

## **Fort York Pedestrian/Cycle Bridge Class Environmental Assessment**

<b>Date:</b>	October 19, 2009
<b>To:</b>	Executive Committee
<b>From:</b>	Richard Butts, Deputy City Manager
<b>Wards:</b>	Ward 19
<b>Reference Number:</b>	P:\\2009\\ClusterB\\wf\\ec09007

### **SUMMARY**

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A significant number of planning studies since 2000 have included consideration of, and recommendations for a pedestrian/cycle link across the two rail corridors north of Fort York, in the area of Bathurst Street and Strachan Avenue. The preparations of the War of 1812 Bicentennial Steering Committee have included such a link as a related legacy project that should be completed in time for the Bicentennial celebrations in 2012. A Class Environmental Assessment (EA) Study has, therefore, been undertaken to address opportunities for a pedestrian/cycle connection from Fort York to Stanley Park, across the existing rail corridors.

The evaluation of a reasonable range of alternative solutions and concepts through the EA process, which included comprehensive consultation with the public and review agencies, resulted in a recommended pedestrian/cycle bridge as the preferred option, with a contemporary design that evokes the historical alignment of Garrison Creek. The design involves a bridge supported by inclined arches that offers a signature design statement, but does not overpower the cultural or historical attributes of the Fort.

This report summarizes the results of the information and discussion that has been provided as part of the extensive public consultation process associated with the EA. An Environmental Study Report (ESR) is being completed by the consultant to the City that documents and describes in detail the results of all of the work undertaken, and will be submitted to the City for review. Once staff has completed its review, in accordance with the contents of this staff report and its recommendations, a Notice of Study Completion

will be issued by the City. The ESR is to be filed on the public record for a 30-day review period in accordance with the requirements of the Municipal Class Environmental Assessment.

## **RECOMMENDATIONS**

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It is recommended that:

1. City Council grant authority to the Deputy City Manager whose responsibilities include Waterfront Revitalization, to issue a Notice of Study Completion following completion of the Environmental Study Report to the satisfaction of the Director, Waterfront Secretariat and the General Manager, Transportation Services, substantially in the form outlined in this report, and to file the Environmental Study Report for the Fort York Pedestrian/Cycle Bridge Class Environmental Assessment Study on the public record for 30 days in accordance with the requirements of the Municipal Class Environmental Assessment;
2. The appropriate City officials be authorized and directed to take the necessary action to give effect thereto.

### **Implementation Points**

Upon receipt of the ESR, detailed design and construction of the bridge would be carried out by Technical Services, Design and Construction Section. An expedited approach is crucial to having the bridge ready for the War of 1812 Bicentennial celebrations in spring 2012.

### **Financial Impact**

Funding in the amount of \$0.440 million for the completion of the Fort York Environmental Assessment is included in the Waterfront Revitalization Initiative 2009 Capital Budget for Transportation Initiatives – Fort York Pedestrian Bridge.

In addition, funding in the amount of \$17.0 million for the detailed design and construction of the Fort York bridge is also included in the Transportation Initiatives – Fort York Pedestrian Bridge sub-project. The preliminary estimate for the design and construction of the bridge is approximately \$19.5 million. Final costs will be determined through the detailed design process in 2010. Staff will report back on funding for any costs in excess of the approved \$17.0 million.

The total funding of \$17.44 million for the Fort York Pedestrian Bridge was approved by Council in October 2008 in a staff report entitled “Toronto Waterfront Revitalization Initiative Five-Year Business Plan/Ten Year Forecast (2008-2017).

The Deputy City Manager and Chief Financial Officer has reviewed this report and agrees with the financial impact information.

## **DECISION HISTORY**

At its meeting of July 16, 17 and 18 2007, Council approved the Waterfront Revitalization Initiative Five Year Business Plan/Ten Year Forecast for 2007-2016 and requested that, given the timing of the War of 1812 Bicentennial, the Waterfront Secretariat review the timing of the pedestrian/cycle link from Fort York northerly (to Stanley Park), for implementation prior to 2012.

<http://www.toronto.ca/legdocs/mmis/2007/cc/decisions/2007-07-16-cc11-dd.pdf> (See EX10.9 page 31)

At its meeting of December 11, 12 and 13 2007, Council approved the report “Fort York Pedestrian Bridge” (November 2007) authorizing staff of the Waterfront Secretariat, in partnership with other relevant divisions, to initiate an EA study for the Fort York pedestrian/cycle bridge in 2008, subject to approval of the 2008 Capital Budget for the Waterfront Revitalization Initiative.

