275 St. Paul Street
Preliminary Structural Assessment

Garden Aerial

Monroe County, New York

June 2014

Prepared By:

LARSEN ENGINEERS
700 WEST METRO PARK, ROCHESTER, NY 14623-2678
Phone: 585-272-7310 Fax: 585-272-0159

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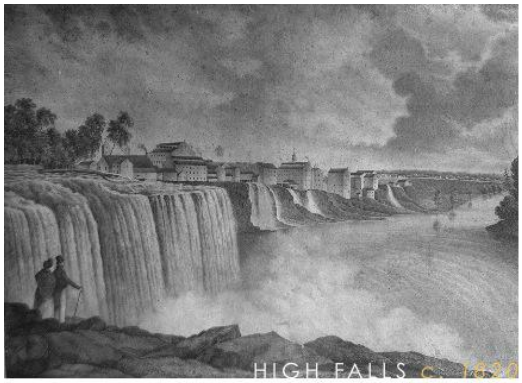
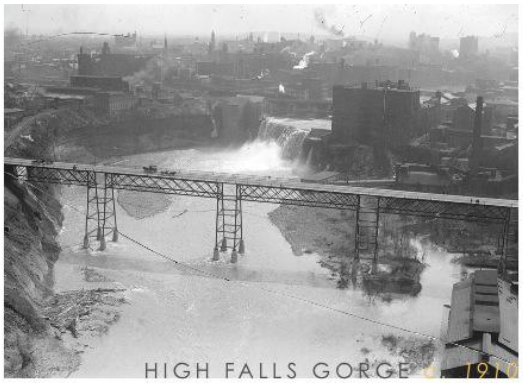
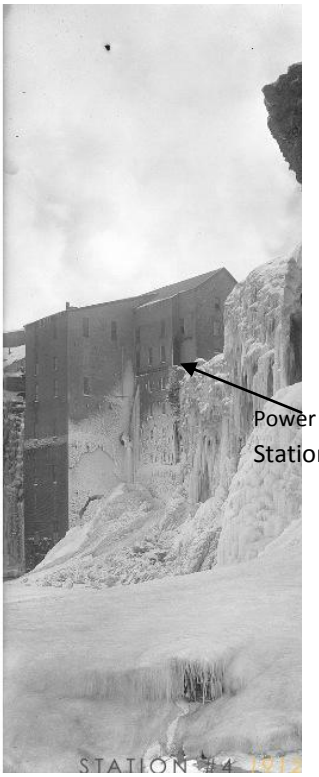
I. INTRODUCTION

The Garden Aerial project is focused on a unique historical area in the heart of the City of Rochester where the Genesee River was key to the generation of hydropower. The electricity generated served many manufacturing plants and a local trolley transportation system. This section of the City is now known as High Falls where the existing bridge serves as the viewing area for the falls.

Some historic pictures shown below convey the images from the past; power generation station #4 is visible on the left hand side of the falls. This building structure and the pylons along the river prior to the water fall edge were recently acquired by the Garden Aerial organization with a goal of developing it into a destination point. The Garden Aerial organization is planning to develop this area into a tourist attraction including the transformation of the bridge into a garden structure connecting the two shores of the River gorge. In addition a pedestrian bridge is planned to allow visitors to come from west end and visit the old power generation building complex consisting of three buildings that were built at different times. The history of power generation and how it served the local businesses and transit system could be displayed in the building which will also serve as a unique view point for the falls.







