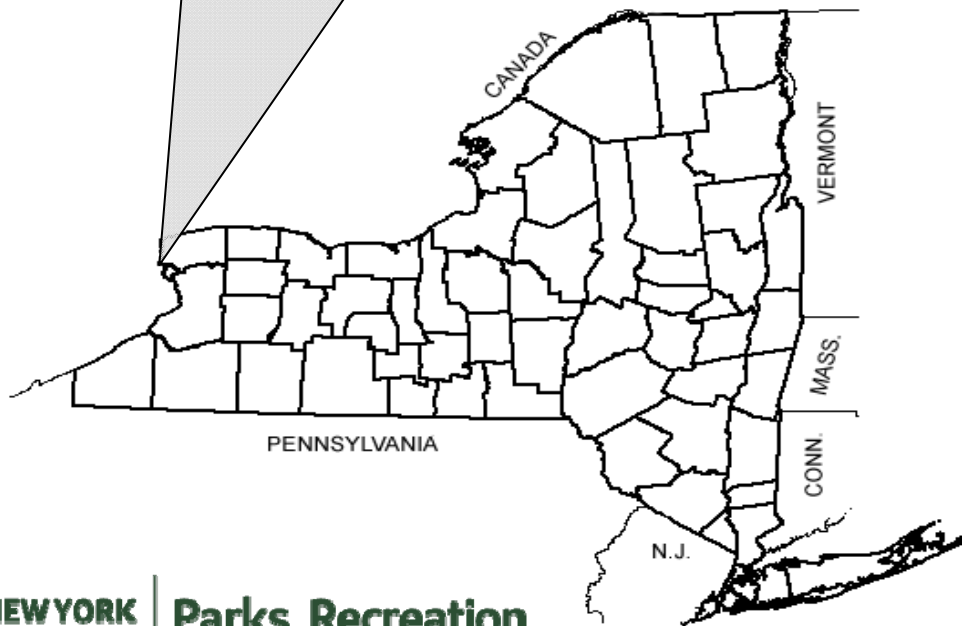


# TRANSPORTATION

## DESIGN REPORT/ ENVIRONMENTAL ASSESSMENT

October 2015

Bridge Project  
P.I.N. 5760.40 BINs 5522000 and 5522010  
American Falls Bridges  
Niagara Falls State Park  
Niagara County  
City of Niagara Falls



**ANDREW M. CUOMO**  
Governor

**Parks, Recreation  
and Historic Preservation**

**ROSE HARVEY**  
Commissioner



**ANDREW M. CUOMO**  
Governor

**Department of  
Transportation**

**MATTHEW J. DRISCOLL**  
Commissioner



U.S. Department of Transportation  
Federal Highway Administration

DESIGN REPORT

# PROJECT APPROVAL SHEET

(Pursuant to SAFETEA-LU Matrix)

**A. IPP Approval:** The project is ready to be added to the Regional Capital Program and project scoping can begin.

The IPP was approved by: **Darrell F. Kaminski** **10/04/12**

\_\_\_\_\_  
NYSDOT Regional Director

**B. Scope Approval:** The project cost and schedule are consistent with the NYS Office of Parks Recreation and Historic Preservation Capital Program.

The scope was approved by: **Darrell F. Kaminski** **11/27/13**

\_\_\_\_\_  
NYSDOT Regional Director

The scope was approved by: **Andy Beers** **11/15/13**

\_\_\_\_\_  
NYSOPRHP Executive Deputy Commissioner

**C. Public Hearing Certification (23 USC 128):** A public hearing was held on \_\_\_\_\_ in accordance with 23 USC 128.

\_\_\_\_\_  
NYSDOT Regional Special Projects Manager

**D. Recommendation for Design Approval:** The project cost and schedule are consistent with the Regional Capital Program.

\_\_\_\_\_  
NYSDOT Regional Program Manager

\_\_\_\_\_  
NYSOPRHP Western District Director

**E. Recommendation for Design and Nonstandard Feature Approval:** All requirements requisite to these actions and approvals have been met, the required independent quality control reviews separate from the functional group reviews have been accomplished, and the work is consistent with established standards, policies, regulations and procedures, except as otherwise noted and explained.

\_\_\_\_\_  
NYSDOT Regional Special Projects Manager

**F. Nonstandard Feature Approval:** No nonstandard features have been identified, created, or retained.

\_\_\_\_\_  
NYSDOT Deputy Chief Engineer

**G. Design Approval:** The required environmental determinations have been made and the preferred alternative for this project is ready for final design.

\_\_\_\_\_  
NYSDOT Deputy Chief Engineer

\_\_\_\_\_  
NYSOPRHP Executive Deputy Commissioner

## LIST OF PREPARERS

### Group Director Responsible for Production of the Design Approval Document:

Joseph E. Nemmer, P.E., Senior Vice President, Greenman-Pedersen, Inc.  
Description of Work Performed: Directed the preparation of the Design Approval Document in accordance with established standards, policies, regulations and procedures, except as otherwise explained in this document.

PLACE P.E. STAMP

### Group Director Responsible for Consultant Supervision and Review of the Design Approval Document:

Craig S. Mozrall, P.E., Regional Special Projects Manager, NYSDOT Region 5  
Description of Work Performed: Supervised the NYSDOT staff responsible for consultant management and review of the Design Approval Document in accordance with established standards, policies, regulations and procedures, except as otherwise explained in this document.

PLACE P.E. STAMP

**Note:** *It is a violation of law for any person, unless they are acting under the direction of a licensed professional engineer, architect, landscape architect, or land surveyor, to alter an item in any way. If an item bearing the stamp of a licensed professional is altered, the altering engineer, architect, landscape architect, or land surveyor shall stamp the document and include the notation "altered by" followed by their signature, the date of such alteration, and a specific description of the alteration.*

# TABLE OF CONTENTS

COVER.....

PROJECT TITLE SHEET.....

PROJECT APPROVAL SHEET.....

LIST OF PREPARERS.....

TABLE OF CONTENTS.....

**CHAPTER 1 - EXECUTIVE SUMMARY .....1-1**

1.1 Introduction ..... 1-1

1.2 Purpose and Need ..... 1-3

    1.2.1. *Where is the Project Located?*..... 1-3

    1.2.2. *Why is the Project Needed?*..... 1-6

    1.2.3. *What are the Objectives/Purposes of the Project?* ..... 1-7

1.3 What Alternatives Are Being Considered?..... 1-8

    1.3.1 *What Specific Bridge Designs Are Being Considered?* ..... 1-9

    1.3.2 *How Will The Niagara River and American Falls Be Impacted During Construction?* ..... 1-11

1.4 How will the Alternatives Affect the Environment? ..... 1-13

1.5 What Are The Costs and Schedules? ..... 1-15

1.6 Which Alternative is Preferred? ..... 1-16

1.7. What are the Opportunities for Public Involvement? ..... 1-16

**CHAPTER 2 - PROJECT CONTEXT: HISTORY, TRANSPORTATION PLANS, CONDITIONS AND NEEDS .....2-1**

2.1 Project History..... 2-1

2.2 Transportation Plans and Land Use ..... 2-3

    2.2.1. *Local Plans for the Project Area*..... 2-3

    2.2.2. *Transportation Corridor*..... 2-3

2.3 Transportation Conditions, Deficiencies and Engineering Considerations..... 2-7

    2.3.1. *Operations (Traffic and Safety) and Maintenance* ..... 2-7

    2.3.2 *Multimodal* ..... 2-9

    2.3.3 *Infrastructure*..... 2-10

    2.3.4 *Potential Enhancement Opportunities*..... 2-23

**CHAPTER 3 – ALTERNATIVES .....3-1**

3.1 Alternatives Considered and Eliminated from Further Study..... 3-1

    3.1.1 *Alternative 1, Null/Maintenance*..... 3-1

    3.1.2 *Alternative 2A, Structure Rehabilitation* ..... 3-1

    3.1.3 *Alternative 3, Replacement – 3 Span Arched Girder Concept* ..... 3-4

3.2 Feasible Build Alternatives..... 3-4

    3.2.1 *Description of Feasible Alternatives* ..... 3-4

    3.2.2 *Preferred Alternative*..... 3-11

    3.2.3 *Design Criteria for Feasible Alternative*..... 3-11

3.3. Engineering Considerations..... 3-13

    3.3.1 *Operations (Traffic and Safety) & Maintenance* ..... 3-13

    3.3.2 *Multimodal* ..... 3-17

3.3.3 *Infrastructure*..... 3-18

3.3.4 *Landscape and Environmental Enhancements* ..... 3-29

    3.3.4.1 *Landscape Development and Other Aesthetics Improvements* ..... 3-29

    3.3.4.2 *Environmental Enhancements* ..... 3-30

3.3.5 *Miscellaneous* ..... 3-30

    3.3.5.1 *NYS Smart Growth Public Infrastructure Policy Act (SGPIPA)* ..... 3-30

    3.3.5.2 *Other Miscellaneous Information*..... 3-30

**CHAPTER 4 - SOCIAL, ECONOMIC, AND ENVIRONMENTAL CONDITIONS AND CONSEQUENCES ..**

..... **4-1**

4.1 Introduction ..... 4-1

    4.1.1 Environmental Classification ..... 4-1

    4.1.2 Coordination with Agencies ..... 4-5

4.2 Social..... 4-6

    4.2.1 Land Use..... 4-7

    4.2.2 Neighborhoods and Community Cohesion ..... 4-10

    4.2.3 Social Groups Benefited or Harmed..... 4-10

    4.2.4 School Districts, Recreational Areas, and Places of Worship..... 4-14

4.3 Economic ..... 4-15

    4.3.1 Regional and Local Economies ..... 4-15

    4.3.2 Business Districts ..... 4-16

    4.3.3 Specific Business Impacts..... 4-17

4.4 Environmental ..... 4-18

    4.4.1 Wetlands ..... 4-18

    4.4.2 Surface Waterbodies and Watercourses ..... 4-20

    4.4.3 Wild, Scenic, and Recreational Rivers ..... 4-22

    4.4.4 Navigable Waters ..... 4-22

    4.4.5 Floodplains..... 4-23

    4.4.6 Coastal Resources ..... 4-23

    4.4.7 Groundwater Resources, Aquifers, and Reservoirs..... 4-24

    4.4.8 Stormwater Management..... 4-25

    4.4.9 General Ecology and Wildlife Resources ..... 4-25

    4.4.10 Critical Environmental Areas..... 4-32

    4.4.11 Historic and Cultural Resources ..... 4-33

    4.4.12 Parks and Recreational Resources..... 4-35

    4.4.13 Visual Resources ..... 4-36

    4.4.14 Farmlands ..... 4-40

    4.4.15 Air Quality..... 4-40

    4.4.16 Energy ..... 4-42

    4.4.17 Noise..... 4-43

    4.4.18 Asbestos ..... 4-43

    4.4.19 Hazardous Waste and Contaminated Materials ..... 4-45

4.5 Construction Effects ..... 4-49

    4.5.1 Construction Impacts..... 4-49

    4.5.2 Mitigation Measures..... 4-50

4.6 Indirect and Secondary Effects ..... 4-51

4.7 Cumulative Effects ..... 4-51

4.8 Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity..... 4-51

4.9 Irreversible and Irrecoverable Commitments of Resources..... 4-51

4.10 Adverse Environmental Impacts That Cannot Be Avoided Or Adequately Mitigated ..... 4-52

REFERENCES:..... 4-53

<b>Appendices</b>	
A.	Maps, Plans, Profiles & Typical Sections
B.	Environmental Information
C.	Traffic Information
D.	Structures Information
E.	Public Involvement (PI) Plan and Input from Stakeholders including Public
F.	Miscellaneous

## CHAPTER 1 - EXECUTIVE SUMMARY

### 1.1 Introduction

This Design Report/Environmental Assessment provides a comprehensive overview of the project development efforts underway to replace two 115-year old bridges in Niagara Falls State Park. The bridges, which connect Prospect Point on the mainland to Green Island and Goat Island, have reached their useful life and need to be replaced.

The two stone-faced concrete arch bridges, which were built in 1900-1901, currently provide pedestrian access to Goat Island for millions of park visitors each year. They also provide access for state park administrative vehicles, and prior to 2004 provided trolley access as well. The structures, which cross over the American Rapids of the Niagara River, are known as the American Falls Bridges. The bridges, Prospect Point, Green Island, and Goat Island are part of Niagara Falls State Park, which is located in the City of Niagara Falls, Niagara County, State of New York, USA.

This is a New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) project administered by the New York State Department of Transportation (NYSDOT). NYSDOT is the lead agency with respect to the State Environmental Quality Review Act (SEQRA) 17 NYCRR Part 15 and FHWA is the lead agency with respect to the National Environmental Policy Act (NEPA) 23 CFR 771.

The Niagara Falls region, including both the United States and Canada, receives millions of visitors annually, with Niagara Falls, USA accommodating a large portion of those visitors, including visitors from Canada. It will be necessary to take into consideration the impact that the project might have on NYSOPRHP's ability to welcome and accommodate these visitors at the park.

This report was prepared in accordance with the NYSDOT Project Development Manual; 17 New York Code of Rules and Regulation (NYCRR) Part 15; and 23 Code of Federal Regulations (CFR) 771.

This report identifies, describes, and evaluates alternatives for meeting project objectives.

#### Present Status

The American Falls Bridges are one hundred fifteen years old. Both bridges are part of the state bridge inventory and numbered with Bridge Identification Numbers (BINs). The bridge from the mainland to Green Island is BIN 5522000, and the bridge from Green Island to Goat Island is BIN 5522010.

Each bridge carries two 10 foot travel lanes and has 8'-2" sidewalks on both sides. The bridges also carry all utilities serving Goat Island, including water, sewer, electricity, telephone, and natural gas.

In 2004, the structures had structurally deteriorated to the point that it was necessary to close the bridges. In order to maintain pedestrian access to Goat Island, temporary bridges (Mabey Bridges) were installed above the existing structures. Since 2004, the temporary bridges have functioned adequately to maintain pedestrian access, but were never considered an acceptable long-term solution.

The temporary (Mabey) bridges need to be replaced because they are not consistent with the character of the park, provide an aesthetically unappealing experience for park visitors, restrict views of the rapids, and are narrower than the concrete arch bridges built in 1900-1901. Furthermore, the concrete arches remain in-place below the temporary bridges, and continued deterioration of the concrete arch bridges has been observed and documented in recent bridge inspection reports. As a result, in 2013 the bridges were temporarily closed and the piers of the Mainland-to-Green Island bridge were underpinned before the bridges could be reopened.

### Alternatives

Initially, two major categories of alternatives were considered: a) rehabilitation of the existing concrete arch bridges and b) replacement of the existing concrete arch bridges. Both alternatives would allow for the removal of the temporary (Mabey) bridges. However, analysis of the superstructures of the bridges concluded that rehabilitation of the bridges is not a viable alternative, given the extensive deterioration of the existing arches, and the type of construction that was originally used for these bridges.

Alternative 2A, Structure Rehabilitation involving a thorough and detailed rehabilitation of both bridges is not a viable alternative.

Alternative 2B, Partial Pier Rehabilitation involves the re-use of portions of the piers of BIN 5522000, superstructure replacement of BIN 5522000, and complete replacement of BIN 5522010. It was determined that the only portions of the bridges that could be saved and reused were the steel micropiles bored in 2013 through the piers and into the rock beneath the footings of BIN 5522000. If the proposed structure is a two span structure on the same alignment or any structure on an alternate alignment the piers would not be rehabilitated.

Alternative 3, Replacement would completely remove and replace the concrete arch bridges, either on the existing alignment or on a new alignment offset from the existing alignment.

### Design and Construction Cost Projections

Design and construction of this project will be advanced in three stages:

- Preliminary Design. This design phase is currently underway, and will conclude with adoption of a Final Design Report/Environmental Assessment, and identification of a preferred alternative for the replacement bridges. Preliminary design is projected to cost \$2.4 million. NYSOPHRP has committed funding in its capital plan to complete this design phase.

- Final Design. Once the Final Design Report/Environmental Assessment has been completed, detailed construction plans and specifications will be developed, and all necessary state and federal permits and approvals will be secured. Final Design will conclude with a complete set of contract documents, readying the project to be bid for construction. The estimated cost of final design is \$2.5 million. These funds have not yet been committed by NYSOPRHP
- Construction. As described in this report, three alternative designs for the replacement bridges have been developed for further consideration, including public comment. The probable 2016 construction cost of the three alternatives range from \$21.37 million to \$37.32 million. The construction cost estimates are premised on a variety of assumptions described in this report. Cost estimates will continue to be refined as project design progresses, and the final construction cost will be determined through New York State's standard competitive bidding procurement process for capital construction projects.

NYSOPRHP has not secured funding for the construction of this project. The agency's annual capital budget for the entire state park system, which spans 215 state parks and historic sites, has been \$90 million to \$110 million annually for the last several years. Therefore, NYSOPRHP will need to secure special capital funding from state and/or federal sources prior to advancing this project to the construction phase.

### Environmental Classification

The project is classified as a National Environmental Policy Act (NEPA) Class III (EA) project in accordance with 23 CFR 771 and a State Environmental Quality Review Act (SEQR) Non-Type II project in accordance with 17 NYCRR Part 15.

## **1.2 Purpose and Need**

### **1.2.1. Where is the Project Located?**

1. Route Number: There is no route number associated with the American Falls Bridges.
2. Route Name: The American Falls Bridges carry the NYSOPRHP Pedestrian Loop and Trolley Loop.
3. State Highway Number and Official Description: The trolley loop and pedestrian route is not a numbered state highway, and there is no "official description."
4. Bridge Identification Number (BIN) and feature crossed:
  - a. BIN 5522000 over Niagara River (Between Mainland USA and Green Island)
  - b. BIN 5522010 over Niagara River (Between Green Island and Goat Island)
5. Municipality: This project is located in the City of Niagara Falls.
6. County: This project is located in Niagara County.



7. Length: The total project length is approximately one quarter (1/4) mile.
8. Location: Connect mainland Prospect Point in Niagara Falls, USA to Green Island to Goat Island.
9. Existing Conditions: These two concrete arch bridges with stone facing have the following characteristics.
  - a. Features Carried: Both bridges carry two 10' travel lanes and two 8'-2" sidewalks.
  - b. Pavement Condition: The pavement carried by both bridges is deteriorated and requires repair.
  - c. Speed Limit: The road is not open to normal traffic and there is no posted speed limit. NYSOPRHP has an internal operational speed limit of 15 mph for park service vehicles and equipment.
  - d. Type and Age of Structures: Both bridges are classified as Thacher Concrete Arch Bridges, with the Green Island-to-Goat Island bridge (BIN 5522010) built in 1900, and the Mainland-to-Green Island bridge (BIN 5522000) built in 1901.
  - e. Mabey Bridges: The two existing concrete arch bridges are retrofitted with temporary (Mabey) bridges in order to provide pedestrian, bicycle, and park maintenance vehicle access over the American Rapids. Public automobiles, other non-park-related vehicles, and trucks are not permitted on the bridges.
  - f. Park Facilities: The bridges carry utilities serving Goat Island, including water, sewer, electricity, telephone, and natural gas.

## 10. Spans and Lengths

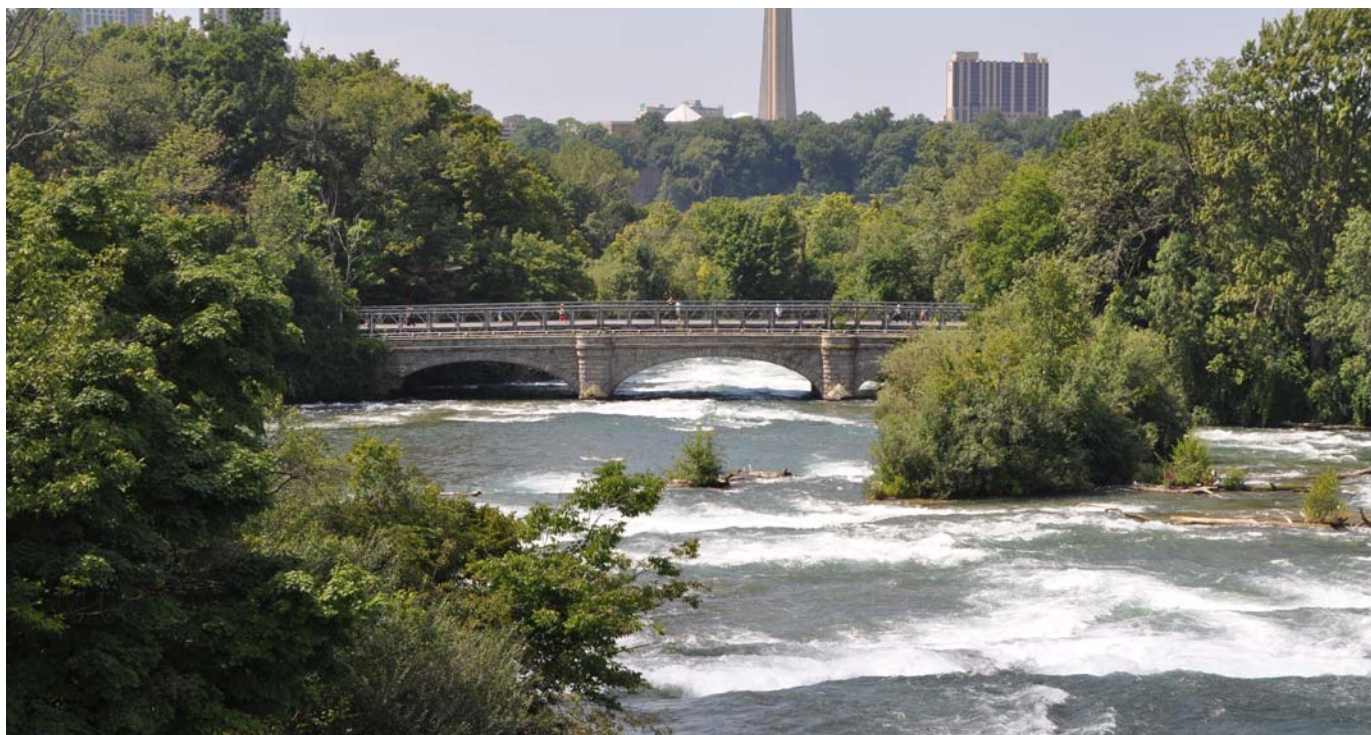
- a. BIN 5522000: The Mainland-to-Green Island Bridge has three spans, and a total constructed length of bridge is 424' 6", consisting of two 40' 3" abutments, two 13' 6" piers; two end clear spans of 103' 6"; and one center clear span of 110' 0"<sup>1</sup>.
- b. BIN 5522010: The Green Island-to-Goat Island Bridge has three spans, and a total constructed length of bridge is 245' 0", consisting of two 36' 6" abutments, two 8' 0" piers; two end spans of 50' 6"; and one center span of 55' 0".

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<sup>1</sup> There is a possible discrepancy between as-built measurements and design; site conditions make precise measurements difficult. The plans were annotated at some point in the past that each clear span was 2 ft. shorter than listed above. This discrepancy could be related to the gunite coating that was applied to the bridge in 1969.



**Figure 1.2.1.a**  
**Existing Conditions**  
**BIN 5522000 (Mainland USA to Green Island)**



**Figure 1.2.1.b**  
**Existing Conditions**  
**BIN 5522010 (Green Island to Goat Island)**



**Figure 1.2.1.c**  
**Existing Conditions**  
**BIN 5522000 (Mainland to Green Island)**

## 1.2.2. Why is the Project Needed?

### Background Information

Niagara Falls State Park was originally known as the “State Reservation at Niagara” or the “Niagara Reservation.” The Niagara Reservation is recognized as a National Historic Landmark (NHL) as well as being listed on the National Register of Historic Places (NRHP). The State Reservation at Niagara was dedicated on July 15, 1885, and represented the first reservation movement in the country for purchase by a state of property for purely aesthetic purposes.

- *Frederick Law Olmsted was consulted twice as improvements were being planned, first in the late 1870s and again, with his partner Calvert Vaux after the reservation was dedicated. The bridges in-place at the location of the American Falls Bridges at the time of Olmsted’s and Vaux’ observations were Whipple Trusses.*
- *The 1887 Olmsted and Vaux plan and report includes four paragraphs regarding “the bridges by which Goat Island is reached.” Recommendations in the report included shoring up and retaining the existing (Whipple Truss) bridges for the time-being,*

*removing superfluous ornamentation, and adding “slightly projecting balconies to the piers.” Regarding a future replacement bridge, with reasoning based on the view of the rapids, Olmsted and Vaux state “there is indeed, nothing to compare with it in all the world....”*

As the reservation was being improved, annual reports between 1885 and 1900 mention some actions that needed to be taken over the years to maintain the Whipple Truss bridges, including addressing a foundation that had settled. The Whipple Truss Bridges were replaced with the existing concrete arch bridges in 1900 and 1901 in anticipation of the 1901 Pan-American Exposition in Buffalo.

For over one hundred years, the concrete arch bridges have provided a connection between Mainland USA and Goat Island for millions of pedestrians to access park facilities located on Green Island and Goat Island. Due to the “low-to-the-water” construction, the bridges provided a means for visitors to experience the sight and sounds of the American Rapids, consistent with Olmsted’s and Vaux’ vision. Until 2004, NYSOPRHP also used these bridges for park trolleys, allowing riders to experience the rapids via low-speed open-air viewing. Currently, the bridges are also used by park police, park maintenance, and park administrative vehicles.

The concrete arch bridges are not accessible to public vehicle traffic. Public vehicles access Goat Island via a bridge constructed in 1965 that extends First Street in Niagara Falls southerly, over the American Rapids approximately one thousand feet upstream of the project site, and higher above the water than the concrete arch bridges. The bridge over the river is referred to as the “American Rapids Bridge” and begins outside Niagara Falls State Park at First Street.

The upstream American Rapids Bridge spans the entire channel without the need for piers or footings in the river, and it is much higher in the air with a feel similar to a highway bridge. Although the upstream bridge includes pedestrian sidewalks, they are narrower than the sidewalks on the American Falls Bridges. Furthermore, the pathways leading on and off the upstream American Rapids Bridge to Prospect Point are not completely within the park, and pedestrians are required to leave the park and travel along Buffalo Avenue to access the bridge. In general, the upstream American Rapids Bridge does not provide desirable pedestrian access between the attractions located at Prospect Point and on Goat Island.

### Project Need

This project is needed to address the identified structural deficiencies of the existing bridges.

#### **1.2.3. What are the Objectives/Purposes of the Project?**

The purpose of this project is to maintain the direct multi-modal connection within Niagara Falls State Park.

Project objectives are the following:

1. Eliminate structural deficiencies and restore bridge conditions.

- a. Bridge Condition Rating shall be 5 or greater<sup>2</sup> for at least 40 years.
  - b. Cost effective construction techniques shall be used to minimize the life cycle cost of maintenance and repair.
2. Provide a low-to-the-water river crossing as a means for visitors to experience the sight, sounds, majesty, and power of the American Rapids, consistent with Olmsted's and Vaux' vision.
  3. Restore accessibility consistent with Americans with Disabilities Act (ADA) guidelines and include well-defined pedestrian walkway areas.
  4. Restore trolley service to the crossing and provide an alternative river crossing for emergency vehicles that currently use the American Rapids Bridge.
  5. During construction, maintain pedestrian access and/or minimize disruption of pedestrian access between Mainland USA, Green Island, and Goat Island during the peak tourism season.
  6. Provide a design consistent with the existing bridges' historical context and park setting, to the extent practical.

### 1.3 What Alternatives Are Being Considered?

Project Alternatives were developed in order to address and meet the project objectives.

Alternatives that were considered include: (1) Null/Maintenance; (2A) Structure Rehabilitation; (2B) Pier Rehabilitation and (3) Replacement. The alternatives are summarized briefly as follows, and discussed in detail later in this report.

Alternative 1, Null/Maintenance: Under the Null/Maintenance alternative, no improvements would be built, and only routine preventative maintenance and corrective action by NYSOPRHP forces would be undertaken.

Because of the deteriorated state of both bridges, preventative and corrective maintenance would be expected to be on-going, potentially extensive, and costly, involving frequent bridge closures. Since preventative and corrective maintenance measures typically have a short service life and may not be capable of addressing the underlying structural deficiencies, the Null/Maintenance alternative is not considered cost effective and could lead to permanent closure of both bridges. Therefore, the null/maintenance alternative will not be considered further, except to be carried forward as a benchmark for comparison.

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<sup>2</sup> Bridge elements are rated on a scale of 1 through 9, most of which are rated on a scale of 1 through 7 with ratings 8 and 9 reserved for special conditions. This scale is used to rate the condition of the bridge element in comparison to its original design capacity and to its original functioning; this scale is not used to rate the condition of the bridge element in comparison to the present-day standards. A rating of 7 indicates new condition and a rating of 5 indicates minor deterioration, but still functioning as originally designed.

Alternative 2A, Structure Rehabilitation: Under the Structure Rehabilitation alternative, extensive repairs would be made to all structural systems and appurtenant features. Concrete, reinforcing steel, stone façade, drainage features, spandrel walls, footings, railing, pavement, sidewalk, and curb would be repaired to re-establish structural integrity and serviceability of the existing bridges.

Because of the age and advanced deteriorated state of both bridges, the Structure Rehabilitation alternative would require extensive re-building of the existing structures in order to construct safe, structurally sound bridges; and appurtenant features would need to be removed prior to structural rehabilitation, and then replaced after the structural rehabilitation is accomplished. Therefore, rehabilitation is simply not a viable alternative and thus will be given no further consideration, except for the possible re-use of existing micropiles of BIN 5522000 (Alternative 2B).

Alternative 2B, Partial Pier Rehabilitation involves the re-use of the micropiles at the piers of BIN 5522000, superstructure replacement of BIN 5522000, and complete replacement of BIN 5522010.

Alternative 3, Replacement: Under the Replacement alternative, the existing bridges would be completely removed, and new bridges would be constructed either on the existing alignment or a new alignment.

For a more in-depth discussion of the design criteria see Section 3.2.3. Design Criteria for Feasible Alternative.

### **1.3.1 What Specific Bridge Designs Are Being Considered?**

One of the most significant decisions to be made through the project development process is to select the type and appearance of the replacement bridges.

State and federal design and environmental assessment guidelines encourage the development of alternative options during the preliminary design, including seeking public comment on alternatives. As illustrated below, three main replacement alternative options have been developed. Additional detail and renderings of the alternative options are provided in Section 3.2 and Appendices A, and B-6 of this report.

The existing American Falls Bridges, which are 115 years old, are reinforced concrete earth filled arches. The bridges are faced with natural stone as an aesthetic treatment (the stone is not a structural element).

Due to significant changes and improvements in bridge design practices, the replacement bridges will not exactly mimic the existing structures. One of the three alternatives, Option 1: Precast Concrete Arched Bridge, most closely mirrors the look of the existing bridges. The other two options are bridges that also meet public access and park operation needs. While these options are visually different from the existing bridges they would utilize aesthetics to be consistent with the park setting.

Option 1: Precast Concrete Arch Bridges: Pictured in the rendering below, this option is very similar in design to the existing American Falls Bridges, incorporating current design and construction standards. The new bridge would consist of three arched spans, with piers anchored into the bedrock similar to the existing bridges. The new bridges will include aesthetic treatments consistent with the historic and park setting in which the structures reside.



Option 1 Mainland to Green Island Bridge

Option 2: Steel Girder Bridges: Pictured below this option utilizes steel girders as the bridge's horizontal structural element. This option also utilizes three spans, with piers anchored in bedrock. The bridge's piers and abutments would include aesthetic treatments consistent with the historic and park setting in which the structures reside.



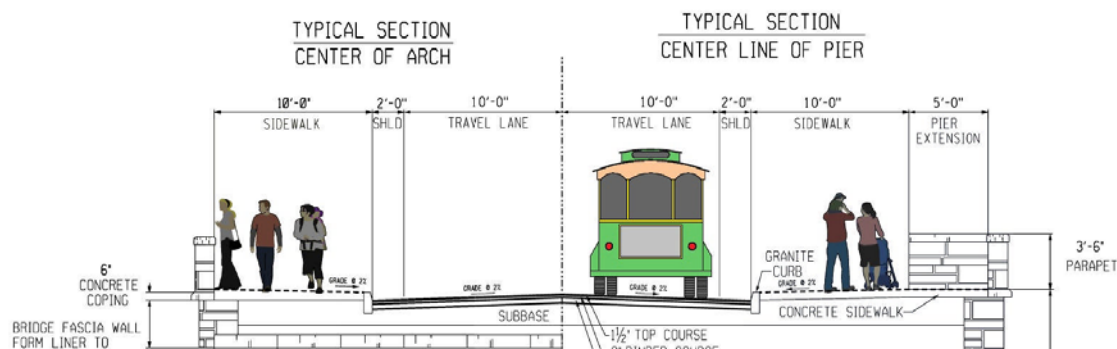
Option 2 Mainland to Green Island Bridge

Option 3: Tied Arch Bridges. Pictured below this option utilizes two steel arch ribs, tied by vertical cables to the bridge deck support steel, as the bridge’s primary horizontal structural element. The piers and abutments would incorporate aesthetic treatments consistent with the historic and park setting in which these structures reside. Although clearly very different aesthetically than the existing bridges, this design is reminiscent of the Whipple Truss bridges that existed in this location in the 1800s, prior to construction of the existing concrete arch bridges in 1900-1901.



