



<b>SUBJECT</b>	UBC AQUATIC CENTRE - BOARD 4 POST-COMPLETION REPORT		
<b>REPORT TO</b>	PROPERTY COMMITTEE		
<b>MEETING DATE</b>	NOVEMBER 26, 2019		
<b>MATTER TYPE</b>	<input checked="" type="checkbox"/> BOARD DISCUSSION NOT REQUIRED	<input type="checkbox"/> BOARD DISCUSSION REQUIRED	
<b>ACTION REQUESTED</b>	No decision required: for information		
<b>REPORT DATE</b>	November 5, 2019		
<b>EXECUTIVE PROPONENT</b>	Peter Smailes, Vice-President Finance & Operations		
<b>PRESENTED BY</b>	John Metras, Associate Vice-President, Facilities		
<b>SUPPORTED BY</b>	Ainsley Carry, Vice-President, Students Kavie Toor, Senior Director, Facilities, Recreation and Sport Partnerships Yale Loh, Treasurer Michael White, Associate Vice-President Campus & Community Planning Jennifer Sanguinetti, Managing Director, Infrastructure Development Aubrey Kelly, President and CEO, UBC Properties Trust		

## PRIOR SUBMISSIONS

The subject matter of this Report has been considered previously by the Property Committee on the following occasions:

1. [June 2012](#) Board 1 Approval, Funding Release: \$800,000
2. [June 2013](#) Board 2 Approval, Funding Release: \$1,500,000
3. [June 2014](#) Board 3 Approval, Funding Release \$37,600,000
  - 1) Board 3 approval to commence construction on the new Aquatic Centre subject to construction tenders being received at or below budget based on 80% of tenders, with a funding release of \$37,600,000 to undertake and complete construction.

Capital Budget	\$39,900,000
Operating Budget	See 10-year Projection
Schedule	
Program	
Award construction contracts	
Funding Release	\$37,600,000
Information	
Expenses to date	\$97,108
Funding released to date	\$2,300,000

- 2) Approval of an internal loan of up to \$11.4 million (25 year amortization, 5.75% annual interest), paid back from the Athletics & Recreation operating budget, as bridge financing to support the project until donor fundraising is completed.

## EXECUTIVE SUMMARY

The executive summary assumes familiarity with the prior submissions and provides a status update from the date of the most recent report.

The new UBC Aquatic Centre is an outstanding building architecturally, and a unique, world-class facility that successfully combines the needs of high performance competitive aquatics programs and community programs in one facility. Feedback from both varsity teams and the community is extremely positive.

The facility includes a 50 metre competition pool, 25 metre recreational lap pool, leisure pool, spectator seating, hot tub, steam/sauna, change and shower rooms (universal, men's and women's), meeting room, wet classroom, office/administrative space, and a lease space. The building was completed and opened to the public in January 2017. The final cost of the project was \$39.910 million in accordance with the approved Board 3 budget.

In comparison with many other aquatic facilities, the UBC Aquatic Centre incorporates leading-edge technologies to provide optimum air and water quality for swimmers, and a superior acoustic environment due to the inclusion of custom acoustic ceiling panels. The facility also incorporates innovative energy and water saving and recycling strategies, including a 1.3-million-litre underground water cistern which harvests rainwater from the facility's roof to replenish evaporated pool water and to help manage stormwater runoff and flooding. The project has garnered multiple design and sustainability awards and has achieved LEED Gold certification.

A stakeholder meeting of occupants, operators and the project delivery team was held on September 3, 2019 to review project successes, constraints and lessons learned. All agreed that the design of the project was very successful and delivered on Athletics & Recreation's goal to build a world-class aquatics facility offering inspirational aquatic experiences for all ages and abilities, with air and water quality second to none. Combining high performance and community programs in one building was unique and there were no models for the team to draw from. Programmatically and operationally, this was a challenging vision but the level of success is indicated by the fact that both varsity athletes and the community love the facility. The pool deck space is adequately sized for events, even after the deck space was reduced to meet budget, and there has been positive feedback on the split of gender-specific and all-gender change rooms and washrooms. The building is outstanding from an aesthetic perspective, with a great quality of light and unusually good acoustic performance. Integration of sustainable measures was a key factor in the design process, and a team effort developed several innovative energy and water saving and recycling strategies

While overall a successful project, some design issues have emerged that can serve as lessons for future aquatic facility projects. There have been some ongoing mechanical and electrical issues causing operating issues. For example the mechanical heat recovery chiller system, an ambitious and complex system designed to further sustainability goals, has taken some time to operate as intended. The rainwater recovery system has had issues, although resolution is imminent. Unlike core academic buildings, Athletics contracts with Building Operations to maintain all or part of the buildings post occupancy. A lesson learned is that closer communication between Athletics, the project team, and Building Operations during design regarding proposed system changes is important to ensure that the building will operate as intended.

