

**APPENDIX B – KGS FEASIBILITY ASSESSMENT REPORT FOR IMPROVED SOUND  
ATTENUATION, ACOUSTICAL UPGRADES AND LED LIGHTING REPLACEMENT AT PAN AM  
POOL – NOVEMBER 2017**



**FEASIBILITY ASSESSMENT REPORT FOR IMPROVED SOUND  
ATTENUATION, ACOUSTICAL UPGRADES AND LED LIGHTING  
REPLACEMENT AT PAN AM INDOOR POOL**

FINAL

KGS Group 17-0107-013  
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PREPARED BY:

Shelley Burns, EIT  
Electrical Designer

APPROVED BY:

Paul Surgeoner, P.Eng  
Electrical Engineer



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## 1.0 INTRODUCTION

The City of Winnipeg has identified a need for the replacement of the existing ceiling tiles in the main tank area at the Pan Am Pool in Winnipeg, MB. The City's investigation into this removal has found that the removal process will require scaffolding in the main tank area. It was identified that during this removal process while the scaffolding is in place, the existing lighting could be upgraded and be incorporated into the new ceiling tile layout.

The City of Winnipeg has engaged KGS Group to assess the existing systems and determine what rehabilitation works might best be implemented that would result in another 30 years of reliable systems. Innova Sound has been sub-consulted to KGS Group to perform the Sound Attenuation and Acoustical Building feasibility component of the assessment report.

## **2.0 OBJECTIVE**

The objective of this Electrical Lighting Replacement Feasibility Assessment Report is to provide the City of Winnipeg with an assessment of the existing lighting systems and options for replacement at the Pan Am Pool located at 25 Poseidon Bay. The evaluation will provide commentary on the current lighting system and options for replacement.

### **2.1 ASSESSMENT AND REPORT FORMAT**

On July 20, 2017 and August 28, 2017 KGS Group completed an assessment of the lighting and lighting control systems at the Pan Am Pool located at 25 Poseidon Bay. The intent of the review was to determine options for replacement.

The Assessment was based upon a visual analysis of the existing building only and review of the building drawings provided.

## **3.0 LIGHTING DESCRIPTION AND ASSESSMENT**

### **3.1 CURRENT SYSTEM DESCRIPTION**

The existing lighting in the main tank pool is estimated to have been upgraded sometime in the 1980's. The lamps are 1000W metal halide (MH) floodlight style fixtures with remote ballasts. There is a system of catwalks above the pool and the existing lighting is mounted to these catwalks. The lighting is installed around the pool along the north and south sides such that none of the light sources are located directly over the pool. The lighting is fed from multiple power panels located throughout the building.

