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### **Illuminating an Iconic North American Landmark**

We're thrilled with our participation in the recent upgrade and enhancement of the lighting of the Niagara Falls! The project, which features cutting-edge LED technology, is the first upgrade in over 20 years. The Niagara Falls Illumination Enhancement Team, spearheaded by Salex president Nick Puopolo, is comprised of several prominent lighting and construction industry leaders. The team represents local, Canadian and American companies on this international endeavour, and includes: Michael Smolyansky, Applications Manager, Salex; Paul Boken, VP and Alan McIntosh, Senior Designer of Mulvey & Banani Lighting; Ed Gesch, President of ECCO Electric; Ron Foley, Scenework; and LED lighting products manufactured by Stanley Electric.

The new solution dramatically improves the visitor experience by boosting the average lighting levels by up to three times and sufficiently improving the lighting's overall uniformity. The new lighting system allows for a universal control protocol, creating endless possibilities when it comes to scalability of the system. The integration of custom user interfaces also provides the ability for the public to interact with what is projected onto the Falls. In addition, the new lighting helps reduce the Falls' current energy consumption by 60 per cent!

The newly installed lights were unveiled to the public on the evening of December 1st, 2016.



# FALL G





# DUYS

NIAGARA FALLS SHINES BRIGHTER THAN EVER THANKS TO AN INTERNATIONAL EFFORT

/// BY ANNE MILITELLO

Everyone who has ever visited Niagara Falls knows the allure of these mighty falling waters. It is a special place where citizens of the US and Canada unite, not only at its borders, but in their love for its immense beauty.

Some say that the enormous amount of negative ions produced by the rushing waters account for blissful feelings when one is near it. Niagara Falls has been a honeymooners' paradise, a playground for daredevils, and the subject of great artists and writers. The sight, sound, and feel of the powerful waters are hypnotic. I can vouch for it. I grew up next to it.

It is also the birthplace of the first hydroelectric plant powered by Nikola Tesla's creation of alternating current (AC), which started the electrification of the world. The history of the falls is fascinating, and the story of the nighttime lighting is equally interesting.

Niagara Falls was first lit in 1860 with 200 Bengal lights for a celebration for the Prince of Wales, creating what *The London Times* called "magical and brilliant beyond the power of all words."



LIGHT MONKEY PHOTOGRAPHY

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The first use of electric lights came in 1879, when the falls were illuminated by carbon arc lights for a special visit by the governor-general of Canada. *The Chicago Times* said, “The fantastic display of color through suitable glasses surpasses the most gorgeous tints the painter may throw on his canvas.” Then 1901 saw the falls lit for an entire week during the Pan-American Exposition and, subsequently, in 1907 for a month-long display. Searchlights aimed at the American falls were colored by gelatin film placed in front of the lights by men that were paid 50¢ per night to stand beside them, changing colors by listening for a commanding series of whistle blows.

It wasn't until 1925, after the formation of The Niagara Falls Illumination Board (still in existence today), that the falls were permanently lit with carbon arcs during a festival of lights. They have remained on nightly ever since, swapping the carbons for Xenon lamps in 1974.

LIGHT MONKEY PHOTOGRAPHY



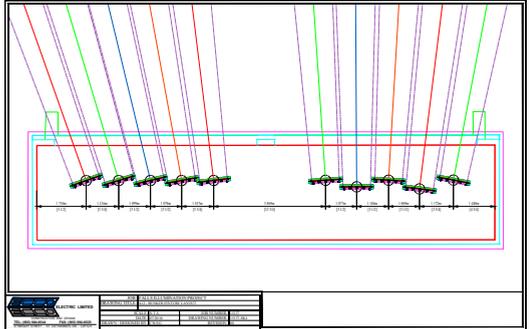
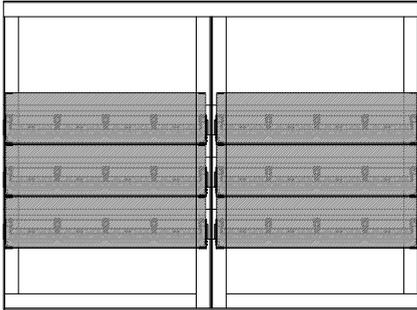
In 1925, the falls were permanently lit with carbon arcs during a festival of lights, remaining on nightly ever since, swapping the carbons for Xenon lamps in 1974.

Flash-forward to December 1, 2016, when a team of technical wizards collaborated to transform the lighting into an even more magnificent display, breaking ground with a technological feat so impressive it would have made Tesla himself proud.