Overall the development process was very successful, with an "amazing team effort" and significant time and investment from all UBC parties, consultants and contractor. The budget was economical for this type of facility and created some challenges. Success was achieved, however, through a collaborative and creative effort from the entire team. A caution cited was the imperative not to compromise key building components to meet the capital budget, as this can create higher operating costs in the long term. Intensive Building Operations engagement was critical to designing a facility with maintainable systems, and this engagement process has been formalized since the Aquatic Centre project was completed.

The site was challenging from the perspective of pedestrian and vehicular access routes, and the team was further challenged by significant contextual changes that emerged during the design and construction process. Flexibility from Campus & Community Planning helped the team arrive at solutions, and it was noted that attention to realistic site servicing needs in the urban design stage is critical as more infill sites are developed in the increasingly congested and pedestrian-friendly campus.

A lesson learned has been the critical need for a good commissioning authority on the project who will be hands-on in helping to solve problems. UBCPT has since sourced an excellent commissioning authority for subsequent projects. Athletics & Recreation also cited the difficulty in fundraising for a project that is already approved and in progress.

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## SUPPLEMENTAL MATERIALS

1. Photographs of UBC Aquatic Centre
2. Design Awards

Supplemental Materials 1 – Photographs of UBC Aquatic Centre



Photo by Shai Gil, courtesy of MJMA & Acton Ostry Architects

Photo 1 – Exterior View



Photo by Shai Gil, courtesy of MJMA & Acton Ostry Architects

Photo 2 – Exterior View of Entrance



Photo 3 – Interior View of Recreation Pool



Photo 4 – Interior View of Competition Pool



Photo 5 – Interior View of Leisure Pool



Photo 6 – Interior View of Leisure Pool

## Supplemental Materials 2 – Design Awards

- 2019 Canadian Interiors Best of Canada Award
- 2019 SCUP Excellence in Architecture
- 2019 AIA/CAE Education Facility Design Award
- 2018 Lieutenant Governor of British Columbia Medal
- 2018 Global Architecture and Design Award
- 2018 AIA International Region Merit Award
- 2018 AIA International Region Sustainability Award
- 2018 Piscine Global Europe Pool Design Award
- 2018 Interior Designers of Canada Award
- 2018 Interior Designers Institute of British Columbia (IDIBC) Award
- 2018 Engineers & Geoscientists of British Columbia Sustainability Award
- 2017 Athletic Business Facilities Award
- 2014 Canadian Architect Award of Excellence



**SUBJECT** UBC BASEBALL ROSE INDOOR TRAINING FACILITY  
BOARD 4 POST-COMPLETION REPORT

**REPORT TO** PROPERTY COMMITTEE

**MEETING DATE** NOVEMBER 26, 2019

**MATTER TYPE**  BOARD DISCUSSION NOT REQUIRED  BOARD DISCUSSION REQUIRED

**ACTION REQUESTED** No decision required: for information

**REPORT DATE** November 5, 2019

**EXECUTIVE PROPONENT** Peter Smailes, Vice-President Finance & Operations

**PRESENTED BY** John Metras, Associate Vice-President, Facilities

**SUPPORTED BY** Ainsley Carry, Vice-President Students  
Kavie Toor, Senior Director, Facilities, Recreation and Sport Partnerships  
Yale Loh, Treasurer  
Michael White, Associate Vice-President Campus & Community Planning  
Jennifer Sanguinetti, Managing Director, Infrastructure Development  
Aubrey Kelly, President and CEO, UBC Properties Trust

**PRIOR SUBMISSIONS**

The subject matter of this Report was previously considered by the Property Committee on the following occasions:

1. [April 2014](#) , Board 1 Approval, Funding Release: \$500,000
2. [September 2014](#) , Board 2 Approval, Funding Release: \$250,000
3. [February 2015](#) , Board 3 Approval, Funding Release \$2,750,000

Board 3 approval to commence construction on the new Aquatic Centre, with a funding release of \$2,750,000 to undertake and complete construction.