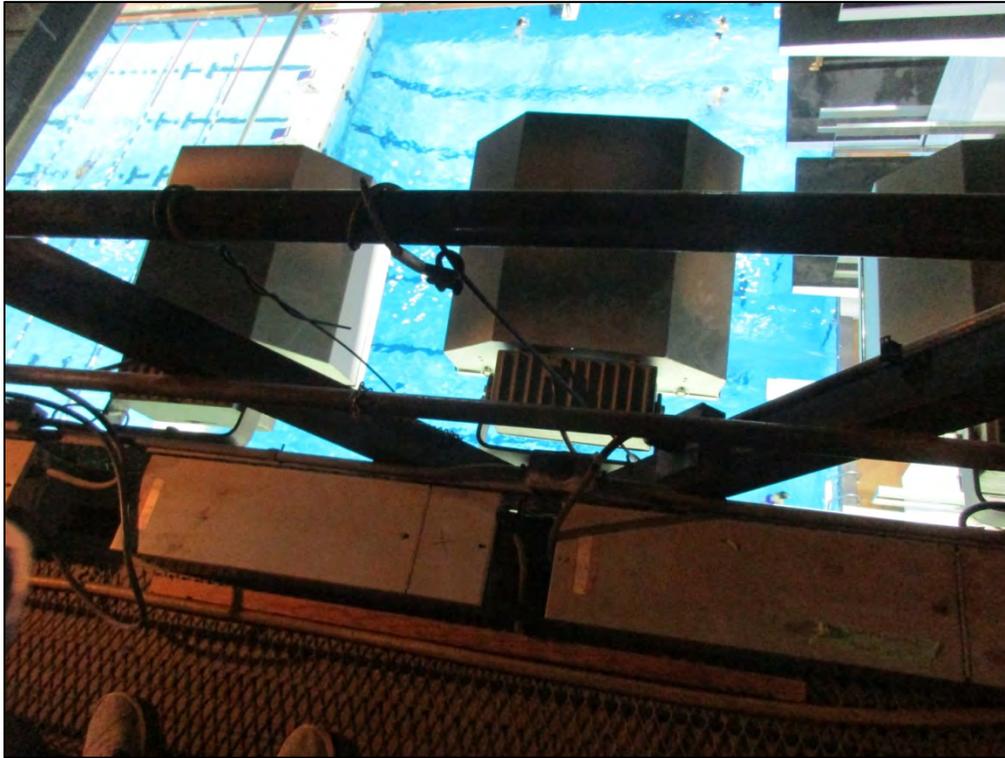
Some of the MH fixtures are used as emergency lighting; these fixtures are marked by white tags and are powered from the emergency distribution which is fed off the generator. The emergency lighting is not switched. The emergency lighting system is also backed up by an Uninterruptable Power Supply (UPS) this is added to provide power during the generator start-up time. This allows the existing metal halide fixture to ride through the start-up time of the building generator without requiring the re-strike time to meet the minimum outage time allowed by MBC.

All lighting within public areas of the facility is complete with on/off control located with low voltage switches in the main reception area. The existing lighting control system was replaced in 2015 with Greengate lighting control panels. The building operators have stated that switching of the existing fixtures is currently not being utilized. All tank and area lighting is on continuously.

There are existing luminaires above the stands. It was noted by operators that this lighting is not used and has been abandoned. It is estimated that these fixtures are 250W metal halide. These fixtures are connected by a twist lock receptacle and were not connected at the time of inspection.

There is existing catwalk lighting. This lighting is incandescent bulbs. It is anticipated that this lighting is not switched and is provided for a minimum foot-candle (fc) level required to meet MBC requirements on the catwalks.

**FIGURE 1  
EXISTING POOL LIGHTING**



### 3.2 LIGHTING LEVELS

#### 3.2.1 Existing Lighting Levels

The existing lighting levels were measured by KGS onsite and are as follows:

**TABLE 1  
LIGHTING LEVEL MEASUREMENTS OF EXISTING POOL LIGHTING**

Water Surface	25-40fc
Pool Deck	40-96fc
Diving Board Area	4-22fc
10 m Diving Board Platform	3-7fc

The existing lighting levels were identified as too low by the user groups specifically in the diving board areas. KGS measurements found that the lighting level at the surface of the water is not constant across the water; the lighting level is highest along the edge of the water and lowest along the centerline of the pool. This appears to be due to the existing lighting source distribution and the placement of the lighting.

The Pan Am Pool staff and user groups have identified the following issues with the existing lighting:

1. The area behind the diving towers is too dark.
2. The diving platforms are too dark, specifically the 10m platform.
3. For some diving boards the lights are too bright and catch the eye during performance, specifically the 3m spring board.

Other issues that KGS has observed are:

4. The water surface is less bright than the pool deck.
5. The bench seating is dark on the edges of the pool.

The majority of these issues are caused because of the location and type of lighting used. The existing system is very bright lights that shine directly down on the edge of the pool.

### 3.2.2 Target Lighting Levels for Renovation

The new lighting shall target lighting levels recommended for this type of facility. The recommended lighting levels for pools according to the Illuminating Engineering Society Recommended Practice RP-6 for Sports and Recreational Area Lighting are listed in Table 2 below.