In 2014, the Niagara Parks Commission and the Niagara Falls Illumination Board (NFI) sent out a request for quotation (RFQ) looking for a brighter and more efficient lighting solution to replace the 21 aging 4,000W Xenons and their antiquated

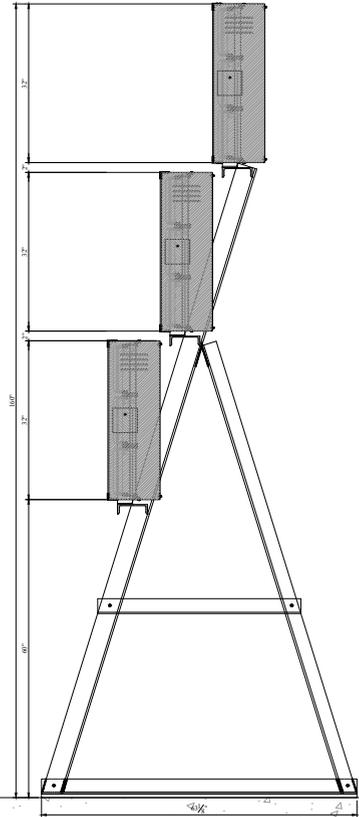
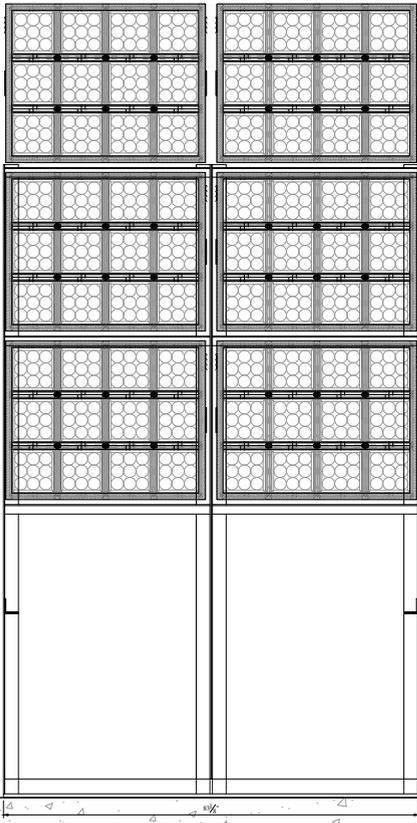
guillotine color-changing system. It was stated that, although LEDs would be the ideal solution, some doubted the technology was ready to illuminate this massive target, more than 2,000' away. It was at this time that Nick Puopolo, principal of Salex, Canada's largest lighting and controls agency, picked up on the RFQ and began to assemble a dream team of lighting designers, engineers, fabricators, control specialists, and installers to compete in a bid to get the gig relighting the falls.





