



CANADIAN CONSULTING ENGINEER
AWARDS 2019

Bethany Riverview

Category: A. Buildings

Presented by: SMP Engineering



integrity

knowledge

innovation



Figure 1. Exterior view of Bethany Riverview

INTRODUCTION

Bethany Riverview is a new \$67 million Long Term and Specialized Dementia Care facility which recently opened in Southeast Calgary, Alberta. Considered as the largest dementia care residential complex in southern Alberta, this facility consists of 210 beds (120 beds committed to complex dementia care), a 3,000 square foot atrium, dining rooms, amenity spaces, support staff areas, daycare, bistro, three courtyards and Bethany Calgary's new corporate offices. The design included concealed exit doors and a Patient Wandering System which protects at risk residents from unknowingly leaving the facility and putting themselves in danger. Upon the commencement of this project, the design team took part in a virtual dementia tour intended to simulate dementia related sensory challenges. This activity helped the design team to understand how an inadequate design for this type of facility can hinder the well-being of a dementia.

"Residents can come live here and feel like they are living in a home and not like they are living in a facility. Each floor is broken into neighbourhoods, and our neighbourhoods are broken into households."

~ Care Service Manager, Bethany Care Society

ABOUT THE PROJECT

Bethany Riverview was designed to deliver continuing care, particularly for those persons with dementia and/or a mental health diagnoses with challenging behaviours. This project was created to generate a safe and caring home to approximately 210 residents - 90 whom require complex care, and the remaining designated as supportive living, including 10 beds that could provide transitional support as residents prepare to return to a regular Long-Term Care (LTC) or Designated Supportive Living (DSL) placement. This transitional unit was a funded special program and may also be used to manage the sub-acute care needs of seniors whose primary residence is within the Riverview Village community.

Bethany Riverview is designed with self-contained households. There are 14 households that comprise 15 beds each. This design enables the co-location of residents with similar care needs to optimize the efficiency and effectiveness of care delivery. Each house provides many daily activities such as dining, recreation and social programming. The 15 bed houses are paired creating a 30-bed neighbourhood which supports operational efficiencies. The neighbourhood provides shared spaces such as staff conference rooms, medication room, resident amenity spaces, and kitchen and servery area.

Although the project was for 210 LTC, DSL 4 and DSL4D beds, the rooms and households will be indistinguishable from each other in design and function. All resident rooms are fully accessible and average 355 sf. Bariatric rooms are 448 sf and include specialized equipment to address their unique care needs.



Figure 2. View of Atrium



Figure 3. View of Atrium

Within the facility, there is also a 3,000-square-foot atrium which acts as year-round indoor space allowing residents the simulation of being outside. A glass panel ceiling encases this facility allowing natural light to enter the space while providing a safe and controlled environment. Here, residents can experience the familiar sights, smells, and sounds of the outdoors while protecting them from elements associated with traditional courtyards. The atrium was designed and funded as a partnership between the Rotary Clubs of Calgary and the Bethany Care Society, aimed to provide a gathering space for dementia residents, family members, caregivers and the wider community.

PROJECT SPECIFICS

Owner: Bethany Care Society

Project Budget (Initial): \$62,000,000

Project Start Date: 01-06-2016

Sector: Long-Term Care and
Specialized Dementia Care

Project Team: IBI Group - Architect

Stuart Olsen - General Contractor

IBI Group - Civil Engineer

SMP Engineering – Electrical Engineer

Reinbold Engineering - Mechanical Engineer

MMP Structural Engineering - Structural Engineer

Location: 200, 2915 26 Ave SE, Calgary, AB T2B 2W6

Project Budget (Final): \$67,000,000

Project Completion Date: 01-09-2018

Project Size: 12-acre campus

INNOVATION / TECHNOLOGY ADVANCEMENT

The interior of the Bethany Riverview residence was developed to provide a sense of home-style living while considering the safety and health needs of the residents. Working closely with the architect's in-house research program, the design development included using the most current research and understanding of sense-sensitive design and assistive technologies. One of the focuses used as a basis for design was the understanding that our environment has a direct effect on our physiological, emotional, psychological and physical well-being.

Each area of the building was designed to have its own unique, identifying features. Colour was used mindfully in each resident area, by floor, neighbourhood and household. A variety of bright, coordinating colours in contrasting tones help to create a cheerful home as well as visually differentiate areas. Additionally, each door was designed with different panelling, hardware, and finishes to create multiple layers of identification.