**TABLE 2**  
**IES RP-6 RECOMMENDED ILLUMINANCE LEVELS FOR POOLS**

	Class 1	Class 2	Class 3	Class 4
Water Surface Illuminance	75 fc	50 fc	30 fc	10 fc
Deck Surface Illuminance	50 fc	20 fc	10 fc	10 fc
Start/Finish and Turning Lanes	100 fc	75 fc	50 fc	-

The Classes are span from professional events (Class 1) to social and recreational events (Class 4). There is some crossover between the classes. The Pan Am Pool operates in the capacity of a Class 2 and Class 3 building for training, amateur leagues and sports clubs. It is therefore proposed to target the illuminance values of Class 2 for the new lighting system.

Additionally the Public Health Act for Swimming Pools and Other Water Recreational Facilities Regulation Part 1 Section 11(1) states:

*“The operator of a swimming pool or other water recreational facility located indoors shall provide a lighting system that will maintain, at any point on the deck and the pool water surface, an illumination of not less than 200 lx (20 fc) and an instantaneous automatic emergency lighting source to facilitate prompt evacuation in case of a power outage.”*

This regulation is seen as a minimum standard. The lighting levels recommended by the IES will be targeted with the minimum not below the 20 fc set out by the Public Health Act.

The targeted lighting levels for the simulations and future detailed design work is recommended to be 50 fc on the water surface with 75 fc at all start/finish and turning lanes and a minimum of 20 fc on the pool deck.

### **3.3 METAL HALIDE FIXTURES VS LED FIXTURES**

A detailed comparison of the Metal Halide to LED fixture is not the purpose of this report, but some reference to the differences as it affects this application will help explain why a fixture replacement is recommended.

The existing technology is metal halide (MH). Metal Halide technology is considered obsolete. Metal Halide bulbs will continue to increase in cost over time as they become a replacement part only. 15,000 hrs is the maximum expect life for a metal halide bulb. Therefore each bulb will need replacement every 1 ¾ years.

The particular fixture installation location at Pan Am Pool leads to difficulty for replacing lamps. The current method is to rotate the fixture on the bracket mount such that the front face of the luminaire is facing the worker on the catwalk. To replace the lamp the worker must be tied off and must reach out over the railing in a precarious position. The replacement takes place over the pool deck and water surface. Care must be taken to prevent any material, including broken glass from falling to the pool deck.

Metal halide lamps do not achieve their full light output immediately after starting. Rather, they require a period of time 1 to 15 minutes-to reach 90% of their full light output

The proposed new technology is LED. The new fixtures will not need to be accessed as frequently as the existing fixtures because lamp replacements are not required. Maintenance requirements for LED fixtures are expected to be much lower than the Metal Halide. We are expecting 100,000 hours of fixture life or 11 years. Access will only be required for cleaning and in the unlikely event of fixture failure. The expectation with LED is that the required handling of the fixtures would be rare, only for cleaning.

LED light sources use approximately a half to a third of the power of metal halide sources to achieve the same light output.

### **3.4 METAL HALIDE FIXTURE LIFE CYCLE COSTS**

In the 10 year expected life cycle of the LED fixture, the metal halide fixtures will require re-lamping 5 times for each of the existing 60 fixtures. Expected ballast failure rates would be 10% to 20% failure over the 10 year period. The cost for this maintenance would be expected to be anywhere from \$185,000 to \$200,000 over the ten year period. These costs would not be seen in the LED replacement. The LED may require the occasional fixture replacements in the 10 years.

### **3.5 LIGHTING CONTROL**

Existing lighting control was replaced in 2015 with Greengate lighting control panels. The lighting controls provide on/off control of the pool lighting and general building lighting. Pan Am Pool staff has indicated that none of the pool lights are switched off at night due to concerns

with the delay the bulbs starting up. Control is installed with four control stations each with five zone pushbutton switches all located behind the desk in reception. The pushbutton layout is not labelled, which adds difficulty in knowing the correct sequence for night time shut down of the pool lights. Investigation would be required to determine what lights could be shut down and maintain the required safe lighting levels of 20fc on the pool deck and 1fc on all path of egress as required by MBC.