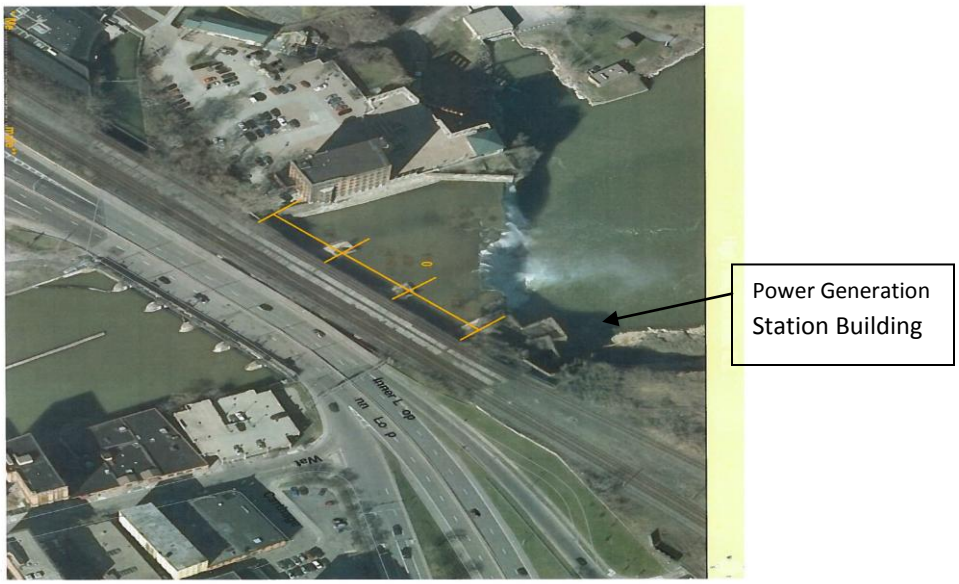
Power Generation
Station Building

In order to better define the project scope as it relates to the reuse of the existing building structures and pylons, the structural conditions must be investigated further. Therefore, Larsen Engineers was authorized to conduct this assessment and review the existing conditions using remote techniques due to limited building access.

II. EXISTING CONDITIONS

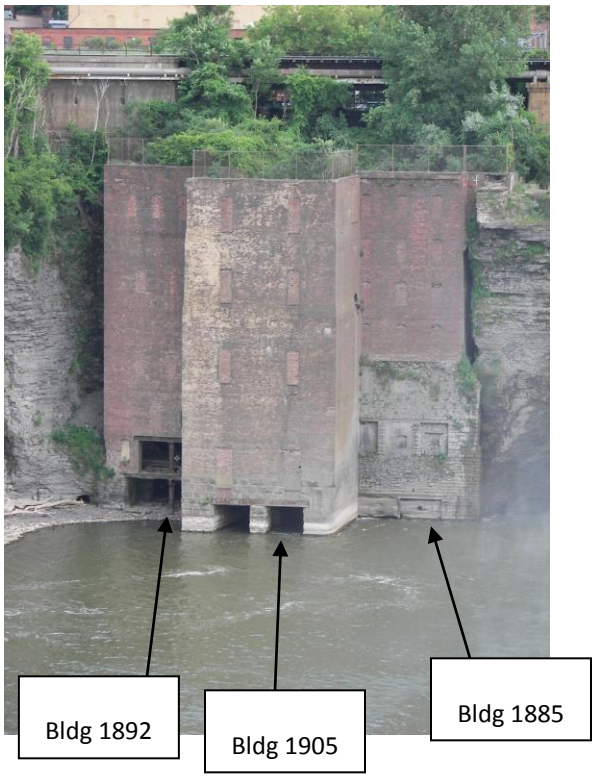
Larsen engineers structures team visited the site and determined that the existing structure is in poor to very poor condition. A multitude of cracks were observed in the brick masonry, steel beams were corroded, wood beams and floor joists are deteriorated or absent, and various anchors in the bedrock appear to have been compromised. Also, the roof slab has collapsed in many areas The structural team and local geotechnical experts inspected the building conditions and determined that it is not structurally sound. Building material samples would be expensive to collect for structural assessment. It is essential to focus on restoring the existing structure and constructing a structural support system to prevent further deterioration and allow proper investigations to continue. This will provide a base level of structural integrity that will allow the required or future investigations and modifications. The photograph below shows the pylons and the power generation structure at the western end of the bridge.

An aerial view of the High Falls area showing some of the same facilities as shown above.



III. SITE AND PROJECT TASKS

The power generation building is shown below. It should be noted that the three structures were built at different times and contained the turbines for power generation with water discharged at the bottom.



We collected the information from Garden Aerial including reports, photographs and project related data from City of Rochester. Unfortunately no “as built” information has been available from the City or RG&E. This made it necessary to engage the remote observation techniques to see the surface condition of the structures, walls etc. without erecting scaffolding or other safe structures for the staff.