Option 3 Mainland to Green Island Bridge

Bridge Travel Lanes. All three bridge alternatives share a similar roadway section as pictured below. Ten foot wide pedestrian sidewalks will be provided on both sides of each bridge. The roadway on the bridge will provide two ten foot wide travel lanes, for use by park trolleys and park administrative vehicles. The pedestrian sidewalks will be demarcated from the vehicle lanes by a curb and two foot curb offsets/shoulders. In Option 3 (B1) the sidewalks are cantilevered outside the arch ribs.



Typical Bridge Roadway Section for Options 1 and 2

### 1.3.2 How Will The Niagara River and American Falls Be Impacted During Construction?

The Niagara River at the location of the American Falls Bridges is a high volume cascade of powerful rapids. Construction of the American Falls Bridges will require temporary dewatering the Niagara River between Goat Island and Mainland USA. Dewatering is necessary for two reasons:



- The existing 115-year old bridges need to be demolished. The river channel must be dewatered in order to demolish and remove the bridges.
- The piers and abutments for the replacement bridges must be constructed “in the dry,” to allow for safe construction procedures and to ensure that the new foundations are firmly anchored to bedrock.

Dewatering will be accomplished by constructing a temporary cofferdam spanning from the upstream tip of Goat Island to the mainland. The cofferdam will shutdown water flow in the riverbed, exposing bedrock. As a consequence, the bedrock at American and Bridal Veil Falls will also be exposed while the cofferdam is in place.

Due to the natural riverbed topography, approximately 85% of the Niagara River flows over the Horseshoe Falls, and 15% flows over the American Falls. Dewatering the American and Bridal Veil Falls channel will redirect the entire river flow to the Horseshoe Falls.

Dewatering of the American Rapids Channel and American and Bridal Veil Falls has been done in the past. In 1969, the U.S. Army Corps of Engineers closed off flow through the channel in order to analyze the stability of the American Falls. The cofferdam necessary for construction of the replacement American Falls Bridges will be installed at the same general location as the 1969 cofferdam.

After the existing bridges are demolished and the new bridges are constructed, the cofferdam will be removed and flow will be restored to the channel and the American and Bridal Veil Falls. It's not anticipated that the cofferdam will result in any long-term impacts to the riverbed or to the falls.

Dewatering the American and Bridal Veil Falls and channel will have a dramatic, albeit temporary, visual impact on Niagara Falls State Park. Dewatering is expected initially be a tourism draw (a once-in-a-lifetime opportunity to see the falls and river channel without water), but after some period of time could negatively impact park attendance, particularly during the summer tourist season.

The length of time that the American Rapids and American and Bridal Veil Falls needs to be dewatered will be determined by the construction sequencing for installation of the new bridges. Detailed analyses have been completed for three possible bridge construction scenarios, each of which would result in different dewatering impacts (both in the length and number of seasons of dewatering):

- Standard Construction Scenario (2-yr):

Year 1: The American Falls would be dewatered for five months, from August through December. The existing bridges would be demolished and piers for the new bridges would be anchored to bedrock. Water flow would be restored in late December. Year 2: Construction would continue but water flow is restored for entire year (the horizontal bridge spans could be placed on top of the piers over moving water). This option minimizes dewatering during the busy summer tourism season.

- Accelerated Construction Scenario (1-yr):

This option requires dewatering the American Falls for nine months, from April through December. This option would dewater the falls for an entire summer tourism season, require 24-hour/day construction, and create risk of significant delays if the project falls behind schedule and needs to be shut down during the winter.

- Extended Construction Scenario (3-yr):

This option has been eliminated from further study but would avoid the need to dewater the American and Bridal Veil Falls by relying on a series of partial cofferdams (at any given time a portion of the river bed would be dewatered, with flow maintained in other sections). However, this option is deemed unacceptable due to its high cost and the unacceptable impact of a three-year construction project in the middle of the park.

**1.4 How will the Alternatives Affect the Environment?**

Exhibit 1.4-A - Environmental Summary				
NEPA Classification	Class III (EA)	BY	Federal Highway Administration	
SEQR Type:	Non-Type II (EA)	BY	NYSDOT	

Exhibit 1.4-B - Comparison of Alternatives					
Category	Alternatives				
	Null	2A	2B	3	
Wetland impacts	None	None	None	None	
100 year floodplain impact	None	None	None	None	
Archeological Sites Impacted	None	None	1 site impacted	1 site impacted	
Noise Impacts	None	None	None	None	
Impact to forested areas	None	5.17 acres	5.17 acres	5.17 acres	
Property impacts	None	None	None	None	
Economic	None	Temporary Impact during Construction	Temporary Impact during Construction	Temporary Impact during Construction	
Construction Cost (2016)	None	\$32.24 M to \$41.94 M	\$21.37 M to \$30.62 M	\$21.56 M to \$37.32 M	

Refer to Chapter 4 Sections 4.4.2.1, 4.4.2.5, 4.4.18.2, 4.4.19.2, and 4.5.2 for mitigation measures that are proposed for this project.

Anticipated Permits/Certifications/CoordinationPermits

International Joint Commission (IJC) / International Niagara Board of Control (INBC)

New York State Department of Environmental Conservation (NYSDEC)

- Article 15 Protection of Waters Permit
- State Pollutant Discharge Elimination System (SPDES) General Permit
- Section 401 of the Clean Water Act Water Quality Certification

New York State Department of State (NYS DOS)

- Coastal Zone Consistency Certification Statement

New York State Department of Transportation (NYSDOT)

- State Road Use Permits

United States Army Corps of Engineers (USACE)

- Section 404 of Clean Waters Act Nationwide Permit No. 3 - Maintenance Activities in all Waters of the U.S.
- Section 404 of Clean Waters Act Nationwide Permit No. 33 - Temporary Construction, Access, and Dewatering
- Section 10 of Rivers and Harbors Act Permit

Certifications

New York State Department of Labor (NYSDOL): Asbestos Variances

Coordination

- International Joint Commission (IJC) / International Niagara Board of Control (INBC)
- Federal Highway Administration (FHWA)
  - 4(f) determination and Finding of “*No Significant Impact*” (FONSI)
  - Section 106 Consultation and Memorandum of Agreement (MOA)
  - ESA Section 7 Consultation
- Advisory Council on Historic Preservation (ACHP)
- NYSDEC pursuant to ECL Article 15
- NYSOPRHP
  - 4 (f) determination
  - Section 106 Memorandum of Agreement (MOA)
- NYSHPO
  - Section 106 Consultation and a Memorandum of Agreement (MOA)
- United States Fish and Wildlife Service (FWS)
  - ESA Section 7 Consultation
- New York Office of General Services (NYSOGS)
- United States Coast Guard
- United States Army Corps of Engineers (USACE)

- National Park Service (NPS)
- Tribal Nations (Seneca Nation of Indians, Tonawanda Seneca Nation, Tuscarora Nation, and Seneca Cayuga Tribe of Oklahoma)
- City of Niagara Falls
- Niagara River Greenway Commission
  - Consistency Review Form

**1.5 What Are The Costs and Schedules?**

State Parks anticipates that Design Approval of this Design Report/Environmental Assessment will occur in the summer of 2016, after all public input and comments have been reviewed and appropriate changes are incorporated into the document. Design Approval is an important milestone, resulting in the selection the preferred bridge design, completion of a thorough review of environmental and historic preservation issues related to the project, and development of a construction cost estimate for the new bridges.

The projected \$24 million construction cost for the preferred bridge design, as presented in the Design Report, is too large to be accommodated within NYSOPRHP’s regular annual capital budget. Therefore, the next step will be for NYSOPRHP to evaluate opportunities to secure special state and/or federal funding allocations for the bridge replacement project. At this time it is unknown when capital funding will be available, meaning at this there is no formal schedule for building the new bridges.

When NYSOPRHP secures construction funding, the agency will initiate final design for the bridge replacement project. It is anticipated that a Finding of No Significant Impact (FONSI) will be published based on this report. Approximately two years will be needed to complete final design, obtain permits and approvals, and bid and award the construction contract. Actual construction is also anticipated to last approximately 24 months. A more detailed final design and construction schedule will be developed at a future date, when construction funding is available.

<b>Exhibit 1.5A Project Schedule</b>	
<b>Activity</b>	<b>Date Occurred/Tentative</b>
Scoping Approval	November 27, 2013
Design Approval	Summer 2016
ROW Acquisition	N/A <sup>1</sup>
Construction Start	TBD <sup>2</sup>
Construction Complete	TBD <sup>2</sup>

1. No ROW acquisitions are required. However, interagency agreements between NYSDOT, NYSOPRHP and NYSOGS will be necessary.
2. Schedule to be determined upon securing funding for final design and construction.

<b>Exhibit 1.5B</b>				
<b>Comparison of Alternatives' Total Project Cost (Millions)</b>				
	Alternate 1 (Null)	Alternate 2A	Alternate 2B	Alternate 3
Total cost	N/A	\$32.24 M to \$41.94 M	\$21.37 M to \$30.62 M	\$21.56 M to \$37.32 M

For more detail on costs for each alternative refer to Section 3.2.1.

### 1.6 Which Alternative is Preferred?

NYSOPRHP has indicated that the 3 span precast concrete arch concept (Option A1/A2) is the preferred alternative for both BIN 5522000 and BIN 5522010. However, all feasible alternatives are still under consideration. A final decision will be made after fully evaluating the alternatives' impacts, and after receiving and evaluating comments on the design report, comments from the public information meeting, and public hearing.

### 1.7. What are the Opportunities for Public Involvement?

The public involvement process for this project has included a Public Scoping Hearing on August 6, 2013. The meeting introduced the project to local officials, providing an overview of project goals and objectives, a history of studies conducted to date, work currently underway, and the plan for upcoming outreach and public involvement, and anticipated project development.

In addition, a Stakeholder Meeting was also held on August 6, 2013 to discuss existing conditions and project needs. Attendees were given the opportunity to voice their concerns and provide suggestions for the project. Attendees were asked to fill out a form where they could provide input on the project purpose and need, and develop a listing of specific concerns and suggestions.

A Public Information Meeting was held on September 23, 2014 to present alternatives. This meeting included both an open forum and a formal presentation by the project design team. A summary of the comments received from this meeting is included in Appendix E.

A Public Hearing is planned for January 2016.

<b>Exhibit 1.7</b>	
<b>Public Involvement Plan Schedule of Milestone Dates</b>	
<b>Activity</b>	<b>Date Occurred/Tentative</b>
Stakeholder Meeting	August 6, 2013
Public Scoping Hearing	August 6, 2013
Public Informational Meeting	September 23, 2014
Public Hearing	January 2016
Current Project Letting date	TBD <sup>1</sup>

1. Schedule to be determined once funding is secured for final design and construction.

Refer to Appendix E for Public Involvement (PI) Plan and Input from Stakeholders including Public.

You may offer your comments in a variety of ways.

- There will be a Public Hearing scheduled in the January 2016 where you can talk to NYS Department of Transportation and NYS Office of Parks, Recreation and Historic Preservation representatives, give comments to a stenographer and/or leave or mail written comments.
- You may contact:

Craig Mozrall, Regional Special Projects Manager  
Please include the six digit Project Identification Number (PIN) 5760.40  
Questions or comments email: [Craig.Mozrall@dot.ny.gov](mailto:Craig.Mozrall@dot.ny.gov)  
Telephone: (716) 847-3033

#### Mailing Address

New York State Department of Transportation Region 5 Design  
100 Seneca Street  
Buffalo, New York 14203

You can visit the Project's website: <https://www.dot.ny.gov/AmericanFallsBridges>

The remainder of this report is a detailed technical evaluation of the existing conditions, the proposed alternatives, the impacts of the alternatives, copies of technical reports and plans and other supporting information.

## CHAPTER 2 - PROJECT CONTEXT: HISTORY, TRANSPORTATION PLANS, CONDITIONS AND NEEDS

This chapter addresses the history and existing context of the project site, including the existing conditions, deficiencies, and needs.

### 2.1 Project History

The two American Falls Bridges were built in 1900-1901 and each consists of three concrete arch spans with stone facades. Each bridge has closed spandrel walls, with earth fill between the spandrel walls and above the arches, with roadways and sidewalks founded on the earth fill.

Rehabilitation projects over their service life are summarized by the following:

- Foundation repair was completed in 1903 based on observed erosion of one footing of BIN 5522010;
- Spandrel wall repair and drainage improvements were completed in the early 1900s;
- Replacement of the overlying roadway, sidewalks, and parapet walls was completed in 1965;
- Isolated concrete repairs and installation of the gunite coating to the underside of the arches was accomplished in 1969; and
- Pier repairs of BIN 5522000 were completed in 1980.

A yellow structural safety flag was issued when a 6' x 12' area of deteriorated gunite and concrete underarch of BIN 5522000 was observed during the June 2003 interim bridge inspection. The deteriorated section included voids one to two feet deep and exposed steel reinforcement.

A subsequent evaluation report of the American Falls Bridges was performed by Erdman Anthony in March 2004, along with a geotechnical investigation by SJB Services in October 2003. The evaluation report to NYSOPRHP specifically addressed the issues associated with the yellow structural safety flag, and the findings included:

- The structures were considered adequate for pedestrian traffic, electric maintenance vehicles, and passenger trolleys;
- Deterioration would likely continue to progress and planning for the replacement of the bridges should begin;
- Reduction of the live loading by re-routing utility vehicles and emergency vehicles to the American Rapids Bridge should begin; and

- A 12 ton limit should be posted for both structures.

Later in 2004, a piece of gunite coating and concrete underarch from BIN 5522000 was reported to have fallen into the Niagara River. This led to an emergency inspection and ultimately the closure of both American Falls Bridges.

Because the bridge closure cut off a critical link to Goat Island, in summer of 2004, an emergency contract administered by NYSDOT resulted in the installation of temporary (Mabey) truss bridges above the existing concrete arch bridges, which allowed re-opening the bridges to pedestrian traffic. The passenger trolleys were rerouted to the American Rapids Bridge because the trolleys cannot navigate the relatively steep approaches to the Mabey bridges and the Mabey bridge widths are too narrow for shared use by pedestrians and two-way trolley traffic.

The Mabey bridges are supported on the existing piers and abutments.

NYSOPRHP continued replacement planning of the bridges.

1. Cannon/FRA prepared a Rehabilitation Report in August 2005, and recommended the replacement of the structures based on findings that included:
  - Arch deterioration of an extent that restoration of the existing concrete was no longer considered feasible;
  - Rehabilitation techniques, including standard reinforcing methods involving plating directly below the existing concrete arches, were not considered to be consistent with maintaining the structures historic elevations, and therefore of questionable aesthetic value; and
  - Conditions of the substructure materials based on evaluations of the existing foundations that revealed inconsistent quality of concrete.
2. Bergmann Associates and LP Ciminelli prepared a Structural Alternative Feasibility Study in July 2009 that evaluated the replacement of the bridges with a variety of structures including cast-in-place arches, precast arch systems, prestressed concrete box beam systems, and steel thru-truss structures. The July 2009 study's preferred alternative was a precast arch system with a new masonry façade, because it generally replicates the existing structures.

The study also included an assessment of dewatering options, identified common cofferdam materials, reported advantages and disadvantages, and explored a full diversion of the American Rapids (similar to dewatering accomplished by USACE in 1969). Cofferdam-related exploration also included localized cofferdams for each structure; and considered "working in the wet" utilizing temporary work structures with localized cofferdams. The study concluded that dewatering alternatives are highly dependent on the alternative selected and on environmental regulations and permitting.



3. In 2012, NYSOPRHP requested NYSDOT's assistance with the project, including scoping, design consultant management, bidding, and construction administration. NYSDOT prepared an Initial Project Proposal (IPP) that was approved in October 2012, a Memorandum of Understanding (MOU) was approved by both agencies in April 2013, and Project Scoping Report (PSR) was approved in November 2013.

During the October 2012 biennial inspection, a red structural flag was issued for BIN 5522000 due to the continued deterioration of the concrete underarch in "Span 2." Because records indicate that concrete for the arches was poured monolithically with the concrete for the piers, the stability of the piers was considered to be unknown, and possibly deficient. Therefore the structures were closed in February 2013, and in March 2013 NYSDOT completed an emergency contract to install micropiles and construct a transfer beam and pile bracing systems to stabilize existing piers of BIN 5522000. The bridges reopened May 16, 2013 upon completion of the project. These piles and transfer beams were designed to maintain a safe crossing until the bridges are permanently rehabilitated or replaced, and resulted in re-opening of both bridges to pedestrian traffic.

## **2.2 Transportation Plans and Land Use**

### **2.2.1. Local Plans for the Project Area**

#### **2.2.1.1. Local Comprehensive Plans ("Master Plan")**

The project is consistent with the local comprehensive plan prepared for the City of Niagara Falls in 2009.

The project is considered supportive of the City of Niagara Falls' focus on the riverside park assets of the community and an identified Pedestrian Priority Zone along Prospect Street and adjacent to the project location, because the project will maintain the river crossing for pedestrians' use.

#### **2.2.1.2. Local Private Development Plans**

The entire project is within a state park, and therefore there are no approved private developments planned within the project area that will impact traffic operations.

By maintaining access to Goat Island within the park, and improving the park, this project will enhance and support private development plans and tourism-related businesses in the adjoining community.

### **2.2.2. Transportation Corridor**

#### **2.2.2.1. Importance of the Project Route Segment**

Niagara Falls receives millions of visitors per year, and the bridges between the mainland and Goat Island via Green Island provide accessibility to large numbers of yearly visitors. The project route is used by pedestrians to travel between the various park areas, attractions, and

observation locations. The project route also provides an opportunity to view and experience the American Rapids.

The project segment is a critical link between Goat Island and the mainland, connecting the park amenities to the core Niagara Falls downtown district. The trails and pathways leading to and from the American Falls Bridges are connected to both the sidewalk network of Niagara Falls, NY, USA and to Niagara Falls, Ontario, Canada via the international Rainbow Bridge.

NYSOPRHP operates a fleet of trolleys to provide park visitors a comfortable and accessible option for traveling between scenic overviews and attractions on Prospect Point, Goat Island, and other park locations including the Discovery Center. In their current structurally deficient condition, the American Falls Bridges are not able to accommodate large vehicles. Therefore the Niagara Falls State Park trolleys must exit the park via First Street, and use the American Rapids Bridge to access Goat Island. The additional travel distance for trolleys to access Goat Island is over one half mile. During peak tourism season the trolleys routinely experience significant delays due to congestion on the city streets adjacent to the park, and therefore the “detoured” route negatively affects the trolley schedule and delays service to and from Goat Island. The project will remove the structural deficiencies and restore trolley traffic to the American Falls Bridges, providing more efficient transportation of park visitors.

#### **2.2.2.2. Alternate Routes**

The upstream American Rapids Bridge provides access to Goat Island, but it is not suitable as a permanent alternate pedestrian access route. Pedestrians utilizing the American Rapids Bridge must exit the park to access the American Rapids Bridge at First Street and Buffalo Avenue. Although the upstream bridge includes pedestrian sidewalks, they are narrow and insufficient to accommodate the volume of pedestrians that walk on the downstream American Falls Bridge. Moreover, the pathways leading on and off the upstream American Rapids Bridge to Prospect Park and Goat Island are not welcoming to pedestrians. In summary, the upstream American Rapids Bridge does not provide acceptable pedestrian access to Goat Island.

If the American Rapids Bridge was used as a permanent alternate route, then as the only bridge connecting the mainland to Goat Island, no redundant emergency route would be available

#### **2.2.2.3. Corridor Deficiencies and Needs**

The primary transportation modes in the project area are pedestrians, bicyclists, and trolleys. No corridor deficiencies have been identified within the project area.

#### **2.2.2.4. Transportation Plans**

This is a New York State Office of Parks Recreation and Historic Preservation project, and is not listed on the approved Transportation Improvement Program (TIP), and Statewide Transportation Improvement Program (STIP).

Construction funding has not been identified at this time. A TIP amendment may be required depending on the funding sources identified.

#### **2.2.2.5. Abutting Highway Segments and Future Plans for Abutting Highway Segments**

The abutting pathways at the approaches of the American Falls Bridges consist of a 20' foot wide path which transitions to the Lower Grove/American Rapids Trail on the Mainland USA approach and the North Shoreline Trails on the Goat Island approach.

The Lower Grove/American Rapids Trail begins at the American Falls, and runs easterly along the mainland shoreline, and provides visitors with an opportunity to experience the majesty, power, and sounds of the American Rapids.

The North Shoreline Trails run along the northern shoreline of Goat Island between Luna Island and the American Rapids Bridge, and provides a link to other Goat Island pathways, including access to major attractions such as the Cave of the Winds and Terrapin Point at the Horseshoe Falls. The trails on Goat Island provide a different experience than the previously-described Lower Grove/American Rapids Trail, because on Goat Island the trails follow along the top of a heavily wooded slope adjacent to the rapids, with flow through this section of the rapids somewhat "tempered" by the various islands located within the channel in this area.

A comprehensive Landscape Improvement Plan for Niagara Falls State Park, prepared in 2012, is part of an initiative to revitalize and restore heavily-used park areas. The landscape improvement plan is a long-term vision for restoring major areas within the park including landscaping, way-finding signage, park roadways, walking paths, and infrastructure. Several landscape improvement projects have been completed as called for in the Landscape Improvement Plan, including the 2014 construction of the Lower Grove/American Rapids Trail on the mainland and the North Shoreline Trail on Goat Island. This project is considered consistent with and part of the initiative to revitalize and restore heavily-used park areas. Figure 2.2.2.5 depicts the areas identified in the plan including the American Falls Bridges.



**Figure 2.2.2.5**  
**Niagara Falls State Park – Landscape Improvement Plan**  
**(Erdman Anthony et al. 2012)**

**2.3 Transportation Conditions, Deficiencies and Engineering Considerations**

**2.3.1. Operations (Traffic and Safety) and Maintenance**

**2.3.1.1. Functional Classification and National Highway System (NHS)**

Exhibit - 2.3.1.1 Classification Data	
Route(s)	Not Applicable
Functional Classification	Urban Local
National Highway System (NHS)	No
Designated Truck Access Route	No
Qualifying Highway	No
Within 1 mi. of a Qualifying Highway	No
Within the 16 ft. vertical clearance network	No

**2.3.1.2. Control of Access**

Only authorized park vehicles are allowed within the project limits; therefore vehicular traffic access is fully-controlled within the project area.

**2.3.1.3. Traffic Control Devices**

The American Falls Bridges site is accessible only to authorized vehicular traffic. Therefore, no traffic control devices exist at the site.

**2.3.1.4. Intelligent Transportation Systems (ITS)**

There is no ITS system in operation, nor is one planned for the project area.

**2.3.1.5. Speeds and Delay**

This project is off of the highway system. Vehicular and pedestrian speed and delay issues do not exist at the project site.

Park-owned and operated trolleys that would normally use the American Falls Bridges to transport tourists to and from Goat Island have been diverted to the American Rapids Bridge. The trolleys exit the park to travel to and from Goat Island via the American Rapids Bridge. Because the trolleys are routinely exposed to off-site safety issues, traffic congestion, and delays, park operators have difficulty scheduling and maintaining a regular trolley interval during peak tourist season.

**2.3.1.6. Traffic Volumes**

Pedestrian traffic counts, included in Appendix C of this report, indicate two thousand five hundred (2,500) pedestrians per hour use the bridges during peak holidays.

This project is off of the highway system and this is not a capacity improvement project.

#### **2.3.1.7. Level of Service (LOS) and Mobility**

The existing temporary (Mabey) bridge sidewalks are roped-off during peak tourism season to delineate approximately 7' widths, and provide an acceptable Level of Service (LOS) A for the peak usage of 2,500 pedestrians per hour, based upon *Exhibit 18-2, New York State Department of Transportation Highway Design Manual*, however, the sidewalks do not provide space for visitors to stop and view the rapids.

The existing bridges provide an acceptable LOS for the pedestrian volumes, even during peak periods, and there are no mobility problems at the site.

#### **2.3.1.8. Safety Considerations, Accident History and Analysis**

This project is off the highway system and primarily used for pedestrian access with intermittent maintenance vehicle use. Trolleys have been re-routed to the American Rapids Bridge due to geometric restrictions of the temporary (Mabey) bridges installed above the existing concrete arch bridges in 2004.

There is no accident history for the facility, and no roadway safety improvements are considered necessary as part of this project.

#### **2.3.1.9. Existing Police, Fire Protection and Ambulance Access**

The State Park Police Station is currently located on park property in the Cave of the Winds building on Goat Island, and park police patrol the project area. Park police vehicles primarily utilize the American Rapids Bridge to travel between the mainland and Goat Island. A new park police station is being constructed on the mainland, and when complete, the existing park police station will be converted to help enhance the park attractions on Goat Island.

The City of Niagara Falls Fire Department provides fire protection services for the park. Fire trucks and ambulances utilize the American Rapids Bridge to travel between the mainland and Goat Island.

#### **2.3.1.10. Parking Regulations and Parking Related Conditions**

There are no areas regulated by parking restrictions within the project limits because only park-owned and park-authorized vehicles are allowed within the project limits.

#### **2.3.1.11. Lighting**

Both bridges are illuminated with street lighting and with floodlights at night. Record plans indicate that conduit and service for the lighting is located under the both sidewalks on each structure.

BIN 5522000 is currently considered relatively well-lit for pedestrians. The lighting on BIN 5522010 is either insufficient or nonfunctional and pedestrian lighting could be improved on BIN 5522010 to match the lighting of BIN 5522000.

### **2.3.1.12. Ownership and Maintenance Jurisdiction**

The New York State Office of Parks Recreation and Historic Preservation (NYSOPRHP) owns and maintains both bridges and all associated appurtenances including sidewalks, railings, drainage and utility systems, roadways, curbs, connecting pathways and approach pavements, and lighting, with the exception of telephone lines on the bridges, owned by Verizon, and the gasline on the bridges, owned by National Fuel. NYSDOT performs annual and biennial inspection of the bridges.

## **2.3.2 Multimodal**

### **2.3.2.1. Pedestrians**

Both of the existing bridges have two 8'-2" sidewalks, but these sidewalks are currently located below temporary bridges and are inaccessible. Pedestrians are accommodated on the temporary (Mabey) bridges via sidewalks approximately seven feet wide, and during peak tourism season pedestrian traffic is separated from the maintenance vehicle traffic by roped-off barriers. The sidewalks on the temporary bridges provide an acceptable Level of Service for pedestrian peak usage, but do not provide space for visitors to stop and view the rapids.

The temporary mainland approach to BIN 5522000 is steep and does not include handrails. Additionally, the walking surface on both temporary bridges consists of textured steel plates, a flush transition is not consistently provided between adjacent plates, and the texture is rough.

The temporary bridges and associated walkways are therefore not ADA compliant.

The Mabey bridge structures are visually unappealing and impede viewing access of the American Rapids, significantly detracting from the park visitor experience.

Two recent park landscape improvement projects near the American Falls Bridges, one on the mainland entitled "Prospect Point and Lower Grove Trail Improvements" and the other on Goat Island entitled "North Shore Trail Improvements" were recently completed as called for in the Niagara Falls State Park Landscape Improvements Plan published in 2012. Both projects accommodate pedestrian movements to and from the American Falls Bridges.

A pedestrian generator checklist is included in Appendix C.

### **2.3.2.2. Bicyclists**

While there are no separate facilities for bicyclists, throughout the park, bicyclists are accommodated by sharing the multi-use trails within the park and travel lanes on the park roadways.

### **2.3.2.3. Transit**

NYSOPRHP operates a trolley that transports tourists between park attractions, including attractions on the mainland and attractions located on Goat Island.

Historically, the trolleys used the American Falls Bridges to access Goat Island. Due to the geometric characteristics of the temporary (Mabey) bridges, the American Falls Bridges are not able accommodate large vehicles, and therefore the Niagara Falls State Park trolleys must exit the park via First Street, and use the American Rapids Bridge to access Goat Island. The American Rapids Bridge is located outside of the park on Mainland USA, and the current route is considered a detour that negatively affects the trolley schedule, and delays service to and from Goat Island, particularly on high visitation days when city streets experience significant congestion.

The Niagara Frontier Transportation Authority (NFTA) maintains bus operations in the Buffalo-Niagara Falls region, including the city streets near the park. NFTA bus routes 40, 50, and 55 operate on Rainbow Boulevard near the project. The closest bus stops to the project are located at First Street and Rainbow Boulevard.

### **2.3.2.4. Airports, Railroad Stations, and Ports**

There are no airports, railroad stations or port entrances within or in the vicinity of the project limits.

### **2.3.2.5. Access to Recreation Areas (Parks, Trails, Waterways, State Lands)**

The project is within Niagara Falls State Park, and the American Falls Bridges provide access to points within the park including the extensive network of trails and water viewing areas. The entire park, including the project site is on state land.

## **2.3.3 Infrastructure**

### **2.3.3.1. Existing Highway Section**

Within the project area the highway is a curbed section, except near the northerly and southerly project limits, where it is partially uncurbed. The two-lane roadway consists of one 10'-0" lane in each direction with no shoulders. The curbs are stone or concrete, and the original curb reveal was 4", but pavement overlays have reduced the reveal in most locations. The roadway pavement is asphalt over concrete slabs. The concrete slabs are approximately 6" on the bridge and 10" on Green Island and the asphalt thickness varies.

The sidewalks are 8'-2" on the bridges and 7'-0" on the approaches. The sidewalks are 1½" of asphalt over concrete slabs of varying thickness. See the Plan, Profile, and Typical Sections in Appendix A for additional information.



**2.3.3.2. Geometric Design Elements Not Meeting Minimum Standards**

2.3.3.2 (1) Critical Design Elements

Exhibit 2.3.3.2 Existing Nonstandard Features					
Critical Design Element	Operating Speed	Standard	Existing Condition	Adverse Accident History? (Yes/No)	Remarks
Clear Bridge Roadway Width	30 mph (based on design speed)	20 ft. plus 2 ft. shdrs. NYSDOT BM Appx. 2A Tables N & R	20 ft.	No	(<400) vehicles per day
Pavement Cross Slope	Not Applicable	1.5% min, 2% max, HDM 2.7.4.2K	2.6%	No	
Rollover	Not Applicable	4% max. between travel lanes HDM 2.7.4.2L	5.2%	No	At crown
Bridge Walking Surfaces	Not Applicable	Ground surface shall be slip resistant ADA Stds. for Transportation Facilities Sec. 302.1	Temporary bridge decks are slippery when wet	No	

2.3.3.2 (2) Other Design Parameters

There are no existing nonconforming features.

**2.3.3.3. Pavement and Shoulder**

The existing pavement on the bridges is in poor condition and exhibits signs of deterioration including cracking, heaving, and settlement.

A Pavement Evaluation and Treatment Selection Report (PETSr) is not considered necessary for this project because the project is a bridge replacement/rehabilitation project, and also because the facility is entirely within a state park and not part of the state highway system. The pavement on and near the bridges will have to be replaced under all feasible alternatives.

There are no existing shoulders.

**2.3.3.4. Drainage Systems**

The existing drainage systems for the roadway and the bridges consist of open swales and ditches on the mainland and Goat Island that convey runoff to the Niagara River, a drainage structure that collects stormwater at a low point in the pathway on Green Island and pipes the water to the river, and a closed drainage system along the curbs on the bridges with drainage structures and closed piping conveying stormwater to the river.

Small-diameter piping originally installed act as weeps, but these are generally clogged and undersized, and evidence of poor drainage includes efflorescence on the undersides of the existing arches, indicative of evaporation of salt-laden water that has leaked through the arches. Additionally, exposed reinforcement is corroded, indicative of water leakage through the concrete.

### **2.3.3.5. Geotechnical**

#### Bridge Foundation Information

The bridge piers and abutments are founded on rock.

For BIN 5522010, the pier foundations are 10 feet wide and approximately 50 feet long and for BIN 5522000, the pier foundations are 15.5 feet wide and approximately 53 feet long. The faces of the piers and abutments of both bridges are one foot from the edge of the concrete base and lined with stone set in concrete.

When the American Falls was dewatered in 1969, repairs to the foundations included replacing areas where the concrete had scoured. Information from 2002 indicates that scour had occurred and in some areas had extended twelve inches in from the faces of the piers. Photographs from 2010 show that the foundations beneath the pier and abutment faces have scoured back to the face of the rock lining, and in some cases the scour appears to extend beneath the rock facing, consistent with the 2002 information.

Eighteen micropiles were previously installed through both piers of BIN 5522000; each pier with two rows of nine piles each. The rows are spaced 7.5 feet apart and the piles are spaced approximately 3 feet center to center in each row.

For four of the micropiles installed in Pier 1 it was necessary to install the 12 inch permanent casing through the pier concrete, thus compromising uplift resistance. To compensate for this, four supplemental anchors were installed to provide additional uplift resistance.

#### Evaluation of Bridge Foundation Conditions

In 2004, one core boring was completed in each abutment of both bridges and two core borings were completed at each pier. Each core hole was drilled through the fill above the arches, through the arch concrete and approximately 10 feet into the underlying dolostone. Boring logs prepared by SJB (February 2005) describe the rock as sound, medium hard, thickly-bedded dolostone, and the borings show that the concrete is in direct contact with the underlying bedrock. Generally, over ninety percent of the rock core was recovered and the rock quality designation, a measure of the discontinuities in the rock, ranged from 64 to 100 percent.