Capital Budget	\$3,500,000
Operating Budget	See Projection
Schedule	
Program	
Authorization to Issue Development Permit	
Proceed to Working Drawings	
Funding Release	\$2,750,000
Information	
Expenses to Date	\$150,000
Funding released to Date	\$750,000



## EXECUTIVE SUMMARY

The executive summary assumes familiarity with the prior submissions and provides a status update from the date of the most recent report.

In accordance with the Capital Projects Policy, this Board 4 post-completion report is provided as part of the project management process following the construction, occupancy and warranty period on the UBC Baseball Rose Indoor Training Centre.

The new UBC Baseball Rose Indoor Training Centre supports high performance baseball (UBC varsity), youth and community baseball, softball and multi-sport functional training. The facility provides a much improved training experience to help UBC athletes reach their potential and to increase community participation in the sport. The facility has been more successful than anticipated, with a 43% increase in program registrations and 33% increase in hours of usage comparing estimates for utilization from year 1 (2015/2016) to year 4 (2018/2019). The 13,180 gross square foot facility includes four full-size batting cages with pitching machines, one designated pitching area with three mounds and training equipment, high-tech video analysis equipment and other training tools, and minor ancillary spaces (washrooms, a change room and coach offices). The building fits well with the adjacent sport facilities, which work together to create a new Thunderbird Precinct identity.

The project was mostly funded by a donor, with Athletics & Recreation providing \$269,000 from operating funds to match the donor contribution. The final cost of \$3.885 million was \$385,000 more than the Board 3 approved project budget of \$3.5 million, due to challenges with site conditions and the addition of some equipment. The additional funding was provided by the project donor and Athletics and Recreation. The facility was opened to the public in September 2015.

A stakeholder meeting of occupants, operators and the project delivery team was held on September 3, 2019 to review project successes, constraints and lessons learned. The Baseball Rose Indoor Training Centre is generally recognized as a great sports facility which functions well, and the development process was very successful. The building was designed and built very quickly and economically, providing good value for money. The large laminated strand lumber (LSL) pre-fabricated cladding panels were innovative and key to the project's affordability and rapid construction schedule. This small building was not a LEED project.

The distance to parking and lack of a drop-off turnaround are the only major complaints regarding the design of the building and site. A lesson learned is the need for thoughtful planning around vehicular access to community facilities.

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## SUPPLEMENTAL MATERIALS

1. Photographs of UBC Baseball Rose Indoor Training Centre

Supplemental Materials 1 – Photographs of UBC Baseball Rose Indoor Training Centre



Photo 1 – Exterior View facing south



Photo 2 – Interior View of batting cages

<b>SUBJECT</b>	<b>NATIONAL SOCCER DEVELOPMENT CENTRE - BOARD 4 POST-COMPLETION REPORT</b>		
<b>REPORT TO</b>	PROPERTY COMMITTEE		
<b>MEETING DATE</b>	NOVEMBER 26, 2019		
<b>MATTER TYPE</b>	<input checked="" type="checkbox"/> BOARD DISCUSSION NOT REQUIRED	<input type="checkbox"/> BOARD DISCUSSION REQUIRED	
<b>ACTION REQUESTED</b>	No decision required: for information		
<b>REPORT DATE</b>	November 5, 2019		
<b>EXECUTIVE PROPONENT</b>	Peter Smailes, Vice-President Finance & Operations		
<b>PRESENTED BY</b>	John Metras, Associate Vice-President Facilities		
<b>SUPPORTED BY</b>	Ainsley Carry, Vice-President Students Kavie Toor, Senior Director, Facilities, Recreation and Sport Partnerships Jennifer Sanguinetti, Managing Director, Infrastructure Development Yale Loh, Treasurer Michael White, Associate Vice-President Campus & Community Planning Aubrey Kelly, President and CEO, UBC Properties Trust		

### PRIOR SUBMISSIONS

The subject matter of this Report was previously considered by the Property Committee on the following occasions:

1. [December 2012](#) Board 1 approval deferred pending changes to playing field layout and field house location.
2. [June 2014](#) Board 2 + 3 approval for the design and construction of the playing fields component of the "National Soccer Development Centre" to be developed on the UBC Vancouver campus in partnership between the Vancouver Whitecaps Football Club and UBC Athletics. This approval is conditional upon: i) tenders for the playing fields being received at or below budget, and ii) Provincial Treasury Board approval of revised field house program.

Funding Release: \$8,511,000.