Larsen team consisted of the following specialists:

1. Jamko – remote controlled camera systems for close up photos and video
2. SJB – Geotechnical and building condition survey
3. SKYOP – remote controlled unmanned aerial photography for exterior conditions

The work for these companies was coordinated with Garden Aerial staff to allow access to the site and understand the project needs.

IV. PROJECT FINDINGS

Larsen’s Professional Structural engineers have reviewed the building and pylon related photographic data collected by Jamko to assess the structural cracks and building envelope conditions. Exhibit A includes selected photographs showing the condition of the pylons. Exhibit B includes the Jamko Inspection logs and structural pictures for buildings 1885, 1892, and 1905 (these buildings make up the power station building structure – see photo on page 3). The damage to the old structure appears to be primarily from environmental exposure to the elements and moisture affecting the brick walls.

The technicians from SJB geotechnical team visited the site and submitted their report of observations and budget cost of future investigations (see Exhibit C). The existing condition of the building would require substantial structural modifications in order to take any additional load. There is no remaining power generating equipment at the base of the station so taking the visitors down to see any historic items would not be the purpose of providing internal access to structures within these buildings. The internal walls may be used to display murals showing historic images about the power generation system and the companies that existed in Rochester at that time based on the hydropower at this generation site.

The incomparable view shed afforded by the building's unique location is intensified by its proximity to High Falls. The visitor is provided an exhilarating and intimate riverfront experience. A viable option for this building's adaptation is, therefore, the development and construction of an open-air viewing facility or rooftop deck. Such a facility or structure would require structural modifications, in order not to put additional load on the internal walls, but would be feasible with special structural design using the vertical rock on south side for anchors and load transfer.

V. REHAB OPTIONS FOR RESTORATION OF STRUCTURES

We have researched some rehabilitation systems that should be further evaluated in the next phase. These include fiber reinforced plastic (FRP) system called M-Brace (manufactured by BSF Corporation) which are adhered to the wall structure around the cracks. Sealing the existing cracks with special epoxy compounds would also be beneficial to restore and preserve the walls. Similarly moisture proof epoxy coating can be applied to external walls with special provisions made for the workers to be supported by the roof mounted support system.

Further evaluations by these special product suppliers and structural specialists that undertake restoration of historic buildings should be considered in the next phase. It is our understanding that Garden Aerial (Owner) wishes to submit a CFA grant application for supporting the restoration or preventive steps at this time.

VI. RECOMMENDATIONS

We recommend that the CFA grant application focus on restoring the structures, which includes sealing and repair of cracks and moisture proofing the exterior walls to prevent further damage. Once the type of display and educational features are planned for the proposed museum, then the necessary structural support system can be designed and a structural sampling and testing plan developed for the next phases of the work.

COST ESTIMATE

The proposed wall restoration and sealing is estimated to cost in the range of $350,000.00

This includes the following:

Crack sealing and FRP reinforcement:	$100,000.00
Scaffolding system for sealing the walls:	$150,000.00
Sealing the exterior walls (20,000 SF):	$50,000.00
Engineering and other support services:	$50,000.00

VII. SUSTAINABILITY FEATURES

This site is one of the oldest power generating sites; it powered both the city lighting and a transportation system based on hydropower. An existing hydropower system owned by RG&E is still operating at an adjacent location. The Garden Aerial vision includes visitors coming to see a bridge converted to a garden for pedestrians and then a small people mover taking tourists to the historic sites in the downtown area. Green and renewable transportation could be provided

at this site if the hydropower is used to make hydrogen fuel. The new transportation system could be powered with the fuel of the future "Hydrogen".

The owners may want to consider the option of using the old power station to display the past hydropower transportation system and its contributions to old established companies. The use of hydrogen powered vehicles could make this a unique learning experience for the visitors.

These are great reasons to restore and protect the structure and provide the required structural supports for the modifications to the roof top area, as well as, any other improvements.

VIII. CONCLUSIONS

This project is anticipated to allow the rehabilitated building to become a visitor center where people can learn about the history of the building's past. Power generated at this building could provide a sustainable, efficient, and environmentally sound transportation system.