The piers include approximately ten feet of concrete above the dolostone, overlain by approximately ten feet of fill and pavement. SJB (February 2005) describes the concrete encountered within the piers as slightly to moderately weathered, and in some locations the concrete is described as deteriorated or highly weathered and fractured.

During installation of micropiles through the piers of BIN 5522000, Hayward-Baker (2013) describes the dolostone beneath the piers as fractured. This apparent discrepancy with the boring logs contributes to uncertainty about the character of the dolostone beneath the piers, but may be due to differences between drilling techniques for micropile installation compared to rock coring.

#### Rock Mass Evaluation

The rock underlying the abutments and piers could be rated as “fair rock,” and the overall rock mass behavior relative to engineering design is considered fair-to-good.

#### Scour Evaluation

The most important mechanism from the standpoint of scour and erosion of the dolostone along the American Channel is likely due to the mechanism of “quarrying and plucking”.

“Quarrying and plucking” is a scour process whereby blocks of intact rock are removed from the surrounding rock in response to turbulent flow. These turbulent flow conditions may be related to the presence of hydraulic jumps, head cuts, changes in bed slopes, bridge piers and other obstructions, etc.

Based on the results from preliminary calculations and observations, rock scour is expected to occur intermittently at vertical drops in the rock (cascades) where blocks may be removed from the surrounding rock. Whether or not loss of rock will regress to the locations of the bridge piers over the design life of the bridges is uncertain and must be considered in the design of the pier foundations.

#### Seismic Setting

The northeast United States lies within the relatively tectonically stable North American Plate. There are three zones identified in New York State with significant seismic hazard including Zone A in northern New York, Zone B in downstate New York, and Zone C in Western New York. Earthquakes have been recorded in Western New York, with epicenters near Attica, New York, about 45 miles from Niagara Falls, in 1929 and 1955. The 1929 Attica earthquake is one of the largest earthquakes recorded in New York State ( $M=5.2$ ) and is believed to be associated with the Clarendon-Lindon Fault System. That system is considered the most likely source of significant earthquakes ( $M>5$ ) that could impact the project site.

**2.3.3.6. Structures**

The characteristics described below are pre-temporary (Mabey) bridge installation.

## 2.3.3.6 (1) Description: Mainland USA to Green Island

- a. BIN – 5522000
- b. Feature carried and crossed – NYSOPRHP Trolley & Pedestrian Path over the Niagara River
- c. Type of bridge, number and length of spans, etc. – Stone-Faced Concrete Arch, three spans, and a total constructed length of bridge is 424' 6", consisting of two 40' 3" abutments, two 13' 6" piers; two end clear spans of 103' 6"; one center clear span of 110' 0".<sup>3</sup>
- d. Width of travel lanes, parking lanes, and shoulders – 2-10' Travel Lanes
- e. Sidewalks – 2 - 8'-2" (10' @ piers)
- f. Utilities carried

These are all services for NYSOPRHP (Supplier)

Electric – Two 4" Conduits – one spare (National Grid)  
 Gas – 6" Conduit (National Fuel)  
 Telephone – 3" Conduit (Verizon)  
 Telephone – 2" Flex Conduit (Ronco)  
 Water – 6" Pipe (Niagara Falls Water Board)  
 Sewer – 6" FM (Niagara Falls Water Board)

## 2.3.3.6 (2) Description: Green Island to Goat Island

- a. BIN – 5522010
- b. Feature carried and crossed – NYSOPRHP Trolley & Pedestrian Path over the Niagara River
- c. Type of bridge, number and length of spans, etc. – Stone-Faced Concrete Arch, three spans, and a total constructed length of bridge is 245' 0", consisting of two 36' 6" abutments, two 8' 0" piers; two end spans of 50' 6"; one center span of 55' 0".
- d. Width of travel lanes, parking lanes, and shoulders – 2-10' Travel Lanes
- e. Sidewalks – 2 - 8'-2" (10' @ piers)
- f. Utilities carried

These are all services for NYSOPRHP (Supplier)

Electric – Two 4" Conduits – one spare (National Grid)

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<sup>3</sup> There is a possible discrepancy between as-built measurements and design; site conditions make precise measurements difficult. The plans were annotated at some point in the past that each clear span was 2 ft. shorter than listed above. This discrepancy could be related to the gunite coating that was applied to the bridge in 1969.

Gas – 6” Conduit (National Fuel)  
Telephone – 3” Conduit (Verizon)  
Telephone – 2” Flex Conduit (Ronco)  
Water – 6” Pipe (Niagara Falls Water Board)  
Sewer – 6” FM (Niagara Falls Water Board)

#### 2.3.3.6 (3) Clearances (Horizontal/Vertical)

There is no horizontal clearance between the existing edge of travel way and face-of-curb. The existing sidewalks on the concrete arch bridges generally provide 8’3” clearance between the existing edge of travel way and face-of-railing, and 10’0” clearance at the piers.

There are no vertical restrictions.

#### 2.3.3.6 (4) History & Deficiencies

##### History

BINs 5522000 and 5522010 were originally constructed in 1900 and 1901. At the time of construction, the bridges were considered technically sophisticated, partly because reinforced concrete was a relatively new bridge-building material. The bridges are mentioned in *The American, A Universal Reference Library, Volume 3*, published by Scientific American Publishing Department in 1907 as examples of the most successful introduction of reinforced concrete bridges in the United States.

Compared to modern standards and practices, the bridges were minimally reinforced; the reinforcing steel in the bridges was of a relatively low tensile strength; the concrete in the bridges lacked quality control during construction and had a relatively low design compressive strength; the footings and piers were composed of plain concrete and boulders, with no reinforcing steel.

Records indicate that the roadway, sidewalks and parapet walls were reconstructed on both structures in 1965. Records also indicate that some concrete repairs and the installation of the gunite coating to the underside of the arches were completed in 1969 when the rapids were dewatered as part of a project sponsored by the International Joint Commission and administered by USACE and others.

Additionally, isolated pier repair work was performed on BIN 5522000 in 1980, and micro-piles were constructed beneath the piers in 2013 in order to allow continued functional performance of the temporary bridges.

##### Deficiencies

The deterioration of the middle span on BIN 5522000 resulted in a yellow structural safety flag and the posting of a twelve-ton weight limit on both structures in 2003. The continued deterioration of the middle span of BIN 5522000 resulted in another yellow structural safety flag in 2004. The temporary (Mabey) bridges were installed in 2004. The continued deterioration of the middle span of BIN 5522000 increased to encompass approximately eighty percent of the

middle span's length, and a red flag was issued based on discoveries made during the October 2012 biennial inspection. The description of the flagged condition included the following:

*In Span 2, the underside of the arch on the left side is severely spalled and the concrete is in poor condition. The spalling is approximately 15' wide by 90' long beginning from the end of Span 2. There are large voids, up to 24" deep, and the concrete crumbles easily within the voids.*

*There are (4) longitudinal steel reinforcement bars spaced at 3' on-center that are exposed at the bottom of the concrete arch.*

*It is unknown how the bottom (tension) mat of reinforcement remains bonded to the concrete arch given the extensive amount of spalling along the span, approximately 80% of the length.*

Copies of the BIN 5522000 Bridge Inspection Report – October 2012, including the red flag and BIN 5522010 Bridge Inspection Report – October 2012 are available in the project files.

Additionally, safety flags have been issued and addressed for BIN 5522000 over the years for deficiencies that have included settled pavement at the approaches to the temporary bridges; gaps in the fencing; and a hole in the concrete sidewalk above the utility chase.

At the time of this report, no flags had been issued for BIN 5522010.

Other deficiencies of both bridges include the following.

- The paved roadway surface carried by the concrete bridges (under the temporary bridges) exhibits longitudinal and transverse cracking. Observed heaving and depressions indicate that water is infiltrating the pavement and the material below the pavement, also carried by the concrete bridges is wet and subject to freeze/thaw damage.
- The gunite coating on the underside of the arches exhibits cracking on fifty-to-seventy five percent (50% to 75%) of the surface areas.
  - The cracking is more severe along the outer edges of each span and less evident within the interior areas.
  - Longitudinal cracking is evident in the arches below construction joints.
  - The construction joints are subject to water filtration from above, and leak. The gunite surface exhibits water staining.
  - Sections of the gunite have de-bonded and are sagging from many of the concrete arches.

- Although not completely visible beneath the gunite coating, where the gunite has fallen away, the concrete arches exhibit voids and severely-deteriorated concrete that is soft and crumbles.
- The stone facing of both bridges is generally in sound condition with no missing stones. However, there are many deteriorated joints, between the stones, where the mortar is worn, missing, or cracked.
  - Cracking is diagonal and stepped extending across the arches in several locations.

### Abutments, Piers, and Footings

Both bridges have abutments, piers, and footings subjected to high velocity water in the rapids of the Niagara River a few hundred feet above the American Falls. The foundations consist of unreinforced concrete possibly keyed into the bedrock riverbed, according to 1969 repair plans.

Because of the high-velocity water conditions, entry into the water is unsafe. Therefore, the “diving” or underwater inspections have been performed using a video camera mounted on a pole, where the camera is moved along the base of each pier recording the inspection, allowing the video to be reviewed later.

Although the clarity of these videos is generally poor due to the turbidity and turbulent nature of the water, the 2002 Diving Reports identified numerous voids along the pier/rock interfaces, and the 2007 Diving Reports indicated several voids and cracks below the waterline including undermining of footings.

#### 2.3.3.6 (5) Inspection

Since 2004, when the temporary bridges were installed, biennial and interim inspections of both BIN 5522000 and BIN 5522010 include inspection of elements of both the “original arch structure” and the “steel truss structure,” and the bridge ratings include the rating of the temporary (Mabey) bridge installed on top of the concrete arch bridges. The temporary bridges are functioning adequately; however, the concrete arch bridges continue to deteriorate.

As stated previously, as a result of the October 2012 inspection, a red flag was issued on BIN 5522000 due to significant spalling within the middle span (Span 2). This condition was originally identified in the 2003 interim and 2004 biennial inspections. In 2004 the limit of the spalled area was approximately 6 ft. wide by 11.5 ft. long, with voids up to 24” deep, and evidence of long-term leakage causing concrete to crumble along the original longitudinal construction joints, indicating that deterioration was continuing. By 2012 when the red flag was issued the spall was approximately 15 ft. wide by 90 ft. long.

The October 2012 biennial bridge inspections provided a Computed Condition Rating of 4.368 and a General Recommendation of 3 (“serious deterioration” or “not functioning as designed”) for BIN 5522000 and a Computed Condition Rating of 4.868 and a General Recommendation of 5 (“minor deterioration but functioning as originally designed”) for BIN 5522010.

Copies of BIN 5522000 and BIN 5522010 bridge inspection reports from October 2012 are included in the project files.

#### 2.3.3.6 (6) Restrictions

Both bridges were posted with a twelve (12) ton limit in 2004.

Due to the red flag issued based on discoveries made on October 12, 2012 during the 2012 biennial inspection BIN 5522000, both bridges were temporarily closed to all use while repairs were implemented during the spring of 2013.

The structures are currently open to pedestrians and park service vehicles.

#### 2.3.3.6 (7) Future Conditions

The work required to correct the structural deficiencies of both bridges is beyond the scope of NYSOPRHP routine maintenance.

#### 2.3.3.6 (8) Waterway

The waterway associated with these bridges is characterized by the following.

- This site is the American Channel section of the Niagara River.
- These bridges are immediately upstream of the American Falls in Niagara Falls, NY.
- The Niagara River is located along the international boundary between the United States and Canada.
  - Also known as the Boundary Water Treaty of 1909, the *Treaty Between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada* established principles and mechanisms for the resolution of disputes related to boundary waters shared by the two countries. The International Joint Commission (IJC) was created as a result of this treaty, and has jurisdiction over cases involving the use or obstruction or diversion of the waters with respect to Articles III and IV of the treaty.
    - Cofferdams and diversions, dewatering and other potential construction-related operations associated with this bridge project will be subject to requirements and processes of the International Joint Commission.
  - Also known as the 1950 Niagara Treaty, the *Treaty Between the United States of America and Canada Relating to the Uses of the Waters of the Niagara River* considered that water resources of the Niagara River may be more fully and efficiently used, while recognizing an obligation to preserve and enhance the



scenic beauty of Niagara Falls and the River consistent with providing beneficial use of waters.

- The 1950 Niagara Treaty stipulates the following minimum flows over the falls
  - April 1<sup>st</sup> to September 15<sup>th</sup> (inclusive)
    - No less than 100,000 cubic feet of water per second (cfs) from between 8 a.m. and 10 p.m. and no less than 50,000 cfs between 10 p.m. and 8 a.m.
  - September 16<sup>th</sup> to October 31<sup>st</sup> (inclusive)
    - No less than 100,000 cubic feet of water per second (cfs) from between 8 a.m. and 8 p.m. and no less than 50,000 cfs between 8 p.m. and 8 a.m.
  - November 1<sup>st</sup> to March 31<sup>st</sup> (inclusive)
    - No less than 50,000 cubic feet of water per second (cfs).
- The waterway associated with these bridges is technically considered navigable by the US Coast Guard. However, based on discussions and correspondence between NYSDOT and the US Coast Guard, it was determined a Coast Guard permit will not be required because it is not practical to navigate in the American Rapids. Therefore, a Coast Guard Checklist is not required.

#### **2.3.3.7. Hydraulics of Bridges**

BIN 5522000 and 5522010 span the American Channel located immediately upstream of the American Falls. The bridges are orientated with no skews, and have historically passed a full range of storm events.

##### Prior Hydraulic Studies

Both bridges were built in the early 1900s, prior to any hydraulic power-related diversions of the river. Rates of water flow in the American Channel were higher in the early 1900s, when the bridges were constructed, compared with lower, present rates of water flow in the American Channel. There is no history of flooding within the project limits.

In order to study the preservation and enhancement of the scenic beauty of the American Falls, in 1967 IJC created the American Falls International Board (AFIB). In December of 1971, AFIB published a hydraulic report that helped develop an understanding of the developments on and in the Niagara River and at Niagara Falls that affected the volumes and levels of water. Several highlights of the hydraulic report include:

- In its natural state, the Niagara River is the means of draining the upper Great Lakes, connecting Lake Erie to Lake Ontario, with flow from Lake Erie controlled by a natural weir in the form of a series of limestone ledges located about a mile upstream of the Peace Bridge, Lake Erie as headwater and the Niagara River as tailwater;
- Interpretation of the flow of the Niagara River is somewhat complicated in that over the years of record, the natural supply to the river has been affected by various artificial diversions of flow into or out of the lakes;
- The Grass Island Pool is located in the Niagara River upstream of Goat Island. The flow in the American Channel and over the American Falls is *dependent* upon the water level in the Grass Island Pool, and under the influence of controls imposed on the river. Therefore, the flow in the American Channel and over the American Falls is in a large measure *independent* of the volume of flow in the river;
- The flow through the Niagara River is measured in Queenston, Ontario by the International Niagara River Control Board. Flow within the river is variable and often predicated on the weather, rainfall events and annual snowfall. Historically, average river flow ranges from 192,000± cfs to 215,000± cfs depending on the season.

In 1970 and 1971, Ontario Hydro, at the request of the AFIB, built a prototype physical hydraulic model of the American Falls in Islington, Ontario. The purpose of the physical model was to evaluate possible treatments that could be applied to improve the aesthetics of the American Falls.

No prior numerical hydraulic model of the American or Canadian Rapids has been found for use on this project.

The American Rapids has been identified as being located in a Special Flood Hazard Area (SFHA), Zone A, by the Federal Emergency Management Agency. SFHAs are defined as areas that will be inundated by a flood event having a 1% chance of being equaled or exceeded in any given year, and the 1% annual chance flood is also referred to as the base flood or 100-year flood. Zone A of the SFHA identifies an approximated special flood hazard area for which no Base Flow Elevations (BFEs) have been established.

#### Present Hydraulic Power-Related Diversions

The intakes for the New York Power Authority (NYPA) and Ontario Power Generation (OPG) power plants draw water from the Grass Island Pool in the river upstream of the project site. The intakes feed NYPA's Niagara Power Plant and three facilities that are part of OPG's Niagara Power Plant Group.

NYPA's Niagara Power Plant, located about 4 1/2 miles downstream from the American Falls, consists of two main facilities: the Robert Moses Niagara Power Plant, with 13 turbines, and the Lewiston Pump-Generating Plant, with 12 pump-turbines.

Ontario Power Generation's facilities on the Niagara River are Sir Adam Beck I Generation Station, with 10 turbines; Sir Adam Beck II Generation Station, with 16 turbines; and the Sir Adam Beck Pump Generating Station, with 6 pump-turbines.

In close coordination with the International Niagara Board of Control, the power plants draw water from the river for power generation while maintaining the required water level of the Grass Island Pool and the required downstream flows over Niagara Falls, in accordance with the 1950 Niagara Treaty and related directives. The water level in the Maid of the Mist Pool immediately downstream of the falls varies depending on the treaty-mandated flow over the falls, and is closely monitored at the Ashland Avenue gauge in the Maid of the Mist Pool.

#### Present American Channel Flow Range

Downstream of the Grass Island Pool, approximately eighty four percent (84%) of the Niagara River flows over the Horseshoe Falls and approximately sixteen percent (16%) flows through the American Channel and over the American Falls during routine conditions. As stated in the prior section of this report, the 1950 Niagara Treaty requires either an overall 50,000 cfs minimum or a 100,000 cfs minimum; therefore, the American Channel minimally conveys approximately 8,000 cfs to 16,000 cfs.

Additionally, according to USACE, when filling the Maid of the Mist Pool daily between approximately 8:00 am and 8:15 am, the total flow is 115,000 cfs. Also, USACE has reported that the Niagara River had seen flow rates as high as 400,000 cfs in the past. Accounting for the 200,000 cfs capacity that is withdrawn for power generation, a maximum flow of 200,000 cfs could discharge over the falls, with approximately eighty eight percent (88%) of the Niagara River flow over the Horseshoe Falls and approximately twelve percent (12%) flow through the American Channel and over the American Falls. The 200,000 cfs maximum flow rate was also included in the hydraulic model.

For hydraulic study purposes as part of this project, as needed to predict channel behavior under potential future bridge configurations, construction scenarios, and cofferdam configurations, reasonable design range for flow in the American Channel is 8,000 cfs to 25,000 cfs.

#### **2.3.3.8. Guide Railing, Median Barriers and Impact Attenuators**

Parapet walls exist on both bridges.

There are no existing guide railing, barriers, or impact attenuators on either bridge or any of the approaches to the bridges.

There is no existing guiderail present on the temporary (Mabey) bridges, but fencing has been installed along the outside edges of the decks of the temporary bridges to protect pedestrians using the temporary bridges.

**2.3.3.9. Utilities**

The bridges carry utilities between the mainland and Goat Island via utility chases. Recent inspections have found deterioration around some of the utility chase access panels on BIN 5522000, resulting in the issuance of a yellow structural safety flag in October 2012, because spalled concrete and exposed rebar adjacent to these access panels had allowed runoff to drain into the utility chase, contributing to the overall deterioration of the bridge.

Existing utilities carried by both bridges are tabulated in Exhibit 2.3.3.9 below.

Exhibit - 2.3.3.9 Existing Utilities				
Utility Owner	Type	Location/Side	Length	Remarks
National Fuel	Gas	Under Sidewalk/Right	Entire Structure	Service for Goat Island
National Grid	Electric	Under Sidewalk/Both	Entire Structure	Service for Goat Island
Verizon	Telephone	Under Sidewalk/Left	Entire Structure	Service for Goat Island
Ronco	Telephone	Under Sidewalk/Left	Entire Structure	Service for Goat Island
Niagara Falls Water Board	Water	Under Sidewalk/Left	Entire Structure	Service for Goat Island
Niagara Falls Water Board	Sewer	Under Sidewalk/Left	Entire Structure	Service for Goat Island

**Notes**

1. Water and Sewer: Municipal (Niagara Falls Water Board) ownership of utilities end outside the park. The utilities on the bridge are owned by NYSOPRHP.
2. National Grid owns no facilities on the bridge or on Goat Island. Everything on the bridge and on Goat Island is NYSOPRHP owned. Somewhere near the bridge there is a “service point,” a small building where the National Grid meter is located.
3. Verizon has a 25 pair copper cable on the bridge.
4. National Fuel’s pipeline is continuous from the Mainland USA to Goat Island.

NYSOPRHP is currently designing a project for construction in 2016 that will deactivate the utilities carried on the existing American Falls Bridge, relocating the utilities onto the American Rapids Bridge approximately 1,000 feet upstream. Assuming this project is completed, NYSOPRHP will decide at a future date whether to install new utilities into the new American Falls Bridge, thereby creating redundant utility service to Goat Island.

**2.3.3.10. Railroad Facilities**

There are no railroads within the project limits and no at-grade crossings within one half mile that could impact traffic conditions.

### **2.3.4 Potential Enhancement Opportunities**

This section of this chapter focuses on the existing areas to identify potential enhancement opportunities related to the project, and to help avoid and minimize impacts. Chapter 4 of this report focuses on potential impacts, enhancements, and mitigation.

#### **2.3.4.1. Landscape**

##### 2.3.4.1 (1) Terrain

The project is located on the Niagara Escarpment, a geological formation that extends from Central New York State westward through Ontario, Michigan, and ending in Wisconsin, north of Chicago, Illinois. The Niagara Escarpment includes the dramatic landforms of the channels and rapids above and including the American Falls and the Horseshoe Falls, and the unique terrain of the lower Niagara River, including the Niagara Gorge.

##### 2.3.4.1 (2) Unusual Weather Conditions

There are no unusual weather conditions within the project area.

##### 2.3.4.1 (3) Visual Resources

The project area is located along the rapids of the American Channel approximately one thousand feet upstream of the American Falls. The two bridges provide access between Mainland USA, Green Island and Goat Island, and views from the bridges and shorelines are dramatic. The views from the bridges are currently obscured by the support trusses of the temporary (Mabey) bridges.

The views from the bridges include the rapids upstream and downstream of the bridges and the wooded shorelines of Goat Island, Green Island and Prospect Point on the mainland.

The American Rapids Bridge partially blocks the up-river view, and the down-river view includes crest of the American Falls and the distant Niagara Falls, Ontario skyline through the mist.

#### **2.3.4.2. Opportunities for Environmental Enhancements**

This project provides opportunities to enhance the areas adjacent to the bridges in accordance with the recommendations outlined in the Niagara Falls State Park Landscape Improvements Plan. The project also provides the opportunity to restore unobstructed views from the bridges and include viewing balconies on the bridges.

## CHAPTER 3 – ALTERNATIVES

This chapter discusses the alternatives considered and examines the engineering aspects for all feasible alternatives to address project objectives in Chapter 1 of this report.

### 3.1 Alternatives Considered and Eliminated from Further Study

#### 3.1.1 Alternative 1, Null/Maintenance

The null/maintenance alternative will not satisfy the project objectives.

The null/maintenance alternative would involve simply leaving the bridges as they currently exist, with the temporary (Mabey) bridges situated over the concrete arch bridges with no improvements other than routine maintenance. Under the null/maintenance alternative, NYSOPRHP would attempt to maintain pedestrian access and structural integrity by performing repairs sufficient to sustain existing conditions.

Under the null/maintenance alternative, accessibility for future repairs would be obstructed by the temporary (Mabey) bridges. Additionally, the physical presence of the temporary bridges would continue to block views of the American Falls and the rapids, and continue to complicate future bridge inspections. The temporary bridges would also continue to obstruct access to the waterlines, sewer lines, and other utilities carried by the bridges.

The work required to correct existing structural deficiencies is beyond the scope of routine maintenance under the null/maintenance alternative. The null/maintenance alternative would therefore result in the continued deterioration of the bridges. Continued deterioration of the bridges would create the need for increased maintenance, possibly involving repeated closures for emergency repair work, and would lead to increasingly restrictive load posting, and eventually complete closure.

Therefore, the null/maintenance alternative will not be considered further, except to be carried forward as a benchmark for comparison.

#### 3.1.2 Alternative 2A, Structure Rehabilitation

This alternative would involve a thorough and detailed rehabilitation, permitting continued use of one or both of the existing bridges. The section below describes why rehabilitation will not be carried further except as noted.

The deteriorated condition of the existing bridges is such that rehabilitation of the superstructure of BIN 5522000 and rehabilitation of the entire BIN 5522010 are not considered feasible. However, re-use of micropiles at the piers of BIN 5522000 is further evaluated under the rehabilitation alternative described in Section 3.2.1.1.

For this project, the rehabilitation alternative, as applied to either bridge, would require the removal of the temporary (Mabey) bridge to expose the concrete arch bridge. Once exposed, the

features carried by the bridge would be removed, and these would include pavement, sidewalks, parapet walls, earth fill, and the stone facing.

The rehabilitation alternative requires cofferdams. In order to perform rehabilitation, areas of the riverbed would need to be dewatered to create a dry working area from which to perform the work. The arch portion of the structure is in poor condition with deteriorated concrete and reinforcing. Due to significant deterioration it would be necessary to completely remove the concrete arches of both bridges, leaving the existing piers and abutments in place. The piers and abutments would be subject to further work and minimally, pier and abutment work would involve removal of the gunite coating and concrete repairs. Rehabilitation of the piers of BIN 5522000 is considered feasible because the micropiles installed in 2013 are structurally sound. Pier rehabilitation of BIN 5522000 is discussed further in Section 3.2.1.1, as a feasible alternative.

After repair of the piers and abutments, the concrete arches would be reconstructed. The features carried by the bridge would then be replaced, and these would include replacement of earth fill, pavement, sidewalks, parapet walls, and stone facing. Other work associated with the rehabilitation alternative would include reconstruction of the approach roads and pathways, landscaping, lighting, and possibly other utilities.

The rehabilitation alternative is characterized by the following.

- |                          |  |
|--------------------------|--|
| Structural Deficiencies  | <ul style="list-style-type: none"> <li>• The load carrying capacity of Bridge BIN 5522000 is insufficient.</li> <li>• The load carrying capacity of Bridge BIN 5522010 is insufficient.</li> </ul>   |
| Extent of Repairs Needed | <ul style="list-style-type: none"> <li>• Elements of BIN 5522000 have deteriorated beyond repair.</li> <li>• For BIN 5522010:             <ul style="list-style-type: none"> <li>○ the original arch superstructure is characterized by widespread areas of hollow, cracked and efflorescence staining of the underside gunite surface;</li> <li>○ The condition of the original concrete is only fair, based on cores extracted from the arch barrel in 2002.</li> <li>○ Concrete repairs would be extensive, and typically repairs of this type have a life expectancy of no more than 25 years.</li> </ul> </li> <li>• The rehabilitation alternative would require the closure of the structures and detouring of all traffic including pedestrians during construction.</li> <li>• The rehabilitation alternative would require temporary removal and relocation of utilities.</li> </ul> |
| Construction Costs       | <ul style="list-style-type: none"> <li>• The estimated construction cost for rehabilitation of BIN 5522000 and BIN 5522010 is \$32.24 M to \$41.94 M. This estimated cost range is greater than sixty five percent (&gt;65%) of the estimated cost range for</li> </ul>  |

replacing the bridges, because of the following factors:

- The monolithic type of original construction does not allow for element-by-element repair of the superstructure.
- Advanced age, spalled concrete, and deterioration of reinforcing of both bridges.
- Poor condition of the concrete.
- Construction costs will be incurred for cofferdams, dewatering and work zone traffic control, with no savings compared to full replacement, where costs would also be incurred for cofferdams, dewatering and work zone traffic control.
- Selective demolition and repair is time consuming and costly.
- Reduced life expectancy of repairs, compared to full life expectancy of full replacement.

Environmental

- The rehabilitation alternative would involve meeting the same environmental requirements as the full replacement alternative. It has been determined that the only portions of the bridges that could be saved and re-used are the steel micropiles in the piers in the water of the larger bridge. Because the micropiles were installed in 2013 and are not a historic element, no historic bridge element could be re-used under either the rehabilitation or the replacement alternative.

Other Factors:

- Chapter 19 of the NYSDOT Bridge Manual:
  - Section 19.2.2 of the Bridge Manual states that it is often most cost effective to simply let some types of bridges, including concrete arch bridges “live out” their full useful life, and these bridges have reached that point.
  - Checklist item III.C. of the Bridge Rehabilitation vs. Replacement Worksheet indicates that concrete arch bridges are usually not rehabilitated due to lack of redundancy, difficulty in load rating, and monolithic construction.
  - Because the life expectancy of repairs is much shorter than for complete bridge replacement, the rehabilitation alternative is even less favorable when accounting for the costs of future rehabilitation and maintenance.

Therefore, due to the deteriorated condition of the existing bridges, and the unknowns associated with the substructure, rehabilitation of the superstructure of BIN 5522000 and rehabilitation of the entire BIN 5522010 is simply not a viable alternative and thus will be given no further consideration.



### 3.1.3 Alternative 3, Replacement – 3 Span Arched Girder Concept.

NYSOPRHP asked for an alternative that spanned the mainland to Green Island channel in a single span. They desired to remove the piers from the water to reduce future maintenance costs and to open up the view of the American Rapids. A three span arched multi-girder concept was developed. This concept had two end spans of 50'-0"; and one center span of 350'-0". The piers were located on the banks of the channel and the abutments buried in vaults on the approaches.

This concept was eliminated from the feasible options for the following reasons.

- The estimated construction cost for this concept was \$30.30 M to \$42.40 M.
- NYSOPRHP wants to maintain the low to the water experience. The concept required a higher profile. The walking surface would be approximately 7'-6" higher than the temporary Mabey bridges and over 9' higher than the original bridges.
- Aesthetics – The steel superstructure did not look like the arch bridges that have graced the location for over 100 years.

## 3.2 Feasible Build Alternatives

### 3.2.1 Description of Feasible Alternatives

Design alternatives have been developed and evaluated, and the following alternatives are further considered for BIN 5522000 and BIN 5522010:

#### 3.2.1.1 Alternative 2B, Partial Pier Rehabilitation

As mentioned in Section 3.1.2, the re-use of micropiles at the piers of BIN 5522000 is a viable solution. The existing concrete surrounding the micropiles would be removed, while the existing concrete between the micropiles would remain. Additional micropiles would be installed and a reinforcing cage would be placed around each pier, with dowels into the existing concrete between the micropiles. If the proposed structure is a two span structure on the same alignment or any structure on an alternate alignment the piers would not be rehabilitated.

#### 3.2.1.2 Alternative 3, Replacement

The replacement alternative, as applied to either bridge, would include the complete removal of the existing bridge and replacement with a new bridge.

#### 3.2.1.3 Technically Feasible Options Under Alternatives 2B and 3

This section of this report discusses technically feasible bridge replacement alternatives that were listed in the December 2008 *Structure Alternative Feasibility Study for the Replacement of the Goat Island Bridges* prepared by Bergmann Associates and LP Ciminelli. Feasible bridges include several types of bridges, resulting in various replacement options.

For clarification purposes, options under the Partial Pier Rehabilitation Alternative and the Replacement Alternative are categorized and defined as Option A and Option B. Option A

includes bridge types that replicate traditional concrete arches and Option B includes bridge types with steel superstructures.

Option A: Three remaining bridge types under the Partial Pier Rehabilitation Alternative and the Replacement Alternative that replicate traditional concrete arches are:

- Replacement Alternative, Option A1: Custom Precast Arch;
- Replacement Alternative, Option A2: Precast Parabolic Arch System; and
- Replacement Alternative, Option A3: Pre-Stressed Concrete Girders with a Soffit or with No Soffit.

Option B: The option under the Partial Pier Rehabilitation Alternative and the Replacement Alternative that included steel superstructures:

- Replacement Alternative Option B1: Tied-Arch Bridge and
- Replacement Alternative Option B2: Steel Girder Bridge.

Some of the above options closely replicate some or many of the aspects of the existing concrete arch bridges.

In order to remove an existing bridge and construct a new bridge under the partial pier rehabilitation alternative and the replacement alternative, areas of the riverbed would need to be dewatered to create a dry working area from which to perform the work.

Key elements that are common to all the above-identified options include the following.

#### Geometry

- The partial pier replacement alternative would maintain the existing horizontal alignment of BIN 5522000; the replacement alternative could either maintain the existing horizontal alignment or place the new bridge on a different horizontal alignment downstream of the existing alignment.
- The partial pier rehabilitation alternative and the replacement alternative could closely replicate the existing vertical alignment.
- The partial pier rehabilitation alternative and the replacement alternative would correct non-standard features, including pavement cross-slope and rollover, roadway width, and sidewalk width.