Automation could be added to the system to shut off non-required lighting during off hours. Override buttons could be installed to quickly turn on lighting as required. The base price presented for the lighting upgrades will include no changes to the existing controls.

### **3.6 REPLACEMENT REBATES**

There is opportunity for rebates under the Commercial Lighting Incentive program that can be achieved using the proposed LED lighting system. Typically Manitoba Hydro will pay a onetime payment of a maximum of \$1 / watt of energy saved. Manitoba Hydro calculates the rebate on a case by case basis at project completion. Estimated rebate values are given for each of the lighting upgrade options in section 4 below, these values are estimates only. Estimated using \$1/watt saved, however the final rebate value will be determined by Manitoba Hydro

### **3.7 LIGHTING SIMULATIONS**

KGS used Visual Lighting Simulation software for the conceptual layout of lighting for this report. The model was built from information provided on the original building drawings. Some dimensions have been inferred from the drawings. No actual field measurements were taken. Accurate field confirmed dimensions will be required during detailed design.

## **4.0 RECOMMENDED WORK SUMMARY AND COST ESTIMATES**

We have provided five options for the lighting upgrades to the main tank, all of the options include replacement with LED lighting. All the options include fixtures that are rated for use in a pool environment. The options are separated into direct lighting and indirect lighting. Indirect lighting means that the fixture source is pointed up and the lighting is reflected off the ceiling to light the space and floor below. Whereas direct lighting the source is pointed down towards the space to be illuminated.

All options utilize the existing lighting power circuits and existing lighting control system. Relocation of the existing power circuits is required for some of the options; this is described in the sections below.

### **4.1 DIRECT LIGHTING OPTIONS**

#### **4.1.1 OPTION 1 – Led High Bay Fixtures Installed Along North and South Sides of Pool**

This option includes two rows of LED high bay fixtures mounted over the north and south sides of the pool. The fixtures are located in a similar arrangement to the existing lighting. As discussed above the existing lighting is deficient in providing a high level of light in the center of the pool and provides little light on the stands area. This proposed high bay LED fixture has a very different light distribution as compared to the existing MH flood style fixtures. The higher performance optics of this proposed fixture provides sufficient lighting levels at the center of the pool and provides light to the stands area

This option requires very little modification to the existing power distribution as the fixtures are mounted in similar locations to the existing.

Small gaps in ceiling tile would be required in the fixture locations to allow the fixtures to be suspended below the acoustic ceiling. This can be easily coordinated during the detailed design. New mounting brackets are required to lower the fixture below the acoustic screening. A possibility is to suspend the fixtures by a pendant or by a chain. A chain hung fixture is recommended as this could be pulled up to the catwalk for any required cleaning. A mock-up of

the fixture can be completed to review this and determine if there is any fixture movement on a chain suspension system.

### Energy Savings:

Fixture Quantity	74
Power per Fixture	589 W
Total System Power	43 kW
Estimated Hydro Rebate Value (Note 1)	\$28,414

**Notes:**

1. Manitoba Hydro rebate value is determined by Hydro on a case by case basis. The estimated value presented above is based on \$1 / Watt of energy saved as compared to the existing installation. The existing installation includes both the pool lighting and the stands lighting. (72kW total).

#### 4.1.2 OPTION 2 – Distributed High Bay Led Lighting

This option includes LED high bay fixtures mounted in a regular pattern above the pool area. A benefit to this layout is it provides the most even distribution of light throughout the space. This layout is very similar to the original lighting layout that was installed at the time the building was constructed. This type of layout is not typical for a pool with MH fixtures because of the difficulty to maintain these fixtures as re-lamping is required and is difficult to complete over the water. This is not an issue with LED fixtures due to the low maintenance requirements.

The fixtures used in this option are lower output fixture as compared to the existing and to option 1 and therefore would not be as bright to the eye. This option would address the darkness on the 10m platform and the glare from the fixtures as they will not be so bright.

There is sufficient electrical power available for this installation, however the existing power circuits will need to be terminated in a junction box and extended to the fixture locations.

