May 2020

Preliminary Cost Analysis Report
Opinion of Probable Costs

Visitor Welcome Centre Phase II & Chamber Options
Centre Block Rehabilitation Program

making the difference
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1  **Foreword from Public Services & Procurement Canada**

Public Services and Procurement Canada (PSPC) used the services of their independent cost consultant for the Centre Block rehabilitation program, Turner and Townsend, to prepare this cost comparison report. PSPC officials have reviewed and validated the report. The report is being tabled to Parliament on the understanding that it provides a cost comparison of specific program components (the Chamber and the Visitor Welcome Centre Phase II) prior to the confirmation of parliamentary requirements and the completion of schematic design. The report does not represent a final cost estimate for either of these individual program elements or the Centre Block rehabilitation program itself.

Given the early nature of this cost comparison, and in alignment with costing best practices, opinions of probable cost can fluctuate up to 20%. In addition, the potential for significant modifications to project specifications or design is not included in Turner and Townsend’s analysis and would adjust their Opinion of Probable cost.

Public Services and Procurement Canada continues to work closely with Parliament to finalize their functional requirements (e.g., number, size and types of functional spaces such as offices, Chambers, committee rooms, cafeterias, ceremonial and parliamentary support spaces as well as security requirements and the size of Phase II of the Visitor Welcome Centre). Decisions on these key elements will directly inform the design and engineering plans, and the project’s baseline scope, schedule, and budget.
Introduction

This Cost Report is generated in response to questions raised at the Standing Committee on Procedure and House Affairs (PROC) session on February 25, 2020. Specifically, this report addresses questions concerning the estimated costs of implementing different options for the House of Commons Chamber and Phase II of the Visitor Welcome Centre. PROC specifically requested estimated costing for modernizing the current sized Chamber and an expanded option that would accommodate 450 members in the traditional paired seating, and cost estimates for three different size options for the Visitor Welcome Centre Phase II.

Centre Block Rehabilitation Program

The Parliamentary Precinct is a national historic site and the Centre Block is a classified heritage building. It is one of Canada’s most important national symbols and is the physical representation of Canadian democracy. It is home to the Senate of Canada, the House of Commons, and the Library of Parliament. Built in the Gothic Revival style, the building includes highly decorative architectural elements from stone carvings, and several ceremonial spaces, including the Hall of Honour, the Memorial Chamber, Confederation Hall, and the Peace Tower. Parliament Hill draws millions of visitors annually.

Public Services and Procurement Canada is responsible for the restoration and modernization programs of the buildings in and around Parliament Hill, preserving these heritage treasures for Parliament and all Canadians. The Long Term Vision and Plan is a clear, multi-decade strategy that was first established in 2001 and revised in 2006. This planning and implementation framework is guiding rehabilitation efforts and is achieving results. This includes the recently completed West Block and Senate of Canada Building, and Phase I of the Visitor Welcome Centre, as well as many other key projects, such as the Sir John A Macdonald building (2015) and the 180 Wellington Building (2016).

With the successful transition of parliamentary operations to the West Block and Senate of Canada Building in January 2019, focus has now shifted to the restoration and modernization of the Centre Block. This effort will be the largest heritage rehabilitation undertaken in Canada to date and is one of the largest rehabilitation programs in the world. The project is currently completing schematic design and construction activities such as demolition and abatement in low heritage areas and excavation work have begun.

The Centre Block has not had any significant intervention since it was constructed approximately 100 years ago. This much needed rehabilitation program will restore and modernize the Centre Block to meet the needs of a 21st century parliament. The program also includes construction of Phase 2 of the Visitor Welcome Centre, which will provide a secure screening capability outside the Centre Block building footprint, provide additional Parliamentary support space, enhance Parliamentary outreach by providing an interpretive experience for visitors to supplement the current tour capability, and will connect the West Block and East Blocks with the Centre Block to create a fully integrated parliamentary complex that is modern, safer, greener, and accessible.
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Currently, Public Services and Procurement Canada is working with Parliament (Senate, House of Commons, the Library of Parliament, the Parliamentary Protective Service as well as the Office of the Prime Minister and Privy Council) to finalize their functional requirements (e.g., number, size and types of functional spaces such as offices, Chambers, committee rooms, cafeterias, ceremonial and parliamentary support spaces as well as security requirements and the size of Phase II of the Visitor Welcome Centre). The outcomes of these functional requirement decisions will directly inform the design and engineering plans. The completion of the schematic design is planned for June 2020. This will inform the baseline scope, schedule, and budget for the Centre Block rehabilitation.

4 Complexities

4.1 Complexity of the Program

Heritage rehabilitations, especially one of this magnitude, are unique, complex, and costly undertakings. The Centre Block is a working building. Its modernization will require a wide range of modern interventions both on the inside and out that will have to be carefully planned and executed while respecting and conserving the highly decorative heritage elements. A comparison to a number of international benchmark projects illustrates the unique levels of complexities involved in the restoration and modernization of the Centre Block.