A12 BUNKER LAYOUT

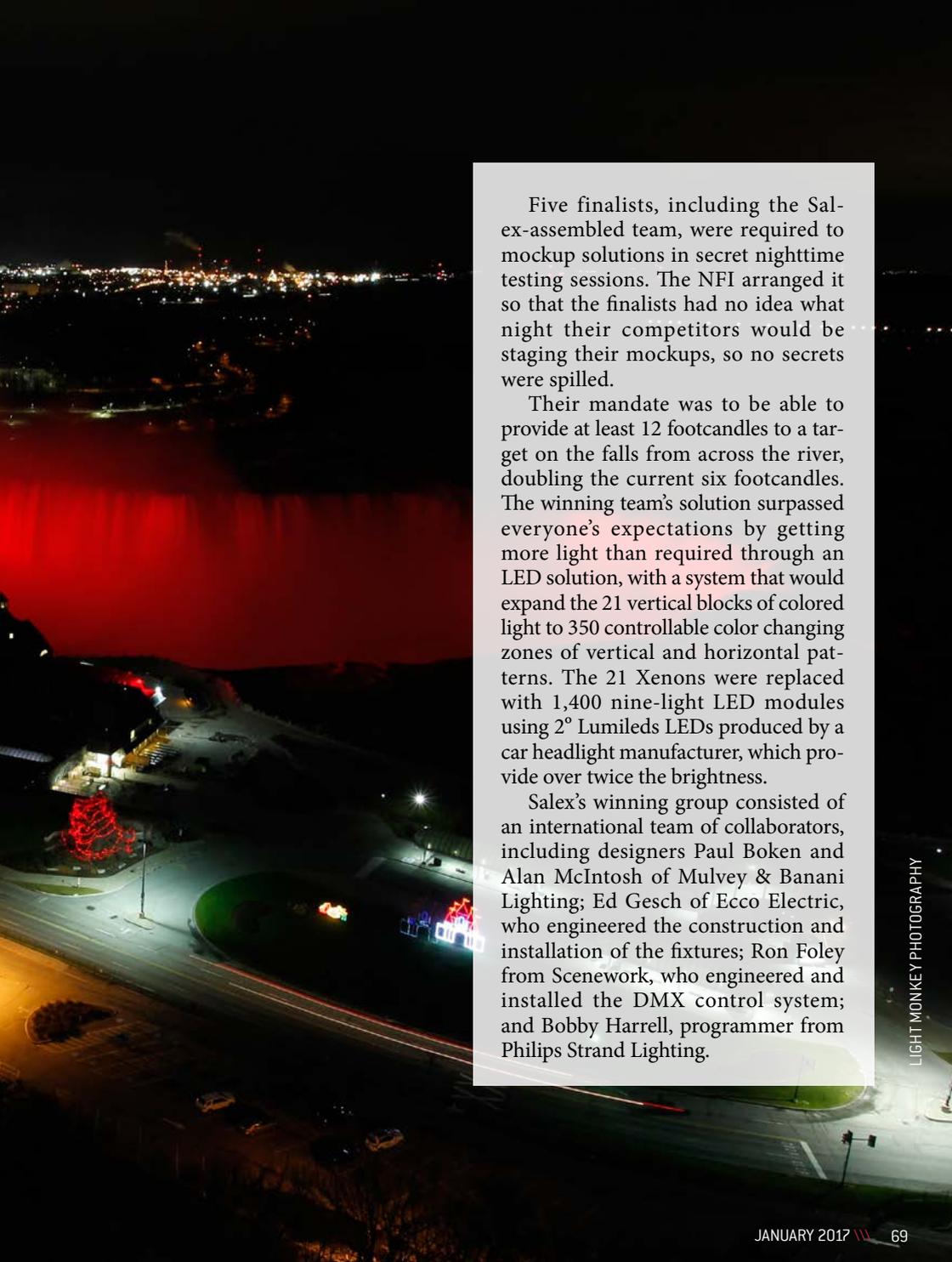
A12 - TOWER - SUPPORT FRAME



A12 TOWER SUPPORT FRAME

Salex's winning solution achieved more light than required through an LED solution, with a system that would expand the 21 vertical blocks of colored light to 350 controllable color changing zones of vertical and horizontal patterns.



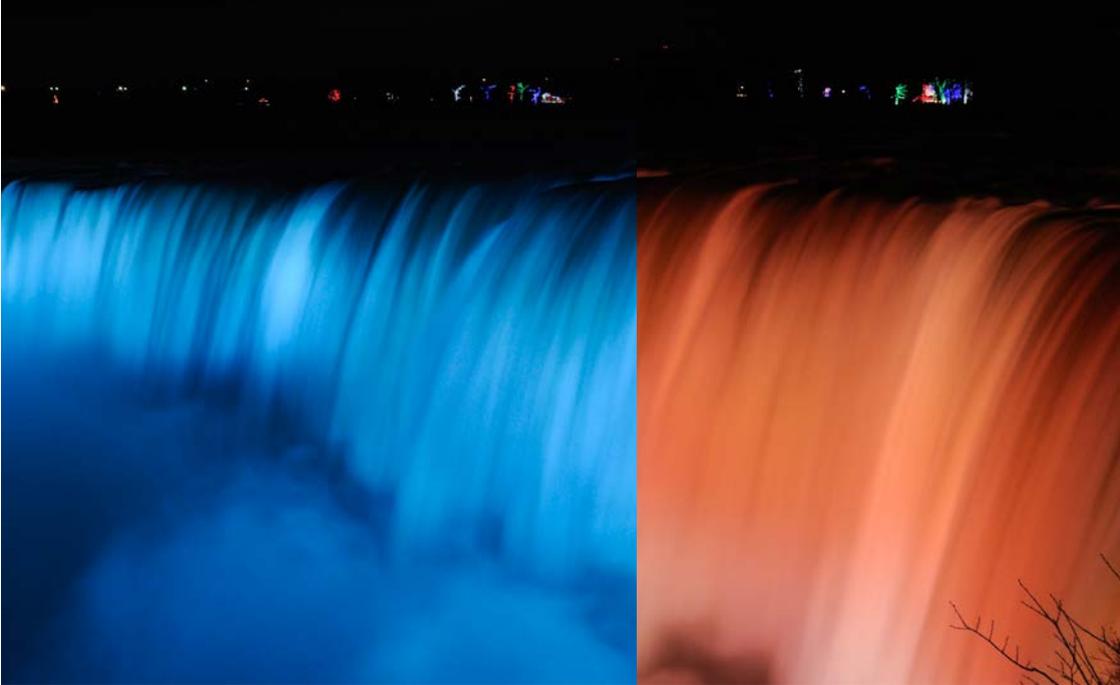


Five finalists, including the Salex-assembled team, were required to mockup solutions in secret nighttime testing sessions. The NFI arranged it so that the finalists had no idea what night their competitors would be staging their mockups, so no secrets were spilled.

Their mandate was to be able to provide at least 12 footcandles to a target on the falls from across the river, doubling the current six footcandles. The winning team's solution surpassed everyone's expectations by getting more light than required through an LED solution, with a system that would expand the 21 vertical blocks of colored light to 350 controllable color changing zones of vertical and horizontal patterns. The 21 Xenons were replaced with 1,400 nine-light LED modules using 2° Lumileds LEDs produced by a car headlight manufacturer, which provide over twice the brightness.

Salex's winning group consisted of an international team of collaborators, including designers Paul Boken and Alan McIntosh of Mulvey & Banani Lighting; Ed Gesch of Ecco Electric, who engineered the construction and installation of the fixtures; Ron Foley from Scenework, who engineered and installed the DMX control system; and Bobby Harrell, programmer from Philips Strand Lighting.