The proposed Garden Aerial Bridge has tremendous potential to attract visitors who will then also be able to enjoy a visit to the proposed museum at the power generation building. This building should therefore be protected from any further damage by sealing / reinforcing the cracks and providing waterproof sealing of the exterior walls as a first step. This will allow development and planning of museum exhibit themes and displays, which will not impart undue loading on the existing structures.

Grant applications to NYS agencies should be applied for, to obtain funds for such restorations. Grant applications should convey the project benefits of economic development and job creation.

Respectfully Submitted By:

S. Ram Shrivastava, P.E., LEED AP
President Larsen Engineers

Exhibit A
Photographs of Pylons

Exhibit A – Photographs of Pylons

UPPER SECTION OF PYLON SHOWN ABOVE

LOWER SECTION OF PYLON SHOWN ABOVE

Exhibit A – Photographs of Pylons

PYLON BASE CONDITIONS AT WATER LEVEL

PYLON BASE LEVEL CONDITIONS

Exhibit A – Photographs of Pylons

PYLON FOUNDATION CONDITIONS AT WATER LEVEL

UPPER SECTION OF PYLON 2 SHOWN ABOVE

Exhibit A – Photographs of Pylons

LOWER SECTION OF PYLON 2 SHOWN ABOVE

PYLON FOUNDATION AT WATER LEVEL

Exhibit A – Photographs of Pylons

PYLON FOUNDATION STRUCTURAL CONDITIONS

PYLON FOUNDATION STRUCTURAL CONDITIONS

Exhibit B
Jamko Inspection Logs and Structural Photos for Buildings 1885, 1892, and 1905 (these buildings make up the power station building structure)

932 Sohn Alloway Road
Lyons, New York 14489
(315) 871-4420 tel
(315) 871-4430 fax
www.jamkocorp.com

CCTV Inspection Log

Project#	Flash Drive	Date	OPERATOR	PAGE		
5877	**1 of 1**	5/9/14	Calabrese	1	of	4

Client:	Larsen	Site:	Garden Aerial - High Falls

Elevation	Timer	Comments	Clock Ref.	Pipe Type	Pipe Size
		1885 Building			
Roof	start	East to South to West to North			
	3:09	Footage counter removed			
		North Wall - crack to window opening			
		Steel beam - closeup			
		East Wall - crack to window opening			
		Steel beam - closeup with erosion hole			
20' - 25'	start	East to South to West to North			
	7:05	South Wall - access opening			
	9:05	SW Corner - voids & cracks			
	10:20	West Wall - support beam recess cracks			
	11:30	North Wall - broken timber beam			
	12:55	NE Corner - crack from window down			
40' - 45'	start	East to South to West to North			
	16:40	SE Corner - mult. cracks & deterioration			
65' - 75'	start	East to South to West to North			
		SE Corner - mult. cracks & deterioration			
75' - 80'	start	South Wall - access opening			
	27:00	SE Wall - brick erosion to rock			
	28:40	E/SE - wall erosion			

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

1:29 (time image appears within video)

3:26 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

4:13 (time image appears within video)

7:44 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

10:33 (time image appears within video)

11:33 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

13:40 (time image appears within video)

14:07 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

16:46 (time image appears within video)

17:11 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

18:35 (time image appears within video)

18:51 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

20:41 (time image appears within video)

21:21 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

22:19 (time image appears within video)

24:51 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

25:20 (time image appears within video)

28:42 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1885 – May 9, 2014

31:58 (time image appears within video)

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CCTV Inspection Log

Project#	Flash Drive	Date	OPERATOR	PAGE		
5877	**1 of 1**	5/9/14	Calabrese	3	of	4