Key aspects of the rehabilitation program include:

- On the outside - New roof, windows, and rehabilitation of the stone façade;
- On the inside - introduction of seismic and structural upgrades to meet modern code requirements as well as replacement of all life safety, mechanical, and electrical systems. To effectively support parliamentary operations, modernization of parliamentary spaces such as the Chamber, committee rooms with integrated IT infrastructure and other improvements so that they are secure, functional, and accessible; and
- Throughout - Conservation of the heritage fabric ranging from the ornate sculpture, to millwork, to murals.

4.1.1 Heritage

The level of effort to plan and successfully integrate building modernization into the heritage fabric of the building is significant. Introduction of new mechanical and electrical systems require opening up walls that are, themselves, heritage assets. Reinforcing the structure requires consideration of the heritage masonry. All of the foregoing are already significant drivers of construction costs and with the modernization requirement of the building, will only add to these costs.
There is a difference between the renovation of a heritage building and the conservation of decorative architectural elements. The Centre Block includes both. The entire building is historic and subject to heritage preservation. It also incorporates specific decorative elements, including Arthur Crisp’s seventeen murals in the old Reading Room and the English Renaissance-style frescoes in the Office of the Leader of the Opposition (see opposite).

The restoration of a building that includes an applied layer of decorative architectural elements throughout and which are intrinsic to the building fabric is rare. For example, although the renovation of the United Nations Headquarters included the restoration of some decorative architectural elements (e.g., Norman Rockwell mosaic), for the most it was an update of a mid-twentieth century office building.

**4.1.2 Structural complexity and Building System Upgrades**

The Centre Block has two different types of structural support: load Bearing masonry and a steel structural framework. Structural upgrades will be required to achieve modern code requirements, combined with seismic upgrades given that Ottawa is located in a seismic zone. In an effort to protect heritage elements of the building, a base isolation solution to address seismic requirements is being pursued. This will be a significant and complex program of work.

Installing modern building systems such as modern heating and cooling also prove to be a significant challenge within the building. Given the age of the Centre Block, these types of systems were limited, or non-existent, and there is little physical space in the building to incorporate this type of essential infrastructure.

**4.1.3 Security**

Given that the Centre Block is a legislative building with public access, security is a significant cost driver. Security may be comparable to some international benchmark projects, but it is nonetheless challenging to compare across projects. In the current environment, security requirements change frequently based on both emerging threats and availability of new technological solutions. Given the evolution of security requirements since the 1990’s it is not possible to merely apply inflation to the cost of security for a Parliamentary building from the 1990’s into 2020 dollars.

**4.1.4 Designated substances**

Designated substances such as asbestos were known to exist in the Centre Block. An extensive Assessment Program was undertaken for the Centre Block Rehabilitation Program in order to reduce risk on such a large-scale heritage program and to inform the schematic design and downstream construction strategies. Based upon lessons learned and a best practice approach,
the Assessment Program for this rehabilitation is amongst the most comprehensive undertaken globally.

The Assessment Program has enabled the identification of the levels and location of designated substances in the building. Extensive abatement will be required ranging from the removal of designated substances in this high heritage building and cannot always be accomplished by conventional demolition – it requires careful de-construction which is more expensive and labour-intensive.

4.1.5 Unforeseen conditions

Typically, renovation projects begin by reviewing the "as-built" drawings which are submitted by the contractor upon completion of a project. As-built drawings reflect all changes made in the specifications and working drawings during the construction process, and show the exact dimensions, geometry, and location of all elements of the work completed during the original construction of the building. In the case of the Centre Block, due to the time it was constructed, very limited "as-built" drawings or other detailed documentation exist. Although the execution of the assessment program has given Public Services and Procurement Canada a much better understanding of the building condition and is informing the design process thereby reducing program risk, it is expected that the project will encounter unforeseen site conditions as the works progress.

4.1.6 Summary

International benchmark projects similar to the Centre Block typically involve rehabilitation of major mechanical and electrical systems, restoration of heritage features, improved accessibility, enhanced energy and environmental performance and updated AV/IT systems. The requirement to conserve significant decorative architectural elements is also not unique. The 2013 project to restore the Rijksmuseum involved substantial conservation of decorative elements. Likewise, the requirement to incorporate significant security elements is also not unique. Recent projects to rehabilitate the United Nations Headquarters in New York and construct the U.S. Capitol Visitors’
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Centre featured the incorporation of significant security elements. The Centre Block, however, requires a complex combination of elements that is difficult to find in other projects. The cumulative impact of these complexities has a direct impact on the costs involved in the restoration and modernization of the Centre Block.

<table>
<thead>
<tr>
<th>Benchmark Project</th>
<th>Elevated seismic zone</th>
<th>Permanent Legislative function</th>
<th>Heritage Conservation</th>
<th>Decorative architectural elements</th>
<th>Security imperative</th>
<th>Elevated Lifecycle</th>
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<th>Constrained industry capacity</th>
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### 4.2 Complexity with the Costing

Just as the design, rehabilitation and construction of the Centre Block represent a complex undertaking, those complexities carry over into the analysis of probable costs of construction.