#### Operational

- Under the replacement alternative, if a new horizontal alignment is utilized, then the existing bridge may remain in use until the new bridge is ready to be used.
- Under the partial pier rehabilitation alternative and the replacement alternative, if the new bridge is placed on the existing horizontal alignment, then the existing bridge could not be used to maintain pedestrian traffic during construction. Therefore detouring of all traffic, including pedestrians would be required, possibly via a

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	temporary pedestrian bridge.
Right of Way	<ul style="list-style-type: none"><li>• Under the partial pier rehabilitation alternative and the replacement alternative, NYSDOT will need to acquire property access rights from other state agencies to allow NYSDOT to administer the replacement of the structures both within the riverbed and outside the riverbed.</li></ul>
Environmental	<ul style="list-style-type: none"><li>• The partial pier rehabilitation alternative and the replacement alternative would involve meeting a variety of environmental requirements. These may include:<ul style="list-style-type: none"><li>○ 4(f) and 6(f) Procedural Requirements.</li><li>○ Environmental permitting.</li><li>○ Permitting with the International Joint Commission.</li></ul></li></ul>
Cost	<ul style="list-style-type: none"><li>• Total project estimated 2016 cost of the partial pier rehabilitation alternative ranges between \$21.37M and \$30.62M and the total project estimated 2016 cost of the replacement alternative ranges between \$21.56M and \$37.32M.</li></ul>
Project Goals	<ul style="list-style-type: none"><li>• The improvements under the partial pier rehabilitation alternative and the replacement alternative would meet the overall objective of eliminating the identified structural deficiencies.</li></ul>

Exhibit 3.2.1A Summary of Alternative Costs - Million Dollars (2016) <sup>8</sup>				
BIN 5522000 - 3 Span Precast Concrete Arches				
BIN 5522010 - 3 Span Precast Concrete Arches				
Activities		Alternative 2B - Replacement (Existing Alignment)	Alternative 3 - Replacement (Existing Alignment)	Alternative 3 - Replacement (Alternate Alignment)
Construction	Mainland USA to Green Island (BIN 5522000)	\$5.10	\$5.20	\$5.20
	Green Island to Goat Island (BIN 5522010)	\$3.60	\$3.60	\$3.60
Aesthetic Treatments	Mainland USA to Green Island <sup>1</sup>	\$0.32	\$0.32	\$0.32
	Green Island to Goat Island <sup>1</sup>	\$0.16	\$0.16	\$0.16
Approach Roadways	Existing Alignment	\$1.30	\$1.30	
	Downstream Alignment			\$2.20
Storm Pollution Discharge Elimination System		\$0.10	\$0.10	\$0.10
Utilities Adjustments/Relocations		\$0.25	\$0.25	\$0.25
Dewatering (Cofferdams) <sup>2</sup>		\$3.00	\$3.00	\$3.00
Construction Sequencing Options <sup>3</sup> (2 Year)		\$0.30	\$0.30	\$0.30
Pedestrian Access Options	Mainland USA to Green Island (BIN 5522000) <sup>4</sup>	\$0.38	\$0.38	\$0.00
	Green Island to Goat Island (BIN 5522010) <sup>5</sup>	\$0.15	\$0.15	\$0.15
Subtotal (2016)		\$14.66	\$14.76	\$15.28
Contingency <sup>6</sup> (20% @ Draft DAD Stage)		\$2.93	\$2.95	\$3.06
Subtotal (2016)		\$17.59	\$17.71	\$18.34
Field Change Payment (5%)		\$0.88	\$0.89	\$0.92
Subtotal (2016)		\$18.47	\$18.60	\$19.26
Mobilization (4%)		\$0.74	\$0.74	\$0.77
Subtotal (2016)		\$19.21	\$19.34	\$20.03
Final Design		\$2.50	\$2.50	\$2.50
Construction Inspection		\$2.50	\$2.50	\$2.50
Total Project Cost (2 Year Construction)		\$24.21	\$24.34	\$25.03
Construction Sequencing Premium <sup>7</sup> (1 Year)		\$5.00	\$5.00	\$5.00
Total Project Cost (1 Year Construction)		\$29.21	\$29.34	\$30.03

Notes:

1. Cost is based on form liners matching existing pattern.
2. Both cofferdams, without ice modifications.
3. Wetting Rochester Shale
4. Remove and reset existing Mabey on concrete foundations. Use existing bridge on alt alignment.
5. Pave the stone cofferdam as walking surface, and provide fences for pedestrian path delineation.
6. NYSDOT recommends standard contingencies: 25% Scoping stage, 15% Design Approval stage, 5% Advanced Detail Plans stage.
7. Premium includes additional cofferdam armoring to install earlier or leave in later. Also includes premium for night time construction. A contingency is recommended for possible winter construction and to offset park operational costs.
8. As funding for final design and construction has not been identified a schedule for construction cannot be established. The 2016 construction costs have been used for comparison purposes.

Exhibit 3.2.1B Summary of Alternative Costs - Million Dollars (2016) <sup>8</sup>				
BIN 5522000 - 3 Span Precast Post-Tensioned Haunched Girders				
BIN 5522010 - 3 Span Precast Concrete Arches				
Activities		Alternative 2B - Replacement (Existing Alignment)	Alternative 3 - Replacement (Existing Alignment)	Alternative 3 - Replacement (Alternate Alignment)
Construction	Mainland USA to Green Island (BIN 5522000)	\$7.20	\$7.30	\$7.30
	Green Island to Goat Island (BIN 5522010)	\$3.60	\$3.60	\$3.60
Aesthetic Treatments	Mainland USA to Green Island <sup>1a</sup>	\$1.20	\$1.20	\$1.20
	Green Island to Goat Island <sup>1b</sup>	\$0.16	\$0.16	\$0.16
Approach Roadways	Existing Alignment	\$1.30	\$1.30	
	Downstream Alignment			\$2.20
Storm Pollution Discharge Elimination System		\$0.10	\$0.10	\$0.10
Utilities Adjustments/Relocations		\$0.25	\$0.25	\$0.25
Dewatering (Cofferdams) <sup>2</sup>		\$3.00	\$3.00	\$3.00
Construction Sequencing Options <sup>3</sup> (2 Year)		\$0.30	\$0.30	\$0.30
Pedestrian Access Options	Mainland USA to Green Island (BIN 5522000) <sup>4</sup>	\$0.38	\$0.38	\$0.00
	Green Island to Goat Island (BIN 5522010) <sup>5</sup>	\$0.15	\$0.15	\$0.15
Subtotal (2016)		\$17.64	\$17.74	\$18.26
Contingency <sup>6</sup> (20% @ Draft DAD Stage)		\$3.53	\$3.55	\$3.65
Subtotal (2016)		\$21.17	\$21.29	\$21.91
Field Change Payment (5%)		\$1.06	\$1.06	\$1.10
Subtotal (2016)		\$22.23	\$22.35	\$23.01
Mobilization (4%)		\$0.89	\$0.89	\$0.92
Subtotal (2016)		\$23.12	\$23.24	\$23.93
Final Design		\$2.50	\$2.50	\$2.50
Construction Inspection		\$2.50	\$2.50	\$2.50
Total Project Cost (2 Year Construction)		\$28.12	\$28.24	\$28.93
Construction Sequencing Premium <sup>7</sup> (1 Year)		\$5.00	\$5.00	\$5.00
Total Project Cost (1 Year Construction)		\$33.12	\$33.24	\$33.93

Notes:

- 1a. Cost is based on form liners and soffit panels.
- 1b. Cost is based on form liners.
2. Both cofferdams, without ice modifications.
3. Wetting Rochester Shale
4. Remove and reset existing Mabey on concrete foundations. Use existing bridge on alt alignment.
5. Pave the stone cofferdam as walking surface, and provide fences for pedestrian path delineation.
6. NYSDOT recommends standard contingencies: 25% Scoping stage, 15% Design Approval stage, 5% Advanced Detail Plans stage.
7. Premium includes additional cofferdam armoring to install earlier or leave in later. Also includes premium for night time construction. A contingency is recommended for possible winter construction and to offset park operational costs.
8. As funding for final design and construction has not been identified a schedule for construction cannot be established. The 2016 construction costs have been used for comparison purposes.

Exhibit 3.2.1C Summary of Alternative Costs - Million Dollars (2016) <sup>8</sup>				
BIN 5522000 - 3 Span Steel Girder				
BIN 5522010 - 2 Span Steel Girder				
Activities		Alternative 2B - Replacement (Existing Alignment)	Alternative 3 - Replacement (Existing Alignment)	Alternative 3 - Replacement (Alternate Alignment)
Construction	Mainland USA to Green Island (BIN 5522000)	\$4.60	\$4.75	\$4.75
	Green Island to Goat Island (BIN 5522010)	\$3.30	\$3.30	\$3.30
Aesthetic Treatments	Mainland USA to Green Island <sup>1</sup>	\$0.67	\$0.67	\$0.67
	Green Island to Goat Island <sup>1</sup>	\$0.35	\$0.35	\$0.35
Approach Roadways	Existing Alignment	\$1.30	\$1.30	
	Downstream Alignment			\$2.20
Storm Pollution Discharge Elimination System		\$0.10	\$0.10	\$0.10
Utilities Adjustments/Relocations		\$0.25	\$0.25	\$0.25
Dewatering (Cofferdams) <sup>2</sup>		\$3.00	\$3.00	\$3.00
Construction Sequencing Options <sup>3</sup> (2 Year)		\$0.30	\$0.30	\$0.30
Pedestrian Access Options	Mainland USA to Green Island (BIN 5522000) <sup>4</sup>	\$0.38	\$0.38	\$0.00
	Green Island to Goat Island (BIN 5522010) <sup>5</sup>	\$0.15	\$0.15	\$0.15
Subtotal (2016)		\$14.40	\$14.55	\$15.07
Contingency <sup>7</sup> (20% @ Draft DAD Stage)		\$2.88	\$2.91	\$3.01
Subtotal (2016)		\$17.28	\$17.46	\$18.08
Field Change Payment (5%)		\$0.86	\$0.87	\$0.90
Subtotal (2016)		\$18.14	\$18.33	\$18.98
Mobilization (4%)		\$0.73	\$0.73	\$0.76
Subtotal (2016)		\$18.87	\$19.06	\$19.74
Final Design		\$2.50	\$2.50	\$2.50
Construction Inspection		\$2.50	\$2.50	\$2.50
Total Project Cost (2 Year Construction)		\$23.87	\$24.06	\$24.74
Accelerated Construction Schedule Premium/Contingency <sup>7</sup>		\$5.00	\$5.00	\$5.00
Total Project Cost (1 Year Construction)		\$28.87	\$29.06	\$29.74

Notes:

1. Cost is based on free standing concrete fascia panel with form liners.
2. Both cofferdams, without ice modifications
3. Wetting Rochester Shale
4. Remove and reset existing Mabey on concrete foundations. Use existing bridge on alt alignment.
5. Pave the stone cofferdam as walking surface, and provide fences for pedestrian path delineation.
6. NYSDOT recommends standard contingencies: 25% Scoping stage, 15% Design Approval stage, 5% Advanced Detail Plans stage.
7. Premium includes additional cofferdam armoring to install earlier or leave in later. Also includes premium for night time construction. A contingency is recommended for possible winter construction and to offset park operational costs
8. As funding for final design and construction has not been identified a schedule for construction cannot be established. The 2016 construction costs have been used for comparison purposes.

Exhibit 3.2.1D Summary of Alternative Costs - Million Dollars (2016) <sup>8</sup>			
BIN 5522000 - 2 Span Steel Tied Arch			
BIN 5522010 - Single Span Steel Tied Arch			
Activities		Alternative 3 - Replacement (Existing Alignment)	Alternative 3 - Replacement (Alternate Alignment)
Construction	Mainland USA to Green Island (BIN 5522000)	\$10.00	\$10.00
	Green Island to Goat Island (BIN 5522010)	\$6.00	\$6.00
Aesthetic Treatments <sup>1</sup>	Mainland USA to Green Island	\$0.45	\$0.45
	Green Island to Goat Island	\$0.30	\$0.30
Approach Roadways	Existing Alignment	\$1.30	
	Downstream Alignment		\$2.20
Storm Pollution Discharge Elimination System		\$0.10	\$0.10
Utilities Adjustments/Relocations		\$0.25	\$0.25
Dewatering (Cofferdams) <sup>2</sup>		\$3.00	\$3.00
Construction Sequencing Options <sup>3</sup> (2 Year)		\$0.30	\$0.30
Pedestrian Access Options	Mainland USA to Green Island (BIN 5522000) <sup>4</sup>	\$0.38	\$0.00
	Green Island to Goat Island (BIN 5522010) <sup>5</sup>	\$0.15	\$0.15
Subtotal (2016)		\$22.23	\$22.75
Contingency <sup>6</sup> (20% @ Draft DAD Stage)		\$4.45	\$4.55
Subtotal (2016)		\$26.68	\$27.30
Field Change Payment (5%)		\$1.33	\$1.37
Subtotal (2016)		\$28.01	\$28.67
Mobilization (4%)		\$1.12	\$1.15
Subtotal (2016)		\$29.13	\$29.82
Final Design		\$2.50	\$2.50
Construction Inspection		\$2.50	\$2.50
Total Project Cost (2 Year Construction)		\$34.13	\$34.82
Accelerated Construction Schedule Premium/Contingency <sup>7</sup>		\$5.00	\$5.00
Total Project Cost (1 Year Construction)		\$39.13	\$39.82

Notes:

1. Cost is based on form liners.
2. Both cofferdams, without ice modifications
3. Wetting Rochester Shale
4. Remove and reset existing Mabey on concrete foundations. Use existing bridge on alt alignment.
5. Pave the stone cofferdam as walking surface, and provide fences for pedestrian path delineation.
6. NYSDOT recommends standard contingencies: 25% Scoping stage, 15% Design Approval stage, 5% Advanced Detail Plans stage.
7. Premium includes additional cofferdam armoring to install earlier or leave in later. Also includes premium for night time construction. A contingency is recommended for possible winter construction and to offset park operational costs.
8. As funding for final design and construction has not been identified a schedule for construction cannot be established. The 2016 construction costs have been used for comparison purposes.

### 3.2.2 Preferred Alternative

NYSOPRHP has indicated that the 3 span precast concrete arch concept (Option A1/A2) is the preferred alternative for both BIN 5522000 and BIN 5522010. However, all feasible alternatives are still under consideration. A final decision will be made after fully evaluating the alternatives' impacts, and after receiving and evaluating comments on the design report, comments from the public information meeting, and public hearing. A public hearing will be scheduled during January 2016.

A public information meeting was held on September 23, 2014 at the Niagara Falls Convention Center. The comments received indicated a preference for a structure that closely resembles the existing arch structures. The attendees indicated they preferred an unobtrusive structure. They also expressed a desire for bridges that don't look like "typical highway bridges."

### 3.2.3 Design Criteria for Feasible Alternative

#### 3.2.3.1 Design Standards

These bridges will be designed for vehicular and pedestrian use, and generally operate as pedestrian and trolley bridges with minor vehicular use by park administrative vehicles, and also accommodate emergency vehicles as necessary.

#### 3.2.3.2 Critical Design Elements

Exhibit 3.2.3.2. Critical Design Elements for Trolley & Pedestrian Path						
PIN		5760.40	NHS (Y/N)		No	
Route Name		NYSOPRHP Trolley & Pedestrian Path		Functional Classification		Urban – Local Roads and Streets
Project Type		Bridge Rehabilitation/Replacement		Design Classification		Local
% Trucks		N/A		Terrain		Rolling
ADT		< 400		Truck Access/Qualifying Hwy.		Neither
Element		Standard			Existing Condition	Proposed Condition
1	Design Speed	30 mph <sup>1</sup> <i>HDM 2.7.4.2 A</i>			N/A	N/A
2	Bridge Lane Width	10 ft. to match approach width <sup>2</sup> (9 ft. minimum, 10 ft desirable per <i>BM Sections 2.3.1 Table 2-1 and Appendix 2A Tables R &amp; N</i> )			10'	10'
	Approach Lane Width				9' and varies	12'
3	Bridge Shoulder Width	2 ft. minimum/maximum, <i>BM Sections 2.3.1 Table 2-1, and App. 2A Table R &amp; N</i>			0'	2'



Exhibit 3.2.3.2. Critical Design Elements for Trolley & Pedestrian Path				
	Approach Shoulder Width		0'	0'
4	Bridge Roadway Width	2 x 10 ft. + 2 x 2 ft. = 24 ft. <i>BM Sections 2.3.1 Table 2-1 and App. 2A Tables R &amp; N</i>	20'	24'
	Approach Roadway Width		18' and varies	24'
5	Maximum Grade	8% <i>HDM Section 2.7.4.2 E</i>	7.27%	5% on bridge; 7.27% south approach
6	Horizontal Curvature	250 ft minimum @ e = 4% <i>HDM Section 2.7.4.2 F, Exhibits 2-8 &amp; 2-12</i>	800' (approx.)	333 ft. minimum
7	Superelevation	4% maximum <i>HDM Section 2.7.4.2 G</i>	N/A	Normal Crown
8	Stopping Sight Distance	200 ft minimum <i>HDM Section 2.7.4.2 H, Exhibit 2-8</i>	TBD	200 ft. Minimum
9	Horizontal Clearance	1.5 ft. with no barrier <i>HDM Section 2.7.4.2 I</i>	8'-2"	10'-0"
10	Vertical Clearance Above Travelway	14'-0" Min, 14'-6" Desirable <i>BM Section 2.4.1 Table 2-2</i>	Unlimited, N/A	Unlimited, N/A
11	Travel Lane Cross Slope	1.5% Min. to 2% Max. <i>HDM Section 2.7.4.2 K</i>	2.6%	2% maximum
12	Rollover	4% between travel lanes, 8% at edge of travelway <i>HDM Sections 2.7.4.2 L</i>	5.2% between travel lanes	8% maximum between travel lanes and shdrs.
13 A	Structural Capacity	<u>New and Replacement Bridges</u> AASHTO HL-93 Live Load, NYSDOT Design Permit Vehicle, <i>NYSDOT LRFD Specifications</i>	N/A	HL-93, NYSDOT Permit Vehicle
14	Pedestrian Accommodation	7' - 3" minimum, 10'-0" desirable <i>HDM 2.7.4.2 N, HDM Chapter 18</i>	8'-2"	10'-0"
<p>(1) The use of a Design Speed of 30 mph is appropriate in consideration of the anticipated use, functional classification, park terrain, and traffic volume.</p> <p>(2) Because this is a bridge project, these widths are based on the approach measured no closer than 100 ft from the bridge.</p> <p>(3) Because of the low volume of this roadway, limited to vehicles as discussed in the project design report, bicycles can share the roadway without the need for a right shoulder</p> <p>Selected Abbreviations: HDM = Highway Design Manual; BM = Bridge Manual; ADAAG = Americans with Disabilities Act Accessibility Guidelines, 1991</p>				

**3.2.3.3 Other Design Parameters**

Exhibit 3.2.3.3 Other Design Parameter: Design Vehicle		
Location	Design Vehicle	Vehicle Accommodated
Entire Project	Articulated Bus (A-BUS)	Articulated Bus (A-BUS)

**3.3. Engineering Considerations**

**3.3.1 Operations (Traffic and Safety) & Maintenance**

**3.3.1.1 Functional Classification and National Highway System**

The facility accommodated by this bridge replacement project is classified as an Urban Local Street and is not part of the National Highway system. This project will not change the functional classification of the facility.

**3.3.1.2. Control of Access**

Access to the facility will remain fully controlled.

**3.3.1.3 Traffic Control Devices**

3.3.1.3 (1) Traffic Signals

No new traffic signals are proposed.

3.3.1.3 (2) Signs

Existing signs will be replaced as necessary, and new signs will be added where needed.

3.3.1.3 (3) Trail Closure System

A system suitable for closing the bridges to pedestrian traffic will be considered during final design.

#### **3.3.1.4. Intelligent Transportation Systems**

No Intelligent Transportation System (ITS) is proposed.

#### **3.3.1.5 Speeds and Delay**

##### 3.3.1.5 (1) Proposed Speed Limit

This facility is not open to public vehicles. No posted speed limit is proposed.

##### 3.3.1.5 (2) Travel Time Estimates

This project is in a park, and off of the public highway system. Analyses to estimate travel times and related speed and delay issues for vehicles and pedestrians traveling on public highways do not apply to this project.

#### **3.3.1.6 Traffic Volumes**

This project is off of the public highway system.

There are no anticipated changes in the park trolley usage requirements and therefore no changes anticipated in vehicular traffic volume. The project is not a vehicular capacity improvement project.

The existing peak holiday average of 2,500 pedestrians per hour will be accommodated by the proposed bridge geometry. The project is not a pedestrian capacity improvement project.

#### **3.3.1.7 Level of Service and Mobility**

##### 3.3.1.7 (1) At Project Completion & Design Year

The existing bridges provide an acceptable Level of Service (LOS) for pedestrian volumes, including during peak periods.

Sidewalks ten feet wide are proposed under bridge replacement options. Based on the peak usage of 2,500 pedestrians per hour, sidewalks ten feet wide will provide for a pedestrian level of service (LOS) of A, based upon *Exhibit 18-2, New York State Department of Transportation Highway Design Manual*. With this peak pedestrian volume and the ten feet wide space available for sidewalks, pedestrians will move in desired paths without altering their movements in response to other pedestrians. There should be adequate space for pedestrians stopping on the bridge to view the rapids and enough room for other pedestrians to move around them safely.

Therefore, the proposed bridges will continue to provide an acceptable LOS for pedestrian volumes, including during peak periods.

### 3.3.1.7 (2) Work Zone Safety & Mobility

#### A. Work Zone Traffic Control Plan

The work zone traffic control plan will be dependent on the selected alternative.

Under construction scenarios involving new bridges constructed on new locations either upstream or downstream of the existing bridges, the existing bridges may be left in service without changing existing pedestrian patterns and usage, except as necessary to avoid construction zones.

Under construction scenarios involving new bridges coinciding with the existing bridge locations, the bridges would need to be closed to traffic at times during construction, and pedestrians and bicycles could be detoured to access Goat Island via ADA-compliant temporary bridges. Separate ADA-compliant pedestrian bridges and paths could be constructed at the upstream end of Green Island. A portion of the Green to Goat Island Cofferdam could be paved and fenced off for ADA-compliant pedestrian and bicycle access, and be connected to an ADA-compliant temporary path constructed at the easterly end of Green Island. The main channel between Green Island and the mainland could be crossed by an ADA-compliant temporary bridge approximately 50 feet upstream of the existing structure. The temporary bridge structure could be similar to the existing Mabey bridge structures, temporary piers on concrete foundations could be used to support the structures, and the foundations and piers could be constructed when the channel is dewatered. After completion of the proposed bridges, the temporary bridge could be removed.

Alternatively, the American Rapids Bridge, located approximately one thousand feet upstream of the project site, connects First Street in Niagara Falls with Goat Island, and is open to pedestrian and bicycle traffic. The American Rapids Bridge, with two sidewalks both approximately 7' wide, could handle additional pedestrian volume. Additional pedestrian travel distance would be required, so pedestrian volumes on the American Rapids Bridge, if used for a pedestrian detour, would likely be less than currently using the American Falls Bridges.

#### B. Special Provisions

##### Trolley Service During Construction

As a special provision, consideration will be given to increasing the number and frequency of the existing trolleys. This special provision could supplement access to Goat Island, and decrease impacts to park visitors if the bridges need to be closed. However, the maximum capacity of park trolleys to transport visitors across the American Rapids Bridge is well below the current 2,500/hour pedestrian usage rate on the American Falls Bridge, meaning trolley service would only partially alleviate impacts to park visitors.

Other special provisions, such as the use of time-related contract incentives and disincentives, and intensified scheduling provisions, such as nighttime construction will be evaluated during final design and incorporated into the bridge construction contract specifications as appropriate.

### C. Significant Projects (per 23 CFR 630.1010)

NYSDOT has determined that the project is not significant per 23 CFR 630.1010.

### D. Transportation Management Plan

A Transportation Management Plan (TMP) will be prepared for the project, consistent with 23 CFR 630.1012. The TMP will include a work zone traffic control plan, and transportation operations and public information components may be included in the TMP if considered appropriate during final design.

#### **3.3.1.8 Safety Considerations, Accident History and Analysis**

New railing on the bridges and new guiderail on the approach roads and pathways will be designed to current standards.

#### **3.3.1.9 Impacts on Police, Fire Protection and Ambulance Access**

This project will improve emergency response to and from Goat Island by creating a redundant emergency access route, in addition to the current emergency access provided by the American Rapids Bridge, located approximately one thousand feet upstream of the project site. The American Rapids Bridge connects First Street in the City of Niagara Falls with Goat Island.

#### **3.3.1.10. Parking Regulations and Parking Related Issues**

No changes to either existing parking facilities or existing parking regulations are proposed as part of this project.

#### **3.3.1.11 Lighting**

The existing lighting within the project limits and the need for new lighting will be evaluated during the final design phase. It is anticipated that roadway carried by the bridges will have appropriate lighting.

Design of proposed lighting will be developed from both a safety and security perspective and will be balanced with rapids lighting, and consistency with on-going and recent park improvements near the bridge site.

#### **3.3.1.12 Ownership and Maintenance Jurisdiction**

NYSOPRHP will continue ownership and maintenance responsibilities for the bridges and other facilities affected by the project. NYSDOT will perform biennial inspections of the bridges. No permanent changes to ownership and maintenance as described in Section 2.3.1.12 of this report are proposed.

### **3.3.1.13 Constructability Review**

The NYSDOT regional construction staff have been provided with a write-up discussing construction options in detail, and also been provided with a constructability review, has reviewed the project, and stated that construction has no comments. The constructability review is available in the project files.

### **3.3.2 Multimodal**

The American Falls Bridges accommodate multiple modes of transportation, and these include pedestrians, bicycles, park trolleys, maintenance vehicles, and emergency vehicles.

#### **3.3.2.1 Pedestrians**

The project will comply with requirements of Chapter 18 of the NYSDOT Highway Design Manual, and result in acceptable operations for pedestrians. The proposed sidewalks on the bridges will be connected to the existing park paths on the mainland, on Green Island, and on Goat Island. Existing park paths will be realigned and reconstructed as necessary to meet the proposed bridge alignments.

The Pedestrian Generator Checklist for this project is included in Appendix C.

#### **3.3.2.2 Bicyclists**

Throughout the park, bicyclists share the trails and use the roadways. The project will continue to accommodate bicycles via shared use of the roadway.

#### **3.3.2.3 Transit**

The project will restore trolley access to and from Goat Island via the American Falls Bridges, thereby improving the transit mode of transportation within the park by eliminating the need for the current detoured trolley route.

No other transit-related changes are proposed as part of the project.

#### **3.3.2.4 Airports, Railroad Stations, and Ports**

No airport, railroad station, or port-related changes are proposed as part of the project and no airport, railroad station, or port-related conflicts are expected as a result of this project.

#### **3.3.2.5 Access to Recreation Areas (Parks, Trails, Waterways, and State Lands)**

Goat Island is considered a recreation area within Niagara Falls State Park, and other recreation areas within the park (including Three Sisters Islands and Luna Island) are accessed from Goat Island.

The American Falls Bridges to be improved under this project provide one of two crossings onto Goat Island from the mainland. The other crossing, the American Rapids Bridge, is located approximately one thousand feet upstream of this project, is accessed from First Street in Niagara Falls, outside of the park, and has sidewalks on both sides that provide pedestrian access to Goat Island.

Under some construction scenarios, access to Goat Island would be temporarily limited to only the American Rapids Bridge, and a temporary pedestrian detour would be needed, along with temporary modifications to the park trolley operations, in order to accommodate park visitors who would have otherwise utilized the American Falls Bridge crossing. These periods would be short in duration (e.g. several weeks).

After completion of the project, the American Falls Bridges will provide pedestrian, trolley, and bicycle access to Goat Island and to other recreation areas within the park accessed from Goat Island.

**3.3.3 Infrastructure**

**3.3.3.1 Proposed Highway Section**

Refer to the proposed typical section in Appendix A.

3.3.3.1. (1) Right of Way -ROW

Access rights will be acquired, to provide NYSDOT the necessary property rights to administer the construction of this project, as summarized by the following exhibit. These rights may be acquired through inter-agency agreements, temporary easements, concurrent use and occupancy maps, or other mechanisms mutually agreeable and appropriate between state agencies.

Exhibit 3.3.3.1 Right-of-Way Acquisitions				
Take	Agency	Type of Acquisition	Estimated Acquisition Area	Reason for Acquisition
1	NYSOPRHP	See Note	See Note	Construction Access
2	NYSOGS	See Note	See Note	Construction Access
3	NYSOPRHP	See Note	See Note	Bridge Inspection Access

Note: The means of transfer and the estimated areas of acquisition are to be determined.

3.3.3.1 (2) Curb

BIN 5522000, BIN 5522010, the approaches to both bridges, and the connecting park trolley loop roadway will have six inch vertical-faced curb, provided on both sides of the park trolley loop roadway within the project limits.

### 3.3.3.1 (3) Grades

The proposed maximum grade will be 5% on the bridges and 7.27% on the south approach to BIN 5522010.

### 3.3.3.1 (4) Intersection Geometry and Conditions

The existing trolley loop carried by the American Falls Bridges intersects with trolley loop roadways on the mainland and on Goat Island. Intersection geometry will need to be revised to match the new bridge alignments with these existing intersections.

Landscaping and enhancement details will be developed during the project detailed and final design phases, using the *Niagara Falls State Park Landscape Improvements Plan* as a design guide.

### 3.3.3.1 (5) Roadside Elements

#### (a) Snow Storage, Sidewalks, Utility Strips, Bikeways, Bus Stops

Sidewalks on the bridges are not used for snow storage. Snow is removed from the sidewalks and stored at other locations in the park.

Utilities to create redundant feeds to Goat Island may be carried by both bridges and will generally be located beneath the sidewalks, and details, including final locations, will be developed during the project detailed and final design phases.

No separate bikeway will be included along the roadside. Park visitors on bicycles will share the roadway with trolleys and park maintenance vehicles.

No bus stops will be located along the roadside within the project limits.

#### (b) Driveways

No driveways exist along the project length, therefore no driveways will be modified as part of the project.

#### (c) Clear Zone

The clear zone<sup>4</sup> will be approximately two feet wide on the bridge for the steel tied-arch option, twelve feet wide on the bridge for the concrete arch options, and be either two feet or twelve feet on the approaches, depending on type of bridge. The clear zone on Green Island will be twelve feet wide.

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<sup>4</sup> Clear zones are those roadside border areas which are essentially without hazards. NYSDOT defines the Clear Zone as that portion of the roadside border width, starting at the edge of the through traveled way, that the Department commits to maintaining in a cleared condition for safe use by errant vehicles.



### 3.3.3.2 Special Geometric Design Elements

The design of the American Falls Bridges project requires emphasis on pedestrian operations and aesthetics.

#### 3.3.3.2 (1) Non-Standard Features

There will be no non-standard features within the project limits.

#### 3.3.3.2 (2) Non-Conforming Features

There will be no non-conforming features within the project limits.

### 3.3.3.3 Pavement and Shoulder

Refer to the proposed pavement sections in Appendix A.

### 3.3.3.4 Drainage Systems

The existing open and closed drainage systems on the mainland, Green Island, and Goat Island will generally be maintained as part of this project, with revisions as needed to accommodate the new bridges and related features of the project. Stormwater flow on the bridges will either be carried to drainage structures off the bridges via the shoulders, or via a combination of surface flow from the roadways and closed drainage system on the bridges.

State Pollution Discharge Elimination System (SPDES) stormwater treatment requirements will be met during detailed and final design.

### 3.3.3.5 Geotechnical

A full Geotechnical Report is available in the project files, and summarized in this section of this report.

#### Preliminary Design Parameters

Preliminary design parameters for the bridge foundations were developed using existing information from USACE, existing boring logs, and construction records from retrofitting the original foundations with micropiles.

The following parameters are recommended for preliminary design of the bridge piers.

Preliminary Foundation Design Parameters for the American Falls Bridges

Parameter	Value
Allowable bearing pressure	30 tsf
Friction factor for sliding along bedding planes	Tan ( $\delta$ )= 0.7
Friction factor for sliding along new concrete rock interface	Tan ( $\delta$ )= 0.7
Rock strength parameters for evaluating shear through rock mass	C = 16 tsf, $\phi$ = 20 degrees

Micropiles are recommended beneath the piers of both bridges. Micropiles should be designed to provide full lateral support for the piers in the event that rock is eroded from the downstream edge of the pier foundations.

Green Island to Goat Island Bridge (BIN 5522010)

Bridge piers and abutments should be founded on rock, with micropiles designed to provide full lateral support for the piers. The Geotechnical Report in the project files includes an illustration of the preliminary design recommendations for this bridge.

Mainland to Green Island Bridge (BIN 5522000)

Bridge piers and abutments should be founded on rock, with micropiles designed to provide full lateral support for the piers. For this bridge, retrofit of the existing piers and existing micropiles should be considered.

The existing micropiles installed in 2013 were designed to support the piers if subjected to unbalanced loading from one arch span with loss of the adjacent arch span. If the construction sequence dictates that one side of the piers be retrofit while the pier is subjected to the unbalanced thrust, it will be necessary to provide additional lateral support for the pier during retrofit.

Retrofitting the existing piers includes removal of unsuitable concrete from the outside of the piers and replacement with new concrete. Unsuitable concrete should be removed approximately to the face of the existing micropiles. Dowels will be installed into the old concrete, to enhance the bond with the fresh concrete, and additional steel reinforcements will be tied to the steel dowels. The proposed piers are wider than the existing so additional micropiles will be added to each pier also. The Geotechnical Report in in the project files includes an illustration the preliminary design recommendations for retrofitting the piers, including additional micropiles for each pier.

If new piers are constructed on a new alignment, then approximately twenty six micropiles would be required for each pier.

### Additional Information

To confirm preliminary design parameters during detailed design, additional information to be gathered should include two borings at each pier and one at each abutment; samples of the pier concrete from BIN 5522000; and testing and analysis to further evaluate pier retrofit. Rock core samples should be collected and tested for unconfined compressive strength. Boring logs should include rock descriptions, rock quality designation and recovery, details of the rock fracture frequency, and photographs of the concrete and the rock cores.