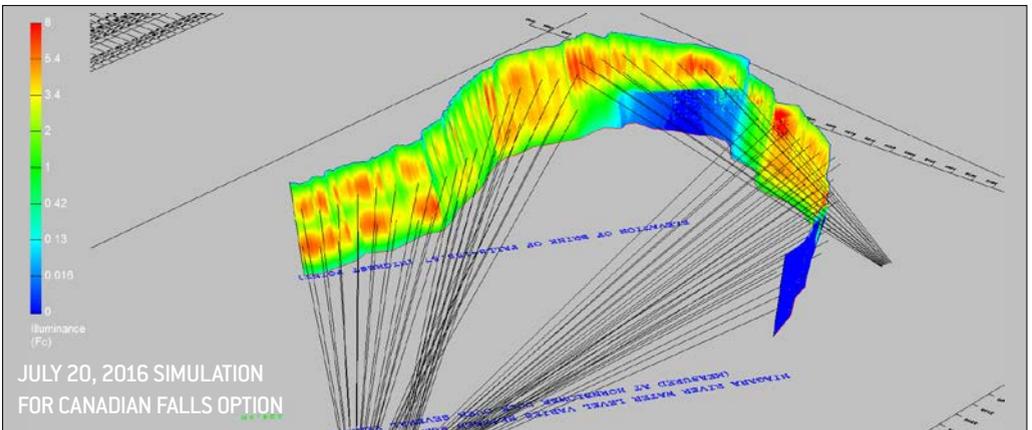
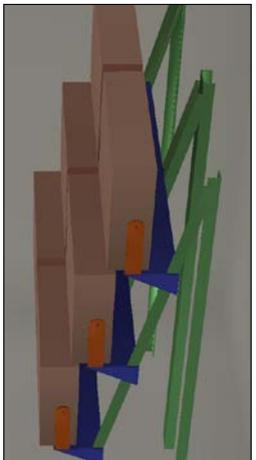
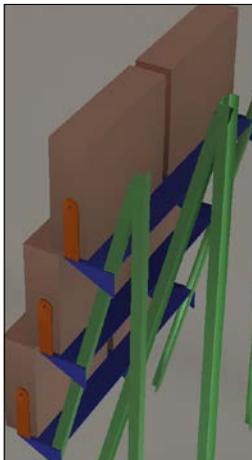
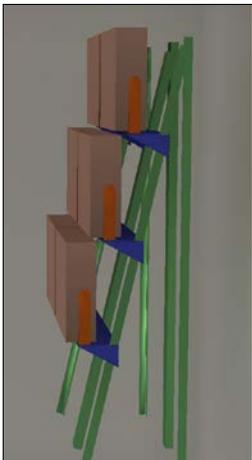
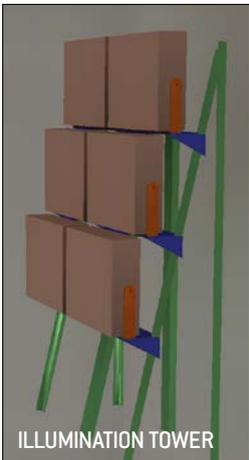
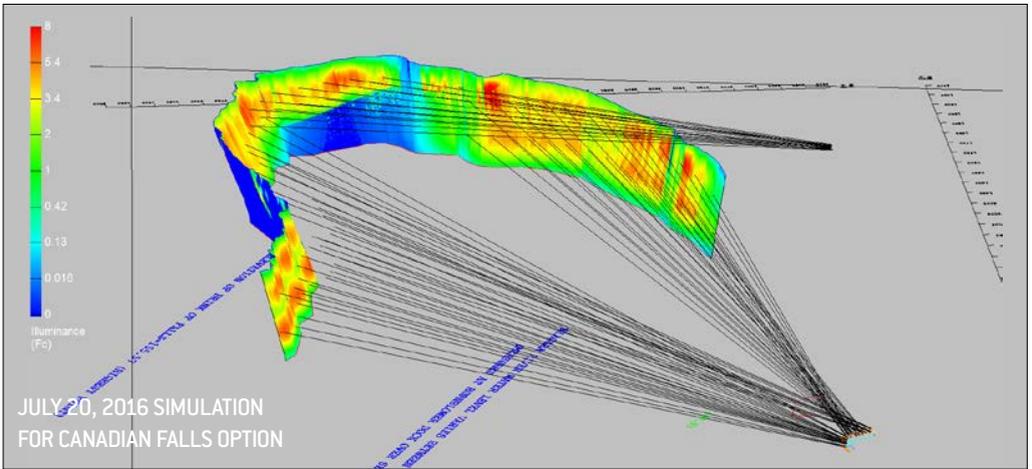