Some of the key challenges and complexities of costing are identified in the sub-sections below.

#### 4.2.1 Structural complexity and seismic upgrades

The complexity of the current design and the seismic retrofit are amongst the most challenging globally, and therefore, the risk of additional costs arising as a result of unforeseen existing
conditions is typically much higher in a project of this nature and should be reflected in an appropriate allowance for construction contingency.

4.2.2 Heritage

The cost premium associated with working in a high heritage building not only affects the specific heritage assets (e.g., The Senate and House of Commons Chambers, Memorial Chamber, Peace Tower Rotunda, and Hall of Honour), but the general approach to all construction works throughout the entire building. Repairs to mechanical and electrical systems require opening walls that are, themselves, heritage assets. Reinforcing the structure requires consideration of the heritage masonry. All the foregoing are significant drivers of construction cost.

The cost of restoring decorative architectural elements which form part of the building fabric cannot be easily compared across projects and incorporated into a construction cost benchmarking analysis. Construction cost benchmarking cannot assess the estimated cost of restoring the hand-painted linen ceiling in the House of Commons Chamber against the cost of restoring the Norman Rockwell mosaic at the United Nations Headquarters.

4.2.3 Security

Security requirements, still in development, will need to be incorporated into multiple aspects of the rehabilitation and range from structural enhancements to the implementation of scanning capabilities. It must be noted that changing security requirements have a direct impact on program scope and schedule and can result in program delays which could further impact program costs. Given the multi-year timescale of the Centre Block Rehabilitation Program, it is foreseeable that the security requirements could evolve and potentially impact the construction scope, timelines, and overall cost of the program. The significant security elements of the project, plus the distinct possibility of increasing requirements over the duration of the program must be reflected in an appropriate risk allowance.

Two of the benchmark projects (United Nations Headquarters and West Block rehabilitation) experienced major increases in building security requirements during construction, with adverse consequences to project cost. Appropriate risk allowances in the West Block project enabled changes to security requirements to be absorbed as part of the program. Not only do changing

Security and the United Nations Headquarters modernization

In 2015, the United States General Accountability Office (GAO) reported the project to modernize, secure, and restore the UN Headquarters Complex was three (3) years behind schedule and $379 million (US) over-budget, largely due to enhanced security measures adopted during the project.

During construction, the UN General Assembly approved new security requirements. The enhanced security, alone, delayed the project by up to 1 year.

The enhanced security requirements were added to the project in 2011 due to increasing threats the UN faced globally. During the project, the UN, the U.S. government, and the City of New York, identified additional security enhancements not envisioned in the original modernization plan.

requirements have a direct impact on project cost, they can also result in project delays which will further impact project cost.

4.2.4 Designated substances
The removal of designated substances in a heritage building cannot be accomplished by conventional demolition – it requires careful de-construction which is more expensive and labour-intensive.

Discoveries of unforeseen designated substances, during construction, can have significant negative impacts on cost and schedule for any heritage restoration project. Even given the Assessment Program, this represents a significant unknown risk, for which the cost and schedule implications cannot be completely quantified at the outset of the project. The risk of cost increases associated with unidentified designated substances must be reflected in an appropriate risk allowance.

4.2.5 Unforeseen conditions
Unforeseen conditions are a significant risk factor for older buildings. The Centre Block is particularly vulnerable to this risk as it was constructed quickly, in wartime, approximately 100 years ago and accurate detailed documentation does not exist.

Unforeseen conditions lead to cost impacts during construction. Prior to construction, the contractor(s) can only price those portions of the project which are represented on the drawings and specifications or directly visible to inspection. When unforeseen conditions arise, the contractor will proceed to execute the work via a change order at premium rates. The risk of encountering unforeseen conditions must be reflected in an appropriate construction contingency.

5 General Cost Analysis Methodology
Turner & Townsend, as the appointed Cost, Time and Risk management strategic advisory consultant for the Centre Block Rehabilitation Program, has been commissioned by Public Services and Procurement Canada to develop a cost analysis providing an Opinion of Probable Cost for options for the Visitor Welcome Centre Phase II and the House of Commons Chamber.

Turner and Townsend’s Opinion of Probable Cost is based on the on-going schematic design process received from the Prime Consultant for the Visitor Welcome Centre Phase II and House of Commons Chamber.
The order of magnitude cost analysis has been developed in conformance with the Canadian Institute of Quantity Surveyors (CIQS) generally accepted principles for Elemental Cost Analysis and Methods of Measurement. Where possible, approximate quantities were measured, from the information provided in order to develop an elemental cost model. The rates used for this cost analysis include labour and material, equipment, and subcontractor’s overheads and profit. Unit Pricing developed for this program is based upon our firm’s experience with similar complex projects.

6 House of Commons Chamber

6.1 Scope of Work

The House of Commons Chamber is comprised of the Chamber which presently accommodates, 338 Members of Parliament, a public Gallery which accommodates 553 seats, and adjacent lobbies to provide support functions for MPs.