### **3.3.3.6 Structures**

#### 3.3.3.6 (1) Description of Work

Under the Replacement Alternative, the two existing three-span concrete arch bridges would be replaced with new bridges. The micropile foundations of BIN 5522000 may be retained if the new bridge is constructed on the existing alignment. Complete descriptions of the existing Mainland to Green Island (BIN 5522000) and Green Island to Goat Island (BIN 5522010) bridges are included in Section 2.3.3.6 of this report.

Currently there are five feasible options: custom precast concrete arch bridges; precast concrete parabolic arch bridges; precast concrete haunched girder bridges, steel multi-girder bridges and steel tied arch bridges. These options are discussed below.

(a) Type of bridge, number of spans, etc.

a. BIN 5522000 Mainland to Green Island

At this location, the existing three-span arch configuration would be maintained for either the precast concrete arch bridge (both types) or for the precast concrete haunched girders bridge. For either option (custom precast arches or custom haunched girders), the spans and rises would be similar to the arches of the existing bridge. The clear spans of either the arches or the girders would be 103'-6"-110'-0"-103'-6" to match the existing bridge. The fascia of the precast arch or the fascia beam for the precast haunched girder could incorporate either a form liner finish or stone veneer. The bridge would have a curb-curb width of 24'-0" and a rail-rail width of 44'-0", with an out-out width of approximately 47'-0" depending on the railing treatment chosen. Elevation, plan, and section views are included in Appendix A.

The steel multi-girder option would also consist of three spans. All the spans would be 115'-6" center-to-center of bearings. The girders would be continuous, and supported by piers approximately 9 ft. wide. The bridge would have a curb-curb width of 24'-0" and a rail-rail width of 44'-0", with an

out-to-out width of approximately 47'-0", depending on the railing treatment chosen. Elevation, plan, and section views are included in Appendix A.

For the steel tied arch option, a two-span configuration would be appropriate for this location. Both tied arch spans are 170'-0" center-to-center of bearings. The arch rib would be laterally unsupported, with a height of approximately 26'-6". The curb-curb width of the tied arch would be 24'-0", and the out-to-out width would be approximately 55'-0" for this option, because the superstructure geometry of a steel tied arch necessitates a wider cross section than the precast concrete arch bridges and precast concrete haunched girder bridges described in the preceding paragraph. Elevation, plan, and section views are included in Appendix A.

At this location, the abutments, wingwalls, and piers for all of the options would be cast-in-place reinforced concrete, supported by spread footings pinned into rock by micropiles. In addition, micropiles are proposed for the piers as outlined in Section 3.3.3.5 of this report. The three-span precast concrete arch, precast concrete haunched girder and steel multi-girder bridges on the existing alignment may reuse the rehabilitated piers and the existing micropiles, but if the precast concrete arch or precast concrete haunched girder bridges are built on a different alignment, or if the two-span tied arch is chosen, new pier(s) would be required.

The precast concrete arch bridge would be backfilled with select structure fill, and a roadway foundation of 12" of subbase with an asphalt concrete roadway section would be installed, along with granite curbs and concrete sidewalks.

The precast concrete haunched girder, steel multi-girder, and the steel tied arch bridge options would utilize a standard 9½" reinforced concrete deck with an integral wearing surface, with curbs and concrete sidewalks installed on the deck.

At this location, the bridge may either be reconstructed on the same alignment or on an alignment approximately seventy five feet (75') downstream from the existing alignment. If the bridge is constructed on the downstream alignment, a portion of Green Island and the Niagara River would need to be filled in order to keep the bridge the same length as the existing bridge, and approximately 8000 CY of fill would be required to extend Green Island into the channel, creating a peninsula where the southerly abutment of the bridge would be located. Under this alignment option, the necessary permit applications would need to include details related to this option. An illustration of the realignment option is included in Appendix A.

## b. BIN 5522010 Green Island to Goat Island

The existing three-span arch configuration can be closely matched using a precast concrete parabolic arch bridge option at this crossing. The spans and rise would be similar to, but not exactly the same as the existing arches. The clear spans of the arches would be 49'-2"-53'-2"-49'-2", and each span would have a rise of 11'-0". The ends spans would have a rise 2'-0" higher, and the center span would rise 1'-0" higher than the existing bridge, in order to keep the springline elevation the same as the existing bridge. A two-span arch bridge is possible at this location, and the clear spans of each arch of a two-span bridge would be 80'-0", with a rise of 10'-5". A custom precast arch bridge is also feasible at this crossing. A two- or three-span precast haunched concrete girder structure is also possible for this location, but because this bridge will have relatively short spans, the precast haunched girder bridge option would not be considered as cost-effective as precast concrete arch bridge option at this location. However, the haunched girder could more precisely match or mimic the shape of the existing arch. Additionally, if the precast haunched girder bridge option is chosen for the Mainland to Green Island bridge as described previously, then similar construction and similar future maintenance needs of the bridges at both locations may be beneficial in the future. Either the fascia of the precast arch or the fascia beam of the precast haunched girder could incorporate either a form liner finish or a stone veneer finish. The proposed bridge would have a curb-to-curb width of 24'-0", a rail-to-rail width of 44'-0", and an out-to-out width of approximately 47'-0" depending on the railing treatment chosen. Elevation, plan, and section views of options at this location are included in Appendix A.

The steel multi-girder option would consist of two spans. Each span would be 100'-0" center-to-center of bearings. The girders would be continuous, and supported by a pier approximately 9 ft. wide. The bridge would have a curb-to-curb width of 24'-0" and a rail-to-rail width of 44'-0", with an out-to-out width of approximately 47'-0", depending on the railing treatment chosen. Elevation, plan, and section views are shown in Appendix A.

For the steel tied arch option at this location, a single-span would be constructed, and be 180'-0" center-to-center of bearings. The arch rib would be laterally unsupported with a height of approximately 29'-0". The curb-to-curb width of the tied arch would be 24'-0", and the out-to-out width would be approximately 55'-0" for this option, dictated by superstructure geometry of the steel tied arch. Elevation, plan, and section views are shown in Appendix A.

The abutments, wingwalls, and piers for all of the options at this location would be cast-in-place reinforced concrete, supported by spread footings founded on rock. In addition, micropiles would be used for the piers, as described in Section 3.3.3.5 of this report. The tied arch alternative does not require micropiles, because no piers would be constructed under that option.

The precast concrete arch bridge would be backfilled with select structure fill, and a roadway foundation of 12" of subbase with an asphalt concrete roadway section would be installed, along with granite curbs and concrete sidewalks.

The precast concrete haunched girder, steel multi-girder, and the steel tied arch bridge options would utilize a standard 9½" reinforced concrete deck with an integral wearing surface, with curbs and concrete sidewalks installed on the deck.

During preliminary design, alternate alignments were evaluated for this bridge upstream and downstream of the existing bridge. However, the Goat Island approach would require extensive tree and earthwork removals in any alternative location. In addition, the ability to build a cofferdam near the bridge and use it to maintain pedestrian traffic during construction permit reconstruction on the existing alignment. Therefore, this bridge would be rebuilt on the existing alignment.

(b) Width of travel lanes, shoulders, and sidewalks

The width of the travel lanes, shoulders and sidewalks are consistent between the three optional bridges at both locations. The travel lanes are 10'-0" and the shoulders are 2'-0". The sidewalks are 10'0" wide, and located on both sides of the bridges. Additionally, see the design criteria listed in Section 3.2.3.2 – Critical Design Elements, and typical sections for each option in Appendix A.

(c) Utilities carried – The proposed bridges may provide facilities to carry the redundant utilities to Goat Island. The utilities (providers) include:

Electric – Two 4" Conduits – one spare (National Grid)  
Gas – 6" Conduit (National Fuel)  
Telephone – 3" Conduit (Verizon)  
Telephone – 2" Flex Conduit (Ronco)  
Water – 6" Pipe (Niagara Falls Water Board)  
Sewer – 6" FM (Niagara Falls Water Board)

The utilities would either be located in the fill under the sidewalks for the precast concrete arch bridge option; between the girders for the precast haunched girders bridge option; or between the stringers of the tied arch bridge option.

NYSOPRHP is currently designing a project for construction in 2016 that will deactivate the utilities carried on the existing American Falls Bridges, relocating the utilities onto the American Rapids Bridge approximately 1,000 feet upstream. Assuming this project is completed, NYSOPRHP will decide at a future date whether to install new utilities into the new American Falls Bridge, thereby creating redundant utility service to Goat Island.

### 3.3.3.6 (2) Clearances

The precast concrete arch bridge option and the precast concrete haunched girder bridge option have horizontal clearances of 12'-0", and unlimited vertical clearance. The steel tied arch bridge option has a horizontal clearance of 2'-0" to the face of bridge rail. The vertical clearance of the steel tied arch bridge option is unlimited.

### 3.3.3.6 (3) Live Load

The new bridges will be designed for HL 93 Live Loads and the NYSDOT Permit Vehicle.

### 3.3.3.6 (4) Associated Work

During demolition of the existing bridges and construction of the new bridges, pedestrian access will be maintained either by temporary bridges, pathways on the cofferdams, the existing bridges, or a combination of these methods. Vehicular traffic will be detoured over the American Rapids Bridge during construction.

### 3.3.3.6 (5) Waterway

The proposed bridges will not adversely affect the hydraulics of the channels. Section 3.3.3.7 of this report discusses the hydraulics of the bridges. The river is classified as navigable at the bridges, but the navigability of the waters in the vicinity of the project will not be affected, because the rapids are in proximity to the American Falls. Permits will be required for the construction of the bridges.

## 3.3.3.7 Hydraulics of Bridges and Culverts

Hydraulic models have been assembled to evaluate the hydraulic aspects of replacement of the Mainland to Green Island bridge, BIN 5522000, and the Green Island to Goat Island bridge, BIN 5522010. A hydraulics report for this project is available in the project files.

### Flow Rates

The International Niagara Treaty of 1950 sets minimum limits on the flow of water over the falls. The Niagara River forms the Grass Island Pool upstream of the International Niagara Control Structure. A portion of the river flow is withdrawn from the Grass Island Pool by the Ontario Power Generation (OPG) intakes and the New York Power Authority (NYPA) intakes. The average water elevation in the Grass Island Pool is mandated at an elevation of 561.01 (IGLD55) and maintained via the operation of the International Niagara Control Structure.

A summary of the discharge rates downstream of the Grass Island Pool, that either flow through or around the International Niagara Control Structure, modeled for this project are as follows, with columns labeled to identify the conditions of each flow rate.

Location	Daytime Tourist Season Flow	Nighttime Tourist Season Flow*	Early Morning Tourist Season Flow	Maximum Flow
Total Flow over Falls	100,000 cfs	50,000 cfs	115,000 cfs	200,000 cfs

\*Nighttime Tourist Season Flow is the same as Non-Tourist Season Daytime and Nighttime Flow.

Because of the numerous manmade influences in the river, neither the Federal Emergency Management Agency (FEMA) nor USACE have established flood flow rates for the upper Niagara River. No attempt has been made to establish flood flow rates as part of this report.

### Methodology and Assumptions

The river hydraulics were analyzed using HEC-RAS software developed by USACE. This study requires an analysis of the flow through rapids, with flow through the rapids under irregular geometry characterized by cascades, which cause drops in water surface elevation parallel and perpendicular to flow direction.

### Summary of Effects of Potential Changes

It is anticipated that the replacement bridges, when selected and then modeled, will have very minor effects on the water surface elevation for the reach studied, because it is anticipated that the hydraulic characteristics of the proposed bridges will be similar to the hydraulic characteristics of the existing bridges.

Hydraulic conditions for existing conditions, proposed conditions, and anticipated temporary conditions are included in the hydraulics report.

No base flood elevations (BFEs, also referred to as the 100 year flood) have been defined at the project site, because no base flood discharges apply under the treaty-mandated flows in this reach of the Niagara River.

### American Falls Bridges Proposed Conditions

Currently there are five feasible options under consideration: custom precast concrete arch bridges, precast concrete parabolic arch bridges, precast concrete haunched girder bridges, steel multi-girder bridges, and steel tied-arch bridges. Because these bridge replacement options are still being evaluated prior to being selected, the hydraulics for the selected option has not been run or described in this report. The most hydraulically restrictive replacement bridge option is a concrete parabolic arch bridge for both bridge locations, and this was modeled.



Upstream the model shows no changes in water surface elevations in the river. Only minor changes in the water surface elevations are predicted by the model in the area of river near the upstream faces of the two bridges.

**3.3.3.8 Guide Railing, Median Barriers and Impact Attenuators**

Aesthetic bridge railing and approach rail will be designed in conformance with design standards and in context with the natural scenery and park setting at the project location.

**3.3.3.9 Utilities**

Exhibit - 3.3.3.9 Utilities				
Utility	Type	Location/Side	Length	Impact
National Fuel	Gas Main	Under Right SW	Entire Structure	Replace*
National Grid	Electric	Under Left SW	Entire Structure	Replace*
Verizon	Telephone	Under Left SW	Entire Structure	Replace*
Ronco	Telephone	Under Left SW	Entire Structure	Replace*
Niagara Falls Water Board	Waterline	Under Left SW	Entire Structure	Replace*
Niagara Falls Water Board	Sewerline	Under Left SW	Entire Structure	Replace*

\* It is expected that the existing utilities will be shut down within the project limits by others prior to construction associated with this project, because NYSOPRHP is currently administering a separate project involving relocating the existing utilities to the American Rapids Bridge. Additionally, replacement of these utilities on BINs 5522000 and 5522010 may be arranged during detailed design, to create redundancy if considered necessary by NYSOPRHP.

**3.3.3.10 Railroad Facilities**

There are no railroads within the project limits.

**3.3.4 Landscape and Environmental Enhancements**

Refer to Chapter 4 for complete discussion.

**3.3.4.1 Landscape Development and Other Aesthetics Improvements**

The project is located in Niagara Falls State Park, the nation’s first state park. Efforts will be made to minimize disturbance to adjacent lands, the shoreline and other park infrastructure, with disturbance to the landscape primarily limited to the relatively narrow project corridor, areas adjacent to the bridge abutments, and area where temporary relocations are needed to construct the project.

Landscape restoration and enhancement will be limited to the areas affected by construction and guided by the recommendations in the *Niagara Falls State Park Landscape Improvements Plan*.

### **3.3.4.2 Environmental Enhancements**

Opportunities to enhance the environment will be explored during the final design phase, and restoration from construction activities will be guided by the *Niagara Falls State Park Landscape Improvements Plan*.

### **3.3.5 Miscellaneous**

#### **3.3.5.1 NYS Smart Growth Public Infrastructure Policy Act (SGPIPA)**

Pursuant to ECL Article 6, this project is compliant with the New York State Smart Growth Public Infrastructure Policy Act.

To the extent practicable this project has met the relevant criteria as described in ECL § 6-0107. The Smart Growth Screening Tool was used to assess the project's consistency and alignment with relevant Smart Growth criteria; the tool was completed by the Region's Planning and Program Management (RPPM) group on 12/2/2013 and reflects the current project scope, and is included in Appendix F-1 of this report.

#### **3.3.5.2 Other Miscellaneous Information**

There is no other noteworthy pertinent information in regard to the proposed conditions.

## **CHAPTER 4 - SOCIAL, ECONOMIC, and ENVIRONMENTAL CONDITIONS and CONSEQUENCES**

### **4.1 Introduction**

As part of this report in regard to the replacement of two stone-faced concrete arch bridges in Niagara Falls (the “project”), the primary purpose of this chapter is to identify the social, economic, and environmental consequences of the feasible alternatives for consideration in selecting a preferred alternative. Three separate areas in the vicinity of the project have been defined for the purposes of this assessment.

The General Study Area (Figure 4.1-1) is the construction zone, where construction will actually occur, or for purposes of this assessment, where construction may potentially occur as determined during the preliminary project design.

The Air, Noise and Wetland Study Area (Figure 4.1-2) is based on the anticipated maximum extent of impacts on air quality and noise that would result from the project beyond the boundaries of Niagara Falls State Park.

The Socioeconomic Study Area (Figure 4.1-3) includes a large part of the downtown Niagara Falls neighborhood.

#### **4.1.1 Environmental Classification**

##### **4.1.1.1 NEPA Classification**

There is a Federal Environmental Approvals Worksheet (FEAW) included in Appendix B of this report. The project does not qualify as a Categorical Exclusion (CE) because the project involves special circumstances described in 23 CFR §771.117(b). Specifically, there may be significant impacts on properties protected by the National Historic Preservation Act (NHPA), and because the significance of any impacts was not clearly established during the scoping phase of the project, this project is classified as a NEPA Class III Action. The NEPA Class III classification of the project requires an Environmental Assessment (EA). The EA will address the sensitivity and significance of the state park, and concerns regarding potential impacts to properties protected by the NHPA.

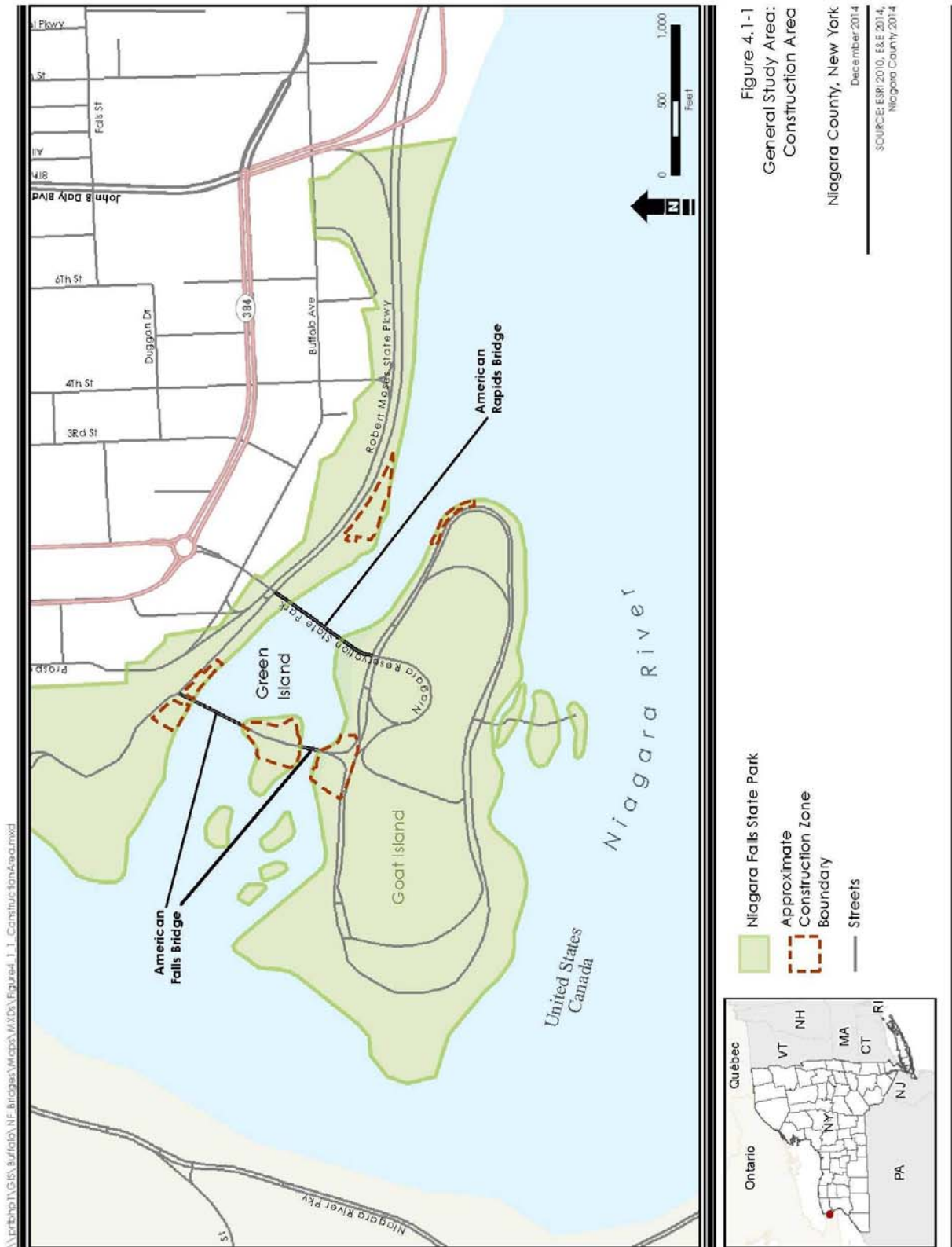
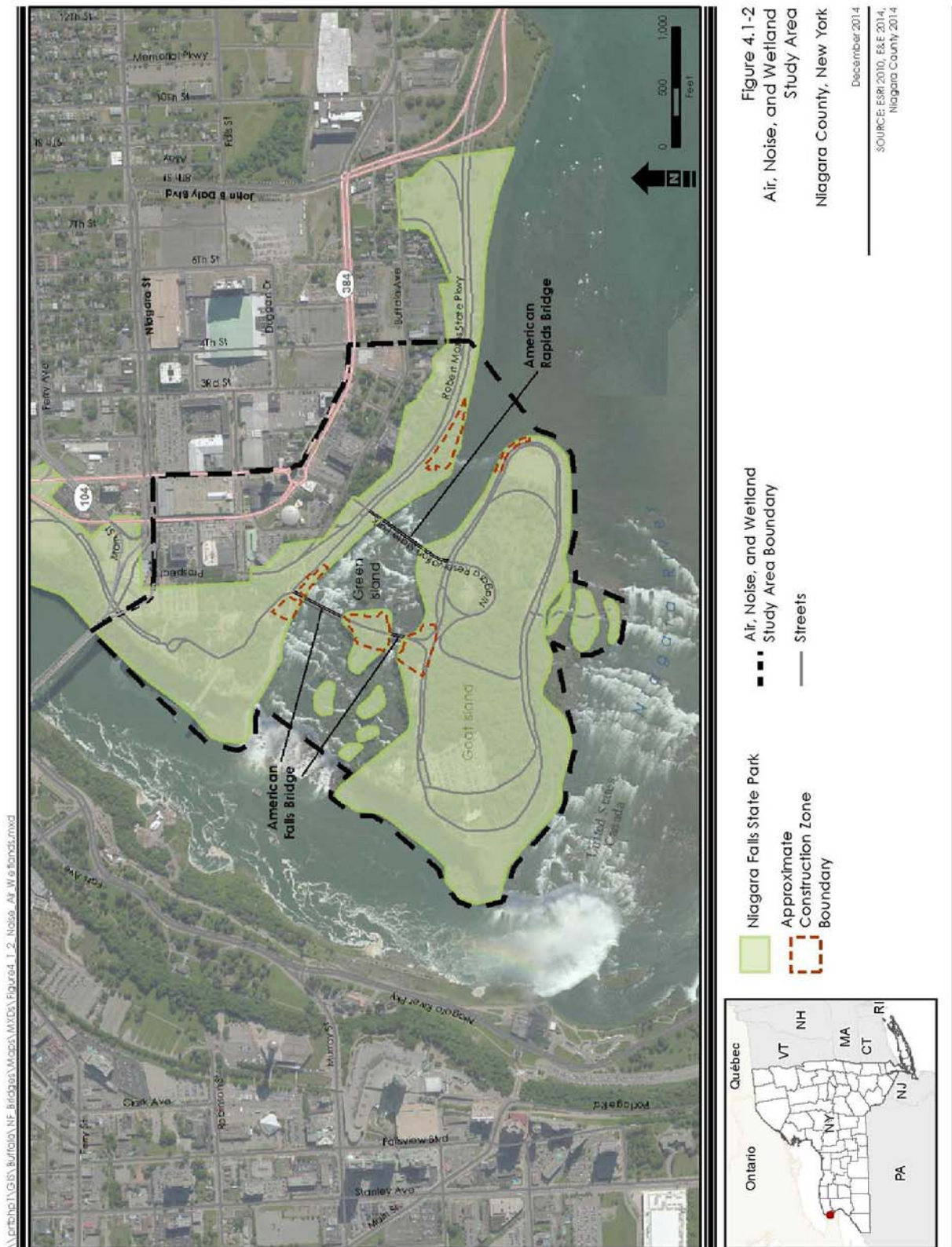


Figure 4.1-1  
General Study Area:  
Construction Area

Niagara County, New York

December 2014

SOURCE: ESRI 2010, E&E 2014,  
Niagara County 2014



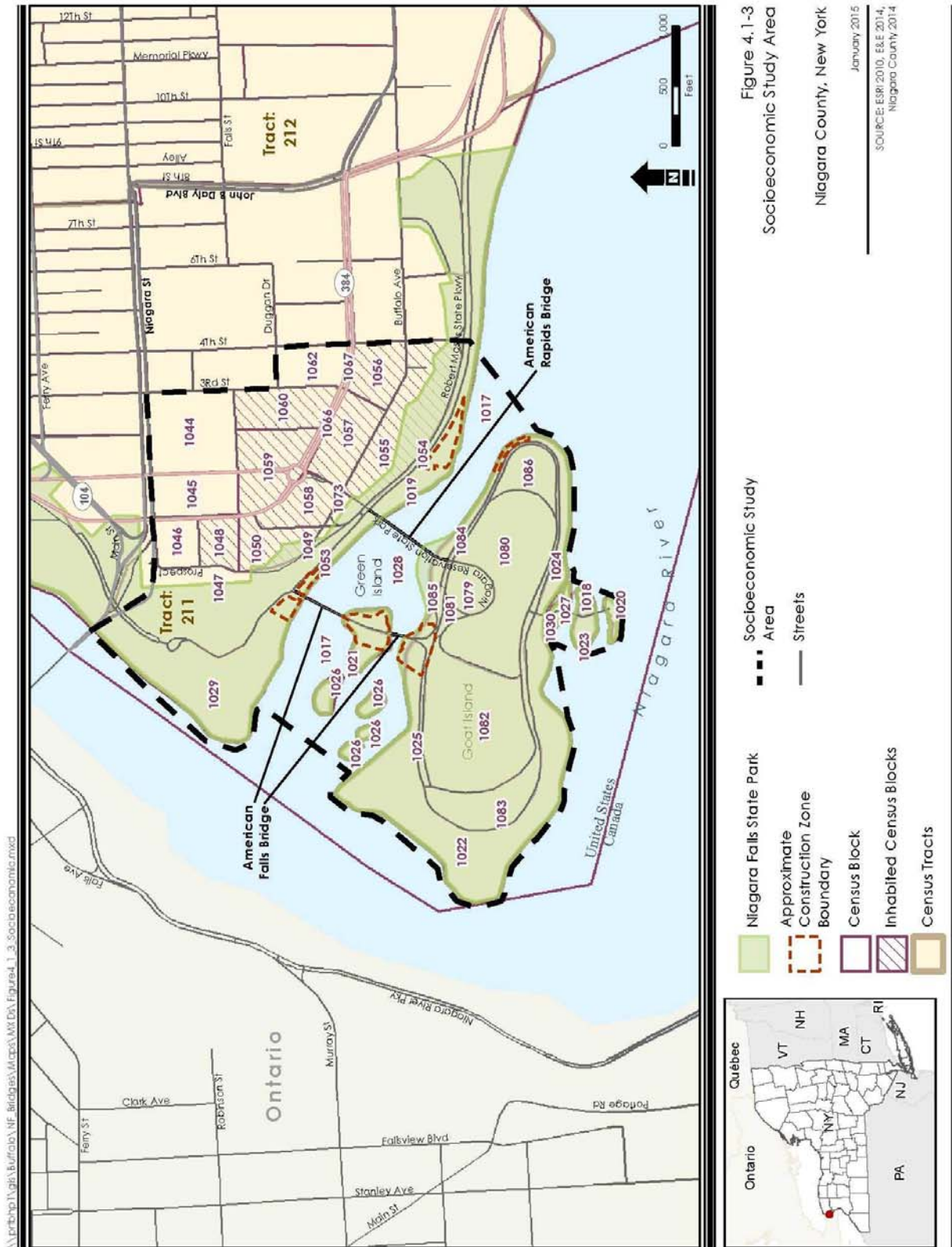


Figure 4.1-3  
Socioeconomic Study Area  
Niagara County, New York  
January 2015  
SOURCE: ESRI 2010, E&E 2014,  
Niagara County 2014

#### 4.1.1.2 SEQR Classification

The project is a Non-Type II Action in accordance with 17 NYCRR Part 15 - Procedures for Implementation of State Environmental Quality Review (SEQR) Act. SEQR Non-Type II projects include actions for which the environmental impacts are not clearly established and require an EA. Under 17 NYCRR Part 15.14(d) (6), a Type II action has “no effect on any district, site, structure or object that is listed, or may be eligible for listing, on the National Register of Historic Places.” The project is being progressed as SEQR Non-Type II (EA) because Niagara Falls State Park is listed on the National Register of Historic Places and the project is entirely within the park.

#### 4.1.2 Coordination with Agencies

##### 4.1.2.1 NEPA Cooperating and Participating Agencies

The following agencies are Cooperating Agencies in accordance with 23 CFR 771.111(d)

- New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP)
- United States Coast Guard
- United States Army Corps of Engineers (USACE)
- United States Department of State
- National Park Service (NPS)
- Advisory Council Historic Preservation (ACHP)
- International Joint Commission (IJC)
- International Niagara Board of Control (INBC)
- New York State Office of General Services (NYSOGS)
- New York State Department of Environmental Conservation (NYSDEC)
- New York State Historic Preservation Office (NYSHPO)
- New York State Department of State (NYSDOS)

The following agencies are Participating Agencies in accordance with 23 CFR 771.111(d)

- United States Fish and Wildlife Service (FWS)
- United States Environmental Protection Agency
- National Marine Fisheries Service
- Canadian Department of Foreign Affairs
- Environment Canada
- Ontario Ministry of Natural Resources
- Ontario Ministry of Environment
- New York State Power Authority (NYPA)
- Ontario Power Generation
- City of Niagara Falls
- Niagara County
- Seneca Nation of Indians (SNI)
- Tonawanda Seneca Nation



- Tuscarora Nation
- Seneca Cayuga Tribe of Oklahoma
- Greater Buffalo Niagara Regional Transportation Council (GBNRTC)
- Niagara River Greenway Commission

#### 4.1.2.2 SEQR Involved Agencies

The following agencies are Involved Agencies in accordance with the SEQR process

- New York State Department of Transportation (NYSDOT)
- Federal Highway Administration (FHWA)
- New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP)
- United States Coast Guard
- United States Army Corps of Engineers (USACE)
- National Park Service
- International Joint Commission (IJC)
- International Niagara Board of Control (INBC)
- New York State Department of Environmental Conservation (NYSDEC)
- New York State Office of General Services (NYSOGS)
- New York State Historic Preservation Office (NYSHPO)
- New York State Department of State (NYSDOS)

## 4.2 Social

The purpose of this section is to discuss the social environment in the vicinity of the site. This project involves two bridges located entirely in Niagara Falls State Park. The project will involve replacing or rehabilitating the existing bridges and result in improved access to Goat Island for pedestrians, bicycles, and park trolleys. The social environment of the project site involves both the park and adjacent downtown neighborhood of Niagara Falls, New York. All project-related construction will take place entirely in the park, and no vehicular traffic to and from the city would have access to the bridges after the project is completed.

The Socioeconomic Study Area (Figure 4.1-3) was selected to include neighborhoods that could experience potential adverse impacts as a result of the project, and for the purposes of analysis, encompasses the anticipated maximum extent of impacts on the existing social and economic characteristics that would result from the feasible alternatives. The Socioeconomic Study Area includes the majority of the downtown neighborhood and all of Goat Island. The Niagara River creates a natural southerly and westerly boundary of the study area. The easterly boundary of the study area is 4<sup>th</sup> Street, southerly of Duggan Drive and 3<sup>rd</sup> Street northerly of Duggan Drive; and the northerly boundary of the study area is Niagara Street.

## 4.2.1 Land Use

### 4.2.1.1 Demographics and Affected Population

The project is located in the City of Niagara Falls, in Niagara County. The City of Niagara Falls has a population of 50,193 and the Socioeconomic Study Area shown in Figure 4.1-3 has a population of 262. (The low population in the Socioeconomic Study Area is because this is primarily a commercial district with very little residential housing). Approximately twenty five percent of the people in the city are under the age of twenty, sixty percent are between the ages of twenty and sixty-four years, and fifteen percent are age sixty-five and older (*U.S. Census 2010*). The median household income for the City of Niagara Falls is approximately \$31,452. There are 26,220 housing units within the City of Niagara Falls and 246 are located in the Socioeconomic Study Area.

The affected populations for the project are primarily tourists that visit Niagara Falls State Park, and local residents that visit and use the park. The park is internationally known and attracts millions of visitors annually (*The Nelson A. Rockefeller Institute of Government 2014a*). Owners of commercial properties in the Socioeconomic Study Area are also indirectly affected by the project.

### 4.2.1.2 Comprehensive Plans and Zoning

#### Comprehensive Plans

The City of Niagara Falls *Comprehensive Plan for the City of Niagara Falls, USA, 2009* identifies the principles and guidelines to influence the city's future development. The city's comprehensive plan recognizes Niagara Falls State Park as a unique asset, supports reinforcement of connections with the park, and has suggestions for agreements and cooperative arrangements with NYSOPRHP.

The city's comprehensive plan recommends that development in the heritage district promote tourism and include boutique hotels, a transit and visitor center, and new pedestrian connections to link the district with the park. Although replacement of the bridges is not specifically addressed in the city's plan, the project is consistent with the city's vision for a revitalized intercity core and waterfront, because the project would improve the connection between the intercity core and the park by accommodating pedestrians and bicyclists that choose to travel between the city core and Goat Island.