<http://www.toronto.ca/legdocs/mmis/2007/cc/decisions/2007-12-11-cc15-dd.pdf> (See EX 15.19 page 53)

At its meeting of June 23 and 24 2008, Council approved an amendment to the 2008 Capital Budget for Waterfront Revitalization to reallocate an additional \$140,000 to the funding for the EA study, based upon the results of a formal procurement process.

<http://www.toronto.ca/legdocs/mmis/2008/cc/decisions/2008-06-23-cc22-dd.pdf>  
(See EX 21.12 page 14)

## **ISSUE BACKGROUND**

The former City of Toronto Council approved the establishment of the Garrison Creek Working Committee in 1996, to develop a plan for the Garrison Creek Linkage project.

In October 1998, City Council adopted the report “Garrison Creek Open Space Linkage Plan” that outlined a comprehensive civic improvement strategy to reinstate the open space linkage and reinterpret the environmental benefits of the Garrison Creek ravine. The purpose of the plan was to implement, over time and at specific locations, civic improvements to connect the isolated parks and open spaces into a system that would connect neighbourhoods along the former Garrison Creek with Fort York and the waterfront. The plan identified a bridge connection over the rail corridors to extend the Stanley Park system south to Fort York, and to return the Fort to a place of greater prominence within the City.

In June 2000, the Friends of Fort York and Garrison Common and the Fort York Management Board published “Fort York: Setting It Right”, which articulated a series of Fort-centred planning and design principles, including:

- a system of parks and open spaces should connect the Fort York Precinct with the adjoining neighbourhoods and the waterfront;
- a public pathway system should link the paths in the Fort York Precinct, the sidewalks of the surrounding streets, the paths in adjoining neighbourhoods and the waterfront promenades and trails.

[http://fortyork.ca/management\\_docs/SIR.pdf](http://fortyork.ca/management_docs/SIR.pdf)

The study proposed the following planning strategies related to Fort York, that:

- major open spaces in the area be consolidated into a single open space/heritage planning unit;
- these open space components be developed to promote a sense of continuity from Lake Ontario north to Stanley Park;
- the Fort be connected to city movement routes;
- there be broader historical resource interpretation and archaeological resource protection.

With respect to connections to the City and the integration and continuity of major open spaces, the study proposed that a new bridge for cyclists, pedestrians and possibly emergency vehicles be developed over the rail corridors, as a much needed alternative to Bathurst Street and Strachan Avenue.

The “Fort York and Garrison Common Parks and Open Space Design and Implementation Plan” (2001), prepared for the City, examined the principles and actions proposed in “Fort York: Setting It Right” in greater detail. In its discussion of connections to the City, the plan recommended a new bridge for cyclists, pedestrians and possibly emergency vehicles over the rail corridors, which would include re-grading of the lands to the north.

[http://www.toronto.ca/culture/brochures/fortyyork\\_report\\_high.pdf](http://www.toronto.ca/culture/brochures/fortyyork_report_high.pdf)

A 2003 City staff report to Toronto East York Community Council discussed the results of a Design Workshop to explore and resolve issues related to the development of the neighbourhood around Fort York, and identified the bridge across the rail corridor as the important link that must be created to connect the Niagara and the Fort York neighbourhoods.

<http://www.toronto.ca/legdocs/2003/agendas/committees/to/to030401/it005.pdf>

The “Central Waterfront Public Space Framework” (2003), prepared by Waterfront Toronto, identified the Fort York Neighbourhood as a public space district where there is an opportunity to create a nationally significant waterfront heritage park ensemble. This would serve as a prominent gateway to the downtown core by consolidating and

integrating historically significant open spaces anchored by Fort York. These improvements are intended to greatly improve access to the waterfront for communities to the north. The concept illustration included a Garrison pedestrian bridge as part of a Garrison Creek Natural Heritage Corridor.

The Fort York Public Realm Master Plan adopted by the City in 2004 included the concept of a new bridge from Stanley Park to the north to Fort York for cyclists and pedestrians that would extend the line of the Garrison Creek landscape, and identified the role of the bridge concept in terms of public realm key components, City/waterfront connections, an integrated park system, and Fort York linkages to surrounding neighbourhoods.