Ensuring that the Chamber and lobbies can support parliament well into the 21st century and beyond is one of the project’s key challenges, and the most pronounced example of the tensions between heritage preservation and building modernization.

Interventions to the Chamber will not only need to consider modernization, but also address seating capacity. The number of MPs has steadily increased since the Centre Block was built, from 235 to the current 338. Based on existing legislation and census data projections, the number of MPs will continue to increase and could reach approximately 460 members by the year 2060. While the increase is not certain, the reality is that the current paired (2) seating arrangement cannot accommodate the current number of MPs. Theatre-style seating in groups of five (5) had already been implemented in the back two rows of the Chamber prior to the Centre Block’s closing for restoration. This reality is driving the need to consider alternate solutions to address capacity challenges.

Ensuring the Chamber gallery is universally accessible will be technically challenging to implement and will result in an overall reduction of the amount of seating that can be accommodated.
6.2 Chamber Options

- Changes to the Chamber will be required to meet the growth needs of Parliament as well as to create a universally accessible Chamber and Gallery. Options range from changing the seating layout and configuration to increasing the size of the Chamber’s footprint. For the purposes of this report, two (2) options, hereafter referred to as Option 1 (Densification of Existing Chamber) and Option 2 (Chamber Expansion) have been analyzed.

N.B. Subsequent to the House of Commons’ Standing Committee on Procedure and House Affairs (PROC) request for a cost comparison analysis, both Chamber concepts were presented to the House of Commons’ Board of Internal Economy (BOIE) on February 27th, 2020 and further discussed at the March 12th 2020 BOIE meeting. Committee members provided direction to prioritize the preservation of key heritage features in the Centre Block, and placed significant importance on the protection of the Chamber’s high heritage features, and indicated a preference for Option 1 - to densify the existing heritage Chamber rather than deconstruct and expand the Chamber.

6.2.1 Option 1 (Densification of Existing Chamber)

The design solution for this option modernizes the Chamber within the existing footprint, allowing the retention of the integrity of the heritage fabric, but modifies seating to enable the accommodation of MPs ranging from approximately 380 to 420, assuming that theatre-style flip seats and desks were utilized in rows of 4 to 6 seats. This option also includes an integrated Lobby solution that provides additional space below the Lobbies and Chamber that is interconnected to the Lobbies to provide MP support services, such as a server, meeting spaces, cloakrooms and washrooms. Modifications will also be required to ensure the Chamber meets accessibility standards. Accessibility improvements will also result in a reduction in Gallery seating from 553 to 305 seats.

6.2.2 Option 2 (Chamber Expansion)

The design solution for this option enlarges the Chamber to accommodate an increase of up to approximately 460 MPs, using a traditional paired seating approach. In this option, the Chamber walls would be expanded beyond their footprint, which would require the demolition and reconstruction of a significant portion of the west side of the Centre Block, which has the potential to have a significant impact on the operations of the newly constructed temporary loading dock. This option would include expanded Lobbies on the same level to provide ancillary support function for MPs. In this option, there is greater flexibility to address accessibility requirements and would provide seating capacity in the gallery sufficient to accommodate approximately 425 seats.
Seating in the Chamber beyond 460 MPs would require changes to the seating configuration beyond the current paired seating (e.g., flip seats and desks). Transitioning to flip seats and desks in an expanded Chamber could increase the number of MPs that could be accommodated to approximately 540 MPs.

### 6.3 Comparison of the Options

Each of the options was evaluated across six discrete criteria ranging from the ability to achieve the parliamentary requirements to the impact on program cost and schedule. The output of the model for the House of Commons Chamber options are shown below.

![House of Commons Chamber Heat Map](image)

### 6.4 Cost Comparison of the Options

Several specific assumptions related to the House of Commons Chamber were required beyond the General Costing Assumptions set out in Section 7 of this report:

- **Construction schedule**, as the program is in the process of baselining the scope, cost, and time, it has been necessary for Turner & Townsend to evaluate these options against each other and as separate and distinct from the balance of the works. For this exercise, it has been assumed that Option 2 will require two (2) years more design, approval, and construction time than Option 1. This additional time has been accounted for in the time scaled items of the costs described below. All of these assumptions are subject to change pending further design development and the ultimate decisions made. It should be noted that as escalation and other time scaled factors typically increase project cost, any increase in completion dates will likely have a direct increasing impact on final project cost.

- **Pricing**, is based on an assessment of the current fair market values for materials and services. Escalation was then applied to those costs separately.

- **Construction Contingency**, is set at 20% of the construction cost. This is typical for renovation construction of this type. Construction contingency is meant to absorb costs related to change orders during construction such as unforeseen conditions during the construction, site coordination etc.
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- **Final Schematic Design (baseline scope),** will be based on key decisions related to the functional program that have been made in conjunction with Parliament. Any changes to program requirements that implicate baseline scope are not factored into this cost analysis and would be considered a risk that would impact cost and time, particularly as the program does not carry contingency to drawdown from for this type of change.