Authorization for the University Administration to enter into the Master Agreement, substantially in the form presented to the Board and otherwise consistent with the prior Board 1, and current Board 2 and 3 approvals, and to enter into the subordinate agreements contemplated in the Master Agreement;

Declaration that the disposal by way of a lease of the field house in accordance with the project agreements to the Vancouver Whitecaps Football Club will not affect the future delivery of educational programs; and authorization for the University Administration to conclude negotiations on the lease of the field house in accordance with the project agreements, and obtain Ministerial approval pursuant to Section 50(2) of the University Act of such lease.

3. [February 2015](#) Board 2 approval for the field house component of the "National Soccer Development Centre" to be developed on the UBC Vancouver campus in partnership between the Vancouver Whitecaps Football Club and UBC Athletics. This approval includes authorization for issuance of the development permit for the field house project. Funding Release \$1,000,000

4. [June 2015](#) , Board 3 Approval, Field House, Funding Release \$15,383,000

Board 3 approval for the National Soccer Development Centre field House project, subject to construction tenders being received at or below budget based on 80% of tenders, with a funding release of \$15,383,000 to undertake and complete construction.

Core Capital Budget	\$21,669,000
Additional Relocation Costs	\$4,225,000
Operating Budget	See Report
Schedule	
Funding Release	\$15,383,000
Information	
Expenses to date	\$3,273,751
Funding released to date	\$10,511,000

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## EXECUTIVE SUMMARY

The executive summary assumes familiarity with the prior submissions and provides a status update from the date of the most recent report.

In accordance with the Capital Projects Policy, this Board 4 post-completion report is provided as part of the project management process following the construction, occupancy and warranty period on the National Soccer Development Centre (NSDC).

The NSDC is the result of a unique partnership between UBC and the Vancouver Whitecaps Football Club (Whitecaps). This joint venture has created a state-of-the-art high performance training centre for the Whitecaps programs and important recreational and high performance sport legacies for the UBC community. The completed NSDC includes the Field House, two grass playing fields, one artificial turf field and a relocated Varsity turf field. The project included previously-reported additional work to create the consolidated facility at Thunderbird Park, with relocation and upgrade of the rugby fields, Logger Sports, utilities and landscape, as well as renovations to build an interim training facility in Doug Mitchell Thunderbird Sports Centre (DMTSC). The Whitecaps, UBC Varsity teams and the UBC community are all very happy with the facilities. Usage of all components is very high, and the NSDC project has led to an increase in field usage of 25% from 2015 to 2018.

The 40,182 gross square feet (3,733 gross square metre) Field House, completed in August 2017, is the centrepiece of the NSDC and provides dedicated facilities for both the Whitecaps and UBC. The building is well designed, and brings vitality to the adjacent plaza. The Whitecaps component includes locker rooms, rehab/physiotherapy rooms, meeting rooms, weight room, kitchen, laundry facilities and offices for coaches and training staff. UBC space includes public change rooms and washrooms, team locker rooms, coaches' and officials' change rooms, coaches' offices, meeting/multi-use rooms, concession kiosk and storage space. The project was completed and opened to the public in January 2017 and anticipates achievement of LEED Gold.

The final project cost was \$27.805 million compared to the Board 3 approved budget of \$25.894 million. The additional cost included \$1.35 million for design enhancements and cost escalation funded by the Whitecaps and \$561,000 related to unexpected soil conditions covered by UBC Properties Trust.

A stakeholder meeting of occupants, operators and the project delivery team was held on September 3, 2019 to review project successes, constraints and lessons learned.

General consensus was that the project has been highly successful. The Whitecaps, Varsity teams and the community are all happy with the new facilities, and all components are intensively used. The project was developed around the understanding that the Whitecaps would get a major share of field use, but that overall field usage for UBC would increase and that there would also be increased opportunities for community engagement. These goals have been realized and the improvements to the fields has been very beneficial. Additional benefits to UBC include revenue from Whitecaps usage of fields at times that are unpopular for UBC and the community. Through cost sharing with the Whitecaps and a reallocation of maintenance funding, UBC has created a new groundskeeping team with a dramatic increase in grass and artificial turf maintenance expertise.

The development process was complex and untraditional but successful overall. This was a unique partnership with multiple partners having different requirements, and Campus & Community Planning's flexibility through the process was appreciated. Athletics & Recreation confirms that they would enter into external partnerships again. However, concluding the legal agreements with the Whitecaps was a challenging process, and next time Athletics & Recreation would ensure that all agreements are in place prior to start of the project.