[http://www.toronto.ca/planning/fortyork\\_master.htm](http://www.toronto.ca/planning/fortyork_master.htm)

Toronto Culture, in a staff report regarding the War of 1812 Bicentennial adopted by Council in September 2006, identified specific proposed initiatives at Fort York, including investigating the feasibility of bridging the rail corridor along the northern boundary of Fort York in order to better connect the communities to the north with Fort York and Lake Ontario.

<http://www.toronto.ca/legdocs/2006/agendas/council/cc060925/edp6rpt/cl001.pdf>

Based on the staff reports adopted in December 2007 and June 2008, the Waterfront Secretariat has proceeded with the EA in conjunction with other ongoing legacy initiatives coordinated through the War of 1812 Bicentennial Steering Committee, chaired by Deputy Mayor Pantalone.

## **COMMENTS**

### **Study Process**

The Fort York Pedestrian/Cycle Bridge Class EA Study has been carried out in accordance with the requirements for a Schedule “C” project under the Municipal Class Environmental Assessment. The process requires that the proponent confirm the need and justification (define the problem/opportunity), identify feasible solutions, evaluate the impact of alternative solutions on the natural, social and economic environment, and select a preferred alternative for construction from various design concepts.

As a requirement of Schedule “C” projects, if City Council endorses the recommendations of this study, the Environmental Study Report (ESR) will be filed in the public record for a minimum 30-day review period. During this period, any member of the public, an agency, property owner or other stakeholder may request that the proponent address any concerns that they may have with the project recommendations. If

any concerns cannot be resolved through consultation between the City and the objector, then a formal request may be made to the Minister of the Environment that a Part II Order be issued. Such request by the objector must be in writing.

A Part II Order, if granted by the Minister of the Environment, elevates the status of the project from a Class EA Study to an Individual EA. If this occurs, the project cannot proceed until the proponent completes an Individual EA Study and receives approval from the Minister. If a Part II Order is not granted, or if no requests or objections are received during the filing period, the project is approved under the Environmental Assessment Act and may proceed.

The Municipal Class Environmental Assessment provides a five phase environmental planning process:

Phase 1 - identification of the problem or opportunity;

Phase 2 - identification and evaluation of alternative solutions;

Phase 3 – identification and evaluation of alternative design concepts for the preferred solution;

Phase 4 – preparation of the Environmental Study Report and filing of the document in the public record;

Phase 5 – Construction and operation or implementation of the project, and monitoring of impacts, in accordance with the terms of the Environmental Assessment approval.

The Fort York Pedestrian/Cycle Bridge Class Environmental Assessment Study is at Phase 4. The results of the work have been shared with the public through a comprehensive consultation process. Completion of an Environmental Study Report that documents and describes in detail the results of all of the work undertaken in Phases 1-3, is underway.

This work has been carried out with the support and advice of a Technical Advisory Committee, comprised of staff from Transportation Services, Technical Services (Structures and Expressways), City Planning (including Transportation, Heritage Preservation, Archaeology), Cultural Services, Parks, Forestry and Recreation, Facilities and Real Estate, Emergency Medical Services, Toronto Police, GO Transit and CN Rail.

Significant supporting technical studies that will be attached to the ESR have been carried out as part of the EA process, including priority studies to address archaeological, cultural and historical aspects related to the Fort and other area features. These include a Stage 1 Archaeological Assessment, a Cultural Heritage Assessment (Built Heritage

Resources and Cultural Heritage Landscapes), a Landscape Architecture Preliminary Report, a Transportation (Pedestrian/Cycle) Preliminary Report, a Phase 1 Environmental Site Assessment, a Geotechnical Report, a Hydrogeological Impact Assessment, a Tree Inventory Report and a Natural Environment Assessment Report.

## **Public Consultation**

Public involvement is an integral and ongoing part of the EA Study process. The public consultation requirements of the Municipal Class Environmental Assessment were comprehensively addressed throughout this project.

A Notice of Study Commencement was issued in October 2008 which appeared in two issues of NOW Magazine and the Parkdale Liberty and on the City's "Get Involved" website. Based on an agency stakeholder list, notices were directly mailed to relevant agencies, area businesses, property owners and residents/neighbourhood associations, and distributed electronically through the Deputy Mayor/Ward Councillor's office.