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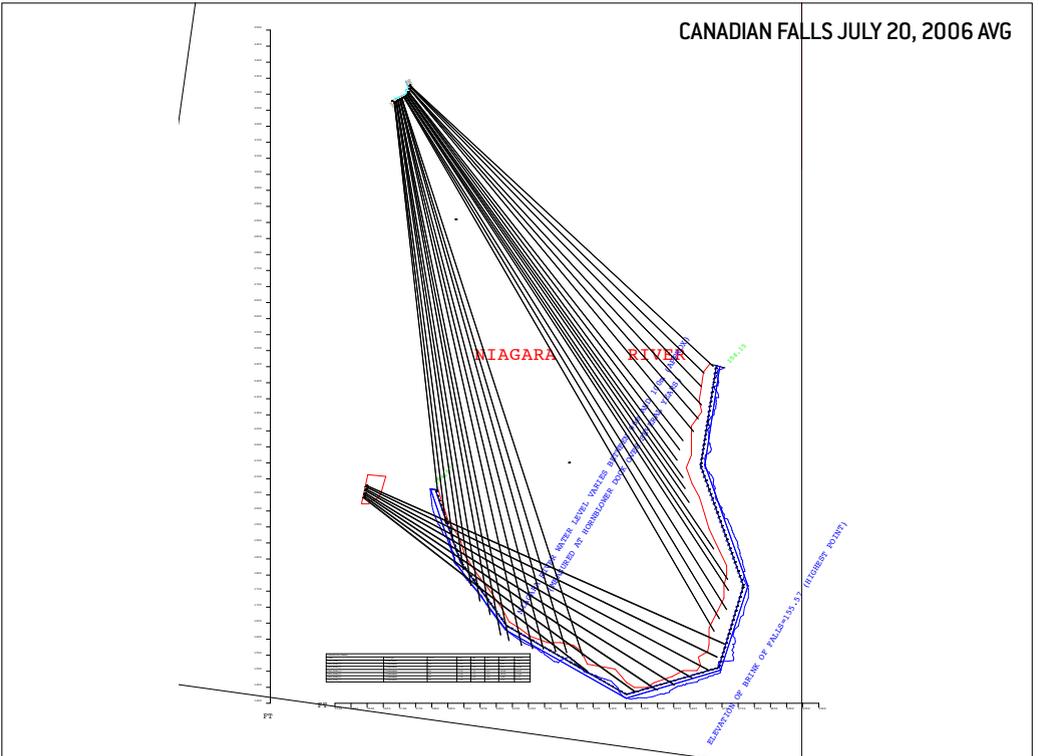
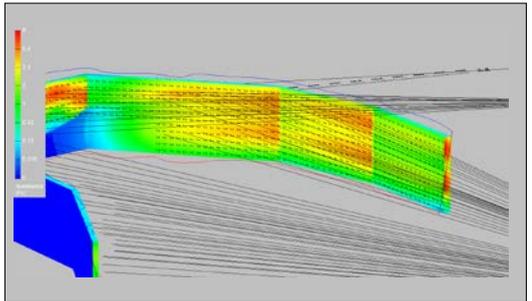
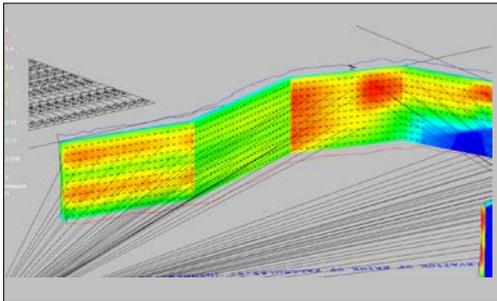
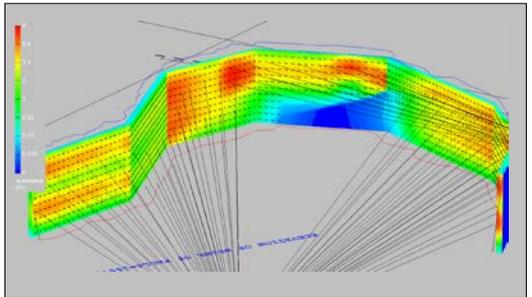
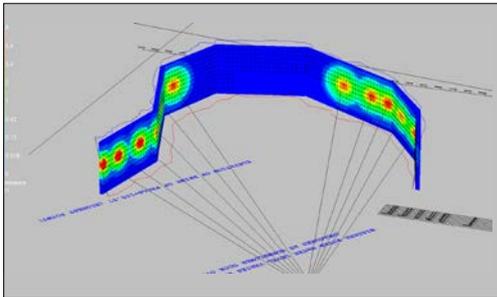