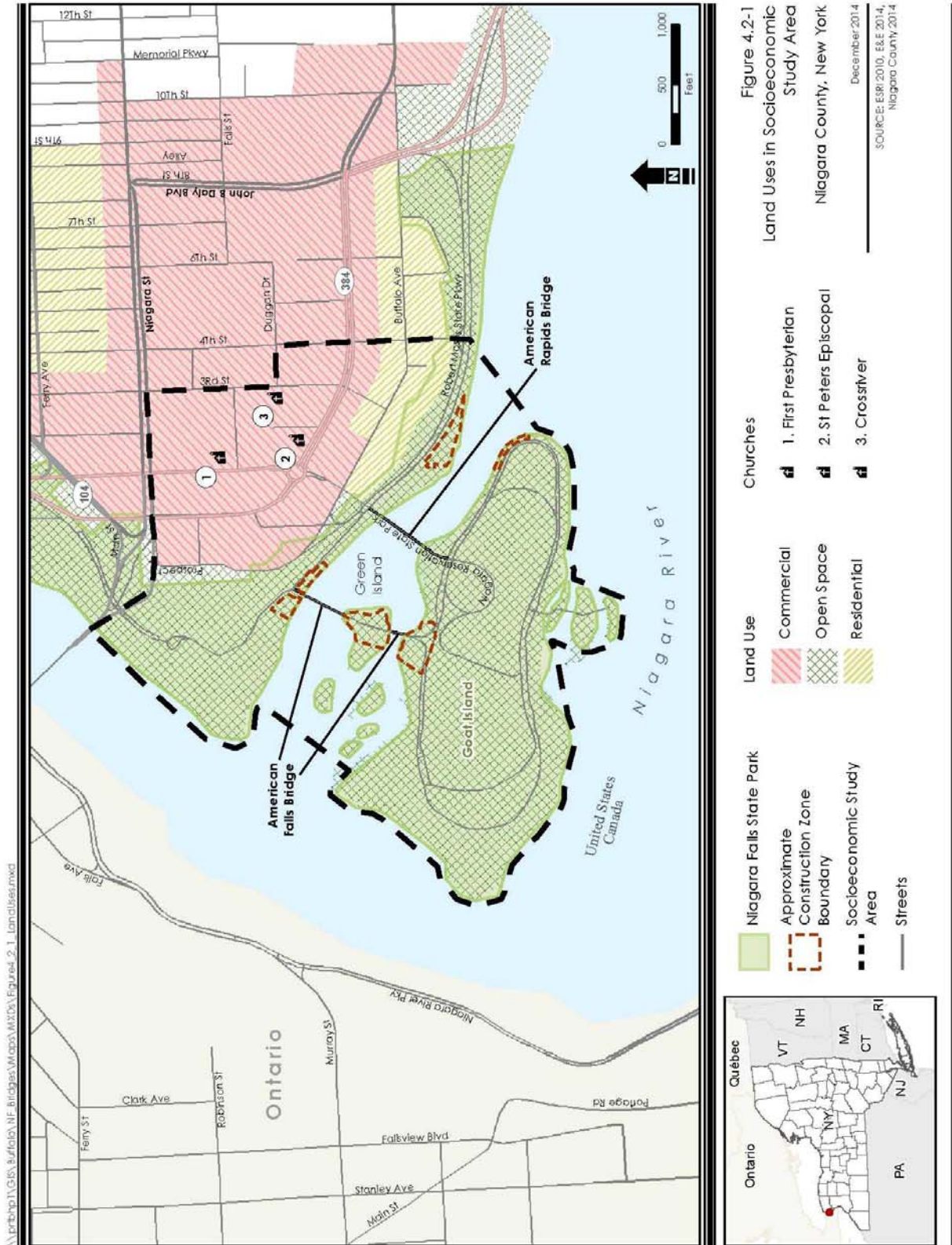
Two plans prepared by NYSOPRHP apply to this project. *The Niagara Falls State Park Landscape Improvements Plan*, developed in 2012, identifies a number of capital rehabilitation and improvements projects for park revitalization. Many of the capital projects identified in the plan include repaving, replacing railings and furnishings, and improving landscaping, and the replacement of the American Falls Bridges are included as one of the capital projects. The project is therefore consistent with the *Niagara Falls State Park Landscape Improvements Plan*.

## Zoning

The project site, located entirely within Niagara Falls State Park is classified by Niagara County as a recreation/conservation land use and zoned by the City of Niagara Falls as open space to provide recreation and conservation (*Clough Harbour & Associates 2009; City of Niagara Falls 2010*). Land uses within the Socioeconomic Study Area include recreational, commercial, and residential uses (Figure 4.2-1). The commercial uses are located predominately northerly of the project site, within downtown Niagara Falls.

The remaining properties within the Socioeconomic Study Area are zoned as D1-Downtown and allow for mixed use combinations of commercial and residential, with graduated building height restrictions to protect views of Niagara Falls. There are a few residential uses located easterly of the project, along Buffalo Avenue. This area is zoned as R3-A Multi-Family Residential, which allows for low density suburban-style townhouses and apartments (*City of Niagara Falls 2010*).

The feasible alternatives are consistent with the community's comprehensive plans and would not affect local zoning.



## 4.2.2 Neighborhoods and Community Cohesion

### 4.2.2.1 Community Cohesion

The Socioeconomic Study Area of the project includes both Niagara Falls State Park and a portion of downtown Niagara Falls (northerly to Niagara Street and easterly to 4<sup>th</sup> Street). A hillside that separates the project from the downtown neighborhood includes a stairway and a separate sloped pathway, connecting the project site to the downtown streets, while the bridges themselves provide cohesiveness between the community and Goat Island, and mitigate the natural separation of the island from the mainland due to the American Rapids.

There are no other neighborhoods adjacent to the project, and the Niagara River separates the project from Niagara Falls, Ontario, Canada.

According to U.S. Census data, 262 residents live in the Socioeconomic Study Area, with the majority of residents (154) living in Census Block 1055 (Figure 4.1-3), which includes the Parkway Condominiums. Additional residents are located in Census Blocks 1048, 1050, 1056, 1058, 1059, and 1060. There are no permanent residents in the park, including none on Green Island and none on Goat Island.

The project would pose no adverse impacts to community cohesion, and would result in improved access to Goat Island for pedestrians and bicyclists within the park and from city neighborhoods, and result in improved access for park trolleys within the park.

### 4.2.2.2 Home and Business Relocations

Because this project involves the replacement of existing bridges located entirely within Niagara Falls State Park, and does not require the acquisition of occupied dwellings/businesses, it would not cause adverse impacts upon neighborhood character and stability. The project would not require any displacement of residences or businesses and there would be no relocation impacts.

## 4.2.3 Social Groups Benefited or Harmed

There are forty one census blocks within the Socioeconomic Study Area, of which 23 are located within Niagara Falls State Park; five are located partially outside of the park; and 13 are located entirely outside park. These census blocks include eight that are inhabited with a total population of 262 residents as of 2010. Income and poverty data were reviewed in the entire study area and compared against Census Tract 211, City of Niagara Falls, and Niagara County for reporting purposes.

### 4.2.3.1 Elderly and/or Disabled Persons or Groups

U.S. Census data indicates that there is no significant concentration of elderly or disabled persons in the study area's census tracts. The population for individuals age 65 and older in the Socioeconomic Study Area was one hundred people, or 38.2% of the study area, in 2010, compared to 14.6% in Census Tract 211, and 15.5% percent in the City of Niagara Falls (*U.S. Census 2010*).

There is no significant concentration of elderly or disabled persons residing in proximity to the project. Elderly and disabled persons comprise a portion of the park's high volume of visitors. Currently, the approaches to the temporary (Mabey) bridges are relatively steep and do not include handrails, the walking surfaces of the temporary bridges consist of textured steel plates, a flush transition is not consistently provided between plates, and the texture is variable and relatively rough. These conditions create difficulty for the elderly and disabled persons and can lead to tripping hazards and unnecessary exertion.

The project would eliminate these deficiencies, and would comply with Americans with Disabilities Act (ADA) guidelines, thereby improving conditions for elderly or disabled persons or groups.

#### **4.2.3.2 Transit Dependent Individuals, Pedestrians, and Bicyclists**

Access within the park is via park trolleys, walking, and bicycling. Currently, the approaches to the temporary (Mabey) bridges are relatively steep and do not include handrails, the walking surfaces of the temporary bridges consist of textured steel plates, a flush transition is not consistently provided between plates, the texture is variable and relatively rough, and the bridges are closed to park trolleys. These conditions create difficulty for some pedestrians and bicyclists, and transit-dependent individuals accommodated by park trolleys are routed outside the park to access Goat Island via the American Rapids Bridge, located upstream of the American Falls Bridges. These conditions currently cause inconvenience, delays, and hazards for transit-dependent individuals, pedestrians, and bicyclists.

The project would eliminate these deficiencies and improve conditions for transit-dependent individuals, pedestrians, and bicyclists.

#### **4.2.3.3 Low Income, Minority and Ethnic Groups (Environmental Justice)**

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, signed by the President Clinton on February 11, 1994, directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.

This section discusses and presents the Environmental Justice (EJ) analysis. For the purposes of this EJ analysis, a "minority community" is considered to be any geographic area where:

- 1) The minority population of the affected area is greater than 50%; or
- 2) The minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate geographic area of analysis.

The 2010 U.S. Census data for the following geographic areas were used to analyze impacts of the project with respect to minority populations:

- Niagara County;

- The City of Niagara Falls;
- Census Tract 211;
- Census Block Group 1 (located within Tract 211) and;
- All census blocks in the Socioeconomic Study Area.

According to the 2010 U.S. Census data, the Socioeconomic Study Area has a 23.3% minority population, with some variation in comparison to data from individual census blocks. As shown in Exhibit 4.2.3-1, the percentage of minorities in the Socioeconomic Study Area is less than the percentages of minorities in Census Tract 211 (48.6%) and in the City of Niagara Falls (30.9%).

Exhibit 4.2.3-1 Race and Ethnicity Data for Socioeconomic Study Area								
	Niagara County		City of Niagara Falls		Census Tract 211		Socioeconomic Study Area*	
	Total	Percent	Total	Percent	Total	Percent	Total	Percent
Total Population	216,469	100.0	50,193	100	1,591	100.0	262	100.0
White	188,907	87.3	34,663	69	818	51.4	201	76.7
Black or African American	14,511	6.7	10,643	21	458	28.8	24	9.2
American Indian and Alaska Native	2,135	1.0	930	1	56	3.5	7	2.7
Asian	1,807	0.8	599	1	92	5.8	15	5.7
Native Hawaiian and Other Pacific Islander	55	0	10	0	0	0.0	0	0.0
Some Other Race	185	0.1	83	0.2	6	0.4	1	0.4
Two or More Races	4,175	1.9	1,757	3.5	82	5.2	9	3.4
Hispanic or Latino	4,694	2.2	1,508	3.0	79	5.0	5	1.9
Total Minority Population	27,562	12.7	15,530	30.9	773	48.6	61	23.3

Source: 2010 U.S. Census

\*Includes census blocks identified in the Socioeconomic Study Area

In order refine the EJ analysis, income data was obtained from “Census Block Group 1”, which is a smaller geographic census unit within Census Tract 211. The geographic area of Census Block Group 1 includes the Socioeconomic Study Area, as well as census blocks just outside of the Socioeconomic Study Area. The census block is the smallest geographic unit the U.S. Census uses to report data; however, the U.S. Census does not provide income data at the Census Block level. Therefore, the next largest geographic unit, the Census Block Group, was used to evaluate potential impacts on low-income populations. The percentage of individuals below the poverty level in Census Block Group 1 is 42.6%, is higher than the 34.9% poverty level in Census Tract 211, and is higher than the 21.8% poverty level in the City of Niagara Falls.

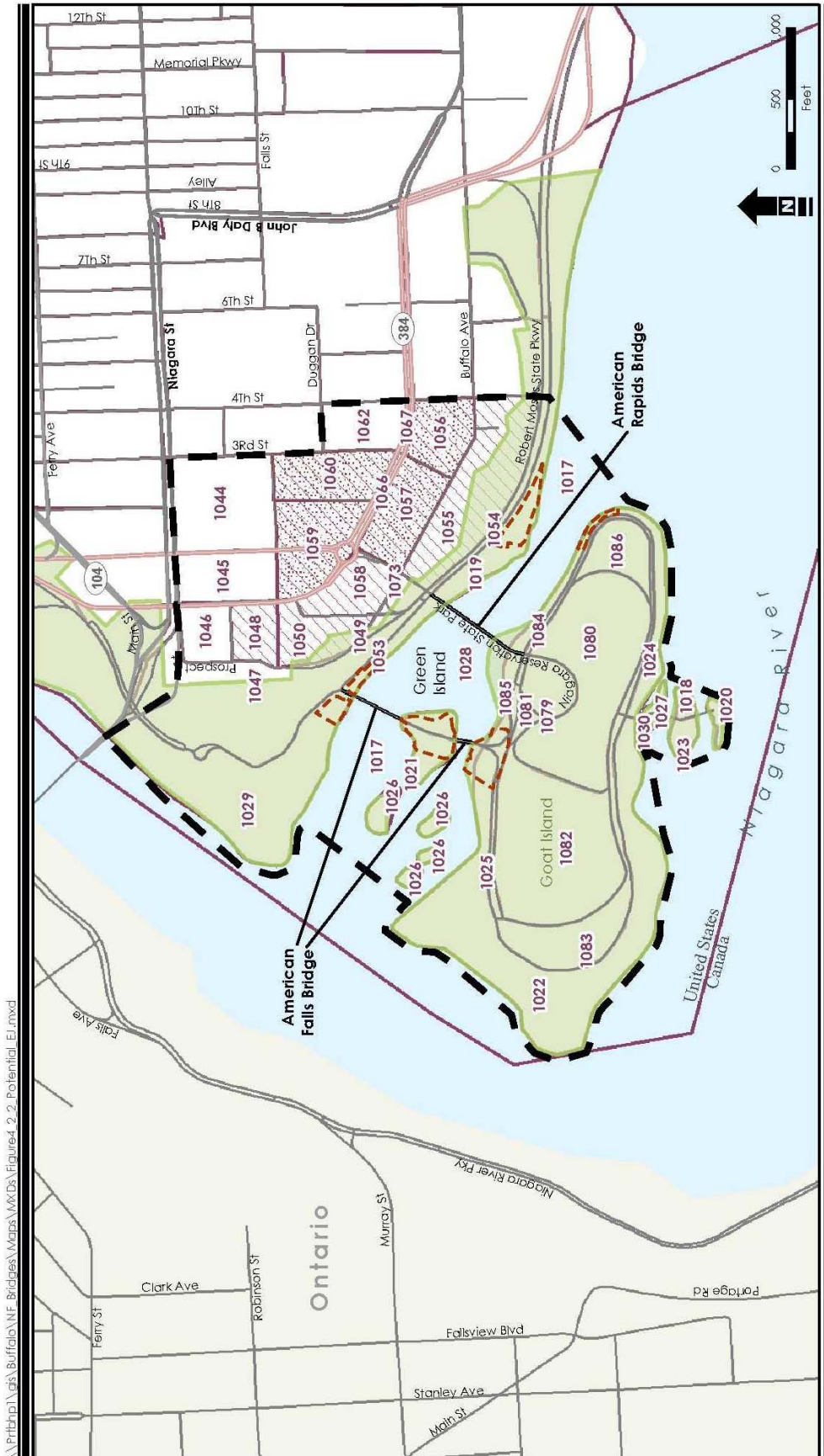
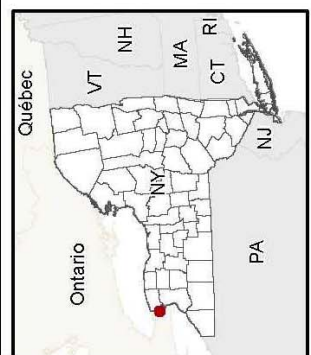


Figure 4.2-2  
Potential Environmental  
Justice Areas  
Niagara County, New York

July 2015  
SOURCE: ESRI 2010, E&E 2014,  
Niagara County 2014





Individual census blocks identified as potential EJ areas are shown in Figure 4.2-2. There are one hundred ten individuals living below the poverty level in the Census Block Group 1, and based on poverty levels in Census Block Group 1, a potential EJ population exists within the Socioeconomic Study Area.

Exhibit 4.2.3-2 Poverty Levels for Socioeconomic Study Area		
Geographic Unit	Population for Whom Poverty is Determined**	Percent of Population Below Poverty Level
New York State	18,710,113	14.2
Niagara County	211,558	12.8
City of Niagara Falls	50,422	21.8
Census Tract 211	1,490	34.9
Census Block Group 1*	258	42.6

Source: U.S. Census Bureau 2010.

- \* Poverty/Income data is only reported at the Block Group Level. Census Block Group 1 is a larger geographic area that extends past the boundaries of the Socioeconomic Study Area.
- \*\* The “Population for Whom Poverty is Determined” was obtained from the 2006-2010 American Community Survey 5-year Estimate (2010) and is only reported as sample data collected over a five year period; therefore ACS data includes a greater margin of error (+/-233) than decennial data and is less accurate.

Project activities are limited to rehabilitation/replacement of the existing American Falls Bridges in Niagara Falls State Park. Based on anticipated impacts and the composition of the Socioeconomic Study Area, the project would not directly or indirectly use criteria, methods, or practices that discriminate on the basis of race, color, national origin, or income level. Based on the above analysis and discussion, the project would not cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of EO 12898.

#### 4.2.4 School Districts, Recreational Areas, and Places of Worship

##### 4.2.4.1 School Districts

The project is located within the Niagara Falls City School District. There are no schools or school properties within the Socioeconomic Study Area, and the closest schools are approximately two miles away from the study area (*Niagara Falls City School District 2014*).

No impacts to schools are anticipated as a result of the project.

##### 4.2.4.2 Recreational Areas

Niagara Falls State Park is the oldest state park in the country, and includes facilities and attractions on the Mainland USA, Goat Island, and smaller islands including Luna Island and Three Sisters Islands. Amenities and activities at the park include biking, fishing, hiking, nature trails, and picnicking. Other recreational facilities at the park include the Niagara Falls Visitor

Center, observation tower, Maid of the Mist Boat Tour, and the Cave of the Winds (*NYSOPRHP 2014*).

No additional recreational areas are located within or in the vicinity of the Socioeconomic Study Area.

The feasible alternatives would not result in significant changes to the park setting. Some temporary impacts would occur during construction. After the project is completed, the bridges would provide improved access to recreational opportunities on Goat Island.

#### **4.2.4.3 Places of Worship**

Three places of worship are located within the Socioeconomic Study Area. The project would not affect the operation of the places of worship, or the ability of worshipers to travel. The nearest place of worship to the current bridge is St. Peters Episcopal Church located approximately eight hundred feet north of the project site, at the intersection of Second Street and Rainbow Boulevard. The First Presbyterian Church is located one thousand feet north of the project site, at the intersection of First Street and Old Falls Street. The Crossriver Church is located at the corner of Third Street and Duggan Drive.

### **4.3 Economic**

No long-term economic impacts would result from the project. The temporary dewatering of the American Rapids could have temporary impacts on businesses that rely on visitors to Niagara Falls State Park, but those potential impacts are considered negligible, as described in the following sections of this report.

#### **4.3.1 Regional and Local Economies**

The economy of the City of Niagara Falls involves tourism, tourism spending, and industrial manufacturing. In 2010, approximately 15.3% of the total civilian employment was attributed to the arts, entertainment, recreation, accommodation, and food service industries. An additional 14.4% of the employed civilian workforce was in the retail trade industry, which has close ties to the tourism industry, and manufacturing employed approximately 13.6% of the employed local labor force.

In 2011 tourists spent approximately \$490.9 million in Niagara County, of which \$62.2 million (12.7 percent) was spent on lodging; \$119.1 million (24.2 percent) was spent on recreation; \$138.1 million (28.1 percent) was spent on food and beverages; \$116.8 million (23.8 percent) was spent on retail; with the remaining \$54.7 million (11.2 percent) spent on all other categories including transportation and second homes (*Tourism Economics n.d.*).

This \$490.9 million in tourism expenditures directly and indirectly supported approximately 13,202 jobs in Niagara County and generated an estimated \$255.8 million in labor income, \$31.8 million in local taxes, and an additional \$29.9 million in state taxes in 2011 (*Tourism Economics 2014*).

The feasible alternatives would not have a significant long-term impact on the economy of the City of Niagara Falls. However, depending on the method of construction selected to rebuild these bridges and the amount of water diverted from the American Falls, short-term impacts may occur during the construction phase. If all water is diverted from flowing over the American Falls for one or more construction seasons, a decline in tourism and tourism spending in Niagara Falls State Park and in the City of Niagara Falls may occur during the construction period. Visitors who would otherwise travel to see Niagara Falls may postpone or cancel their trip as a result of dewatering of the American Falls. Additionally, if water is only flowing over the Horseshoe Falls, visitors may be more inclined to observe Niagara Falls from the Canadian side, and not the American side. The potential loss of tourism to Canada could possibly be significantly mitigated through effective marketing. The Canadian observation areas typically offer a unique panoramic view unavailable on the American side, but which no longer exists if the American Falls is dewatered (it would appear as does the rest of the gorge wall from that perspective).

Conflicting anecdotal reports from 1969, when the American Falls was dewatered to study and analyze geological characteristics, indicate that 1969 was a slow tourism season and that the dry American Falls may have played a role in the decline in the number of visitors. However, the number of estimated visitors to the Park during this period (previously known as the Niagara Reservation) was at its highest as a result of the peaked interest in the dewatered falls. One possible explanation for the conflicting observations on the impacts on tourism from dewatering the American Falls is that tourists who had to travel long distances to visit Niagara Falls were disinclined to do so when the American Falls was dewatered, resulting in fewer hotel rooms and restaurant meals sold, while simultaneously, local and regional visitors increased their attendance at the park to observe this “once in a lifetime” event.

Although it is not possible to accurately quantify the expected economic impacts associated with dewatering of the American Falls, dewatering could result in a decrease in park attendance, decreases in room rentals, and decreases in tourism spending.

If, however, the construction method selected allows a reduced amount of water to flow over the American Falls, no negative impacts are expected for visitation rates, tourism expenditures, the local and regional economies as a result of construction of the project.

#### **4.3.2 Business Districts**

##### **4.3.2.1 Established Business Districts**

The downtown Niagara Falls business district, which encompasses all of the Socioeconomic Study Area and the eastern side of 4<sup>th</sup> Street, is home of numerous hotels, motels, restaurants, tourist shops, and attractions. There are a total of thirteen hotels and motels with over two thousand rooms located in the downtown business district, including the Seneca Niagara Hotel and Casino (over six hundred rooms) and the Sheraton at the Falls (approximately four hundred rooms) (*HVS Consulting and Valuation Services 2011*). Additionally, the downtown business district includes office buildings, retail establishments, Seneca Niagara Casino, the Niagara Falls Conference and Event Center, and the Niagara Falls Culinary Institute.

#### **4.3.2.2 Effects on Business Districts**

No long-term impacts are expected within the downtown Niagara Falls business district as a result of the project, but depending on the construction method selected, some short-term impacts could occur during construction. Dewatering the American Falls and channel could initially be a tourism draw (a once in a lifetime opportunity to see the falls and river channel without water), but after some period of time could negatively impact park attendance, particularly during the summer tourist season. To the extent park visitation is impacted positively or negatively, local hotels, restaurants, retail establishments, and tourist attractions could be impacted by increased or decreased park attendance and tourism expenditures. After the project is completed and the water flow is restored to the American Falls, visitation rates and tourism expenditures would be expected to return to normal.

Closure of the existing bridges due to unplanned structural failure would result in significant long term negative socioeconomic impacts. Closure of the bridges and dewatering of the Falls in a controlled and planned approach would result in a less negative impact.

In addition, some long-term positive impacts to existing businesses adjacent to the project area may occur due to improvements to pedestrian movements, and to the enhancement of the crossing corridor.

#### **4.3.3 Specific Business Impacts**

##### **4.3.3.1 Established Businesses**

Established businesses on Goat Island are the Top of the Falls Restaurant; the Cave of the Winds, which includes the attraction, a gift shop, snack bar, and ice cream shop; and various other tourist-related kiosks. Each of these establishments is either operated directly by NYSOPRHP personnel, or administered by private concessionaries under service agreements with NYSOPRHP.

Additional kiosks and concessions are located on the mainland. Also on the mainland are the Visitor Center at Prospect Point, including the Niagara Legends of Adventure Theater; the Prospect Point Gift Shop; a seasonal candy shop; an ice cream and coffee bar; and an outdoor grill, with the embarkation point for the Maid of the Mist boat ride attraction located nearby. These operations are also administered by park personnel or by private concessionaires under service agreements.

Several established businesses located near the project area, but outside of the park include the Red Coach Inn restaurant; Comfort Inn at The Pointe, a one hundred eighteen-bed facility located on the corner of Prospect Avenue and Old Falls Street; the Hard Rock Café, the Niagara Wax Museum, Starbucks Coffee, T.G.I. Friday's; and the Legends Bar and Grill.

#### **4.3.3.2 Effects Assessment**

The businesses located on Goat Island may see lower levels of visitation and experience minor losses in business during the construction operations if full dewatering of the American Falls occurs for an extended period during the peak summer and early fall tourism season.

During construction, some established businesses may experience minor, temporary impacts as a result of the project. For example, the Cave of the Winds attraction may consider adjusting operations during construction due the potential dewatering of the American Falls.

Because project objectives include maintaining pedestrian access to Goat Island near the existing American Falls Bridges during construction, overall sales activity at established businesses on the island may not be affected by the project. To minimize impacts, directional signs should be posted in the construction area, directing pedestrians as necessary to maintain access. In addition, trolley service to Goat Island could be increased to some extent, to add flexibility during construction. Other attractions within the park may experience increased attendance, due to adjusted operations of the Cave of the Winds, changes to trolley services, and temporary access conditions during the various construction phases.

Established businesses located adjacent to the Niagara Falls State Park are not expected to be impacted during construction, and no impacts are expected to occur to established businesses after construction is complete.

### **4.4 Environmental**

#### **4.4.1 Wetlands**

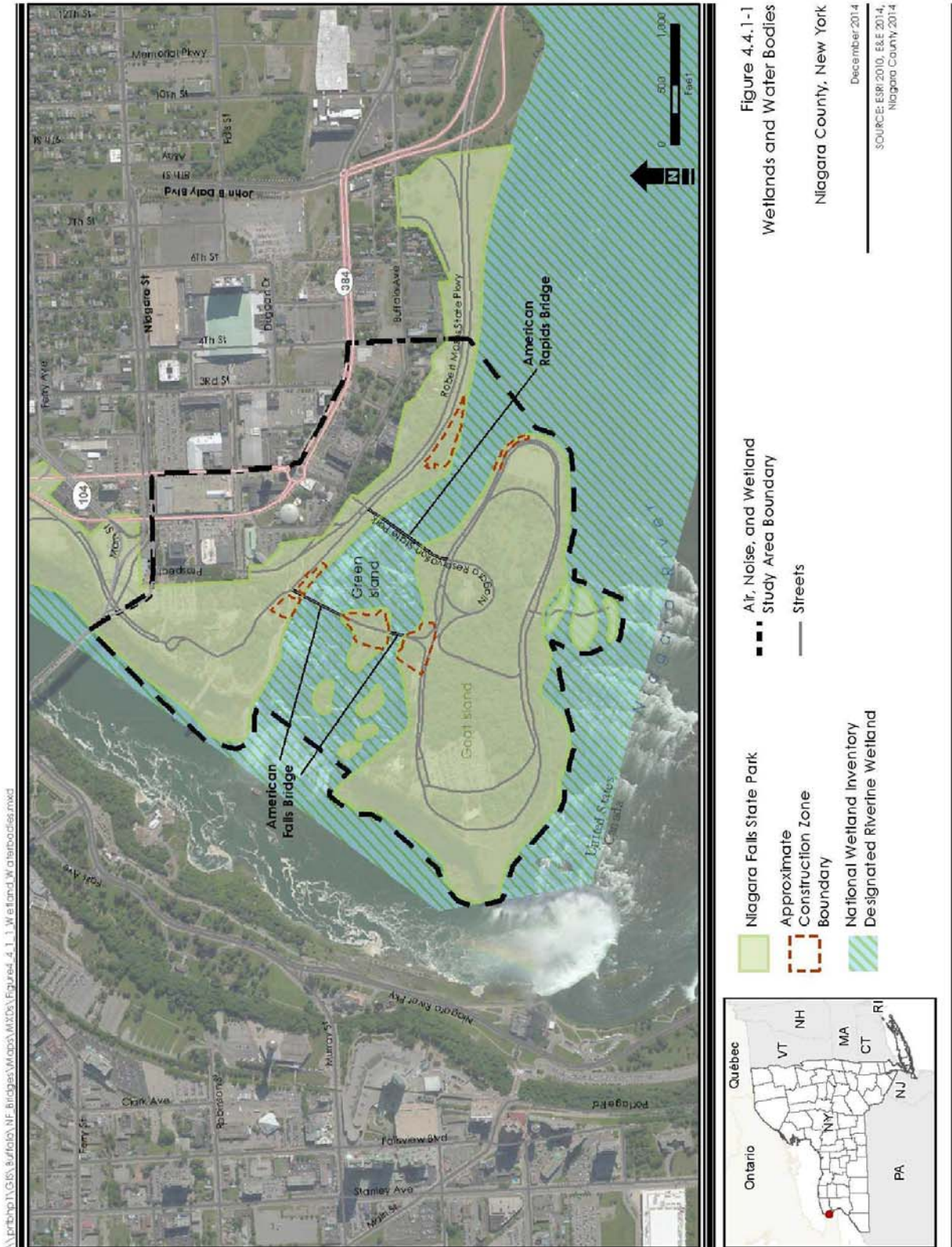
##### **4.4.1.1 State Freshwater Wetlands**

The New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetlands Maps for Niagara County, Niagara Falls Quadrangle, 1984 and NYSDEC web-based Geographic Information System (GIS) wetland data were reviewed for the presence of potential New York State freshwater wetlands within or near the Air, Noise, and Wetlands Study Area. There are no NYSDEC-regulated freshwater wetlands or regulated adjacent areas within or near (100 feet) the project.

No impacts to state-regulated freshwater wetlands would result from the project. No further investigation is required under New York State Environmental Conservation Law (ECL), 6 NYCRR Part 663 Article 24.

##### **4.4.1.2 State Tidal Wetlands**

A review of the NYSDEC GIS wetland data files indicates that there are no NYSDEC jurisdictional tidal wetlands or regulated adjacent areas within or near the project limits, therefore ECL, 6 NYCRR Part 661 Article 25 does not apply. No impacts to state tidal wetlands would result from this project.



#### **4.4.1.3 Federal Jurisdiction Wetlands**

The United States Fish and Wildlife Service (USFWS) web-based National Wetlands Inventory (NWI) mapping was reviewed for the presence of potential federal regulated wetlands within or near the Air, Noise and Wetland Study Area. The Niagara River is mapped as a riverine wetland (R3RB2H) within and around the Air, Noise and Wetland Study Area (Figure 4.4.1-1 Wetlands and Water Bodies).

Historic NWI maps show Green Island and the northern Niagara River shoreline within the park as being palustrine forested wetland (PFO1A). Along the northern Niagara River shoreline a mixture of wild shrubs grow within the riprap protection. Immediately upland of the riprap the park land is developed in a manner that provides visitors with access to the shoreline (i.e., multi-use path, railing, and open lawn) to view the flow of water through the rapids above the American Falls. No recorded wetlands are present in this area.

Green Island is also mostly developed (i.e., road, sidewalks, open lawn) except for woods along the island perimeter.

A site survey of the Air, Noise, and Wetlands Study Area was conducted on September 9, 2014, to determine if there are any wetlands in the wooded areas within or near the project site. No wetlands were identified by the site survey.

#### **4.4.1.4 Executive Order 11990**

According to EO 11990, projects with federal involvement shall avoid, minimize, and mitigate for impacts on wetlands. A site survey was conducted on September 9, 2014, to determine whether wetlands are present within or near the anticipated construction area. No wetlands were identified within or near the anticipated construction area by the site survey.

#### **4.4.1.5 Mitigation Summary**

Impacts to Waters of the United States, including wetlands, require authorization under Section 404 and Section 401 of the Federal Clean Water Act (CWA).

No wetland mitigation/monitoring plan is required for this project, because no wetlands are anticipated to be impacted.

### **4.4.2 Surface Waterbodies and Watercourses**

#### **4.4.2.1 Surface Waters**

It is anticipated that the project activities would result in impacts to Waters of the United States, and that this work would require authorization by the United States Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA), Nationwide Permit No. 3, Maintenance (NWP 3) and Nationwide Permit No. 33, Temporary Construction Access and Dewatering (NWP 33). Nationwide Permit No. 33 requires NYSDOT to provide a pre-

construction notification to USACE and to receive an authorization prior to undertaking the proposed activities.

Depending on final design and construction techniques, additional permits from USACE may be required, and the permits would be obtained after the location and the extent of the impacts are determined. Mitigation to minimize impacts may be required. Work would not commence until the permits are acquired and would adhere to any conditions set forth by the permit(s).