The distribution of the Notice of Study Commencement announced the initiation of the Class EA Study and invited interested stakeholders to participate. Two Public Information Centres (PICs) were held at key decision points during the study.

The first PIC was held on April 16 2009 at Niagara Public School. Notices were placed in two issues of NOW Magazine, on the City's "Get Involved" website, mailed directly to relevant review agencies, businesses and resident/stakeholder associations, distributed through an area wide Canada Post flyer drop, and sent electronically through the Deputy Mayor/Ward Councillor's office.

The information presented included the need and justification for the project, the alternative solutions being considered, the evaluation criteria for assessing the alternative solutions, the evaluation of the alternative solutions, the identification of the preliminary preferred solution as a pedestrian/cycle bridge, and preliminary design concepts.

Approximately 65 members of the public attended this meeting, and 17 comment sheets were received from attendees. In general the overall response to the proposed pedestrian/cycle bridge was positive.

The second PIC was held on September 16 2009 at Wellington on the Park, 15 Stafford Street. Notices were distributed in the same manner as the first PIC.

The information presented included the evaluation of alternative design concepts and presentation of the recommended preferred design concept for the bridge. In addition to the "Drop-in" format to present the study data, a formal presentation and question/answer period was convened at the PIC, which was considered successful. Approximately 44

members of the public attended the meeting and 5 comment sheets were received from attendees. Again the overall response to the project was generally positive.

Additional public consultation occurred throughout the study, including the Friends of Fort York in March 2009, the City Design Review Panel in May 2009, and the Toronto Pedestrian Committee in September 2009. Written comments were provided by the Friends of Fort York and the Pedestrian Committee, as well as detailed comments in minutes from the Design Review Panel.

## **Environmental Assessment Findings**

### **(1) Identification of the Problem or Opportunity**

The identified problem/need in the study area is a desired off-street pedestrian and cyclist connection between the Niagara Street Neighbourhood north of Fort York and the Martin Goodman Trail network to the south, potential and current development parcels adjacent to Fort York, and the Toronto Waterfront Garrison Creek Trail network. Barriers and restrictions to pedestrian and cyclist movement in the study area include existing and proposed roads (Strachan Avenue and Bathurst Street bridges, Gardiner Expressway) and the CN/GO Transit rail corridors. Area neighbourhoods and parks are currently divided by the existing rail corridors. Public use of the study area and access to the Fort is impacted by the Gardiner Expressway Corridor, the rail corridors and the presence of area land uses such as a municipal yard, parking lots and industry.

The identified opportunity is to connect existing parks and trails through a strategic north-south open space connection over the railway corridor, in support of the City of Toronto War of 1812 Bicentennial activities, raising the profile of the Fort and improving access to it, and improving linkages to the waterfront. A structure over the rail corridor would connect Trinity Bellwoods Park, Stanley Park, Fort York, June Callwood Park, Coronation Park, and the Martin Goodman Trail, thus establishing continuity from the original Lake Iroquois Shoreline to Lake Ontario. This would improve pedestrian and cyclist sense of safety and comfort by providing an alternative to higher traffic routes such as Strachan Avenue and Bathurst Street, enhance access to the Fort and increase its public presence. Achieving this opportunity is consistent with policies in the Official Plan and Bike Plan, and previous area planning studies since 1996.

### **(2) Identification and Evaluation of Alternative Solutions**

To address the opportunity described above, three alternative solutions were identified and evaluated in the EA study. A brief description of these alternatives and the results of the evaluation are provided below:

#### **Alternative 1 – Do Nothing**

The Do Nothing Alternative was included as a benchmark for the assessment of the other planning alternatives. This involves relying on current road corridors/sidewalks for



pedestrian and cycle circulation and leaving park connections in the area as they currently exist.

#### Alternative 2 – Enhance Pedestrian/Cycling Infrastructure on Existing Roads

This alternative includes providing on-street bike lanes on Bathurst Street and Wellington Street and improving pedestrian facilities on Strachan Avenue, Wellington Street and Bathurst Street.

#### Alternative 3 – Construct New Pedestrian/Cyclist Link

This alternative involves building a new pedestrian/cycle crossing of the railway corridor, between Strachan Avenue and Bathurst Street, to provide a user friendly linkage between the Stanley Park/Niagara neighbourhoods, the Fort York neighbourhood and the waterfront.