Unique and identifiable zones were established to aid in wayfinding, minimize anxiety and heighten spatial organization. Palettes were selected with a focus on research regarding the therapeutic aspects of colour, as mood and recovery can all be positively affected by appropriate usage. Colour rendering in the lighting was also key to ensure the palettes were lit correctly.

To create a comforting environment, familiar design features were used to conceal operational areas, such as creating custom linen access panels at each resident's room. These panels are concealed with decorative moulding, to look like a design feature, while acting as a panel for staff to access clean and dirty linens without bothering the resident.

The design between the public and private spaces were also designed specifically to read as distinct and different areas, while the resident areas were homey and comforting. The main floor reception and assembly spaces have a more hospitality feel, and the café has more retail inspired finishes. This was also designed to help the residents feel as though they can move freely and visit other areas without leaving the building.

All the above items helped in enhancing the experience of the resident, and to encourage their need to wander. A sense of purpose and destination was created by giving the residents a sense of walking through the different neighbourhoods, but it also helps to identify the individual rooms to help them return home safely, without creating agitation or disorientation.



Figure 4. View of Resident Entrances



Figure 5. View of Servery



Figure 6. View of Gathering Space



Figure 7. View of Reception

ADVANCED APPROACH | LEADING CONCEPT

At the start of the project, Bethany Care Society has requested that the design team “*think outside the box*” and provide a design that not only would create a residential feel but would provide an environment that slowed the spread of dementia among the residents. It was imperative to differentiate this facility from others by ensuring that patient care was prioritized ahead of cost. By working with the construction manager throughout the design phase of this project, the design team was able to provide unique solutions that met the client’s request while still being able to meet the budget.

The leading objective of this project was to increase capacity for specialized populations, particularly those with complex dementia. Located on a 12-acre campus, The Bethany Riverview consists of a four-storey concrete building of an estimated 178,810 square feet in size and is situated on about 2.5 acres of land. Of this land approximately 40% will be “covered” meaning, almost half of this land mass includes resident outdoor space, landscaping and surface parking.

SMP’S ROLE

SMP Engineering was the Electrical Engineering Consultant for this project and was involved in the design of the lighting systems, power systems, life safety systems, communication systems, nurse call systems, security systems (access control/intrusion detection), resident elopement, resident entertainment, and the wireless infrastructure.

Additionally, SMP was involved with the architecture of the building, specifically the colours used for interior finishes and room configuration. However, the majority of our scope was the design of the lighting for the facility as well as the security, communications, nurse call and IT systems involved.

The project was completed on time though it did take a lot of effort, by all parties, near the end of the project construction time line to enable the building to be finished on time.

The construction budget, including the contingency fund for the project was \$67 million dollars. During the construction period, several studies were produced by dementia researchers that resulted in solutions that would help in better care for the residents, and many of these solutions were incorporated into the project during construction which resulted in the project going marginally over budget by approximately \$200,000 dollars.

As this project was a first in providing the most effective and unique design possible, the design team knew that the design fees would not meet actual costs. However, in a mutually agreed decision between the design team and client, the extra allocation was approved because all parties knew that the fee short fall would be made up on future projects since most of the design issues would not have to be redone.

Upon the commencement of this project, the design team took part in a virtual dementia tour intended to simulate dementia related sensory challenges. This activity helped the design team understand how an inadequate design for this type of facility can hinder the well-being of a dementia patient, while also garnering unnecessary stress.

Teams participated in the simulation which gave a bird's eye view into the sensory challenges experienced by people with dementia. From here, a greater insight was established, allowing the project team a solid understanding of the limitations and difficulties experienced by patients every day. By understanding and recognizing these limitations, we can break the mould on how we build traditional facilities and re-create the standard to better suit the needs of specialized care.

This project is the first of its kind for Bethany Care Society and is also the flagship for all future dementia and long-term care facilities going forward. The research and technology involved in creating the design was so advanced that it could be assumed that resources like this could be available for other specialty care facilities in the future.

Although the project has only been operational for only a few weeks, the overall impression by the client, staff, and residents has been very positive.

TECHNICAL EXCELLENCE

Lighting Design

One of the most important issues regarding dementia care is the lighting. This not only affects a resident's physical health but could also influence their mental health. By providing lighting that is bright, glare free, uniform, mirrors the pattern of sun during a normal day, and has more of a residential feel rather than an institutional feel, can greatly improve the mental and physical health of residents.