Client:	Larsen	Site:	Garden Aerial - High Falls

Elevation	Timer	Comments	Clock Ref.	Pipe Type	Pipe Size
		1892 Building			
5' depth		Plate Hole Access			
	0:00	Facing South Wall			
	0:15	Water Entry Port? - blocked in			
	1:55	SW Corner - structural steel			
	2:30	West Wall			
	3:20	NW Corner - void confirmed w shadows			
	6:20	North wall			
	7:00	NE & East - 1905 Building			
	7:48	Main Room 1905 Bldg - lattice support column			
10' depth		NW Small Hole Access			
	8:52	NE Corner			
	10:00	NE Corner - lower levels			
	10:12	East to 1905 Bldg - w/plate hole			
	10:28	South Wall			
	11:00	Structural Steel			

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

0:24 (time image appears within video)

1:59 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

2:14 (time image appears within video)

2:20 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

3:30 (time image appears within video)

5:01 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

6:30 (time image appears within video)

6:55 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

7:16 (time image appears within video)

7:27 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

7:40 (time image appears within video)

8:02 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

8:57 (time image appears within video)

9:58 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

10:30 (time image appears within video)

11:35 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1892 – May 9, 2014

11:49 (time image appears within video)

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CCTV Inspection Log

Project#	Flash Drive	Date	OPERATOR	PAGE		
5877	**1 of 1**	5/9/14	Calabrese	2	of	4

Client:	Larsen	Site:	Garden Aerial - High Falls

Elevation	Timer	Comments	Clock Ref.	Pipe Type	Pipe Size
		1905 Building			
10' depth		East to South to West to North			
	2:42	Southeast Corner			
	3:30	South Wall - main room			
	6:30	Looking SW to 1892 bldg & 1905 west wall			
	6:48	Junction 1905/1892 buildings			
	7:45	SW Corner - 1905 building			
		West Wall - 1905 building			
	10:00	Steel Beam - closeups			
	12:00	West Wall - 1905 building			
	12:10	NW Corner - 1905 building			
	13:20	North Wall			
	13:45	SW structural steel			
	14:15	South Wall - review			
	15:05	NW Corner - 1905 building			
	16:00	NW Corner - tree & structural steel			
	19:00	East Wall - structural steel			
	20:32	End of 1905 Building			

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

0:10 (time image appears within video)

0:47 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

1:01 (time image appears within video)

1:12 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

2:15 (time image appears within video)

3:06 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

4:21 (time image appears within video)

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Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

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Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

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Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

14:20 (time image appears within video)

15:24 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

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17.06 (time image appears within video)

Garden Aerial Project – Former Power Station Building – Pictures are from Inspection Video for Building 1905 – May 9, 2014

20.32 (time image appears within video)

Exhibit C
SJB Report – Preliminary Structural Assessment and Plan

Contract Drilling and Testing
SJB SERVICES, INC.

☐ CORPORATE/ BUFFALO OFFICE
5167 South Park Avenue
Hamburg, NY 14075
Phone: (716) 649-8110
Fax: (716) 649-8051

☐ ALBANY OFFICE
PO Box 2199
Ballston Spa, NY 12020

5 Knabner Road
Mechanicville, NY 12118
Phone: (518) 899-7491
Fax: (518) 899-7496

☐ CORTLAND OFFICE
60 Miller Street
Cortland NY 13045
Phone: (607) 758-7182
Fax: (607) 758-7188

☐ ROCHESTER OFFICE
535 Summit Point Drive
Henrietta, NY 14467
Phone: (585) 359-2730
Fax: (585) 359-9668

May 27, 2014

Larsen Engineers
700 West Metro Park
Rochester, New York 14623

Attention: Ram Shrivastava, P.E., LEED® AP
President

Reference: Preliminary Structural Assessment and Plan
for Additional Geotechnical and Structural Investigation
Former RG&E Station #4 and Pedestrian Bridge Pillars at High Falls
275 St. Paul Street, Rochester, New York

Dear Ram,

On May 9, 2014 , SJB made a site visit to observe the existing structures at 275 St. Paul Street. It is our understanding that a project is in the planning stages to renovate the Rochester Gas & Electric Station #4 to allow for a staircase leading to a museum of the generation engine and construction of a pedestrian bridge over High Falls utilizing the existing concrete piers of the former power lines.