Small gaps in ceiling tile would be required in the fixture locations to allow the fixtures to be suspended below the acoustic ceiling. This can be easily coordinated during the detailed design. New mounting brackets are required to lower the fixture below the acoustic screening. A possibility is to suspend the fixtures by a pendant or by a chain. A chain hung fixture is recommended as this could be pulled up to the catwalk for any required cleaning. A mock-up of

the fixture can be completed to review this and determine if there is any fixture movement on a chain suspension system.

**Energy Savings:**

Fixture Quantity	88
Power per Fixture	432 W
Total System Power	38 kW
Estimated Hydro Rebate Value (Note 1)	\$33,984

**Notes:**

1. Manitoba Hydro rebate value is determined by Hydro on a case by case basis. The estimated value presented above is based on \$1 / Watt of energy saved as compared to the existing installation. The existing installation includes both the pool lighting and the stands lighting. (72kW total)

**4.1.3 OPTION 3 – Install Linear Style Tube Lighting**

This installation includes many lower output fixtures mounted end to end to provide continuous rows of light above the pool. This is achieved with small LED tube lighting. These fixtures have a power supply which would be located on the catwalk for accessibility; the fixtures are connected with low voltage prefab connectors.

The existing locations of the electrical power would require little to no modifications as the power supplies for this option are intended to be installed near the locations of the existing lighting.

The mounting of this lighting can be incorporated into the acoustic ceiling design and can share the ceilings mounting method. These fixtures would be mounted end to end to provide linear lines of light across the pool.

**Energy Savings:**

Fixture Quantity	312
Power per Fixture	58 W
Total System Power	28 kW
Estimated Hydro Rebate Value (Note 1)	\$43,550

**Notes:**

1. Manitoba Hydro rebate value is determined by Hydro on a case by case basis. The estimated value presented above is based on \$1 / Watt of energy saved as compared to the existing installation. The existing installation includes both the pool lighting and the stands lighting. (72kW total).

#### 4.1.4 OPTION 4 – Install Flood Lighting

A more typical downlight application for a pool is to use floodlights. They would be located on the wall above the galleries and aimed at a 45degree angle down to the service of the water. This moves the fixture away from the site lines up from the pool and still gives good distribution on the pool. In this option the flood lights are wall mounted above the galleries. High output flood lighting is used to blast the entire area with light. The downside to this option is the fixtures will be bright to the eye.

This option would require significant rewiring for electrical power. Junction boxes could be provided on the catwalk where the existing fixtures are wired and surface conduit brought to the new lighting fixtures.

The mounting of these fixtures on the walls will be coordinated with any acoustic treatment. Maintenance of the fixtures will be more accessible from the gallery area.

#### Energy Savings:

Fixture Quantity	48
Power per Fixture	1000 W
Total System Power	48 kW
Estimated Hydro Rebate Value (Note 1)	\$24,000

**Notes:**

1. Manitoba Hydro rebate value is determined by Hydro on a case by case basis. The estimated value presented above is based on \$1 / Watt of energy saved as compared to the existing installation. The existing installation includes both the pool lighting and the stands lighting. (72kW total)

#### 4.2 INDIRECT LIGHTING OPITONS

Indirect lighting gives a more natural feel and good lighting quality for a pool application. The lighting is achieved by bouncing the light off the ceiling to fill the space. This is best suited to an application with a white or light coloured ceiling with a high reflectance rating.

#### 4.2.1 OPTION 5 – Wall Mount Above Galleries

This option includes the installation of indirect lighting fixtures wall mounted on the pools walls above the galleries. Indirect fixtures would be pointed up at the new acoustic ceiling. This option requires the acoustic ceiling have a white colour and high reflectance value.

This option would require significant rewiring for electrical power. Junction boxes could be provided on the catwalk where the existing fixtures are wired and surface conduit brought to the new lighting fixtures.

Maintenance costs would be the lowest as the fixtures could be serviced with a ladder on the galleries. Investigation is required to determine if tying off is required for ladder work on the galleries. Tie points would be added during the fixture installation. Scaffolding would not be required for this option of fixture installation.