The Bethany Care Society requested the team to come up with lighting solutions that would promote positive health, the design team needed to also be conscious of the project's construction budget. Since the project was a design-bid-build construction method, the design team only had a rough estimate of the associated costs for the lighting, creating the dilemma of producing a design that was either too expensive, thereby having to redesign the lighting after the tender was completed to save costs, or provide a lighting scheme that met the client's minimum requirements, but comes in under budget, causing the team to redesign the lighting to increase the quality of the lighting, thereby adding time and costs to the construction schedule and budget.

The team's unique idea to resolve this issue was to create three designs, commonly referred to by the team as "Good", "Better" "Best". The "Good" design, which was the base tender design, would meet the minimum design intent, with simple on-off controls for the lighting, and be the most cost-effective design. The "Better" solution, which was a cost adder, used higher quality light fixtures, than the "Good" solution, with automated dimming controls than mirrors the light levels of dawn and sunset on a normal day. The "Best" solution, which also was a cost adder, used the highest quality light fixtures, creating the best lighting solution possible for dementia care, with a control system that not only controls the light level of the "Better" solution but controlled the colour of the lighting as well, with the light being more of a cool colour in the morning or dawn and a more warm colour in the evening or sunset.

The costing for all three lighting solutions had to be carried in the contractor's tender, so the client could pick and choose which solution to use depending on the area, function and costs, without having to pay the extra costs associated with change notices. Eventually the client chose to use the 'Better' solution for all resident corridors and amenity spaces while using the "Best" solution for the lounges and dining rooms.

Great care was also required in the design of the lighting for the resident suites, considering the resident would spend more time in their suite than any other area of the building. The lighting had to be bright, comfortable, and mirror a residential or home environment. Decorative LED fixtures were used in the suite entry and sitting area, with a linear wall mounted LED fixture over the bed, LED lights in the clothes closet, an LED strip light in the bathroom door frame, and a wall mounted LED fixture over the bathroom vanity.



Figure 8. View of Door Halo

To prevent a resident from being agitated or shocked by turning on the bright bathroom light when going to the bathroom at night, a unique solution was devised. An amber LED strip light was in-bedded in the bathroom door frame to provide a halo effect to the bathroom, so the resident can find the bathroom door in the dark without having to turn on the room lights. Amber colour was used as it does not affect a person's sleep patterns when left on during the night. Upon approaching the bathroom door, a motion sensor picks up the resident's movements and turns on the bathroom lights at low brightness, with the light level slowly increasing over 30 seconds to full brightness. This allows the resident's eyes to adjust to the light without startling them. Once inside the bathroom, the motion sensor prevents the lights from turning off until the resident leaves and after a given period the lights slowly fade off. This control system for the bathroom lights is centrally controlled by a computer that can adjust the light level and operational time of the controls to suit an individual's sleep habits.



Figure 9. View of Door LED Strip

Safety and Security Design

The state-of-the-art Safety and Security system installed in the Bethany Care Facility includes safety components to keep residents' safe and secure, within the confines of the building. The heart of the system is the modern Nurse Call system which includes the ability to monitor the residents' bed at night, allowing for emergency calls from resident rooms, and can classify emergencies by code, thus allowing a triage of alarms during busy times of the day, when urgent requests need to be handled before convenience requests.

For patient safety during inclement weather and/or to prevent residents from wandering away from safe spaces within the facility, a modern tracking system is available (i.e. patient wander system). This is especially valuable for those with memory issues that may not recognize dangerous situations on their own.

Communication within the building is achieved through wired and wireless telephone and intercom systems that allow mobile accessible communications between visitors, staff and residents that includes many built-in safety features such as high visibility help-phone stations in the underground public parking space, in the case of medical or other emergency (i.e. telephone and intercom systems).

In the case of an emergency or alarm, video camera coverage of public spaces and emergency exits is designed to allow for immediate remote monitoring of areas and doors by staff to quickly assess the alarm situation remotely and instantaneously without delay of having to go to the event personally. Thereby speeding up an appropriate response to many potential issues.

If an event occurs, cameras are recorded for training, security and identification purposes to allow staff to learn from situations and to actively pursue actions in the case of inappropriate and/or criminal activity. All video recording will be in accordance with best practice and all Legislative requirements as required.