Each alternative solution was analyzed and evaluated in detail utilizing seven criteria groups:

- Transportation: to address pedestrian and cyclist access opportunities, public and user safety, pedestrian and cycle operational constraints, the impact of railway operations of CN and GO Transit, and transit operations and planning;
- Land Use: to address compatibility with continuous open space link objectives, neighbourhood planning objectives, Fort York and Garrison Common Open Space planning policies, land use planning objectives, provincial policy statements, Official Plan policies;
- Cultural Environment: to address archaeological resources, built heritage landscape and cultural heritage landscape;
- Social Environment: to address property impacts, support of Fort York visibility in the community objectives, visual vistas and compatibility with community sustainability objectives;
- Technical: road and bridge infrastructure needs and impacts, constructability, geotechnical considerations and utility impacts;
- Natural Environment: to address impacts on vegetation, Garrison Road and Garrison Creek areas, roadside environments and surface water/drainage impacts;
- Cost: overall cost of design and construction.

Based on the results of the analysis and evaluation, Alternative 3 was identified as the preferred solution. It supports the objectives of linking the Garrison Creek park systems to the Fort and the waterfront, provides for enhanced safety by minimizing conflicts

between pedestrians, cyclists and vehicles, serves as a highly functional facilitator of alternative transportation modes, is consistent with previous planning studies and the Official Plan, and will serve to enhance the profile of the Fort and access to it. The full evaluation table is provided in Appendix 1.

### (3) Identification and Evaluation of Design Concepts for the Preferred Solution

The design approach focused on three key objectives:

- to connect the Niagara Neighbourhood to Lake Ontario. The bridge would provide a north south pedestrian/cycle route over the rail corridors, and become part of a network of potential linkages through the Fort York precinct;
- to enhance Fort York. The bridge would need to find the right balance between achieving excellent viewing opportunities of Garrison Common, Fort York and the City beyond, while minimizing the physical and visual impact on the historical significance of the Fort;
- to evoke the history of Fort York and Garrison Creek. The bridge would incorporate elements that evoke and interpret the history of the Fort and the strategic relationship it had with the alignment of Garrison Creek.

Based on these design objectives the alternatives developed included four alternative bridge alignments:

Alternative Alignment 1 – Straight Bridge;

Alternative Alignment 2 – Bridge Curves Away from Downtown;

Alternative Alignment 3 – Bridge Curves towards downtown and Fort York;

Alternative Alignment 4 – Bridge has S Shape, Recalls Original Alignment of Garrison Creek.

Alignment Alternatives 1 through 4 are shown in Appendix 2.

Based on a review of bridge structure options, two structural design option concepts were considered for the bridge: a truss style bridge and an inclined tied-arch style bridge. These two options are also shown in Appendix 2.

The alternative bridge alignments and structural types were assessed according to the following criteria groups:

- Environmental: to address impact on archaeological resources, natural environment (vegetation and wildlife), built heritage environment, cultural heritage environment;
- Planning and Land Use: to address property impacts, compatibility with Fort York and Garrison Common Open Space planning objectives, future plans for the Ordnance Street Triangle Lands and the proposed Metrolinx Strachan Avenue Railway Overpass, connectivity to Stanley Park, the proposed Fort York Visitor Centre and the waterfront;
- Historical Context: to address harmony with the historic Garrison Creek alignment, the proximity of a soft touchdown to the Fort York entrance and the Garrison

military cemetery, and vista opportunities in relation to the Fort, other historical features, area neighbourhoods and the downtown;

- Architectural and Engineering: to address bridge aesthetics, the configuration and location of the south ramp at Garrison Common and the north ramp at the Stanley Park extension, accessibility options to the Ordnance triangle lands between the north and south rail corridors, constructability, suitability of alignment to truss versus arch structure, structure length, and cost for structure and approaches, civil, landscape and other costs, architectural and engineering fees.

The full evaluation table is provided in Appendix 3. Based on this evaluation, the recommended preferred design concept selected is the Alternative Alignment 4, the S shaped bridge, as an inclined tied-arch structure. It captures the historical relevance of the Garrison Creek route, provides for significant vista opportunities, integrates well into the area landscape but achieves a modern signature design that does not overpower the historical and cultural attributes of the Fort area, includes a touch down in the Garrison Common designed to minimize impacts, and provides enhanced access to the Fort and emerging trail networks. It is also the alternative most generally favoured in written and verbal comments received at PIC 1 and 2.