Celebrated Canadian television lighting designer and member of the NFI, Linus MacDonald became a valuable member of the team in a unique client/consultant relationship. His support and participation after the impressive mockup became invaluable to the team as they moved forward. All parties stress the true collaborative nature of the process and how their respect for each other and their shared love for the project and the falls fueled their efforts. They worked tirelessly in a short amount of time, upholding the mandate that they were to install without ever losing a night of lighting on the falls.

In a sales visit to Mulvey & Banani's office in 2013, Boken was introduced to a prototype of a 2° LED fixture made by car headlight manufacturer Stanley Electric,

who thought they might get into the architectural side of things with this new module. At that time, Boken was impressed by its performance but had no use for it. Only after he was approached by Puopolo to join the team for the Niagara Falls bid a year later did he remember the awesome prototype he had seen, which became the light source for the entire design. The team used AGI32, Google Maps, WYSIWYG, satellite photos, NFI surveys, Photoshop, and CAD to calculate the array of fixtures and colors and provide virtual presentations to the Parks Commission and the NFI for approval. They wanted to provide them with a system that not only provided solid color at any given time but could also provide gradient color and patterns on the water.

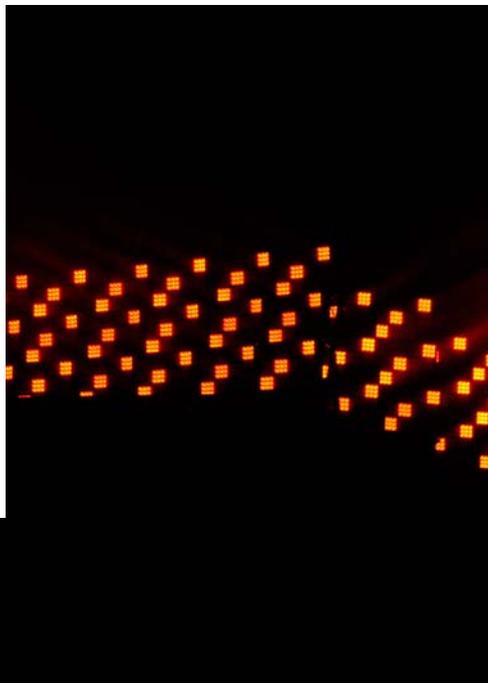
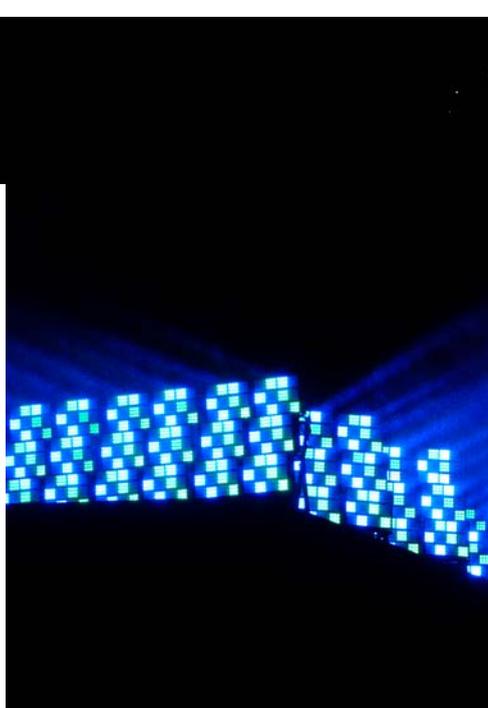




The team also faced a challenge on the Canadian, or Horseshoe, Falls due to the massive mist curtain veiling the front, created by the force of the rushing waters. They knew that this time around they wanted to get light behind the mist in order to light the crest of the falls, which had always been hidden by the seemingly solid curtain of mist. They staked out an additional location that illuminated the back, allowing for the full falls to be seen at night for the first time. The virtual calculations also told them they needed to add an additional middle layer, which helped provide perfect blending and get the gradients they wanted.

Next came the realtime mockups. Ed Gesch acquired access to an abandoned airport in Welland, Ontario, in order to get an uninterrupted shot of light at 2,000' to simulate the range needed for the falls' location. Because it was unregulated, they didn't need permission from the FAA to conduct the test. This is where they saw proof that they were able to outperform the minimum criteria for the competition. They used this location to line up the individual beams within the module for perfect color blending.

The next hurdle was to account for the extreme temperatures, including ice, blizzards, and subzero temperatures in the winter. Because of the heavy mists produced by the falls, ice buildup is serious business.





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Gesch set out to find the right glass to protect the LEDs while not compromising the lumen output. Any light loss due to interference from the glass might have compromised their chances for winning the bid. As luck would have it, while visiting a local theatre, he overheard the technicians complaining that the glass window for the projector in the light booth had broken and how costly it would be to replace. Upon questioning why, he learned that optical glass has almost no light loss. He sought out this theatrical glass, had it traced with liquid silver oxide, and placed busbars on the side in order to create heat on the glass to prevent ice from forming and causing light loss. Sensors were added to “measure the perfect storm” as Gesch explains and to thwart Mother Nature’s potential damaging effects. Gesch used Hammond-built enclosures on yokes to pan and tilt onsite for focusing, which could handle wind loads up to 60mph.

