QEII Foundation
- NS Department of Health and Wellness
- NS Department of Infrastructure Renewal
- QEII OR Executive
- QEII Clinical Services Planning
- Capital Health Leadershift Enabling Team (LET)
- DGH Clinical Affairs Group
- DGH OR Executive

Public Engagement

Two public consultations were held leading up to this report.

- February 18, 2013. Bethune Ballroom, Halifax
- February 20, 2013. NSCC Waterfront Campus Cafeteria, Dartmouth

Internal (staff) engagement

Open houses, presentations, workshops and user-group sessions were held at both the QEII and DGH sites which offered opportunity for information sharing and input from staff. Special thanks are extended to all who attended and provided valuable feedback.

Innovation and Best Practices

Many of the best practices and innovative ideas in healthcare are often both interrelated and supportive of multiple objectives. “Best Practice” is most frequently associated with clinical best practice in the form of proven protocols and treatments that achieve optimal patient outcomes for the lowest demand of resources and lowest costs. This is often referred to as evidence based care.

Similarly, in healthcare design there is a movement to create design solutions that can be demonstrated to achieve predictable outcomes, referred to as “Evidence Based Design.” The goal in creating healthcare environments is to create spaces and experiences that support the healing process either directly, by the effect the environment has on the patient, or indirectly by positively affecting those individuals that are supporting the patient.

Examples of best practice with this regard are discussed on the following pages and include:

- Private Patient Rooms
- Daylight and Views
- Team Rooms
- Patient Safety
- Situational Awareness
- Hand Washing
- Medications
- Task Lighting
- Radio Frequency Identification (RFID)
- Automation and Robotics
- Safety
- Flexibility and Change
- Operational Redesign
- Modular Solutions
- Patient Centered Care

Evidence Based Design is the creation of design solutions demonstrated to achieve predictable outcomes

Private Patient Room

There has been much debate among healthcare providers over recent years surrounding the subject of the private patient room and whether or not all patients should be housed in private rooms with private 'en-suite' bathrooms. This debate is well documented in the report titled 'The Use of Single Patient Rooms vs. Multiple Occupancy Rooms in Acute Care Environments' (2003) by Habib Chaudhury, Atiya Mahmood and Maria Calente at the Simon Fraser University. The current consensus is that all new hospitals should be constructed with 100% private rooms for all patients. This is now enshrined in the 'Guidelines for Design and Construction of Healthcare Facilities' (2010) published by the Facilities Guidelines Institute. The CSA Z8000 Standards follow suit, with section 4.5.3 reading in part: *"All inpatient bedrooms in Class A HCFs shall be single bedded unless the functional program demonstrates the necessity of a two-bed arrangement."* The justification for this requirement is also noted within the documents, as "*Single patient room occupancy has been shown to reduce the potential for transmission of organisms (and, therefore, to decrease the risk of infection), decrease medication errors and improve safety for both patient and health care providers overall."*

The private patient room model has been demonstrated to provide a superior healing environment by improving noise control, thereby allowing the patient to achieve improved rest and faster recovery. The private room can provide improved family amenities and, thus, indirectly improve the healing experience with increased opportunities for social interactions. The private room has also been shown to reduce the likelihood of nosocomial infections, further enhanced when hand washing sinks are located at the room entrance so patients and family can observe staff hand washing as they enter or leave the room. However, for certain specialties, including palliative care, the socialization provided by multi-patient rooms can be beneficial.

Private patient rooms also allow a more efficient use of rooms, as room assignment does not need to consider issues of roommate compatibility such as age or gender, or isolation for infection control.

That said, the debate continues with many healthcare providers challenging this recommendation on the basis of perceived benefits in staffing efficiency and costs.

The advantages of the private room model of care are:

- Improved patient and family satisfaction
  - Quieter and more restful experience
  - Improved patient and family comfort
  - Improved patient privacy
- Improved healing environment
- Improved patient safety
  - Reduced incidence of nosocomial infections
  - Reduced incidence of medication errors
- Improved patient and family security
- Improved staff satisfaction
- Improved operational costs (Babrow & Thomas, 2000)

The advantages of the multi-bed model of care are:

- Improved patient socialization
- Increased staff efficiency
- Perceived lower operational costs
- Reduced first time capital/construction costs.

Ulrich, R. S., Zimring, C., Zhu, X., DuBose, J., Seo, H.-B., Choi, Y.-S., et al. (2008). A Review of the Research Literature on Evidence-Based Healthcare Design (Part II). HERD, 21.