- **Security,** the current level of design completion accounts for the structural components related to building hardening and accounts for enhanced security requirements that are already included in the design documents. It must be noted that security requirements have not been established by Parliament. Finalizing the security requirements could result in direct additional program costs and schedule impacts, which could further impact program costs. Given the multi-year timescale of the Centre Block Rehabilitation Program, it is foreseeable that the security requirements will evolve and potentially impact the construction of the relevant works (e.g., if there were a requirement to provide enhanced blast protection for the Senate and the House of Commons Chambers or the Memorial Chamber, this work could significantly affect the cost, complexity, and schedule of the program.)

- **Other Program Costs,** no provisions have been included for other program costs. When evaluating West Block, the BCC costs were in the 2-5% range of overall construction. It could be assumed that a similar range would be incurred in the fit out of the House of Commons Chamber, assuming that finishes, fixtures and equipment of similar range are ultimately selected. At this stage of design completion these are very rough order of magnitude assumptions and further design development and selections will weigh heavily on final pricing.

Generally, Option 1 saves the heritage components of the House of Commons Chamber and does provide modernized capability of Parliamentary functions, whereas Option 2 provides enhanced Parliamentary capability and space. The design, execution and delivery of Option 2 will likely be impacted by significant cost and time implications due to the required time to achieve design approvals and the required heritage intervention.

To manage the required heritage intervention, the finalization for design of Option 2 will need to progress through a significant heritage and development approval process and will require bringing this element of the program to 100% design development in order to secure those approvals. That design development work would require extensive understanding of the proposals for both the internal and external materials palette and finishes and would require a minimum of one year to complete given the required extensive stakeholder engagement. Following these reviews an intensive review by both Federal Heritage Buildings Review Office and the National Capital Commission, including a potential demand for public consultation will be required.
The cost analysis in the table below reflects our Opinion of Probable Cost for the two Chamber options:

**Figure 2 House of Commons Chamber Cost**

The significant cost difference in the direct hard building cost (the direct cost of materials and trade labour to construct) between the two options is best understood by evaluating the scope of each. While Option 1 requires upgrades and modernization to the existing Chamber, Option 2 entails the demolition of the existing Chamber, coupled with a significantly larger Chamber footprint, all of which drive the hard building cost upwards. Each of the remaining four factors in the cost build-up are generally driven as a percentage of the hard building cost and therefore similarly scale upwards.

7 Visitor Welcome Centre

7.1 Scope of Work

7.1.1 Scope of Work – Visitor Welcome Centre Phase I

Designed to blend with the historical structures and natural surroundings of Parliament Hill, Phase 1 of the Visitor Welcome Centre Complex was completed in 2018 as an essential enhancement to the Precinct’s overall security and visitor services.
This modern, multi-level underground facility helps maintain a balance between openness, and security by acting as the principal entrance to the House of Commons during the rehabilitation of Centre Block. This newly constructed building supports parliamentary operations and materiel handling facilities for the West Block. A utility pathway between adjacent buildings provides much needed additional infrastructure for the operations of Parliament.

As the new secure point of entry for visitors, the building also improves the visitor experience to one of Canada’s most important heritage sites and popular tourist attractions by housing a Parliamentary boutique and support to the Library of Parliament’s public outreach and tour program. This initial phase of the Visitor Welcome Centre will be expanded to provide the same service for the Centre and East Blocks and will establish an integrated parliamentary complex.

7.1.2 Scope of Work – Visitor Welcome Centre Phase II

The construction of a Visitor Welcome Centre that connects the parliamentary triad has been a planned component of the Long term Vision and Plan since its inception and has been endorsed by parliamentary committees within both the House of Commons (Board of Internal Economy) and the Senate (Committee on Internal Economy, Budgets, and Administration).

The Visitor Welcome Centre Phase II will, first and foremost, improve the security posture of the Parliament Buildings by establishing a secure visitor screening area outside of the footprint of the parliament buildings as well as accommodate modern functional requirements that do not fit within the footprint of the Centre Block, but Parliament requires to be adjacent to support parliamentary operations. Once constructed, the Visitor Welcome Centre Complex will interconnect the West Block, Centre Block and East Block to form one integrated parliamentary complex and enhance the functionality for Parliament. It will also provide Canadians and international visitors with an opportunity for a deeper engagement with Canada’s parliamentary democracy.

7.2 Options

Phase II of the Visitor Welcome Centre will connect to the existing Phase I structure and will be a multi-story underground structure situated directly in front of the Centre Block. Each of the Visitor Welcome Centre Phase II options provide the same security screening capability and connectivity to support the movement of people, services, and goods across the complex. The extent to which the options are able to meet the Senate, House of Commons, and Library of Parliament functional program requirements varies based on the overall size of the building. Specific details for each option are shown immediately below.