#### **4.4.2.2 Surface Water Classification and Standards**

The Niagara River is mapped as a NYSDEC Class “A” waterway as defined by Title 6, Part 701 of the Water Quality Regulations. The best usages for Class “A” waters are source of water supply for drinking; culinary or food processing purposes; primary and secondary contact recreation; and fishing. The water quality of the Niagara River is suitable for fish propagation and survival.

Nationwide Permit No. 33 requires NYSDOT to provide a pre-construction notification to USACE, and to receive an authorization prior to undertaking the proposed activities

#### **4.4.2.3 Stream Bed and Bank Protection**

Based upon a review of the NYSDEC GIS database, the Niagara River is a protected waterway within the General Study Area. Project-related impacts to the Niagara River and its banks would need to comply with all conditions in the New York State ECL, Protection of Waters NYCRR Part 608 Article 15, and an Article 15 permit would be required.

#### **4.4.2.4 Construction Impacts to Surface Waters**

Construction of two new bridges would have no significant long-term impacts on the water quality of the Niagara River. Temporary, minor impacts on water quality and aquatic life in the immediate vicinity of the construction site within the Niagara River resulting from the construction of bridge piers are unavoidable, as is the permanent loss of a small area of aquatic substrate in the Niagara River if new piers are slightly larger than existing piers. Water quality may be affected by temporary access and dewatering.

Bridge construction activities in the middle of the Niagara River are not anticipated to introduce sediments into the river’s water column because the river bottom in the vicinity of the American Falls is continually scoured clean by the high velocity and volume of the water passing through the area. Given the volume and velocity of water flow in the area of the existing bridges and the lack of sediments in the area, no adverse impact on any potential fisheries resources in the immediate area during construction are anticipated.

#### **4.4.2.5 Mitigation Summary**

Compensatory mitigation for water-related impacts associated with the project may be required, depending on evaluation of permit applications by NYSDEC and USACE.



Standard construction methods including feasible and reasonable measures and best management practices will be used to minimize any potential impacts of storm water runoff and wind exposure. Impacts to surface waterbodies and watercourses resulting from project are expected to be negligible.

#### **4.4.3 Wild, Scenic, and Recreational Rivers**

##### **4.4.3.1 State Wild, Scenic and Recreational Rivers**

Based upon a review of the NYSDEC GIS database, the Niagara River is not designated as a State Wild, Scenic, or Recreational River.

No impacts to New York State Wild and Scenic Rivers would result from the project.

##### **4.4.3.2 National Wild and Scenic Rivers**

Based upon a review of the National Wild and Scenic Rivers System database, the Niagara River is not designated as a National Wild and Scenic River.

No impacts to National Wild and Scenic Rivers would result from the project.

##### **4.4.3.3 Section 4(f) Involvement**

The proposed project does not involve work in or adjacent to a wildlife or waterfowl refuge. No further consideration is required.

##### **4.4.3.4 Mitigation Summary**

The project would not impact wild and scenic rivers. No mitigation is required.

#### **4.4.4 Navigable Waters**

No impacts are expected on the navigability of the Niagara River as a result of this project.

##### **4.4.4.1 State Regulated Waters**

*Navigable waters of the state* means all lakes, rivers, streams, and other bodies of water in the state that are navigable in fact or upon which vessels with a capacity of one or more persons can be operated notwithstanding interruptions to navigation by artificial structures, shallows, rapids or other obstructions, or by seasonal variations in capacity to support navigation. Based on the definition, the Niagara River is considered navigable water. However, navigability of the waters in the vicinity of the project would not be affected, due to the rapids and proximity to the American Falls. A NYSDEC Protection of Waters Permit for Excavation or Placement of Fill in Navigable Waters will be required, pursuant to ECL Article 15, Title 5. The permit will be obtained once the location and extent of the impacts are ascertained.

#### **4.4.4.2 Office of General Services Lands and Navigable Waters**

The Niagara River is located within the project area and the work would require the use of underwater New York State Office of General Services (NYSOGS) holdings in the river. Interagency agreements or other arrangements such as easements would be finalized after the location and extent of the impacts are determined.

#### **4.4.4.3 Rivers and Harbors Act – Section 9**

The project would involve the modification of a bridge over a navigable waterway of the United States, the Niagara River. This section of the river, although classified as navigable, consists of high velocity water upstream and in proximity to Niagara Falls, and therefore there is no boat traffic. The US Coast Guard has been consulted and a USCG Section 9 Permit Application is not necessary for this project.

#### **4.4.4.4 Rivers and Harbors Act – Section 10**

The project would involve the rehabilitation/reconstruction of bridges over a navigable water of the United States, the Niagara River. The construction would necessitate temporary placement of fill into the river, and would require a USACE Section 10 Permit. A permit application would be submitted to the USACE after the extent of the impacts is fully ascertained, and the permit would be obtained prior to the commencement of work. No permanent impacts are anticipated as a result of this project.

### **4.4.5 Floodplains**

#### **4.4.5.1 Executive Order 11988**

The project will not impact any floodplains. EO 11988 does not apply.

#### **4.4.5.2 State Flood Insurance Compliance Program**

The portion of the project site that includes Green Island and the American Rapids is located in a Special Flood Hazard Area (SFHA), Zone A, as defined by the Federal Emergency Management Agency (FEMA) (*NYS DEC 2014*). However, no flood-related adverse effects are expected from the project because of the multi-use function of the Niagara River and the high level of controls in place to maintain the multiple functions of the river.

### **4.4.6 Coastal Resources**

#### **4.4.6.1 State Coastal Zone Management Program**

This is a SEQR Non-Type II project and crosses the American Rapids portion of Niagara River, which is designated as a coastal water body under the Local Waterfront Revitalization Program (*NYS DOS 2014*). The project is located in a State Coastal Zone Management area (Niagara River), is federally funded and requires a federal permit (other than a Nationwide Permit). Therefore, determination of the project's consistency with the New York State Department of

State (NYSDOS) Coastal Management Program and coastal policies is required, and a state consistency review would be required. The review would be initiated by completion of a State Coastal Assessment Form (CAF) and Federal Consistency Assessment Form (FCAF) and submission to the (NYSDOS).

#### **4.4.6.2 State Coastal Erosion Hazard Area**

The project is not located in or near the shoreline of Lake Erie or Lake Ontario, the shoreline of Long Island, or the shoreline of the Atlantic Ocean (*NYSDEC 2014*) and therefore not in or near a Coastal Erosion Hazard Area. No impacts to state coastal erosion hazard areas would result from the project.

#### **4.4.6.3 Waterfront Revitalization and Coastal Resources Program**

The project is not located in a Local Waterfront Revitalization Area as it is not included in approved or pending list of Local Waterfront Revitalization Programs (*NYSDOS 2014*). No impacts to Local Waterfront Revitalization Areas would result from this project. No further action is required.

#### **4.4.6.4 Federal Coastal Barrier Resources Act and Coastal Barrier Improvement Act**

The project is not located in, or near a coastal area under the jurisdiction of the Coastal Barrier Resources Act (CBRA) or the Coastal Barrier Improvement Act (CBIA) (*USFWS 2014*). No impacts to coastal barriers would result from the project.

#### **4.4.6.5 Niagara River Greenway**

This is a SEQR Non-Type II project located within the boundaries of the Niagara River Greenway, and therefore must be reviewed for consistency with the vision, principles, goals, and criteria described in the Niagara River Greenway Plan. A Niagara River Greenway Commission Consistency Review Form (NRGCRF) has been completed, and the conclusions from the review are included in Appendix B.

#### **4.4.7 Groundwater Resources, Aquifers, and Reservoirs**

##### **4.4.7.1 Aquifers**

A review of NYSDEC aquifer GIS data files indicates that the project is not located in an identified Primary Water Supply or Principal Aquifer Area. No further investigation for NYSDEC-designated aquifers is required (*NYSDEC 2014*).

A review of the United States Environmental Protection Agency (USEPA)-designated sole-source aquifer areas, from notices in the Federal Register, maps, and fact sheets indicates that the project is not located in a Sole Source Aquifer Project Review Area. No federal review and/or approvals are required pursuant to Section 1424(e) of the Safe Drinking Water Act (EPA 2014).

No impacts to aquifers would result from the project.

#### 4.4.7.2 Drinking Water Supply Wells (Public and Private Wells) and Reservoirs

There are no municipal drinking water wells, wellhead influence zones, or reservoirs within or near the project area, according to the *NYS Atlas of Community Water System Sources*, dated 1982, issued by the NYS Department of Health. No impacts to drinking water supply wells or reservoirs would result from the project.

#### 4.4.8 Stormwater Management

A SPDES General Permit GP-0-15-002 would be required because the project would likely involve more than one acre of soil disturbance. A Stormwater Pollution Prevention Plan (SWPPP) with the appropriate sediment and erosion control measures would be developed.

Permanent stormwater quality management practices may be required, depending upon the amount of new or redeveloped impervious area. Stormwater quantity controls will not be required because project runoff discharges into a fifth-order magnitude waterway.

The General Study Area is not adjacent to or discharging runoff to a Total Maximum Daily Load Watershed or a listed 303(d) water body.

#### 4.4.9 General Ecology and Wildlife Resources

Because Niagara Falls State Park provides visitors with access to areas near shorelines of Goat Island and the mainland via multi-use paths, viewing areas with railings, and open lawns to view the flow of water through the rapids above the American Falls, the resulting altered landscape with substantial tourist use provides limited habitat for wildlife.

No known significant fish habitats within the Niagara River are in the vicinity of the General Study Area.

Because of the relatively shallow water levels and high velocity currents of this portion of the Niagara River, dewatering may have an impact on some invertebrates that may be present. Some protected areas in shallow water and close to shore may provide gravelly riverbed habitat suitable for freshwater mussels, but because of the fast-moving water, they are not expected to be present in the study area.

##### 4.4.9.1 Fish, Wildlife, and Waterfowl

The predominant mammals that may be seen in the park include eastern chipmunk (*Tamias Tamias*), gray squirrel (*Sciurus carolinensis*), red squirrel (*Sciurus vulgaris*), and the fox squirrel (*Sciurus niger*).

The bedrock substrate, high flow velocities, and shallow depth conditions of the river at the project site do not provide suitable habitat for fish species. Discussions with NYSDEC biologists familiar with the river, indicated that migratory bird species, wading birds, and waterfowl would experience a temporary disturbance and would be displaced to suitable habitats nearby (Adams 2014).

The project would not cause any long term significant impacts to fish and wildlife.

#### **4.4.9.2 Habitat Areas, Wildlife Refuges, and Wildfowl Refuges**

The project does not involve work in, or adjacent to, a wildlife or waterfowl refuge. No further consideration is required.

#### **4.4.9.3 Endangered and Threatened Species**

The presence of endangered and threatened species at or near the project site was determined by checking the area near the project site for species listed in several databases, and via discussion with biologists at NYSDEC familiar with the Niagara River in the vicinity of the project. Also, a Biological Evaluation was prepared and provides detailed information regarding threatened and/or endangered species potentially located in or near the General Study Area.

According to NYSDOT's search of the FWS Information, Planning and Conservation (IPaC) system, there could be federally protected, threatened, or endangered species located in or near the General Study Area. Exhibit 4.4.9-1 summarizes listed species and migratory bird species that could be affected and/or impacted by the project. No listed species were observed during field surveys of the General Study Area.

##### Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is no longer protected through the Endangered Species Act, but federal protection remains through the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. New York State also classifies the bald eagle as a threatened species. There are two known bald eagle nest areas on the Niagara River. Nesting has occurred on Navy Island (Ontario) near the northwesterly corner of Grand Island over the past decade or longer. Another pair of bald eagles has recently established residency with a nest on Strawberry Island (New York). These locations are approximately 3.5 and 11 miles, respectively from the General Study Area. As bald eagle populations continue to increase throughout New York, Ontario, and surrounding areas, there is a likelihood that additional nests will occur along the Niagara River in the future. The nesting pairs currently inhabiting the Niagara River area are not known to regularly frequent the project site as evidenced by the scarcity of reports submitted to eBird for Niagara Falls State Park. The recorded sightings were limited to only during the winter months (eBird 2014). According to the National Bald Eagle Management Guidelines (USFWS 2007), the chronology or typical reproductive activities of bald eagles in the northern United States, including New York State, is as follows:

- Nest building (December through February);
- Egg laying/incubation (February through April);
- Hatching/rearing young (March through June); and
- Fledging young (June through August).

These are the time periods during which bald eagles are sensitive to anthropogenic disturbance, with nest building considered to be when eagles are most sensitive. As the existing nests are not in the immediate vicinity of the project site and there is little documented use of the project site by bald eagles, project-related-construction activities are unlikely to disturb the two known

nesting bald eagle pairs; therefore the project is unlikely to result in a take or taking pursuant to 6 NYCRR Part 182 and is not subject to regulation under this Part.

Northern Long-Eared Bat

The United States Fish and Wildlife Service (USFWS) listed the northern long-eared bat as federally threatened under the 4(d) ruling in April of 2015. While there is no available data on the occurrence of northern long-eared bat (*Myotis septentrionali*) in the vicinity of the project area, the historical broad distribution of northern long-eared bats within the region, and ample foraging and roosting habitat both within and surrounding the project area, enhance the likelihood that the species may be present in the project area.

Suitable roost trees for the northern long-eared bat typically include trees with a DBH of 3-inches or greater and the presence of exfoliating bark, crevices, cavities, and/or cracks. A site visit was conducted which identified fewer than 10 trees that meet this criteria within the study area. A Biological Evaluation was prepared and provides additional information on this species and trees with a DBH of 3-inches or greater.

The *United States Fish and Wildlife Northern Long-Eared Bat Interim Conference and Planning Guidance* (USFWS 2014) recommends that clearing of potential roost trees occur from October 31 to March 31 in order to minimize the likelihood of adverse impacts. The presence of northern long-eared bat habitat has been verified at and near the project site. The potential effects resulting from tree removal can be minimized by limiting clearing from October 31 to March 31. Based on the small tree quantity and the ability to control timing of tree cutting associated with the project, NYSDOT has made a preliminary effect determination that tree removals “May Affect, But Not Likely to Adversely Affect” this species. The preliminary effect determination needs to be submitted to FHWA for forwarding to USFWS for concurrence.

Federal-Listed Species

Exhibit 4.4.9-1 lists the possible impacts on listed species.

Exhibit 4.4.9-1 Federal Listed Species		
Species	Status	Impacts
Northern long-eared bat ( <i>Myotis septentrionali</i> )	Proposed Endangered	No Impacts – No known hibernaculum within or near the General Study Area
American bittern ( <i>Botaurus lentiginosus</i> )	Bird of Conservation Concern (BCC)	No nest sites - Temporary impact – displaced to suitable nearby habitats
Black tern ( <i>Chidonias niger</i> )	BCC	No nest sites - Temporary impact – displaced to suitable nearby habitats
Bald eagle ( <i>Haliaeetus leucocephelus</i> )	BCC	No nest sites - Temporary impact – displaced to suitable nearby habitats
Black-crown night heron ( <i>Nycticorax nycticorax</i> )	BCC	No nest sites - Temporary impact – displaced to suitable nearby habitats
Cerulean warbler ( <i>Dendroica cerulean</i> )	BCC	No nest sites - Temporary impact – displaced to suitable nearby habitats

Golden-winged warbler ( <i>Vermivora chrysoptera</i> )	BCC	No nest sites - Temporary impact – displaced to suitable nearby habitats
Least bittern ( <i>Icthyophaga exilis</i> )	BCC	No nest sites - Temporary impact – displaced to suitable nearby habitats
Wood thrush ( <i>Hylocichia mustelina</i> )	BCC	No nest sites - Temporary impact – displaced to suitable nearby habitats

Additionally, the NYS Natural Heritage information database was used for this study, and also indicates that there is a possibility that a state-protected, threatened, or endangered plant and/or animal species could occur in or near the General Study Area. During site visits, including visits conducted during the flowering season, none of the plant species listed in the database was observed within the General Study Area.

Exhibit 4.4.9-2 lists species within the riparian corridors of the Niagara River along the mainland as well as Goat and Green Islands in proximity of the project. The absence of these species is possibly in part due to near-shore habitat disturbance and modification caused by bank armoring and reshaping that has taken place over the last century. The presence and extent of suitable habitat in most areas has been reduced by ice scour and dense canopy shade from a vegetative overstory of mature trees. Some small, linear features exist, leaving some habitats that could support listed plant species.

Based on field observations and the expertise of the NYSDEC biologists, no impacts are anticipated on the species listed in Exhibit 4.4.9-2 (Adams 2014). Due to the normally shallow water levels and high velocity currents it is unlikely that the listed blackchin shiner (*Notropis heterodon*) would be present in or near the project site.

#### State-Listed Plant Species

The irregular shoreline riparian corridor contains structures that include micro habitat features which can support aquatic plant species with transition areas into upland areas. Although these features are small, habitat for the listed species of concern could exist within the project work areas, but the absence of state-listed plant species within the project work area or footprint has been confirmed by plant surveys conducted by field biologists during the growing season based on phenology for each species. Although landscape features and potential habitats for these species has been significantly modified, there is a possibility that the listed species could occur within the altered riparian and inland areas that will be disturbed by construction activities. Habitat and phenology data for each species was used to focus field surveys in the project work areas:

- Marsh valerian (*Valeriana uliginosa*) inland wet meadows, emergent marsh/shorelines, blooms May through July;
- Woodland bluegrass (*Poa sylvestris*) Inland openings, moist to dry soil, blooms June through August;
- Drummond's rock cress (*Boechera stricta*) rock outcrops, limestone cliffs and boulders, blooms May;
- Marsh arrow-grass (*Triglochin palustre*) emergent marsh/shoreline, inland wet meadow, blooms July through September;

- Rock-cress, Rock Draba (*Draba arabisans*) inland dry, rocky soil, calcareous cliffs, blooms June/ July.

Potential habitat for Marsh Valerian (*Valeriana uliginosa*) is not present within the areas potentially affected within the study area. Additionally, this species was not observed during a site visit conducted on September 9, 2014. Although the historical record of the last known occurrence of this species does not include a date of the occurrence, it can be stated that the species has not been recently observed, because the historical record is aged and not recent. This coupled with the lack of suitable habitat in the project area suggests that this species is highly unlikely to be found at and near the project site. Additional site visits were conducted during the flowering season in 2015 to verify that the project will have no impact on this species. This species was not observed during June 16, 2015 and July 13, 2015 site visits.

Potential habitat for Woodland bluegrass (*Poa sylvetris*) is present within the areas potentially affected within the study area. This species has been observed within the last 27 years, growing on the edge of the Niagara gorge in a seep (NYNHP 2013b). Because a seep habitat is not present in the project area, the species is considered unlikely to occur in the project area. Site visits, including during the flowering season in 2015, have verified that the project will have no impact on this species. This species was not observed during June 16, 2015 and July 13, 2015 site visits.

Drummond's rock cress (*Boechera stricta*), Marsh arrow-grass (*Triglochin palustre*), and Rock-cress (*Draba arabisan*) were not observed during a project site visit on September 9, 2014. Potential habitat for these species is present within the areas potentially affected within the study area. Because observations of these species has not been documented for over 100 years, and because extensive changes have taken place within the natural habitats of the park during the past 100 years, these species are considered unlikely to occur within the project area. An additional site visit conducted during the flowering season in 2015 has verified that the project will have no impact on these species. This species was not observed during June 16, 2015 and July 13, 2015 site visits.

#### State Listed Bird Species

The black tern is a New York State-listed endangered bird species. Black terns primarily feed on small fish by diving into the water, often nest on cattails and floating vegetation mats, and are highly dependent on large marsh size (preferably >20 hectares) and proximity to other wetlands. Suitable foraging or nesting habitat for the black tern is not present within the areas of disturbance. The project will likely have no impact on these birds because of low likelihood of occurrence within the project area.

The least bittern is a New York State-listed threatened bird species. Preferred habitat for the least bittern contains stands of cattails or bulrush with bur-reed, sedges, or common reed. Large marsh size is an important requirement for suitable breeding habitat areas for this species. The areas of disturbance do not provide suitable foraging or nesting habitat for the least bittern. The project will likely have no impact on these birds because of low likelihood of occurrence within the project area.



The Peregrine Falcon is classified as an endangered bird species in New York State. Peregrine falcons typically build their nests on high ledges or cliffs that are 50 to 200 feet off the ground, but are also known to readily adopt artificial nest boxes placed on tall buildings or bridges in urban areas. Peregrine falcons are seen year-round along the Niagara River in the vicinity of the Project area, although with more frequency during and following the nesting season (eBird 2015). The Canadian side of the Niagara Gorge near Horseshoe Falls contains a nesting site that has been occupied by a breeding pair nearly every year from 1998 through 2014 (NPC 1998; NYSDEC 2012). Two additional documented peregrine falcon nest sites on the North and South Grand Island Bridges over the Niagara River have been active in recent years (NYSDEC 2012). Given the number of observations of peregrine falcon sightings and the proximity of the Niagara Gorge nest to the project area, peregrine falcon individuals may be temporarily displaced from foraging within the project area during construction activities, but no nests are likely to be impacted by the project.

The common tern is a New York State-listed threatened bird species. Common terns nest in colonies on the ground in habitat that provides isolation from predators, a nearby supply of food, and flat, relatively open habitat with sparse vegetation. For these reasons common terns tend to establish nest sites on peninsulas or islands. The Niagara River in the immediate area provides some foraging habitat but not suitable nesting habitat for the common tern. Observations of the common tern have been recorded in the spring and summer months near Niagara Falls State Park (eBird 2015). Colonies in the Niagara region exist on breakwaters in Buffalo Harbor in eastern Lake Erie (NYPA 2012), approximately 18 miles (30 kilometers) south of the project area. The project will likely have minimal impact on these birds because of low likelihood of occurrence within the project area.

Based on comments from NYSDEC, coupled with the project following the seasonal clearing restriction for trees potentially associated with habitat for the northern long-eared bat species, which also avoids clearing during nesting season, NYSDOT has made a preliminary effect determination of “No Effect” on the bird species described above.

Exhibit 4.4.9-2 State Listed Species/Notable Species		
Species	Status	Impacts
Marsh valerian ( <i>Valeriana uliginosa</i> )	Endangered	Unlikely to be present – lack of habitat - tree overstory/ice scour
Woodland bluegrass ( <i>Poa sylvetris</i> )	Endangered	Unlikely to be present – lack of habitat - tree overstory/ice scour
Drummond’s rock cress ( <i>Boechera stricta</i> )	Threatened	Unlikely to be present – lack of habitat - tree overstory/ice scour
Marsh arrow-grass ( <i>Triglochin palustre</i> )	Threatened	Unlikely to be present – lack of habitat - tree overstory/ice scour
Rock-cress ( <i>Draba arabisans</i> )	Threatened	Unlikely to be present – lack of habitat - tree overstory/ice scour
Blackchin shiner ( <i>Notropis heterodon</i> )	Unlisted	Suitable habitat does not exist - No Impacts

Exhibit 4.4.9-2 State Listed Species/Notable Species		
Species	Status	Impacts
Peregrine falcon ( <i>Falco peregrinus</i> )	Endangered	No nest sites - Temporary impact – displaced to suitable nearby habitats
Osprey ( <i>Pandion haliaetus</i> )	Notable species	No nest sites - Temporary impact – displaced to suitable nearby habitats
Ringed-billed gull ( <i>Larus delawarensis</i> )	Notable species	No nest sites - Temporary impact – displaced to suitable nearby habitats
Herring gull ( <i>Larus smithsonianus</i> )	Notable species	No nest sites - Temporary impact – displaced to suitable nearby habitats
Black duck ( <i>Anas rubripes</i> )	Notable species	No nest sites - Temporary impact – displaced to suitable nearby habitats
Common tern ( <i>Sterna hirundo</i> )	Threatened	No nest sites - Temporary impact – displaced to suitable nearby habitats
Black tern ( <i>Chidonias niger</i> )	Endangered	No nest sites - Temporary impact – displaced to suitable nearby habitats
Least bittern ( <i>brobrychus exilis</i> )	Threatened	No nest sites - Temporary impact – displaced to suitable nearby habitats

**4.4.9.4 Invasive Species**

A site visit of the General Study Area confirmed the presence of a variety of invasive species along the shoreline and throughout the area. Identified species include:

- Buckthorn (*Rhamnus cathartica*) – Abundant
- Bush honeysuckle (*Lonicera maackii*, *L. tatarica*) – Abundant
- Tree of heaven (*Ailanthus altissima*) – Present
- Privet – *Ligustrum vulgare* – Present
- Porcelian berry - *Ampelopsis brevipedunculata* – Present
- Barberry – *Berberis thunbergii* – Present

The NYSDOT Environment Procedures Manual, Section 4.8.3, Invasive Species Control Practices for Maintenance and Construction, provides guidance for control and management of invasive species during construction. Best management practices for the appropriate removal and disposal of invasive vegetation at the project location would be used, to prevent the regeneration of invasive plants in disturbed soil areas from seedbank sources, and to control the spread of invasive plant propagules from the construction site. Post-project monitoring is recommended to determine if post-project spot treatments could control invasive plants that could re-colonized the project site after the project is completed.

#### 4.4.10 Critical Environmental Areas

##### 4.4.10.1 State Critical Environmental Areas

Local agencies may designate specific geographic areas within their boundaries as critical environmental areas (CEAs). State agencies may also designate geographic areas they own, manage or regulate, including Wildlife Management Areas and Significant Coastal Zones.

According to information obtained from NYSDEC's website, the project does not involve work in or near a CEA (*NYSDEC 2014e*).

##### 4.4.10.2 State Forest Preserve Lands

According to information obtained from NYSDEC, the project does not involve work in or near state forest preserve lands.

##### 4.4.10.3 State Bird Conservation Areas

The New York State Bird Conservation Area (BCA) Program was established in 1997 to safeguard and enhance bird populations and their habitats on State-owned lands and waters. The goal of the BCA Program is to integrate bird conservation interests into agency planning, management and research projects, within the context of agency missions. According to information obtained from NYSDEC, the project site is not listed as a BCA.

##### 4.4.10.4 Important Bird Areas and Sensitive Bird Species

Important bird areas (IBAs) are areas that provide essential habitat for one or more species of bird, and are used by breeding, wintering, and/or migrating birds. According to the Audubon Society, the General Study Area lies within part of an IBA. In winter, the Niagara River hosts a large population of Bonaparte's gulls (*Chroicocephalus philadelphia*), making it globally significant. The project would not be under construction during the winter, and the project site is on only a small portion of the Niagara River. No impacts to the IBA would occur as result of the project.

There are several sensitive bird species that may be temporarily displaced due to temporary dewatering of the riverbed. Bird species in the vicinity of the project include ring-billed gulls (*Larus delawarensis*), herring gulls (*Larus smithsonianus*), double-crested cormorants (*Phalacrocorax auritus*), various species of ducks, osprey (*Pandion haliaetus*), black-crown night heron (*Nycticorax nycticorax*), and peregrine falcons (*Falco peregrinus*). Temporary displacement of these bird species due to the project have no adverse impacts to these bird species because there are other suitable habitats nearby, and the construction activities would be short-term.

#### **4.4.11 Historic and Cultural Resources**

##### **4.4.11.1 National Heritage Areas Program**

The project is located in the Niagara Falls National Heritage Area. The Niagara Falls National Heritage Area, Inc., has been contacted to ensure that the project is consistent with the Heritage Area Management Plan.

##### **4.4.11.2 Natl. Historic Preservation Act–Sec.106 / State Historic Preservation Act–Sec.14.09**

Niagara Falls State Park is listed in the National Register of Historic Places (NRHP) and is also a National Historic Landmark. A *determination of effect* will be performed in order to evaluate the effects that the project may have on the NRHP-listed property, or on contributing elements.

Because the project would likely involve federal funding, NYSDOT will follow the Section 106 Process of the National Historic Preservation Act (“106 Process”). The 106 Process ensures compliance with the New York State Historic Preservation Act (NYSHPA) Section 14.09 process.

##### **4.4.11.3 Architectural Resources**

The American Falls Bridges are contributing elements of the NRHP-listed Niagara Falls State Park. A *determination of effect* as part of this environmental assessment will include an evaluation of the project’s effects on the bridges.

##### **4.4.11.4 Archaeological Resources**

Consultation with the SHPO was initiated in March 2014 and included the submittal of the Phase IA/IB Cultural Resource Survey and request for review and comment. SHPO replied in April 2014 and indicated that they would require additional site investigation in order to make an impact determination. These evaluations included an additional Phase IB archeological reconnaissance as well as a Phase II Site Examination. The additional investigation was conducted at the site in December 2014.

The investigation was conducted according to the New York Archaeological Council’s *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections* (1994), which are endorsed by NYSOPRHP. A report entitled Additional Phase IB archeological reconnaissance and Phase II Site Evaluations of the Goat Island Site (A06340.001961) and the Green Island Site (A06340.001962) has been prepared according to NYSOPRHP’s *State Historic Preservation Office (SHPO) Phase I Archaeological Report Format Requirements* (2005).

Consultation with the FHWA will be required to determine if the project meets the criteria of a *Programmatic Section 4(f) Evaluation and Approval for FHWA Projects that include Minor Involvement with Historic Sites*.

#### 4.4.11.5 Historic Bridges

The American Falls Bridges, built in 1900 – 1901, are contributing elements of the NRHP-listed Niagara Falls State Park. A *determination of effect* as part of this environmental assessment will include an evaluation of the project's effects on the bridges. Consultation with the FHWA will be required to determine if the project meets the criteria of a *Programmatic Section 4(f) Evaluation and Approval for FHWA Projects that Necessitate the Use of Historic Bridges*.

#### 4.4.11.6 Historic Parkways

This project does not have to potential to impact any historic parkways.

#### 4.4.11.7 Native American Involvement

NYSDOT will coordinate with the Seneca Nation of Indians (SNI), the Tonawanda Seneca Nation, Tuscarora Nation, and the Seneca Cayuga Tribe of Oklahoma. Additionally, the project will follow the Section 106 Process of the National Historic Preservation Act (36 CFR 800), and the 106 Process will ensure compliance with the Archaeological Resources Protection Act.

#### 4.4.11.8 Section 4(f) Involvement

Historic properties that are listed on, and eligible for, inclusion in the National Register of Historic Places are located within the project's area of potential effect. Niagara Falls State Park and two archeological sites are the historic sites potentially affected by this project.

The State Reservation at Niagara (now Niagara Falls State Park) was listed on the National Register of Historic Places on October 15, 1966 as Niagara Reservation, No. 66000555. The park is also recognized as a National Historic Landmark.

The American Falls Bridges, built in 1900 – 1901, are *contributing elements* of the NRHP-listed park.

Consultation with the NYSHPO was initiated in March 2014 and included the submittal of the Phase IA/IB Cultural Resource Survey and request for review and comment. SHPO replied in April 2014 and indicated that they would require additional site investigation in order to make an impact determination. These evaluations included an additional Phase IB archeological reconnaissance as well as a Phase II Site Examination. The additional investigation was conducted at the site in December 2014 in accordance with the New York Archaeological Council's Standards for Cultural Resource Investigations and the Curation of Archaeological Collections (1994), which are endorsed by NYSOPRHP. A report entitled Additional Phase IB Archeological Reconnaissance and Phase II Site Evaluations of the Goat Island Site (A06340.001961) and the Green Island Site (A06340.001962) has been prepared according to NYSOPRHP's State Historic Preservation Office (SHPO) Phase I Archaeological Report Format Requirements (2005). Based upon the analysis provided in archaeological report, both the Goat Island and Green Island Sites are considered to be archaeological sites eligible for individual listing on the National Register.

The reconstruction of the BINs 5522000 and 5522010 would represent a use of these two contributing elements of the Niagara Falls State Park as a historic site.

Avoidance of the Goat Island archaeological site is feasible.

On Green Island, the existing road and the sidewalks will be widened and additional fill will be required. These activities may result in the use of the Green Island archeological site, a potentially NRHP-eligible site. Archaeologically sensitive areas will need to be monitored during construction by qualified professional archaeologists, to ensure that any resources that may be present beneath deep fill or existing pavement are appropriately addressed in accordance with anticipated Section 106 obligations. In the event that additional archaeological resources are encountered during construction, the applicability of Section 4(f) will be determined by the FHWA, in coordination with NYSDOT, and in consultation with SHPO.

There are no other prudent and feasible alternatives that would completely avoid the use of historic 4(f) properties, because the use of the two bridges work in proximity to the Green Island Site will be required to meet the purpose and need for the project.

A 4(f) evaluation is required and a draft of the evaluation is included in Appendix B.

#### **4.4.12 Parks and Recreational Resources**

Niagara Falls State Park, where the project is located, is owned by the State of New York, is the only park and recreational resource within the Socioeconomic Study Area. This park is listed in the National Register of Historic Places and is a National Historic Landmark.

Niagara Falls State Park includes land located on the mainland along the Niagara River Gorge and upper rapids south of the Rainbow Bridge to John Daly Boulevard, as well as several islands within the Niagara River, including Goat Island and Green Island. The park is the oldest state park in the nation, was established in 1885 and then known as the State Reservation at Niagara. The park provides scenic overlooks to the rapids of the Niagara River above the American and Canadian Falls as well as scenic overlooks of the two falls themselves.

In 1887, Fredrick Law Olmsted and Calvert Vaux prepared a report and plan for the State Reservation at Niagara, and the report included observations and recommendations regarding the bridges in place at the time of the report.