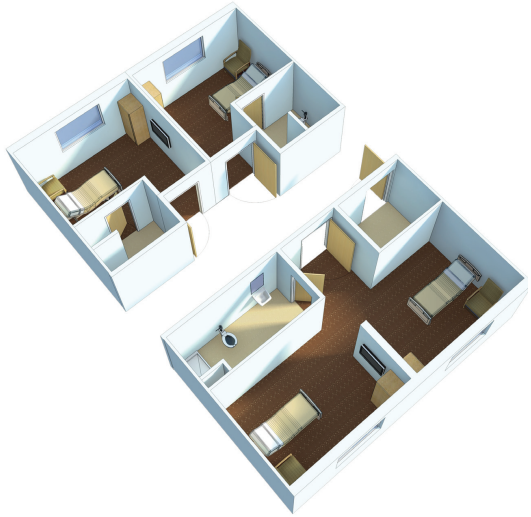
Calkins, Margaret P., & Biddle, Stacey, & Biesan, Orion (2012). Contribution of the Designed Environment to Fall Risk in Hospitals.

Kennedy, M. R. C. (2012). Sleep as a moderating value in healthcare design. Health Environments Research & Design Journal, 6(1), 123-143.12123.

O'Connor, M., O'Brien, A., Bloomer, M., Morphett, J., Peters, L., Hall, H., … Munro, I. (2012). The environment of inpatient healthcare delivery and its influence on the outcome of care. Health Environments Research & Design Journal, 6(1), 105-117.

Zimring, C., & Seo, H-B. (2012). Making acuity-adaptable units work: Lessons from the field. Health Environments Research & Design Journal, 5(3), 115-128

The patient rooms in Banner Ironwood provide large windows, oversized doors to the toilet rooms, a dedicated family area, and variable lighting levels. The also serves as a communications hub, allowing patients to order their meals or watch educational programs tailored to their needs. Selected rooms are equipped with the E-ICU system which allows remote specialists to consult over the television.



Left: flexible room layouts under consideration for renovations to the existing 5th Floor of the Dartmouth General include the option of converting double rooms into singles.

Patient Room Size and Organization

There are a variety of issues that relate to the appropriate size of the patient room and the justification for increasing this size beyond community averages. It is now common practice to carefully organize the room to provide dedicated areas for the three primary activities and users: the patient, the family and the care team (staff). By defining where each of these zones occur, and by organizing the room to optimize circulation between these zones, the room entrance and the bathroom, it is possible to maximize the value of exterior window views. This arrangement will preserve good visibility of the patient by the care team while providing sufficient space for efficient and effective care.

Each room must provide space for the first two users, the patient and care team, at a minimum. The amount of area dedicated to the family will vary depending upon expected patient acuity and cultural considerations.

Patient Space

The space needs for the patient area are defined by the patient bed and the area required around the bed. Included in this zone are the other room amenities including the bedside table, patient wardrobe/locker, television and a shelf for cards/flowers, etc.

Staff Space

Staff space needs vary, depending somewhat on the model of care. The amount of space allowed for the care team can determine the types of in-room procedures that might be performed, by determining the equipment and care team space that will be available. In teaching hospitals, the team area will need to include sufficient space to accommodate students accompanying the physician. A recent trend is the expansion of the care team to include a Pharmacist in the rounding team, which also increases the size of the team.

Family Accommodation

The space allowance for family is perhaps the largest variable within the overall room size. This can vary from a minimal area to accommodate a single chair, to a quite generous space for multiple family members. The inclusion of either a built-in or freestanding sofa can provide space to accommodate several people including children, or guests who may require bariatric seating options. The sofa can be also used by a family attendant to sleep/stay overnight with the patient. In some instances when the extended stays are anticipated, the family space can include sufficient space for a desk and chair for the attendant to work on a laptop computer or conduct personal business.

Location of Bathroom

The location of the bathroom is an important design issue and can affect the overall size of the patient bedroom. There are typically three alternates for the bathroom location in the private and semi-private room – Inboard, Outboard and Back-to-Back between pairs of rooms. Each option has different advantages.

- Inboard: The inboard bathroom results in adding circulation space to the overall room size to accommodate the passage from the room entrance door, past the bathroom to functional area of the bedroom.
- Outboard: The outboard bathroom results in a loss of area that might have been assigned to the family zone.
- Back-to-Back: The back-to-back bathroom optimizes the space availability for the three functional areas in the patient room. It can, however, result in increased corridor lengths and, thus, add to the overall space on the patient care unit.