The budget for the Field House was economical and the design team and Construction Manager were very good at accommodating changes to meet the budget; however some issues have emerged due to value engineering changes. Installation of lower cost, packaged mechanical units has led to savings, but also operational issues and service calls. Unlike core academic buildings, Athletics contracts with Building Operations to maintain all or part of the buildings post occupancy. A lesson learned is that closer communication between Athletics, the project team, and Building Operations during design regarding proposed system changes is important to ensure that the building will operate as intended. The Whitecaps' non-UBC standard requirements also created some design and budget challenges. The lesson learned is to expect that working with non-UBC partners may require additional time and fees to resolve any conflicts between UBC and non-UBC systems. Building commissioning was challenging, and deficiencies were identified but not always satisfactorily resolved. The value of good commissioning was a lesson learned that has been incorporated into subsequent building development projects.

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## SUPPLEMENTAL MATERIALS

1. Photographs of National Soccer Development Centre

Supplemental Materials 1 – Photographs of National Soccer Development Centre



Photo 1 – Exterior View of Field House South Elevation and Fields Beyond



Photo by Michael Elkan, courtesy of Acton Ostry Architects

Photo 2 – Exterior View of Field House North Elevation



Photo by Michael Elkan, courtesy of Acton Ostry Architects  
Photo 3 – Exterior View of Field House



Photo 4 – Exterior View of Field House



Photo by Michael Elkan, courtesy of Acton Ostry Architects  
Photo 4 – Interior View of Whitecaps Fitness Facility



Photo by Michael Elkan, courtesy of Acton Ostry Architects  
Photo 4 – Interior View of Whitecaps Locker Room





**SUBJECT**    **ĆƏSNAŦƏM HOUSE AT TOTEM PARK RESIDENCE (FORMERLY TOTEM PARK INFILL PHASE 2)  
BOARD 4 POST-COMPLETION REPORT**

**REPORT TO**    PROPERTY COMMITTEE

**MEETING DATE**    NOVEMBER 26, 2019

**MATTER TYPE**     **BOARD DISCUSSION NOT REQUIRED**                       **BOARD DISCUSSION REQUIRED**

**ACTION REQUESTED**    No decision required: for information

**REPORT DATE**    November 5, 2019

**EXECUTIVE PROPONENT**    Peter Smailes, Vice-President Finance & Operations

**PRESENTED BY**    John Metras, Associate Vice-President Facilities

**SUPPORTED BY**    Ainsley Carry, Vice-President Students  
Andrew Parr, Managing Director, Student Housing & Hospitality Services  
Yale Loh, Treasurer  
Michael White, Associate Vice-President Campus & Community Planning  
Jennifer Sanguinetti, Managing Director, Infrastructure Development  
Aubrey Kelly, President and CEO, UBC Properties Trust

**PRIOR SUBMISSIONS**

The subject matter of this Report was previously considered by the Property Committee on the following occasions:

1. [April 14, 2015](#) , Board 1 Approval, Funding Release: \$750,000
2. [December 3, 2015](#) , Board 2 Approval, Funding Release \$2,100,000
3. [April 14, 2016](#) , Board 3 Approval, Funding Release \$27,350,000
  - a) Board 3 approval for the Totem Park Residence In-Fill Phase 2 project, with a final funding release of \$27.35 million to undertake and complete construction.
  - b) Approval an internal loan of up to \$30.2 million at 5.75% annual interest paid back over 30 years from housing rental revenue

Revised Capital Budget	\$30,200,000
Operating Budget	See report
Schedule	
Program	
Award construction contracts	
Funding Release	\$27,350,000
Information	
Expenses to date	\$533,000
Funding released to date	\$2,850,000

## EXECUTIVE SUMMARY

The executive summary assumes familiarity with the prior submissions and provides a status update from the date of the most recent report.

In accordance with the Capital Projects Policy, this Board 4 post-completion report is provided as part of the project delivery process following the construction, occupancy and warranty period on the čásnaʔəm House at Totem Park Residence, Phase 2 of the Totem Park Infill project.

This project was an efficient method of increasing capacity at Totem Park, providing 354 additional beds for first year students. The addition of this building has increased the Totem Park population to over 2,100 students. The new residence has a total gross area of 9,020 square metres (97,085 square feet) and is LEED Platinum certified under the LEED for Homes Mid-rise program. The final project cost was \$30.2 million, in accordance with the Board 3 approved budget. UBC Properties Trust managed the project, with Public Architecture as the architect and Ledcor as the construction manager. The project was completed on time for August 2017 occupancy.