The bridges observed by Olmsted and Vaux in 1887 were replaced by the American Falls Bridges in 1900 – 1901. The American Falls Bridges are important features of Niagara Falls State Park. Functionally, the bridges have provided a multimodal connection between the mainland and Goat Island for millions of park visitors over the years. Pedestrians, bicyclists, and park trolleys cross the bridges, and due to their “low to the water” construction, the bridges provide a means for visitors to experience the sights, sounds, majesty, and power of the American Rapids.

#### **4.4.12.1 State Heritage Area Program**

The project will not impact areas identified as State Heritage Areas.

#### **4.4.12.2 National Heritage Areas Program**

The project is located in the Niagara Falls National Heritage Area. The Niagara Falls National Heritage Area, Inc., has been contacted to ensure that the project is consistent with the Heritage Area Management Plan.

#### **4.4.12.3 National Registry of Natural Landmarks**

Although the project is located near the American Falls and within a historic state park, there are no nationally significant natural areas within, or adjacent to, the project area listed on National Registry of Natural Landmarks.

#### **4.4.12.4 Section 4(f) Involvement**

Niagara Falls State Park, where the project is located, is the only park and recreational resource within the Study Area. The park is listed in the National Register of Historic Places and is a National Historic Landmark. As a publicly owned park, the Niagara Falls State Park qualifies for protection under Section 4(f).

The project will include replacing existing pavement with new pavement within the existing park. A 4(f) evaluation is required and a draft of the evaluation is included in Appendix B.

#### **4.4.12.5 Section 6(f) Involvement**

The project will impact parklands that have been partially or fully federally funded through the Land and Water Conservation Act, because in 1976, \$11,500 was awarded to the Niagara Reservation.

NYSDOT has determined, however, that the project will not transfer any recreational land to non-recreational use, and therefore no Section 6(f) impacts are anticipated. NYSDOT will request concurrence with this determination from NYSOPRHP and the National Park Service.

#### **4.4.12.6 Section 1010 Involvement**

This project does not involve the use of land from a park to which Urban Park and Recreation Recovery Program funds have been applied. No further action is required.

#### **4.4.13 Visual Resources**

A Visual Impact Assessment (VIA) has been conducted for this project, and is included in Appendix B.

#### 4.4.13.1 Introduction

Because this bridge improvement project can create a new visual experience for tourists and local residents using the park and those living, working, walking, and traveling nearby, in order to meaningfully assess the project's visual impacts, the features that comprise the visual landscape and the values that viewers place on them have been considered.

Visual impacts from the project could result from changes in the visual landscape and the viewers' response to those changes. Given the historic status and geologic significance of the natural features contained within the project area, a VIA is warranted.

The methodology for the VIA for the project generally follows the format described in Visual Impact Assessment of Highway Projects (US Department of Transportation, Federal Highway Administration Office of Environmental Policy, March 1981), and conforms to the NYSDOT Visual Assessment Policy. Following is an outline of the methodology.

1. Identify Project Viewshed
2. Identify Visual Districts
3. Assess Existing Visual Environment
  - Describe Visual Character
  - Rank Visual Quality
4. Identify Viewer Groups
  - Rank Viewer Exposure and Sensitivity
5. Assess Visual Impact for No-build and Project Alternatives
  - Document Change to Visual Resource
    - Identify Key Viewpoints
    - Photograph Existing Conditions
    - Prepare Simulations of Proposed Conditions
  - Evaluate Change to Character and Quality of Visual Resource
  - Predict Viewer Response
  - Describe and Rate Resultant Impact on Visual Resource
6. Identify Strategy and/or Techniques to Avoid, Minimize, or Mitigate Impacts

#### 4.4.13.2 Effects Assessment

##### Project Area Visual Setting, Character and Quality

Unlike many highway projects that may pass through several visual districts, the American Falls Bridges project occurs in one visual district with a consistent visual character and quality. The entire project is contained within the park. The mainland area of the park and the Goat Island area contain various passive recreational facilities in addition to the major falls viewing areas. These include trails, shoreline promenades and over looks, and multi-use lawn areas. The landscape elements of the park define the area as a visual district.



The landscape of the park is characterized by the curvilinear alignment of the paths, drives and trails, the variable rolling topography of the passive use areas in contrast with the steep and rugged slopes adjacent to the shore and rapids, and the diverse mix of planted trees and shrubs that blend with riverside natural areas.

Based on an evaluation of the project viewshed, the visual elements of vividness, intactness, and unity displayed are very strong. The resultant visual quality of the project area is therefore high or a very positive attribute.

### Viewer Groups

The viewer groups that may typically be affected by the visual changes associated with the project include tourists, both motorists and pedestrians using walkways within the viewshed, local residents who walk through the park for recreation and exercise, and employees working at the park and attractions within the park. Shoppers and patrons of the area businesses, that are often identified as a separate viewer group, are included as part of the tourist viewer group. The entire project viewshed is contained within the park so there are no residents with a direct view of any visual changes associated with the project, and therefore for this project the resident viewer group is limited.

Each viewer group typically will have a different degree of sensitivity to potential changes to the visual environment. Due to the high quality of the visual resources associated with this project the viewer group response to visual impacts was high for all of the groups.

### Viewpoints and Simulations

Eight key viewpoints have been identified to evaluate the impact of changes to the visual environment that may result from implementing the proposed project. Photographs from these key viewpoints have been evaluated for their characteristics and qualities as the existing/no build condition. Photo simulations of the project options have been prepared from the same viewpoints.

For the purposes of simulating potential future conditions the options under the Replacement Alternative are categorized and defined as Option A and Options B1 and B2. Option A includes all bridge types categorized as traditional concrete arches, Option B1 is the Steel Tied-Arch bridge type, and Option B2 is the Steel Girder Bridge.

### Impact Evaluation

After completion of the simulations, the visual conditions displayed by the proposed options were reviewed to assess changes to each view. The changes have been described, and the response of the most significant viewer group for each viewpoint has been predicted, using a range from negative to neutral to positive. An impact rating was then given based on the degree of change and predicted viewer response. The impact ratings included values of low, moderate, and high.

#### 4.4.13.3 Design Influence

The visual effects assessment can be used as one of the parameters in identifying the most appropriate solution for the replacement of the American Falls Bridges.

The appearance of current concrete arch bridges could be emulated by the traditional concrete arch option.

The steel tied-arch option provides a degree of replication of the historical bowstring truss bridges present at the site in the late 19<sup>th</sup> century, but there is no viewer group that would have memory of that type of bridge at the project site. In general the tied-arch option would represent a change to the current visual scene, and would be more noticeable from some viewpoints compared with other viewpoints.

The steel girder option would represent a change to the current visual scene, and would be noticeable from nearly all viewpoints.

#### 4.4.13.4 Conclusion

The visual resources within the project viewshed are of high character and quality. The proposed project will temporarily disrupt these visual attributes during construction.

The change to visual character and quality was evaluated and the viewer response to the changes was predicted and analyzed considering their exposure and sensitivity, to determine the positive and/or negative visual impacts of each option. After considering the change to character, quality, and predicted viewer response, the resultant positive or negative impact was ranked low, moderate, or high for Replacement Alternatives Option A, B1, and B2. To provide a comparison, the overall impacts of each option are discussed below.

##### Option A – Traditional Concrete Arch Bridge

The completed option would not present significant changes to the scene, as this option closely emulates the style and characteristics of the existing bridges. Little or no response to change in visual resources is expected as a result of this option. Ultimately there would be a positive impact as the completion of the proposed project would allow for the removal of the two temporary (Mabey) bridges that currently degrade the character and quality of the visual environment in the project area.

##### Option B1 – Steel Tied-Arch Bridge

Once completed this option would be expected to display significant changes to the scene that alter the character and quality of the view. These changes do not harm the scene but do change it. The lightweight character of this option actually allows natural features to become stronger elements within the view. Also, while there is a degree of historic precedent for this type of bridge, no current members of the viewer groups would have any memory of this style. Overall it is expected that the changes stemming from this option would likely result in a high negative viewer response.

### Option B2 – Steel Girder Bridge

Once completed this option would be expected to display significant changes to the scene; however the changes do not harm the scene but do change it. Unlike Option B1, there is no historic precedent for this type of structure. While the narrow profile increases the prominence of the natural features in the scene, the highway and industrial qualities of this design would likely not be considered compatible with the historic park environment. Overall the resultant impact is mainly low with the viewer responses distributed relatively evenly between negative and positive responses, with positive responses having a slight advantage.

#### **4.4.14 Farmlands**

##### **4.4.14.1 State Farmland and Agricultural Districts**

Based on a review of the NYS Agricultural District Maps for Niagara County, the project is not located in or adjacent to an Agricultural District (*Cornell IRIS 2012*).

No impacts to state farmlands or agricultural districts will result from the project.

##### **4.4.14.2 Federal Prime and Unique Farmland**

The project activities will not convert any prime or unique farmland, or farmland of state or local importance, as defined by the USDA Natural Resources Conservation Service, to a nonagricultural use.

No impacts to federal prime and unique farmland would result from the project.

#### **4.4.15 Air Quality**

No significant impacts to air quality are expected as a result of this project. The two existing concrete steel arch bridges, as retrofitted with temporary (Mabey) bridges currently provide pedestrian, bicycle, and park maintenance vehicle access over the American Rapids. Public automobiles, other non-park-related vehicles, trucks are not permitted to access the two bridges. Park trolleys are currently re-routed and unable to use the two existing bridges, but will be able to use the new bridges after the project is complete.

Due to the limited vehicular use of these bridges to park trolleys and maintenance vehicles, no transportation air quality impacts are expected. Therefore, only a qualitative air quality analysis for this project has been conducted.

The project's Air Quality, Noise, and Wetlands Study Area is shown on Figure 4.1-2.

The air quality analysis evaluated the construction of replacement bridges on slightly different alignments adjacent to the existing bridges.

#### 4.4.15.3 Transportation Conformity

The project is located in Niagara County, which is designated as an attainment area for the ozone NAAQS.

Transportation conformity does not apply to the project for two reasons. First, a transportation conformity analysis is not applicable to the Air Quality, Noise, and Wetlands Study Area as of July 1, 2013, due to USEPA action to revoke the transportation conformity requirements for the 1997 ozone ambient air quality standard (*Federal Register, Volume 77, Issue 98, Monday, May 21, 2012, pp 30160 to 30171*). Second, the project consists of replacing two bridges that carry only pedestrians, bicycles, and upon completion, park trolleys and maintenance vehicles. Therefore, the project is considered an exempt project per Table 2 in 40 CFR Section 93.126 (Safety: Widening narrow pavement or reconstructing bridges - no additional travel lanes; Air Quality: Bicycles and pedestrian facilities.). In addition, this project is also exempt from Regional Emissions Analysis per Table 3 (changes in horizontal alignment) in 40 CFR Section 93.127 (*Projects Exempt from Regional Emissions Analyses*).

#### 4.4.15.4 Carbon Monoxide (CO) Microscale Analysis

Applying the criteria from the NYSDOT's TEM to this project, it is determined that an air quality analysis for CO is not required because this project will not increase traffic volumes, reduce source-receptor distances by 10 percent or more, or change other existing conditions to such a degree as to jeopardize attainment of the NAAQS.

Therefore the project does not require a project-level carbon monoxide microscale analysis.

#### 4.4.15.5 Mesoscale Analysis

Applying the criteria from the NYSDOT's TEM for this project, it is determined that the project does not significantly affect traffic conditions over a wide area and, therefore, air quality conditions over a large area are not affected. Additionally, this project does not meet the standard required to be considered as a regionally significant project.

Therefore, a Mesoscale Analysis is not required for this project.

#### 4.4.15.6 Mobile Source Air Toxics (MSATs) Analysis

As discussed in Section 4.4.15.3, the project is exempted under the Clean Air Act conformity rule under 40 CFR Section 93.126, therefore, analysis or discussion of MSAT is not required.

#### 4.4.15.7 Particulate Matter (PM) Analysis

The project focuses on reconstructing two bridges that primarily serve pedestrian, bicycles, and upon completion, park trolleys and maintenance vehicles. The project would not result in local air quality concerns as defined in 40 CFR 93.123(b) (1), and does not result in a significant number of diesel vehicles or increase in local traffic volumes.

Therefore, no PM analysis is required for this project.

#### 4.4.15.8 Greenhouse Gas Analysis

A greenhouse gas analysis is not required for this project.

#### 4.4.16 Energy

Requirements for energy analyses (direct and indirect) and greenhouse gas (GHG) analysis are provided in NYSDOT 2003a and NYSDOT 2003b. Typically a project that does not require an energy analysis also does not require a GHG analysis.

Energy analyses should be performed for all projects listed in Transportation Improvement Plans (TIPs) and Long Range Plans (LRPs) that have been identified as regionally significant based on the criteria outlined in NYSDOT's *Energy Analysis Guidelines for TIPs and Plans*. No construction fund source has been identified, the project is not presently listed in a TIP or LRP, and the project is not considered a regionally significant project. Therefore, the criteria for determining whether a regionally significant project require either an energy and GHG analysis do not apply to this project.

The following quantitative thresholds may be used to determine the need for analysis for projects that are not identified as regionally significant, but could have potential impacts on energy:

- Change in Vehicle Miles Traveled (VMT)
  - An action along a corridor that could result in a VMT increase of greater than 10 percent. *This does not apply to this project.*
  - An action in an urban area (as defined by the Metropolitan Planning Organization boundaries) which could result in a VMT increase of greater than one percent. *This does not apply to this project.*
  - An action in a rural area (within an NYSDOT region not defined as an urban area) which could result in a VMT increase of greater than one percent. *This does not apply to this project.*
- Transportation Facility Construction Costs
  - Project costs on transportation facilities (e.g., roadways, rail facilities, airports) resulting in construction costs of \$50,000,000 or more.

Park maintenance and police vehicles are the only vehicles currently utilizing the American Falls Bridges. After construction of the project, park trolleys and emergency vehicles will also be able to travel over the American Falls Bridges, but cars, trucks, and buses will continue to be prohibited. Park trolleys currently use the American Rapids Bridge to access Goat Island, and this adds distance to vehicle trips. After the project is constructed, the availability of the American Falls Bridges for park trolleys will reduce VMT by park trolleys operating within the park, because the currently added distance to use the American Rapids Bridge will no longer be necessary. No additional vehicle trips will be generated as a result of the project.

Because the project would not increase VMT, generate additional vehicle trips, significantly affect land use development patterns, result in a shift in travel patterns; significantly increase or

decrease vehicle operating speeds, neither an energy nor GHG analysis are required for this project based on VMT quantitative criteria.

Although the project cost could exceed \$50 million, no significant energy impacts are expected as a result of this project, and neither an energy nor GHG analysis are considered necessary for this project based on transportation facility cost criteria.

#### **4.4.17 Noise**

Current traffic flow across the two temporary (Mabey) bridges between the mainland and Green and Goat Islands is restricted to pedestrians, bicyclists, and park maintenance vehicles. Currently park trolleys and non-park-related vehicles (cars, trucks, emergency vehicles and buses) are not allowed to utilize the bridges. After the new bridges are constructed, park trolleys and emergency vehicles will be able to travel over the new bridges, but cars, trucks, and buses will continue to be prohibited from crossing the new bridges.

Because the project will not result in cars, trucks, and buses using the new bridges and only park-maintenance vehicles and emergency vehicles will use the bridges, no transportation-related noise impacts will result from this project.

Additionally, the project will not significantly change either the horizontal or vertical alignment, or increase the number of through-traffic lanes on any transportation thoroughfare, and the project is not a noise abatement project. Therefore, this project is not Type I or Type II as per 23 CFR 772. A Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project is identified as a Type III project according to this part. Type III projects do not require a noise analysis.

The project would result in temporary construction noise impacts that could be a nuisance and affect the enjoyment of park visitors. Typical measures that could be taken to minimize construction noise include the following:

- Deploying temporary noise barriers;
- Using cushion blocks with impact hammer pile drivers;
- Using operating mufflers on internal combustion engines;
- Prohibiting prolonged idling of noise equipment when that equipment is not in use;
- Notifying the City of Niagara Falls that construction will take place in the area;
- Scheduling various construction operations, whenever feasible, in a manner that minimizes the accumulative noise buildup; and
- Limiting construction activities to daylight hours.

#### **4.4.18 Asbestos**

##### **4.4.18.1 - Assessment and Quantification**

Asbestos surveys were conducted for both existing bridges. Surveys included a review of available record drawings, site walkovers and the collection of bulk samples of suspect asbestos-containing materials (ACMs) on October 15, 2014. The purpose of the surveys is to identify

potential visible/accessible sources of ACM, confirm its presence through laboratory analysis and evaluate the potential for ACMs to be present within inaccessible areas that may be disturbed during construction of the project.

This section of the report summarizes the Asbestos Survey Reports included in the project files.

Only accessible areas were inspected. Inaccessible areas, such as areas within the bridge or the approaches to the bridge were not included in this inspection.

Results were similar for both BIN 5522000, the Mainland to Green Island bridge and BIN 5522010, the Green Island to Goat Island bridge, summarized by the following.

#### Confirmed Asbestos-Containing Materials (ACMs)

The following material was determined to contain asbestos:

Tan Caulk In Between Joints of Concrete Parapet Caps

#### Inaccessible/Assumed ACMs

Sewer and water lines may be insulated or covered with suspect asbestos materials. The presence of asbestos containing material will be determined during the final design phase via consultation with the utility companies.

A bituminous material and a bituminous joint filler located between the sidewalk and the concrete parapet and curbing along both sides of the bridges.

A bituminous material located between the asphalt concrete and concrete sidewalk along both sides of the bridges.

A yellow brick layer below the asphalt layer of the bridge approaches may contain asbestos.

Non-metallic utility ducts within the bridge structures, and associated expansion sleeves may contain asbestos materials.

Suspect asbestos-containing caulking compound may be located around utility conduit expansion sleeves serving the light poles.

Suspect asbestos joint filler was observed in the mortared joints of the concrete parapet caps along both sides of the bridges.

No other inaccessible/assumed ACMs were identified.

The inspection procedures used for the surveys as well as the approximate quantities of confirmed and inaccessible/assumed ACMs are summarized in the Asbestos Survey Reports.

#### 4.4.18.2 - Mitigation Summary

Because it has been determined that asbestos-containing materials are present and will be impacted, an asbestos special note and specification will need to be prepared during final design, by either NYSDOL-licensed personnel or a licensed consultant asbestos designer. Asbestos removals will require special handling and disposal in accordance with New York State Department of Labor Industrial Code Rule 56.

#### 4.4.19 Hazardous Waste and Contaminated Materials

##### 4.4.19.1 Hazardous Waste and Contaminated Materials Screening

A Hazardous Waste/Contaminated Materials (HW/CM) Screening was conducted within the project vicinity. This screening included a review of available records and a project corridor site walkover conducted on July 14, 2014. The purpose of this screening is to identify potential areas of environmental concern that may be disturbed during construction of the project.

This section of the report summarizes the HW/CM Screening Report included in the project files.

##### Environmental Data Resources (EDR)

EDR Inc. was contracted to provide a comprehensive review of Federal, State and locally listed data on sites of potential concern within the project vicinity. This data search was performed in accordance with ASTM E-1527-13 standards. The use of the EDR resource allows for a comprehensive listing of sites of potential concern. The EDR report revealed 19 environmental records at 13 properties within the minimum required search distance of environmental concern at the proposed project. The majority of the properties/areas identified do not pose a concern to the project, due to one or more of the following:

- Distance from the project;
- The assumed groundwater flow direction within the project area is to the west; therefore if the property/area of concern is located westerly of the project, it is unlikely to be considered a potential area of environmental concern based on elevation and groundwater flow;
- The contaminant identified within the EDR report is non-persistent or a gas. An example is a release of chlorine gas that was inadvertently released several years ago and now is unlikely to pose a concern;
- The issue was minor in nature and cleaned up and closed by the NYSDEC with “no further action required”. An example is equipment failure releasing minimal amounts of contaminant with a corrective action taken.

The American Falls Bridges over the Niagara River is not located within or immediately adjacent to a site or property of concern that was identified in the EDR report. Multiple incidents at Occidental Chemical Corporation, Olin Chemical, and Peak Chemical Niagara, LLC were recorded in the EDR report; However, these incidents were either minimal in nature, or the spilled product was contained within the appropriate secondary containment areas at the facility,



never entering the ground. None of these incidents poses an apparent environmental concern relative to the project.

#### Aerial Photography Review

Aerial photos of the project location were reviewed from the following years: 2011, 2009, 2008, 2006, 1995, 1985, 1981, 1970, 1963, and 1938. Comparing aerial photos from years 1938 and 1963 indicates that the eastern portion of Goat Island was extended with fill materials, but it cannot be determined from the photos the age and origin of the fill<sup>5</sup>. No other items of environmental concern were identified on the aerial photographs within the project area.

#### Historical Topographic Map Review

A historical topographic map of the project location from 1901 was reviewed. No items of environmental concern were identified with regards to the project on this map.

#### Historical Sanborn Map Review

Sanborn Maps are utilized as part of the HW/CM screening since they serve as a historical reference to prior land use. Sanborn fire insurance maps were reviewed from the following years: 1888, 1892, 1897, 1914, 1950, 1955, 1969, 1970, 1979, and 1985. No items of environmental concern were identified with regards to the project on these maps.

#### Record Mapping Review

The record plans available for review are the 1934 plans titled “Reinforced Concrete Arch Bridge with Stone Facing Green Island to Goat Island Niagara Reservation, Niagara Falls, NY” and “Reinforced Concrete Arch Bridge with Stone Facing Green Island to Mainland Niagara Reservation, Niagara Falls, NY”. One potential item of concern was identified during review of the record plans being that both bridges contain “earth fill” of unknown age and origin.

#### Project Site Walkover

The HW/CM Screening included a walkover of the project corridor, conducted on July 14, 2014. Items of concern include the presence of fill material on the mainland, Green Island, Goat Island, and fill of unknown age and origin near the upstream end of Goat Island (site of a potential cofferdam for the project), and the presence of fill of unknown age and origin to raise the walking surface grade to the level of the temporary (Mabey) bridges.

#### Historic Site Use Investigation

Within the project limits, the property on the northern bank of the Niagara River (“the mainland”), Green Island, and Goat Island are part of the Niagara Falls State Park (formerly State Reservation at Niagara). This property was purchased in 1885 by New York State, and has

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<sup>5</sup> According to NYSOPRHP personnel familiar with the history of the site, the fill was placed between 1959 and 1962, and the material was excavated during construction of the Robert Moses Parkway.

undergone extensive modification since the purchase. Previous to the park's creation, the mainland and Green Island were extensively developed and predominantly industrial, while Goat Island remained privately owned and predominantly undeveloped. From 1823-1885, Green Island was utilized by a paper mill and the mainland consisted of various mills, industries, and residential homes as well as a canal way that provided water power for these mills and industries. After purchase of the area by New York State in 1885, approximately 150 buildings were demolished on the mainland, and the area was filled and graded to provide a more natural setting. Similarly, the paper mill on Green Island was eventually demolished, and the island was filled and graded. Filling and grading activities continued throughout the project area until the late 1960s and much of the fill used is of unknown origin.

Test pit surveys conducted within the project area for the 1983 cultural resource report and a 2014 cultural resource report indicate the presence of potentially contaminated fill materials. Material descriptions in these reports include:

- "silt sand w/ash, mortar, & brick"
- "Coal, ash, & slag"
- "Cinder & slag"
- "Very dark gray silt sand, slag"
- "Ash Layer"

### Radiological Research

The presence of technically-enhanced naturally occurring radioactive material (TENORM) identified as slag or fill is a concern in the Niagara Falls region. Due to the unknown age and origin of fill materials in the project area, as well as the mention of slag material in the Geotechnical Report prepared by SJB Services Inc. previously for NYSOPRHP, and the reviewed cultural resources reports, the fill material utilized within the project area may include TENORM.

### HW/CM Screening Conclusions

Based on the findings of the Hazardous Waste/Contaminated Materials screening, the following items of environmental concern were identified, and should be further investigated to better understand their potential effects as related to the project:

1. The Mainland Site:
  - a. Historic Land Use - This site was historically used as an industrial and commercial area. Approximately 150 buildings and multiple power production raceways were demolished to create the current Niagara Falls State Park. Potentially contaminated materials at this site relative to the industrial and commercial use, as well as potentially contaminated materials as a result of the demolition of previously existing structures is a concern at this site.
  - b. Fill Importation - This site has been subject to extensive fill importation over the course of more than 80 years from 1885 to the late 1960's. The origin of these fill materials is unknown, and previous test pit surveys conducted throughout the area

of potential impact indicate that potentially contaminated fill materials do exist at this site.

2. The Green Island site:

- a. Historic Land Use - This site was historically used by a paper mill from 1823 to 1885. Soon after the incorporation of Green Island into the current Niagara Falls State Park, the paper mill buildings were either demolished or razed into their own foundations. Potentially contaminated materials at this site relative to the paper mill, as well as potentially contaminated materials as a result of the demolition of previously existing structures are a concern.
- b. Fill Importation - The site has also been subject to extensive fill importation. The origin of these fill materials is unknown, and previous test pit surveys conducted throughout the area of potential impact indicate that potentially contaminated fill materials do exist at this site.

3. The Goat Island Site:

- a. Historic Land Use - Goat Island remained predominantly undeveloped before it was purchased to become part of the park. Fill and grading at this site is minimal compared to Green Island and the mainland, however imported fill materials of unknown age and origin are still a concern.
- b. NYSDEC Spill Record - Although the NYSDEC spill #9706671 is reported as being closed, there is no documentation of the specific location of this incident, or whether remedial action was conducted. It was reported that the storage tank was isolated at the maintenance garage; however, there is no indication within the report as to whether the tank was removed from the area of the garage or was transported there to be isolated. There is the potential for petroleum contamination to exist within the area of potential impact at this site.

4. Proposed Cofferdam Location Site:

- a. Fill Importation - The presence of unknown fill materials is a concern relative to the history of extensive contour modification at other locations of concern within the park, and the extension of the eastern end of Goat Island between 1938 and 1963.

#### 5. American Falls Bridges Site:

- a. Fill Importation - Based on available record plan review, it was determined that the existing bridges contain earth fill of unknown age and origin. Review of previous Geotechnical Boring Logs indicates that potentially contaminated fill materials do exist at this site.

Technically-enhanced naturally occurring radioactive material (TENORM) has historically been widely used in the Niagara Falls area as fill and bedding material for roadway and driveway projects. This material has been previously described as “slag”. The 1983 cultural resources report indicates the presence of slag in multiple test pits throughout the project area. A full radiological survey is recommended for all five locations itemized above.

Additionally, for any soils that will be exported from the site during the reconstruction of the bridges it is recommended that soil samples be collected and analyzed for RCRA metals and semi-volatile organic compounds (SVOCs) to facilitate proper disposal, using standard specifications available for this type of work and routinely utilized by NYSDOT for projects throughout New York State.

#### 4.4.19.2 Mitigation Summary

Five locations with the potential to contain hazardous waste/contaminated materials were identified in the Hazardous Waste/Contaminated Materials Site Screening. As a mitigation measure, a Hazardous Waste/Contaminated Materials Site Assessment is needed, and will need to include a radiological survey for the five locations itemized above, in order to assess potential impacts to the project. If necessary, a remediation plan will need to be developed after review of the Hazardous Waste/Contaminated Materials Site Assessment.

Soil and fill materials excavated from the project site will need to be segregated into appropriate waste streams, chemically analyzed to facilitate disposal profiling, and disposed of off-site in accordance with applicable regulations.

### 4.5 Construction Effects

#### 4.5.1 Construction Impacts

The specific methods to be used for the demolition of the existing bridges and construction of the proposed bridges are under evaluation. It is expected that conventional construction methods will be used, and that construction impacts will be mitigated where necessary using conventional methods. The effects of construction would be temporary and include the following.

- **Low Economic Impacts.** The project will employ construction workers and generate demand for products from local and regional vendors of construction material and related products and services. Depending on timing and detailed characteristics, decreasing the flow of the American Falls during construction may initially result in a temporary increase in visitors to the Niagara Falls region (once in a lifetime opportunity to see the American Falls without water), but dewatering over an extended period during the peak

summer and/fall tourism season could result in decreased business at local hotel and other tourist related businesses.

- Low Impacts to Natural Resources. Construction of the bridges will involve a minor disturbance of the rock riverbed of the Niagara River. The use of cofferdams will be used to facilitate construction and the cofferdams will be designed to create construction sequences that allow for construction while minimizing impacts to the river.
- Low Impacts to Natural Resources. Dewatering of the riverbed for construction of the bridges could result in adverse effects on shoreline and near shore vegetation, leading to erosion and the temporary displacement of bird species to other nearby suitable habitats. Construction also has the potential for the discharge of sediment into the Niagara River. Impacts of shoreline erosion will be minimized by designing cofferdams to route water without inundating shorelines and islands, based on hydraulic analyses. Temporary dislocation of bird species will be considered a very minor impact, because only a short portion of the shoreline will be affected, leaving other unaffected shoreline areas to accommodate temporarily dislocated birds. Armoring of shorelines to prevent erosions will also be considered during the permitting and detailed design processes, and designed as necessary based on hydraulic analysis of predictable changed conditions during construction, including changes to water elevation and changes to water velocity along shorelines affected by construction.
- Low Construction Noise Impacts. Construction of the Niagara Falls Bridges could have temporary, adverse impacts on nearby receptors. It is expected noise impacts will range from 55 to 82 dBA during construction.
- Construction Traffic Impacts. Demolition and construction of the bridges could result in temporary adverse impacts to local traffic and temporary adverse impacts to pedestrian and bicycle access within the park. An increase in the number of construction vehicles on local roads may result in an increase in traffic delays. Temporary short-term closure of the bridges during construction would require pedestrians and bicyclists to use the American Rapids Bridge to access Goat Island.

In summary, construction impacts are expected to be short-term in nature. While the area near the bridge site, including access and exit areas will be restricted, plans will call for the existing bridges to remain open to provide pedestrian access to and from Goat Island.

The primary construction impacts include the temporary closure of limited areas near the existing bridges to protect public safety. During the design phase, efforts to minimize potential construction-related impacts will be evaluated and incorporated into the final design of the project.

#### **4.5.2 Mitigation Measures**

Measures will be taken to minimize temporary impacts of construction activities. Construction related impacts will be temporary and in most cases would not require mitigation. A construction phasing and sequencing plan will be developed to either maintain pedestrian access via the existing bridges, via temporary bridges, via temporary pathways constructed on the cofferdams, or combinations of these methods. If necessary during construction, temporary directional or “way finding” signs will be posted near the construction areas, directing pedestrians to points of attraction. Trolley service to Goat Island may also be increased.

Noise impacts will be reduced using best management practices including limiting the hours of construction and the deployment of temporary noise barriers.

Standard construction methods including feasible and reasonable measures and best management practices would be used to minimize potential erosion and sedimentation impacts. A site-specific Erosion and Sediment Control Plan (ESCP) is required to minimize erosion and protect the quality and quantity of downstream surface waters so that they are not significantly altered from existing conditions during construction. The ESCP would detail the site-specific methods that would be implemented to control or reduce the rate of stormwater runoff and reduce potential erosion of exposed soil. The ESCP would identify and define controls to prevent or reduce wind erosion and dust during and after construction activities. Soil stockpiles, should they become necessary, would need to be protected from the wind. Construction activities should be scheduled to minimize the extent of disturbed areas at any one time, thus avoiding exposure of large areas of open soil to the adverse effects of wind. Vegetative covers, mulch, spray adhesives, wetting of exposed soil, and wind barriers also may be employed.

Project-specific ESCP design and mitigative measures would be determined during final design in accordance with the requirements of NYSDOT's Standard Specifications for Soil Erosion and Sediment Control (NYSDOT 2006). The ESCP would be prepared prior to the start of any construction activities and would be closely followed.

#### **4.6 Indirect and Secondary Effects**

There are no anticipated social or economic indirect or secondary effects as a result of this project.

#### **4.7 Cumulative Effects**

There are no cumulative effects anticipated as a result of this project.

#### **4.8 Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity**

There is no significant allocation of environmental resources with respect to this project under any of the alternatives. Neither rehabilitation nor reconstruction of the American Falls Bridges would convert any undeveloped lands from public use or restrict access to Niagara Falls State Park.

#### **4.9 Irreversible and Irretrievable Commitments of Resources**

Implementation of the proposed action does not involve a significant commitment of any natural, physical, human, or fiscal resources. Lands used in the construction of the bridge facilities could be considered an irreversible commitment during the time period that the land is used for the bridge facilities. However, if a greater need arises for the use of the land, or if the bridges are no longer needed, the land can be converted to another use. Due to the status of the lands as a state

park, and the desire for multi-modal access to Goat Island, there is no reason to believe such a conversion will ever be necessary or desirable.

#### **4.10 Adverse Environmental Impacts That Cannot Be Avoided Or Adequately Mitigated**

Impacts due to the rehabilitation or reconstruction of the American Falls Bridges may include short-term erosion of exposed on-site soils and increased traffic, dust, and noise due to construction activities. These activities are expected to be short-term, intermittent in nature, and largely contained on site, and would cease when construction was completed.

Reconstruction of the bridges would result in the unavoidable impact of removing the existing bridges, a contributing element to the National Register listing of the Niagara Falls State Park. Rehabilitation of the bridges would preserve this contributing element, but is not considered feasible because of the deterioration and age of the existing bridges.

The new bridge design would be selected to reflect and enhance the context of the park.

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