7.2.1 Small Option (20,300m²)

The small option provides a security screening capability outside the footprint of the Parliament Buildings, connects the Centre, East, and West Block into one integrated parliamentary complex, and provides the necessary mechanical space to operate the facility. In this option, Parliamentary business and material handling support space is limited and only one (1) large committee room has been programmed for the Senate. From a Library of Parliament program
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7.2.2 Medium Option (32,600m²)

The medium option has all the capabilities of the small Visitor Welcome Centre but provides space for parliamentary press conferences, space for parliamentarians to meet constituents, enhanced parliamentary material handling and parliamentary support functions including multimedia, postal and printing services, health services, and public food services. In this option, three (3) Committee Rooms (small, medium and large) as well as a multipurpose room for the Senate have been included. In addition to the capacity for tour support and a boutique, the entry level houses a Parliamentary interpretive program for Canadians and international visitors.
7.2.3 Large Option (39,048m²)

The large option was developed to fully address all initial Senate, House of Commons, and Library of Parliament functional program requirements. In addition to the capabilities identified in the medium option, it also includes three (3) large Committee Rooms plus a multi-purpose room for the Senate and a full alternate experience visitor program for the Library of Parliament.

<table>
<thead>
<tr>
<th>Functions</th>
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<tbody>
<tr>
<td>Security</td>
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<tr>
<td>- Secure visitor screening.</td>
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<tr>
<td>Senate Committee Rooms</td>
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<tr>
<td>- Three (3) Large plus multipurpose room in support of the Senate.</td>
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<tr>
<td>Visitor Experience Program and Tour Support</td>
</tr>
<tr>
<td>- Support for guided tours and boutique.</td>
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<tr>
<td>- Full cated parliamentary visitor experience program requirements accommodated.</td>
</tr>
<tr>
<td>Building Connectivity and Operations</td>
</tr>
<tr>
<td>- Centre Block, East and West Block connected into one integrated Parliamentary complex.</td>
</tr>
<tr>
<td>- Mechanical room to support building operations.</td>
</tr>
<tr>
<td>Parliamentary Support</td>
</tr>
<tr>
<td>- Full requirements met for material handling and business support functions including multimedia, postal and printing services, health Services, and public food services. Species for parliamentarians to engage constituents.</td>
</tr>
</tbody>
</table>

7.3 Comparison of the Options

Each of the options was evaluated across six discrete criteria ranging from ability to achieve the parliamentary requirements and impact to program cost and schedule. The output of the model for the Visitor Welcome Centre Phase II options are shown below.

Figure 3 Visitor Welcome Centre Phase II Heat Map

7.4 Cost Comparison of the Options

Several specific assumptions related to the Visitor Welcome Centre Phase II costing were required beyond the General Costing Assumptions set out in Section 7 of this report:

- **Construction schedule**, as the program is in the process of baselining the scope, cost, and time, Turner & Townsend has evaluated these options separate and distinct from the
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balance of the work. Due to the increase in Gross Floor Area between the options and
the likely requirement for additional time to obtain the required approvals for the Large
Option, this exercise has assumed that the Medium Option would require six (6) months
longer than the Small Option to complete. The construction of the Large Option
would require approximately 24 months more than the Small Option. This difference in
completion time has been accounted for in the time scaled items of cost described below.
All of these assumptions are subject to change pending further design development and
the ultimate decisions made. It should be noted that as escalation and other time scaled
factors typically increase project cost, any increase in completion dates will likely have a
direct increasing impact on final project cost.

- **Pricing**, is based on an assessment of the current (2Q 2020$) fair market values for
materials and services. Escalation was then applied to those costs separately.

- **Construction Contingency**, is set as 10% of the construction cost. This is typical for
new construction of this type. Construction contingency is meant to absorb costs related
to change orders during construction such as unforeseen conditions during the
construction, site coordination etc.

- **Schematic Design**, was based on the medium sized building. Therefore, there will be a
redesign required that could have schedule impact if it is ultimately decided to proceed
with either the small or large sized options. The schedule impact to either of those
options is not fully known at this time.

- **Construction methodology**, associated with below grade construction has not been
finalized. There are the inherent problems that may come with this size of excavation.
Unknowns include not knowing the full extent of below ground services, obstructions,
dewatering, potential for heritage findings and the impact of rock blasting.

- **Security**, the current level of design completion sets the security requirements that are
already included in the design documents. It must be noted that security requirements
have not been established by Parliament. Finalizing the security requirements could
result in direct additional program costs and schedule impacts, which could further
impact program costs. Given the multi-year timescale of the Program, it is foreseeable
that the security requirements will evolve and potentially impact the construction of the
relevant works thus increasing program cost.