Field Observations

Based on SJB's site visit we note the following:

The structural components of the existing RG&E #4 structure are predominantly in poor to very poor condition:

- Steel beams/columns are corroded

- Concrete is cracked/damaged.
- The exterior brick walls are also in very poor condition with damaged, holes, missing mortar joints, cracked brick, etc.
- Wood beams and columns also may be deteriorated.
- Various anchors into the bedrock also appear to have been loosened.

At this time, based on SJB's observations, the existing building is not structurally sound. A significant structural rehabilitation, if not full structural re-construction, of the

building will be required for this project. Additional investigation work will be necessary to evaluate the concrete and its foundation along with vertical and lateral support by the underlying bedrock and adjacent bedrock face.

The structural components of the existing concrete pillars located along the existing railroad bridge which are to planned to be re-used as a pedestrian bridge over High Falls appear to be in fair to good condition from a distant viewing. Additional investigation work will be necessary to evaluate the concrete structure and its anchoring into the underlying bedrock.

Proposed Investigatory Services

To further assess the existing building components for re-use of materials, for development, and to assist in design for new structural support or new building shell, we provide the following:

<u>Field Sampling and Testing of Structural Components</u>

- Sampling of Steel Components for Metallurgical Testing and Testing of Physical Strength Properties
- Sampling of Wood Components for Testing of Physical Strength Properties
- Sampling of sections of Brick Masonry for Compressive and Shear Strength Testing
- In-Place Testing of Mortar Strength
- Physical Strength Analysis of Masonry Units
- Concrete Radar Scanning
- Petrographic Analysis
- Chemical Analysis
- Sampling of Concrete components for Compressive Strength Testing and for analysis of steel re-inforcing
- Half-Cell Potential Testing of Re-inforcing

<u>Field Sampling and Testing of Geotechnical Components</u>

- Geological Field – Structural Mapping
- Coring of Bedrock and Engineering Geologic Classification
- Compressive Strength Testing of Bedrock
- Field Anchor Bolt Testing of Bedrock
- Geotechnical Engineering Evaluation

Approximate Budget for Investigation

- Design and Construction of Scaffolding Platforms for Sampling (25K to $100K-depending on access to concrete pillars from RR Company)
- Sampling and Analytical Testing for Structural Components ($25-$40K)
- Geologic Mapping ($5,000)
- Geotechnical Drilling ($15K-$25K)
- Geotechnical Engineering Evaluation ($2,500-$5K)

Concluding Remarks

SJB appreciates this opportunity to observe the existing conditions and to provide this preliminary structural observation report and recommendations for further investigation work. If the scope of work and estimated budget appear to be acceptable, SJB can meet to discuss this project further and to "fine-tune" the budget and scope to meet your design and construction needs. If you should have any questions, please contact our office at your convenience.