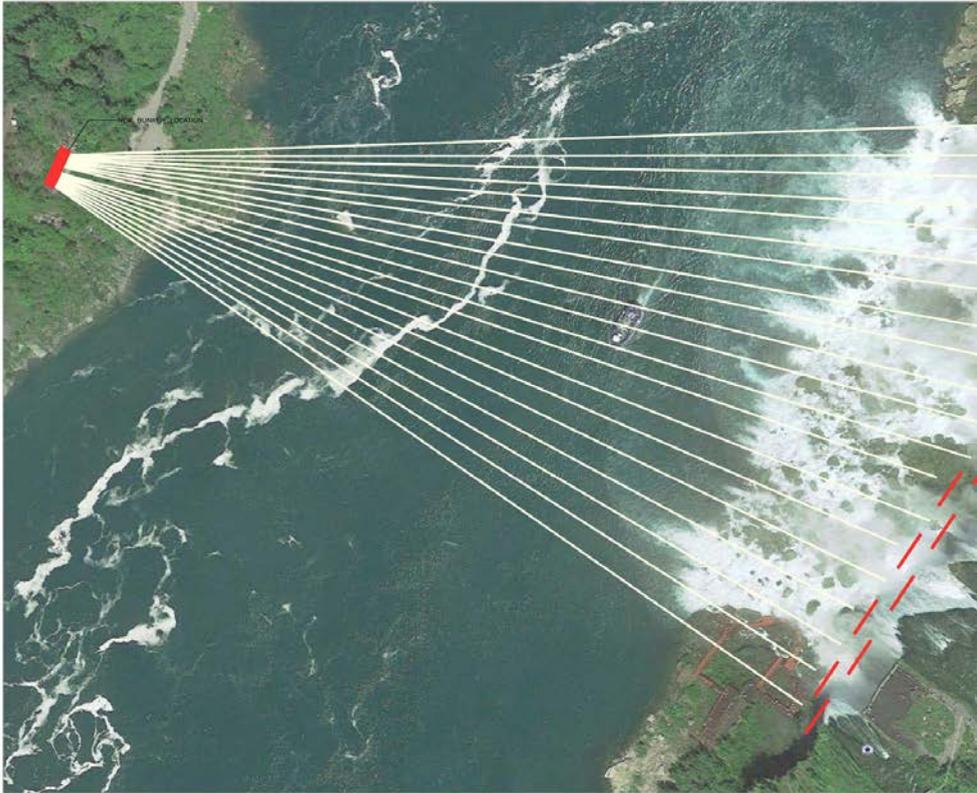
There are three lighting locations: one for the Canadian falls at the Illumination Tower that was the original site for the lights; one at the Bunker, an indoor shed at the base of the river that lights the American falls; and one at Table Rock Centre, which grazes the side of the crest at the Canadian falls.



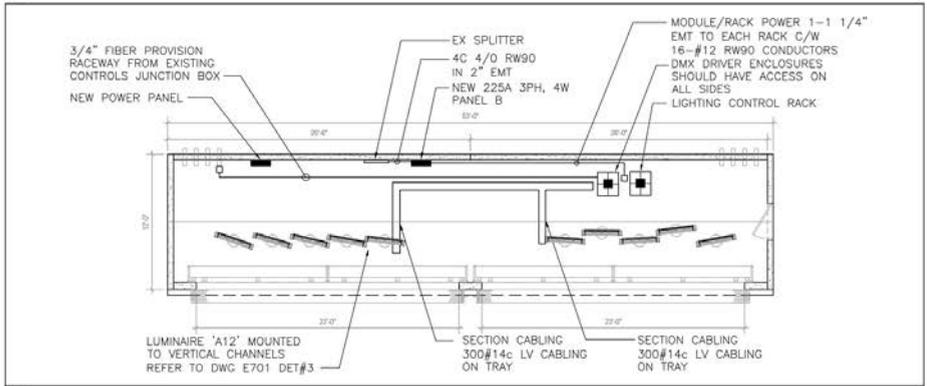
NIAGARA PARKS COMMISSION

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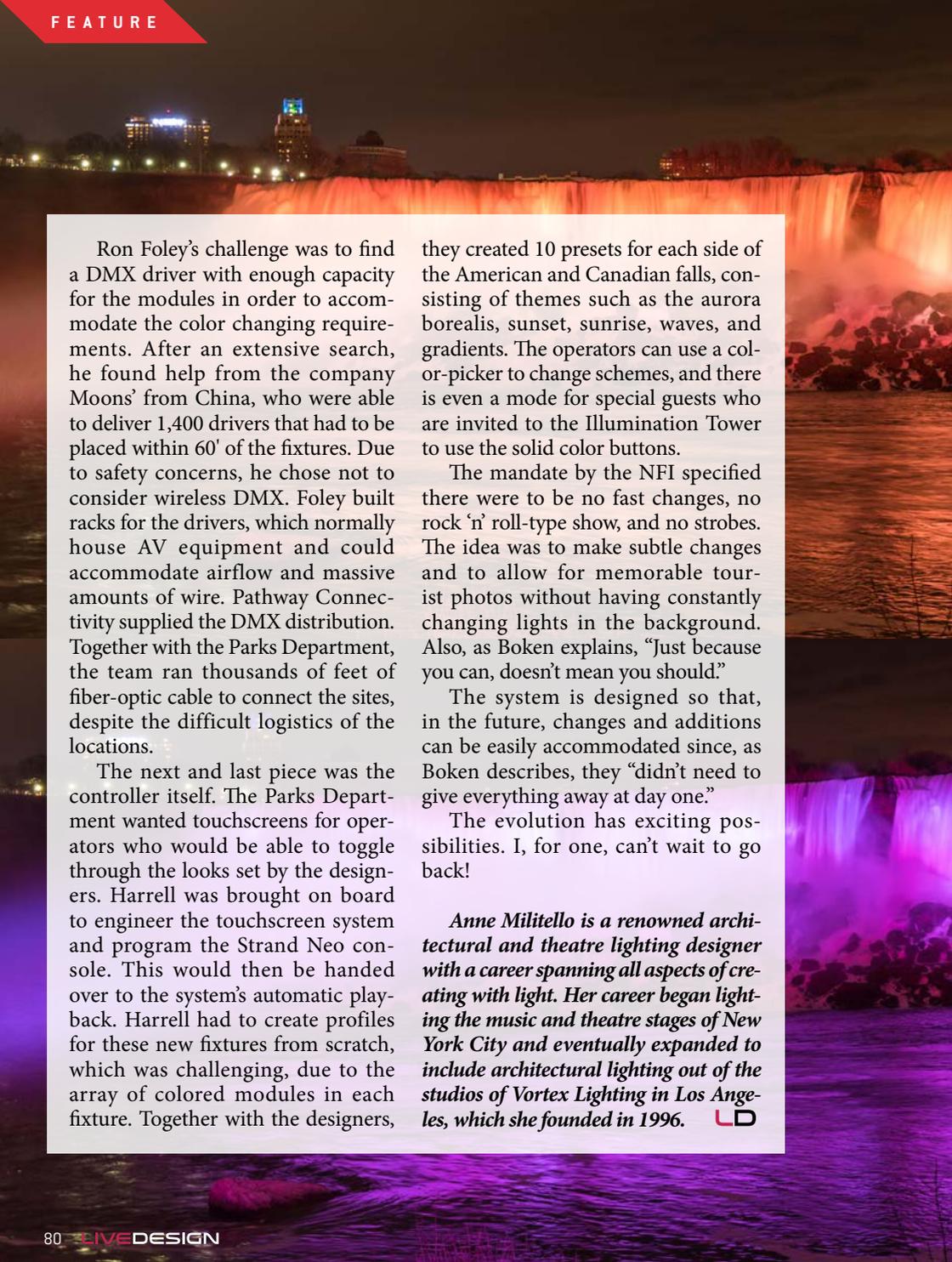
4 BUNKER SITE PLAN  
SCALE: NTS