### **Recommended Design**

Alternative Alignment 4/Inclined Arch Structure, as illustrated in Appendix 4, includes the following elements:

- 232 m structure length;
- 5 m unobstructed deck width;
- overhead inclined arch structure which tilts west on the north span and east on the south span;
- a south end ramp and landscaped parkette area that descends parallel to the south rail corridor to minimize impacts on Garrison Common, the Fort entrance and the proposed Visitor Centre area;
- a north end ramp and landscaped parkette area that descends as a winding pathway to Wellington Street;
- compatibility with a future touchdown in the Ordnance Street triangle lands between the north and south rail corridors.

The preliminary estimated cost to construct the project based on the above elements is \$19.5 million.

### **Public/Agency Concerns**

Throughout the public consultation process, valuable comments were received from the general public and review agencies which assisted in the development and evaluation of the alternatives. The primary questions identified and our responses to them are summarized below.

## Parking

At the second Public Information Centre the issue of parking was raised, as the planned bridge landing at its north end at Wellington Street is currently a parking lot on land owned by the City, and some employees of local business park there. There will be a loss of this parking in order to allow for the pedestrian/cycle bridge, and users may need to find other parking in the area. The City is also engaged in improving area transit systems throughout the City that provide an alternative travel option to personal automobiles.

## Go Transit Request for a Sightline Study

This type of study is required by GO to confirm that the bridge proposal will not have any impacts on train operations in terms of operator visibility and train speeds. The study must reflect new GO proposals for its routine operations and the results of the GO Metrolinx proposal for a Strachan Avenue overpass. The City and GO are currently working on an arrangement to complete such a study, the results of which will influence the detailed design stage of the project. In the meantime, the preferred preliminary bridge design reflects the parameters provided by GO through its participation on the Technical Advisory Committee. Completion of this study has the potential to lower the bridge elevation and reduce construction costs.

## Bridge Deck Width

The preferred design alternative provides for a 5 m unobstructed width for the bridge deck. The question of a 6 m versus a 5 m width has been discussed at Technical Advisory Committee meetings, Project Team meetings and the Pedestrian Committee. Other pedestrian bridge projects in the City are addressing the same question. The experience on other bridges in the City, the needs and interaction of pedestrians and cyclists on the bridge, as well as the cost implications of deck widths have been reviewed in these discussions. The project team has recommended proceeding with a 5 m deck width in the preferred alternative design concept, going forward into detailed design. Additional ideas such as viewing platforms and rest spaces, deck treatments and lighting considerations suggested by stakeholders will be reviewed in detailed design.

## Next Steps

Pending approval of this report by City Council and sign off by the City in accordance with the contents of this staff report and recommendations, the ESR will be filed on the public record for a minimum 30 day period. Once EA approval is received, detailed design and construction through Technical Services, Design and Construction may proceed.

It is anticipated that detailed design will take approximately 6-9 months, after a design firm has been engaged. Additional work recommended by the supporting technical studies for the EA will need to be addressed, including incorporating the results of the GO

Transit Sightline Study, completing a Stage 2 Archaeological Assessment, and follow up geotechnical work.

Project construction is estimated at 18-20 months and is anticipated to be carried out from fall 2010 through 2011 in order to ensure a completion date in late 2011 or early 2012. The bridge is a legacy project required in time for the War of 1812 Bicentennial in the spring of 2012.

In addition, City staff is working on the plan and schedule for relocation of the City tree nursery currently located just west of the Fort. This area is where the south ramp of the bridge is planned to touch down. Relocation of the nursery is a corporate objective required to facilitate the plans for the pedestrian/cycle bridge and a Fort York Visitor Centre project being undertaken by the City, as part of the War of 1812 Bicentennial.

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## **SIGNATURE**

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Richard Butts

## **ATTACHMENTS**

Appendix 1 - Evaluation of Alternative Solutions  
Appendix 2 - Alternative Design Concepts Alignment and Structure  
Appendix 3 - Evaluation of Alternative Design Concepts  
Appendix 4 - Recommended Preferred Design Concept