The project has been very successful. It has provided additional residence beds for first year students to help address the growing student housing wait list, it has provided efficient use of campus land and resources, and it provided a successful pilot of the LEED for Home Mid-Rise rating system. Student residents report very positive feedback on the livability of the building, including specific comments about the high ceilings (providing a sense of spaciousness), the bright and open entrance lobby and house lounge and the quality and style of the bathroom facilities within the building. Students also appreciate the Indigenous storytelling components of the building. Further, aesthetically, the building fits well with the Totem Park Residence character.

A stakeholder meeting of occupants, operators and the project delivery team was held on October 3, 2019 to review project successes, constraints and lessons learned. Based on general consensus, this was an excellent project in every respect. Stakeholders cited the good work of the construction manager in delivering the project on time and on budget, despite a series of project managers. The building was completed well in advance of student move-in, which is critical to a successful move-in process.

Overall the project development process was very positive. Collaborative urban planning with Campus & Community Planning (C&CP) resulted in a very successful outcome. SHHS implemented several unique consultation processes on this project.

The first consultation was student community involvement to help determine which residence style to build. This resulted in a decision to build traditional style rooms with common shared washrooms rather than modified-traditional bedrooms as initially intended. Among other things, this decision significantly increased the opportunity to create a strong residence community and reduced the anticipated number of washroom fixtures, hence removing the necessity to install a larger sewer line which would have entailed significant cost.

The second community involvement piece was the establishment of an Indigenous Storytelling committee consisting of representatives from Musqueam and SHHS. This Musqueam house naming and storytelling process resulted in Musqueam generously gifting the name čásnaʔəm to SHHS. This name, along with the similar 2011 Musqueam gifting of the names həmləsəm and ǵələxən houses, carries important stories that have been explored and brought forward in multiple ways:

- External building signage and čásnaʔəm story
- Internal signage, storytelling boards and Indigenous art
- Window decals
- Indigenous landscaping and plant signage
- House logos created by Musqueam youth via an art contest

SHHS noted the teachings that have been created for residents of čəsnaʔəm, an example of which is this message on the building entry sign adjacent to a nail: *"We ask those who enter to do so with an open mind and open heart. Only then can we enter together to do good work. A nail by the door reminds us of this. We ask you to leave behind any preconceptions or bad thoughts you may have. Please hang them on this nail. It is up to you whether you choose to pick them up again when you leave."* A teaching of the Musqueam people and their relatives.

Finally SHHS and C&CP engaged in a very robust neighbourhood consultation process with the adjacent Hawthorn neighbourhood, which expressed concern about the noise and disruption that would be generated by additional first year students. The outcome has been very positive and there have been few complaints.

The one item that has been less successful is the landscaping on the Marine Drive side. The raised berm is a strategic intervention to block car headlights and provides a safe barrier between the roadway and the building, however the planting appears uncared for instead of the natural landscape effect that was intended. Stakeholders agreed to initiate a process to upgrade the landscape and to add trees over the coming year, planting at appropriate times and funded by SHHS.

There was also a concern from Totem Park residents that the project was being built on the existing tennis courts. This has been addressed with a separate project which added new and additional hard surface play areas on a nearby site within Totem Park Residence.

The project is meeting expectations operationally. The financial pro forma is hard to analyze because the building is tied to the rest of the Totem park complex, but it is clear that the building runs very efficiently. Adding 354 students to the mandatory meal plans at Totem Park without requiring additional capital investment in the dining facilities resulted in additional economic benefit. Students are well integrated into the overall Totem Park community.

The project piloted the LEED for Homes Mid-Rise program, and was Platinum certified. The building performs well, and the actual energy use intensity (EUI) of 17 kW/m<sup>2</sup> is the lowest of the buildings in SHHS's portfolio. This is also due to the fact that the building has no high energy use kitchens or other functions.