Sincerely,

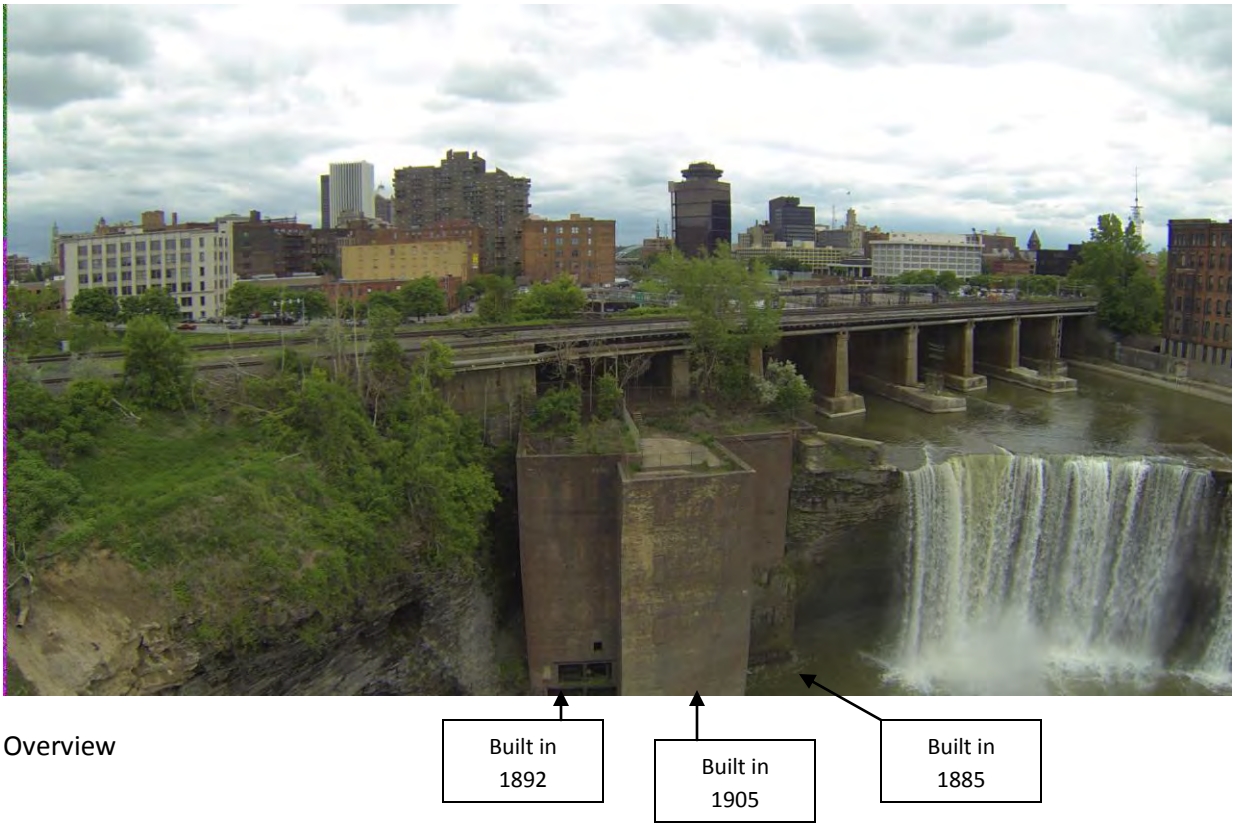
Chuck Guzzetta
Rochester District Manager