Adaptability

The ability for a patient room to be adapted to other uses over time is referred to as room adaptability. The concept is typically coupled to the idea of creating a structural bay size that will accommodate a variety of room sizes to meet differing demands. For example, an acute care patient room may be required to become a critical care room at some point. The adaptation can be more easily accommodated if the room module is sized to meet the needs of both acute and critical care rooms.

- Universal Room: When applied to patient rooms, this term describes creating a room that can be used by either a critical or acute patient. While hospitals that have tried to implement a 100% universal room policy have found it to be prohibitively difficult to implement, acuity adaptable rooms that combine med-surg and progressive care into one unit can be beneficial. A common example of this room might be the Cardiac Care room. In this instance, the transition of the heart patient following surgery from being classified as a critical patient quickly progresses into an acute status. This room is required to meet the functional requirements of a critical care patient, with high level of monitoring and visibility from a nurse station, and the less demanding needs of an acute patient.

Patient Acuity

The degree of patient acuity is a major determinant of minimum room size. Typically, the higher acuity patient will require more space in the patient and staff areas to support additional equipment or supply needs.

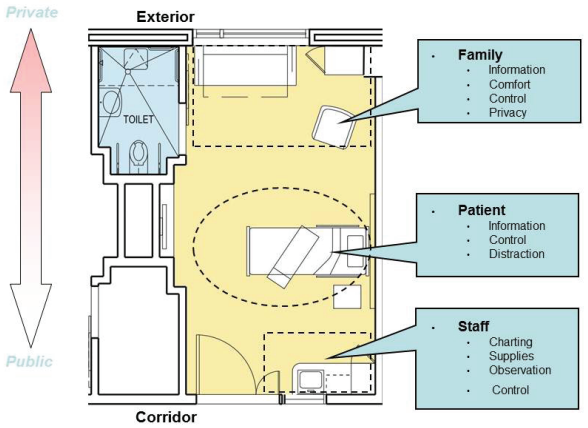
Special Needs

The special needs of the patient and/or their family attendants are an increasingly challenging issue to manage. This category includes disability of all sorts, including obesity. The incidence of obesity is increasing in North America, creating demands that this group is appropriately and respectfully accommodated. Larger people require more space to maneuver and may require wider clearances around objects. For example, both the patients and/or their attendants may use oversized wheelchairs. These patient rooms also require bathrooms that are appropriately sized to accommodate disabled patients and attendants using wheelchairs, patient lifts and care team support.

Specialty Care Model Needs

The patient room is typicaly a standard design which will accommodate most patient types. There are some patient types that require more specialized responses. These specialty groups would include, among others:

- Pediatrics and Maternity
- Chemical Dependency
- Mental Health
- Long Term Rehabilitation



Patient room zoning can affect room size. When more family space is required, the overall room size may need to increase. The size of the staff and patient zones will depend on the equipment expected to be used and the size of the care team.

It is now common practice to provide dedicated areas for the patient, the family, and the care team in patient rooms. The amount of area dedicated to family will vary depending on patient acuity and cultural considerations.

The adaptability of patient rooms is typically coupled with structural bay size to accommodate a variety of room sizes within one structural system.

Daylight and Views

It is demonstrable that patients who occupy sunny patient rooms and with attractive views from their beds typically heal faster in comparison to patients without this amenity. In these instances, this results in a lower average length of stay and higher utilization. It has also been demonstrated that similar results can be achieved using attractive landscape paintings, pictures or video images to augment a less-than-desirable bedroom window view. Attention to the quality and intensity of room lighting can compensate for direct sunlight into the space.

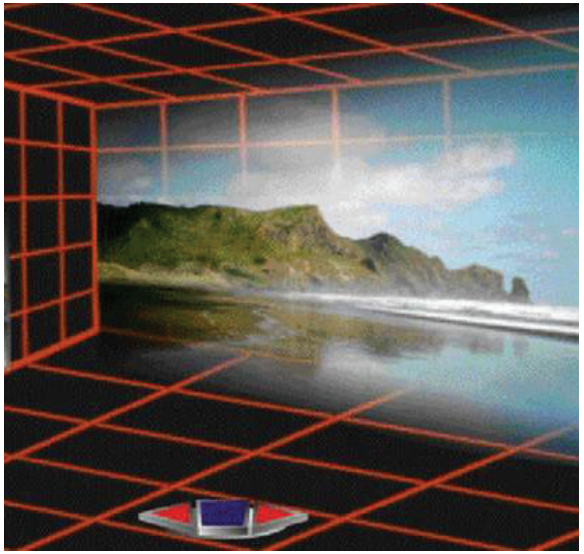
Herman Miller Healthcare. (2010). Patient Rooms: A Changing Scene of Healing. 7.