- **Other Program Costs**, no provisions have been included for other program costs. When
evaluating Visitor Welcome Centre Phase I, the BCC costs were in the 1-2% range of
overall construction. It could be assumed that a similar range would be incurred by the
fit out of the Visitor Welcome Center Phase II assuming that finishes, fixtures and
equipment of similar range are ultimately selected. At this stage of design completion
these are very rough order of magnitude assumptions and further design development
and selections will weigh heavily on final pricing.
The cost analysis in the figure below reflects our Opinion of Probable Cost for the three Visitor Welcome Centre Phase II options:

**Visitor Welcome Centre – Phase II**

**Forecast Cost**

<table>
<thead>
<tr>
<th>Small Option - 20,300 m²</th>
<th>Medium Option - 32,600 m²</th>
<th>Large Option - 39,048 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100,439,000</td>
<td>$67,900,000</td>
<td>$647,970,000</td>
</tr>
<tr>
<td>$64,459,000</td>
<td>$40,764,000</td>
<td></td>
</tr>
<tr>
<td>$512,297,000</td>
<td>$58,019,000</td>
<td></td>
</tr>
<tr>
<td>$90,299,000</td>
<td>$54,179,000</td>
<td></td>
</tr>
<tr>
<td>$131,013,000</td>
<td>$733,525,000</td>
<td></td>
</tr>
<tr>
<td>$113,451,000</td>
<td>$154,998,000</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 4 Visitor Welcome Centre Phase II Cost**

The significant cost difference in the direct hard building cost (the direct cost of materials and trade labour to construct) between the three options is best understood by evaluating the scope of each. The primary difference in the three options are the gross floor area and the extent of the excavation. Both of these factors contribute significantly to the variation of the hard building cost. Each of the remaining four factors in the cost build-up are generally driven as a percentage of the hard building cost and therefore similarly scale upwards.

**8 General Assumptions & Exclusions**

When developing any cost estimate it is important to understand the basis of estimate. The basis of estimate is a set of assumptions that are used to calculate the final cost estimate. The assumptions within the basis of estimate for this exercise are carried across all three options.

The following general assumptions were made in the development of these cost estimates, pertaining and apply to both the **House of Commons Chamber** and the **Visitor Welcome Centre**:

- **Escalation**, contingency has been calculated to the assumed mid-point of construction. Based on Statistics Canada the historical index for the past 10 years for Ottawa has been
(approximately) 3% per annum. While there is a projected slowdown for the balance of 2020, construction activity is projected to pick up beginning first quarter 2021. Given the foregoing, Turner & Townsend is projecting an escalation rate of 3% to 4% in the short to medium term. For purpose of this exercise Turner & Townsend utilized an average of 3.5% per annum (from current to the mid-point of construction for all contemplated options.)

- **Design Contingency**, is set as 20% of the construction cost for the Chamber and 10% for Phase 2 of the Visitor Welcome Centre. This is typical for this stage of design development for restoration and new construction elements and would be utilized to account for any increases in cost as a result of detailed design development. Design contingency is not meant to absorb increases in cost as a result of scope creep, changes in partner requirements or changes after baseline design is achieved. For example, costs not covered by design contingency include increases in program and gross floor area during Detailed Design.

- **COVID-19**, is having an unprecedented impact on the construction market currently and is likely to have some longer-term impacts. Although, at this time, the Centre Block Rehabilitation program remains open and is an active program, Turner & Townsend has not assessed the impact of Covid-19 on schedule or costs, and Turner & Townsend cannot currently provide an opinion on whether this will remain status quo. Turner & Townsend is uncertain of how the construction market will react to Covid-19; it could, as an example, either generate competition once things normalize or it could drive an increase in escalation as a result of the adjustments stemming from supply chain stress or from new policies/procedures. For example, new health and safety protocols in the context of COVID-19 are creating additional unforeseen costs, although at this point, it is difficult to estimate the longer-term impacts on costs.

9 **Summary**

This cost analysis serves to inform, enable, and support key decisions pertaining to the House of Commons Chambers and the next phase of the Visitor Welcome Centre.

Turner & Townsend has developed an Opinion of Probable Cost for each of these options to support the evaluation and decision-making process. This cost analysis is based on the on-going schematic design process information provided by the Prime Design Consultant on each of the options. In the event of any changes to the scope, there could be an impact on the cost. This cost analysis provides the relative cost differential between the options.

This cost analysis is based on an order of magnitude estimate which reflects the current design maturity. As the program is still in the conceptual stage of design, the finalized Schematic Design will ultimately set the baseline scope and will be based on Parliaments key decisions related to the functional program. Any changes to program requirements that may occur after baseline scope finalization are not factored into this cost analysis and would be considered a risk that could impact cost and time.
APPENDIX A: House of Commons Chamber – Costing Table & Cost Elements

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>OPTION 1 1,496m²</th>
<th>Extension</th>
<th>OPTION 2 7,586m²</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Centre Block Chamber Option</td>
<td>$24,765</td>
<td>37,048,000</td>
<td>$18,615</td>
<td>141,211,000</td>
</tr>
<tr>
<td></td>
<td><strong>NET BUILDING COST</strong></td>
<td><strong>$24,765</strong></td>
<td><strong>37,048,000</strong></td>
<td><strong>$18,615</strong></td>
<td><strong>141,211,000</strong></td>
</tr>
<tr>
<td>3</td>
<td>General Requirements, Construction Management + Bonds/Insurances</td>
<td></td>
<td>12,164,000</td>
<td></td>
<td>46,364,000</td>
</tr>
<tr>
<td>4</td>
<td>Design Contingency</td>
<td></td>
<td>8,384,000</td>
<td></td>
<td>31,957,000</td>
</tr>
<tr>
<td>5</td>
<td>Construction Contingency</td>
<td></td>
<td>10,061,000</td>
<td></td>
<td>38,348,000</td>
</tr>
<tr>
<td>6</td>
<td>Escalation to the mid-point of Construction Projected at 3.5%</td>
<td></td>
<td>$6,288,000</td>
<td></td>
<td>$45,129,000</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL CONSTRUCTION ESTIMATE</strong></td>
<td><strong>$50,765</strong></td>
<td><strong>$75,945,000</strong></td>
<td><strong>$39,943</strong></td>
<td><strong>$303,009,000</strong></td>
</tr>
</tbody>
</table>