For security reasons, access control to the building and sensitive areas therein, shall be through modern secure proximity ID credential ensuring that only authorized staff and family members have access to sensitive areas and/or resident areas that would otherwise be off-limits to strangers and/or unauthorized personnel. This electronic access control allows for instantaneous removal of privileges (if needed) and ensures that mechanical keys are not accidentally lost and/or intentionally copied by unauthorized personnel for common doors that are otherwise public access points.

Security is also maintained through the use and integration of intrusion alarm components to ensure that no unauthorized access is allowed into protected areas of the building and which is used (in part) to trigger the video system and alert the staff of potential problems.

All activity within the building security and safety systems is logged for learning and future programming purposes to ensure that the facility will continuously improve its ability to respond to emergency situations and potential future threats that may otherwise negatively affect the safety and security of the Residents, Staff and Visitors.

MANAGEMENT OF RISK

From the initial stages of design, regularly scheduled meetings with the owner were held to ensure all operational requirements were satisfied. The project's Prime Consultant, IBI Group Architects assembled a strong consulting team based on prior experience with reputable firms for geotechnical, structural, mechanical, and electrical disciplines while providing the remainder of services in-house, including civil engineering, interior design and landscaping.

The work was completed under a construction management contract and Stuart Olson Construction was engaged early in the process to provide input during the pre-construction phase. A phased tendering approach was implemented by the construction manager in order to obtain accurate and detailed pricing by reducing overlap in trades' scopes.

During each stage of the phased-tendering process, the construction manager held value engineering (i.e. cost savings) meetings with the owner, project manager, and consulting team.

Once mechanical and electrical sub-contractors were selected, detailed coordination meetings were held, and potential mechanical/electrical/structural conflicts were resolved prior to construction through the use of the construction manager's 3D modeling software.

Prior to construction, IBI Group Architects' graphics department developed detailed computer-generated renderings of the interior and exterior of the building in order to demonstrate the spatial relations and aesthetics of what the finished product would look like.

A full-scale mock-up of the suite was constructed on the site and located indoors at the owner's adjacent facility. These gave a visual representation of the details and interior finishes so that the owner could see the design first-hand either make approvals or changes prior to construction, without affecting schedule.

Risk management during construction was achieved in part through IBI Group's construction contract administration. Periodic site reviews, regular site meetings and daily communication was conducted by experienced personnel specializing in building envelope design. Detailed review of progress claims, submittals and on-site mock-ups as well as timely responses to construction manager's requests for information helped to ensure quality of work and compliance with contract documents while maintaining schedule throughout the construction phase of the project.

Changes in the work during construction were addressed via consulting team's coordination and issuance of change documents. Any cost or schedule implication as a result of a change in the work was submitted by the construction manager and reviewed for accuracy by the consulting team on behalf of the owner.

ADDED VALUE | MEETING THE NEED

While the project doesn't exactly meet the needs of the province as a whole, the Bethany Riverview is a much-needed resource in the spectrum for some of the 44,000 Albertans with dementia. Since opening its doors, the facility aids seniors in getting the proper care they need while easing the burden on the province's acute care bed system by freeing up resources in emergency rooms.

According to the Alzheimer Society of Calgary, approximately 13,000 or more people in the city and surrounding areas are living with Alzheimer's disease or related dementias. The number of new dementia cases (for Calgary and all of Canada) is projected to increase significantly over the next 15 years.

DEGREE OF DIFFICULTY

This project was very difficult in many ways. As previously mentioned the design team basically started from scratch, to come up with the most unique and cost-effective design possible, and not to repeat the same mistakes that other facilities have made in caring for dementia patients. Because the client required the facility to be totally completed by the end of the 3rd quarter of 2018, the design and construction period was condensed to meet this very tight deadline. The design period was reduced to 5 months and the construction period to less than 2 years. To reduce the overall design and construction schedule, the initial design focus was to complete the construction drawings for the building structure and parkade, while the construction team focused on this work, it left the design team with additional time to complete the interiors design package. Great communication and teamwork between the design and construction teams allowed the project to be completed in the very tight deadline required by the client.

BENEFIT TO SOCIETY

It is no secret that the requirements of a senior's facility are not as they once were. With research and modern technology in place, we can design a facility that not only is optimal in providing care, but we can make "aging in place" more comfortable. By designing systems that are functional, easy to operate, effortless to maintain, and effective, quality of life is vastly improved for residents and staff.

To be able to provide input on the design of independent, supportive, and assisted living retirement facilities for the elderly, we are able to improve the quality of life for our elderly. Ensuring that our elders receive high-quality facilities that they deserve, will set the bar for future generations to follow.