Vincent, E., & Battisto, D., & Grimes, L., & McCubbin, J. (2010). The Effects of Nature Images on Pain in a Simulated Hospital Patient Room. Health Environments Research & Design Journal,3(3), 42-55

Windows in the Emergency Department treatment rooms at Banner Page do more than provide natural light. Every room has a view of the garden. Carefully placed walls create private garden spaces, ensuring visual privacy for the patients, without compromising the views.

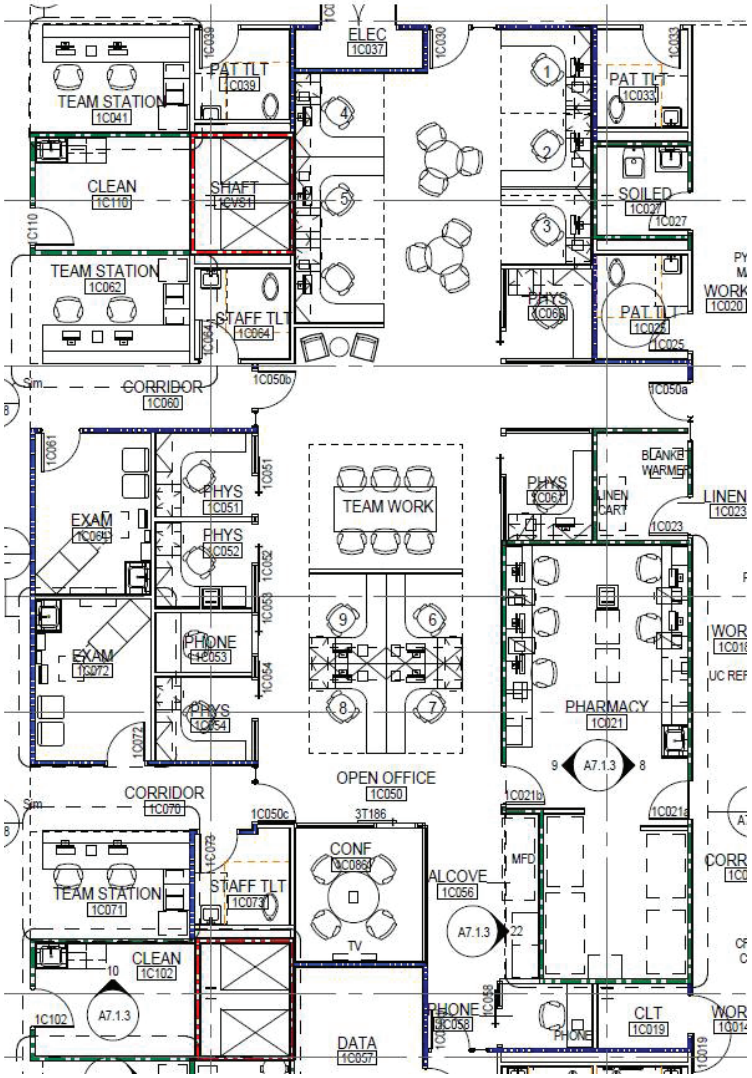
It is demonstrable that patients who occupy sunny patient rooms and with attractive views from their beds typically heal faster in comparison to patients without this amenity.

Views, paintings, photos of nature



Virtual reality - to create a personalized experience

Microsoft flat screen wallpaper under development



By designing care teams' working environments to encourage collaboration, quality and effectiveness of care can be improved.

Team Rooms

Creating a working environment for care teams that encourages easy, direct communication and collaboration has been shown to improve the quality and effectiveness of care. Every care pathway should be reviewed to determine when and where team collaboration spaces can be employed to optimize care and reduce the likelihood of errors and omissions. Collaboration spaces must be balanced by the incorporation of spaces that support quiet, focused work activities. The use of glass enclosed work cubes, telephone booths and mini conference spaces to separate noisier activities from those needing peace and quiet can help with this balance.

Almquist, J., & Kelly, C., & Bromberg, J., & Bryant, S., & Christianson, T., & Montori, V. (2009). Consultation room design and the clinical encounter: The space and interaction randomized trial. Health Environments Research and Design,3(1), 41-78

The team area at this cancer center in Ohio is designed to provide a balance of team and private workspace. Physician workstations are in cubicles with sliding glass doors, while other team members are at open workstations. Small private phone cubicles are provided to allow for privacy when needed. The team room is placed between clinics, allowing team members to move easily between them.