**Cost Elements**

**Construction**

- Protection/removal/storage heritage materials across level 1 to level 6.
- Demolition of level 1 to level 6 including shoring of existing structure.
- Base isolators to new construction.
- New foundations, slab, basement area, suspended floors, roof structure and roof finishes, including tie into existing building.
- Construction of new exterior wall to match existing stone, including tie into existing walls.
- Allowance for additional M&E for new areas.
- New interior finishes, partitions, doors, millwork, including heritage finishes.
- Site development to include demolition and removal of existing landscaping and allowances for provision of new landscaping, planting, paving etc.

**Construction Management & General Requirements**

- General requirements allowance is 13.2% of Net Building Cost.
- Bonding, insurance & permits allowance is 2.2% of Net Building Cost & General Requirements.
- Construction Management is carried as 17.2% of Net Building Cost & General Requirements.
APPENDIX B: Visitor Welcome Centre Phase II - Costing Table & Cost Elements

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>SMALL OPTION 20,300m²</th>
<th>MEDIUM OPTION 32,600m²</th>
<th>LARGE OPTION 39,048m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excavation</td>
<td>$2,135</td>
<td>$2,025</td>
<td>$2,027</td>
</tr>
<tr>
<td>2</td>
<td>Remaining Construction</td>
<td>$12,664</td>
<td>$10,215</td>
<td>$9,786</td>
</tr>
<tr>
<td></td>
<td><strong>NET BUILDING COST</strong></td>
<td>$14,800</td>
<td>$12,240</td>
<td>$11,013</td>
</tr>
<tr>
<td>3</td>
<td>General Requirements, Construction</td>
<td>$300,433,000</td>
<td>$399,017,000</td>
<td>$461,271,000</td>
</tr>
<tr>
<td></td>
<td>Management + Bonds/Insurances</td>
<td>98,643,000</td>
<td>131,011,000</td>
<td>151,451,000</td>
</tr>
<tr>
<td>4</td>
<td>Design Contingency</td>
<td>$399,076,000</td>
<td>$530,028,000</td>
<td>$612,722,000</td>
</tr>
<tr>
<td>5</td>
<td>Construction Contingency</td>
<td>67,989,000</td>
<td>90,299,000</td>
<td>104,388,000</td>
</tr>
<tr>
<td>6</td>
<td>Escalation to mid-point of Construction</td>
<td>$44,438,000</td>
<td>59,019,000</td>
<td>68,227,000</td>
</tr>
<tr>
<td></td>
<td>(2021-2026) - projected at 3.5%</td>
<td>$40,794,000</td>
<td>$54,179,000</td>
<td>$62,633,000</td>
</tr>
<tr>
<td>7</td>
<td><strong>TOTAL CONSTRUCTION ESTIMATE</strong></td>
<td>$227,207</td>
<td>$222,501</td>
<td>$217,166</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL CONSTRUCTION ESTIMATE</strong></td>
<td>$552,297,000</td>
<td>$733,525,000</td>
<td>$847,970,000</td>
</tr>
</tbody>
</table>

*Excavation costs had been identified separately as they have been actively tendered in the market.

Cost Elements

Construction

- Allowance for rock excavation, rock anchors, temporary works, and permanent dewatering.
- Foundations including strip footings and pad footings.
- Slab on grade including insulation, under slab drainage.
- Waterproofing and Insulation.
- Concrete structures for upper floor, roof and perimeter basement walls and elevator/stair cores.
- Interior partitions, glazed partitions, interior doors/frames, sliding glass doors and windows.
- Interior floor finishes including carpet, stone floor, raised flooring and vinyl safety flooring.
- Interior ceiling finishes including gypsum board ceilings, architectural acoustic ceilings, acoustic ceiling tiles, suspended ceiling with attenuation baffles, special feature finish and prefabricated ceiling panels.
- Interior wall finishes include acoustic panels, wood paneling, special feature finishes, ceramic wall tiles and paint.
- Allowance for millwork and fittings and fixtures to reflect proposed program.
- Elevators.
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- Mechanical and electrical works including plumbing and drainage, fire protection, HVAC, controls, service and distribution, lighting, devices, and heating, systems, and ancillaries.

Construction Management & General Requirements

- General requirements allowance is 13.2% of Net Building Cost.
- Bonding, insurance & permits allowance is 2.2% of Net Building Cost & General Requirements.
- Construction Management is carried as 17.2% of Net Building Cost & General Requirements.