## SUPPLEMENTAL MATERIALS

1. Photographs of čəsnaʔəm House at Totem Park Residence

Supplemental Materials 1 – Photographs of čəsnaʔəm House at Totem Park Residence



Photo 1 – Exterior View of Residence and covered exterior walkway



Photo 2 – Residence Signage



Photo 3 – Interior View of Student Room



Photo 4 – Interior View of Common Room

<b>SUBJECT</b>	<b>ACADEMIC DISTRICT ENERGY SYSTEM, UBC VANCOUVER BOARD 4 POST-COMPLETION REPORT</b>	
<b>REPORT TO</b>	PROPERTY COMMITTEE	
<b>MEETING DATE</b>	NOVEMBER 26, 2019	
<b>MATTER TYPE</b>	<input checked="" type="checkbox"/> BOARD DISCUSSION NOT REQUIRED	<input type="checkbox"/> BOARD DISCUSSION REQUIRED
<b>ACTION REQUESTED</b>	No decision required: for information	
<b>REPORT DATE</b>	November 5, 2019	
<b>EXECUTIVE PROPONENT</b>	Peter Smailes, Vice-President Finance & Operations	
<b>PRESENTED BY</b>	John Metras, Associate Vice-President Facilities	
<b>SUPPORTED BY</b>	David Woodson, Managing Director, Energy and Water Services Jennifer Sanguinetti, Managing Director, Infrastructure Development Yale Loh, Treasurer Michael White, Associate Vice-President Campus & Community Planning	

## PRIOR SUBMISSIONS

The subject matter of this Report was previously considered by the Property Committee on the following occasions:

1. [February 7, 2011](#) , Board 1 Approval Phases 1 to 9, Funding Release \$2,350,000
2. [June 8, 2011](#) , Board 2&3 Approval for Phase 1, Funding Release \$5,891,020
3. [April 3, 2012](#) , Board 2&3 Approval Phases 2&3, Funding Release \$16,250,000.
4. [June 4, 2013](#) , Board 2&3 Approval Phases 4 to 9, Funding Release of \$63,810,000 ; An internal loan of \$60.1 million to support the balance of the project.

## EXECUTIVE SUMMARY

The executive summary assumes familiarity with the prior submissions and provides a status update from the date of the most recent report.

In accordance with the Capital Projects Policy, this Board 4 post-completion report is provided as part of the project management process following the construction, occupancy and warranty period on the Academic District Energy System (Vancouver).

The Vancouver Academic District Energy System Steam to Hot Water Conversion Project (DES) replaced the 90-year-old campus steam heating system with a high efficiency hot water district energy system. Replacement of the system was a cornerstone Climate Action Plan project that enabled the reduction of UBCV's greenhouse gas (GHG) emissions by 34% (in 2016), resulted in significant annual energy, water and financial savings, and has earned UBC a global reputation as an innovator in district energy conversion from steam to hot water.

The multi-year and multi-phase project included construction of the LEED Gold, award winning Campus Energy Centre (opened in June 2016) equipped with 45 MWt of high efficiency hot water boilers, replacement of end-of-life steam piping with 22 kilometres of high efficiency pre-insulated hot water distribution piping, and connection

of 115 buildings to the system including conversion of 102 existing buildings with energy transfer stations. The full Board approved project budget of \$88.3 million included \$3.5 million reserved for demolition of the decommissioned Power House. The original project scope was delivered on budget with the reserved amount intact for the Powerhouse demolition. Scope additions to address new requirements over the six-year course of the project cost an additional \$3.7 million. This additional cost was covered separately by Energy & Water Services.

The project reduced DES natural gas use beyond the targeted 24%, and the hot water system uses 2000 times less water than the steam system it replaced. Greenhouse gas savings have allowed UBC to meet its goal of reducing GHG emissions by 34%. Operational savings of \$3.5 million annually are used to repay the internal loan that Energy and Water Services (EWS) assumed to fund this project. The new system is so efficient that the CEC can actually be turned off in the summer, with domestic hot water needs provided by the Bioenergy Facility alone.

The project was one of the largest conversions from steam to hot water in North America, and the successful implementation and subsequent GHG, energy and water use reductions have made UBC a leader in steam system conversion. The project was implemented in 9 phases over 5 years, from 2011-2017.

A stakeholder meeting of occupants, operators and the project delivery team was held on September 26, 2019 to review project successes, constraints and lessons learned.

All stakeholders agreed that the project was an incredible accomplishment. It was a very complex and challenging undertaking to replace a 90-year-old system servicing virtually the entire academic campus. Installation of new hot water distribution piping and installation of new hot water heat exchangers affected all campus roads, open spaces and buildings. The problem of aging, inefficient steam-based district energy systems is common to North American universities but there was only one prior example of system replacement (University of Rochester). UBC was a pioneer and has become a model for others world-wide. EWS and C&CP conduct tours of the CEC and have consulted with other universities and the federal government.