3 FLOOR PLAN  
SCALE: 3/16"=1'-0"

1 FLOOR PLAN  
SCALE: 3/16"=1'-0"





Ron Foley's challenge was to find a DMX driver with enough capacity for the modules in order to accommodate the color changing requirements. After an extensive search, he found help from the company Moons' from China, who were able to deliver 1,400 drivers that had to be placed within 60' of the fixtures. Due to safety concerns, he chose not to consider wireless DMX. Foley built racks for the drivers, which normally house AV equipment and could accommodate airflow and massive amounts of wire. Pathway Connectivity supplied the DMX distribution. Together with the Parks Department, the team ran thousands of feet of fiber-optic cable to connect the sites, despite the difficult logistics of the locations.

The next and last piece was the controller itself. The Parks Department wanted touchscreens for operators who would be able to toggle through the looks set by the designers. Harrell was brought on board to engineer the touchscreen system and program the Strand Neo console. This would then be handed over to the system's automatic playback. Harrell had to create profiles for these new fixtures from scratch, which was challenging, due to the array of colored modules in each fixture. Together with the designers,

they created 10 presets for each side of the American and Canadian falls, consisting of themes such as the aurora borealis, sunset, sunrise, waves, and gradients. The operators can use a color-picker to change schemes, and there is even a mode for special guests who are invited to the Illumination Tower to use the solid color buttons.

The mandate by the NFI specified there were to be no fast changes, no rock 'n' roll-type show, and no strobes. The idea was to make subtle changes and to allow for memorable tourist photos without having constantly changing lights in the background. Also, as Boken explains, "Just because you can, doesn't mean you should."

The system is designed so that, in the future, changes and additions can be easily accommodated since, as Boken describes, they "didn't need to give everything away at day one."

The evolution has exciting possibilities. I, for one, can't wait to go back!

*Anne Militello is a renowned architectural and theatre lighting designer with a career spanning all aspects of creating with light. Her career began lighting the music and theatre stages of New York City and eventually expanded to include architectural lighting out of the studios of Vortex Lighting in Los Angeles, which she founded in 1996. LD*



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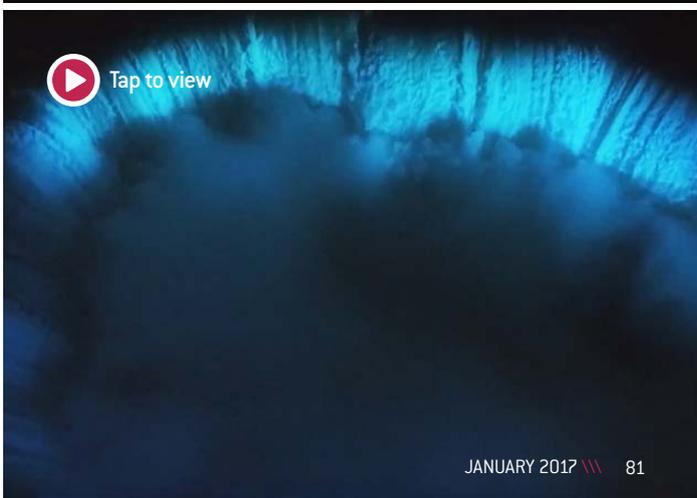


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