Exhibit D

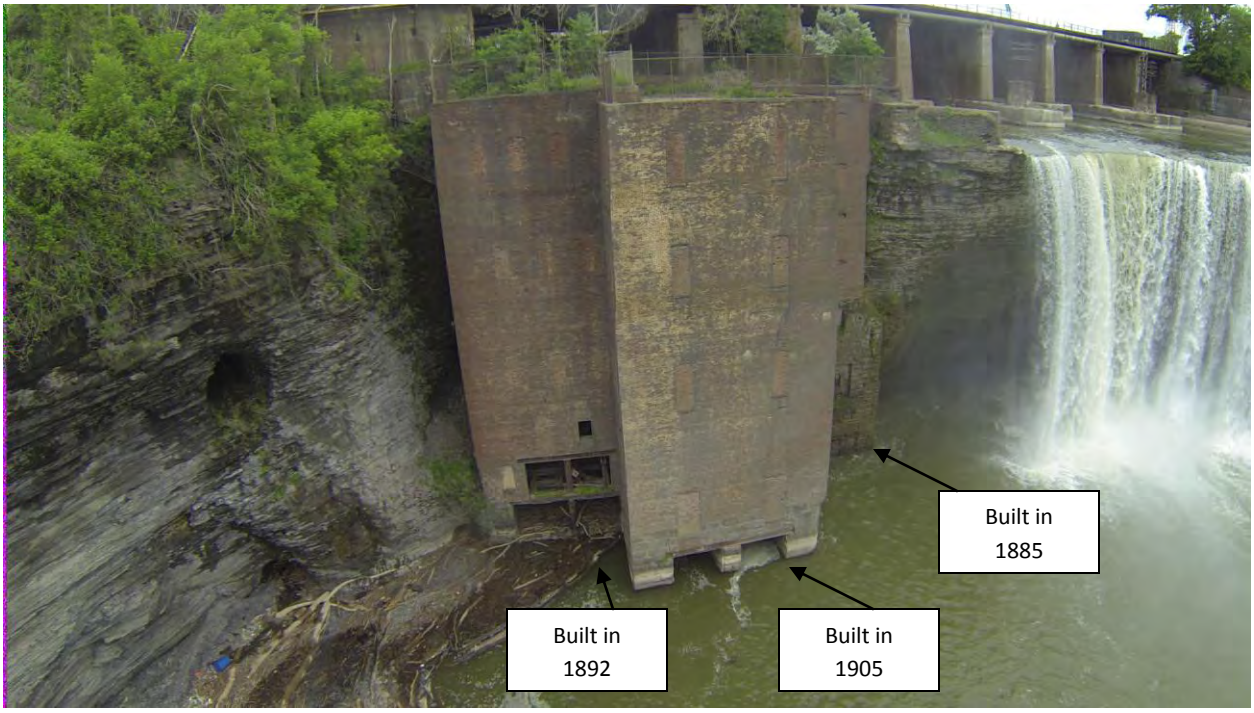
SKYOP - Photographs

Exhibit – D: SKYOP PHOTOS OF 275 ST PAUL STREET

SKYOP – remote controlled unmanned aerial photography for exterior conditions



Overview



275 St Paul Street – close up

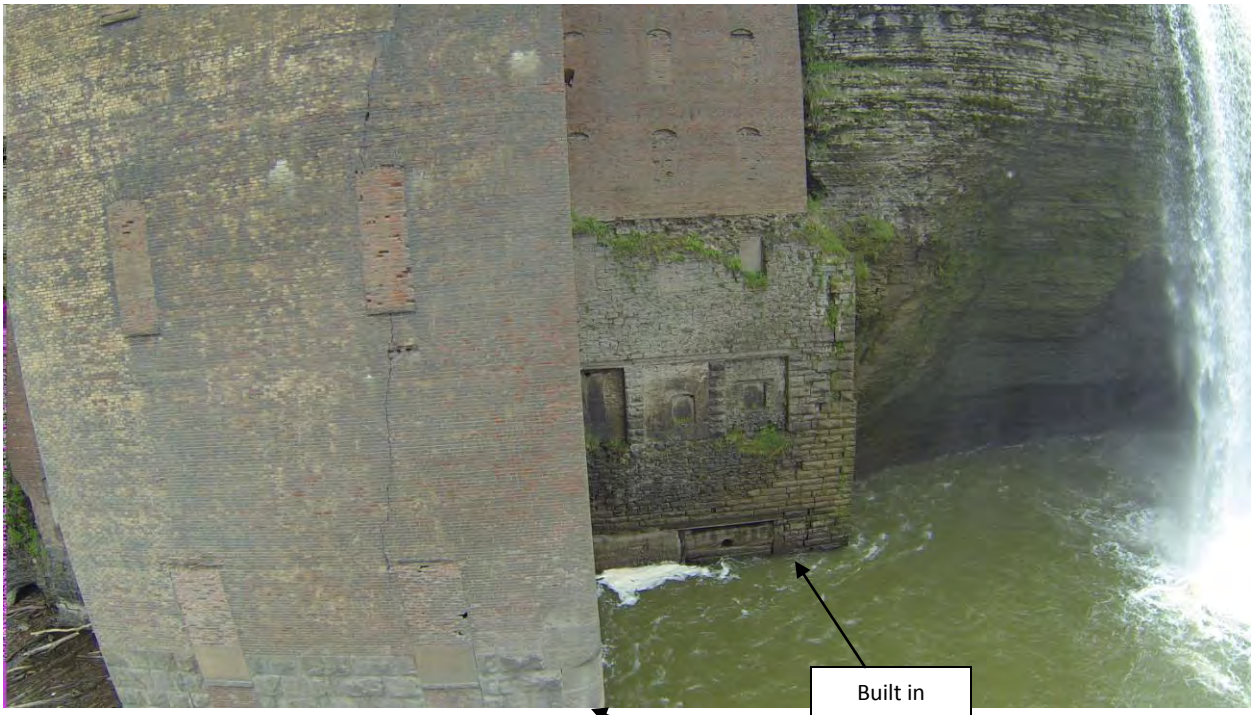
Top deck roof view

Roof close up – 275 St Paul Street

Eastern shore view

Lower part of 275 St Paul Street

Close up – lower section



Close up – western view – lower section