It was a challenge to keep all buildings operating while the project was being implemented. Construction of the temporary steam to hot water heat exchanger on University Boulevard was key as it (a) allowed new buildings built prior to the CEC to be constructed with connection to the hot water system (e.g. Orchard Commons, Ponderosa Commons, Aquatic Centre, Earth Sciences Building) which resulted in significant mechanical savings to these projects, and (b) allowed the project to convert buildings one by one rather than having to wait until the full system was ready to go. Integrating the project with public realm improvements was also key to creating a “win” for campus constituents, who were not generally aware of the operational benefits behind the disruption.

One issue emerged with the heat exchangers that were installed in existing buildings to supply domestic hot water. The heat exchangers provided were defective and did not meet specifications, resulting in premature failure and contamination of hot water systems in four buildings. All defective heat exchangers were replaced and there has been no re-occurrence of the issue.

The Campus Energy Centre has won a number of design awards. The building is aesthetically pleasing, bright, and a good place to work. C&CP believes the beauty of the material (engineered wood and steel structure, expansive glazing, exterior metal cladding) was an important aspect in getting academic support for a utility building on a major academic site. The transparency showcases the energy process, and the zinc shroud that screens the intake and exhaust louvres is bird friendly.

The CEC plant runs very efficiently and was designed with room for additional boilers that will be required with campus expansion. There is appropriate demarcation of Building Operations core building equipment and EWS process equipment. The building was initially designed with minimal office area, but during construction, the large open workshop was converted into office space for the new EWS department, and a new office area mezzanine has since been added.

The boilers at the CEC have experienced excessive noise and vibration since their initial operation. Although significant progress has been made to improve their operation, there are still ongoing vibration issues resulting from breaching and exhaust stacks design and installation deficiencies. UBC has active claims with the boiler manufacturer, general contractor, and architect, and is pursuing a satisfactory resolution to the issue.

The development process overall was collaborative and inclusive. Design, execution and delivery required coordination on an unprecedented level. This project has left a lasting legacy of fundamental change and critical improvements to internal UBC project development processes and relationships between units. Weekly meetings between all stakeholders were working sessions to pre-emptively solve issues, and new communication processes emerged such as the public construction map.

The team was innovative in dealing with the challenges of a multi-year project. Phasing was very beneficial, and the Phase 1 pilot project allowed for lessons learned to be incorporated into later phases, and verified cost and savings assumptions. It was difficult to implement a project with a budget developed in 2010 for phases that wouldn't complete until 2017, and budget constraints put a lot of pressure on the project management group. However, the team was innovative and pre-purchased bulk district energy piping to stay on budget.

Although the process was positive overall, a number of lessons were learned. The project was by definition very disruptive to the campus, and it took time for the full project team to develop good communication plans. Campus constituents to this day are unaware of all of the benefits of this project; the upcoming Bioenergy Facility expansion project is an opportunity to re-energize the discussion and communicate the accomplishments of the project. A lesson learned was the importance of solid communications throughout the project.

There are always continuity risks in a multi-year project. The length of the project meant that there was a lot of turnover in personnel and University leadership over the years. EWS learned the importance giving more consideration to the transition period when both the old system and the new system would be in operation concurrently.

The project scope did not include the removal of redundant steam equipment from existing building mechanical rooms. This has caused some operational issues where it is unclear that connections have been abandoned. A lesson learned for future system replacement projects is the necessity of following up with removal of redundant equipment.

The CEC is LEED Gold Certified. The use of cross-laminated timber (CLT) construction for an industrial building was very innovative and there have been many requests to tour the building. This was a rare case where a Life Cycle Analysis (LCA) study helped inform design, leading to a hybrid construction of wood and steel. A downside to the use of CLT was the difficulty in securing timely deliveries from the single supplier in BC. This supplier has since increased plant size and improved operations.

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## SUPPLEMENTAL MATERIALS

1. Photographs of the Academic District Energy System (Vancouver)



Supplemental Materials 1 – Photographs of Campus Energy Centre - Academic District Energy System (UBC Vancouver)



Photo 1 – Exterior View



Photo 2 – Exterior View of Entrance



Photo 3 – Interior View of Equipment



Photo 4 – Interior View of Equipment



Photo 5 – Interior View of Equipment



Photo 6 – Interior View of Controls Room