#### Energy Savings:

Fixture Quantity	60
Power per Fixture	1000 W
Total System Power	60 kW
Estimated Hydro Rebate Value (Note 1)	\$12,000

#### Notes:

1. Manitoba Hydro rebate value is determined by Hydro on a case by case basis. The estimated value presented above is based on \$1 / Watt of energy saved as compared to the existing installation. The existing installation includes both the pool lighting and the stands lighting. (72kW total).

#### 4.3 ADDITIONAL OPTIONAL LIGHTING AND LIGHTING CONTROLS UPGRADES

The following items have been identified as potential areas for improvement to the proposed upgrades listed above. These items can be added to the project at the City's discretion. Descriptions are provided below and costs are included in the cost estimate in Appendix C.

##### 4.3.1 Add Lighting for Diving Area

The diving area light levels are identified as too dark in the existing installation. There existing High Pressure Sodium (HPS) fixtures mounted on the underside of the 1m and 3m diving

platforms which provide lighting on the floor level. It is proposed to replace these HPS fixtures with new LED fixtures and provide additional wall mount LED lighting behind the dive tower.

**FIGURE 2**  
**EXISTING POOL LIGHTING – DIVING DECK**



This option adds new wall mount LED fixtures to the wall behind the dive tower. These fixtures will be incorporated into the acoustic treatment of the back wall. New higher performance fixture will be added the diving deck to modernize the appearance.

Power would be supplied with surface run conduit from the existing lighting control panels on either side of the pool. This would be considered non-essential lighting that could be switched off at night.

#### **4.3.2 Add Lighting for Deck Level Bench Seating**

The benches located on either side of the pool deck are dark as compared to the surrounding areas. The benches are shadowed from above by the concrete platforms of the galleries.

This option would install linear LED fixtures in the front face of the overhang to provide lighting in these areas. This would also provide additional lighting on the pool deck.

Additional lighting power circuits would be required to power this lighting. Power would be supplied with surface run conduit from the existing lighting control panels on either side of the pool. This would be considered non-essential lighting that could be switched off at night.

#### **4.3.3 Automate Lighting Control**

The lighting control system that was installed in 2015 is a fairly sophisticated systems; however the user controls are only simple push button zone controllers.

There is opportunity to add a graphical interface to the existing system to make its usage more intuitive. Time clock functions would be added to automate the on/off control of non-essential lighting during off hours.

#### **4.3.4 Change Lighting In Foyer and Running Track**

We observed during site visits that the lighting for the second floor Foyer and Running track appears to have been retrofitted into older fixture housings.

While a contractor is on site for the cost of the fixtures and installation it may be worth replacing these fixtures with a downlight style fixture to modernize the appearance of the track.

## 5.0 COST SUMMARY

Table 3 below summarizes the capital works recommended to upgrade the pool lighting. The related detailed design engineering and capital costs are also presented. Note any potential costs related to additional work has not been included. See Appendix C for detailed cost estimate.

**TABLE 3**  
**UPGRADE COST ESTIMATE SUMMARY**

ITEM	DESCRIPTION	TOTAL
1.1	General Conditions	\$455,000
	<b>Down lighting Options</b>	
4.1.1	Replace Existing Fixtures with LED	\$745,580
4.1.2	Multiple Rows of LED Fixtures	\$788,295
4.1.3	Linear Tube Fixtures	\$753,513
4.1.4	Floodlighting	\$849,059
	<b>Indirect Lighting Options</b>	
4.2.2	Wallmount above Galleries	\$705,528
	<b>Other Upgrades</b>	
4.3.1	Add Lighting for Diving Area	\$8,009
4.3.2	Add Lighting for Bench Seating	\$27,878
4.3.3	Automate Lighting Control	\$18,883
4.3.4	Foyer and Running Track Lighting	\$155,141

## 6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the discussions above, an upgrade to LED lighting is recommended. All direct lighting options presented are possible. Indirect lighting is not the recommended route for this space based on the ceiling type and the size of the space to be it. Option 4 is also not recommended as it does not increase the lighting performance as compared to the existing baseline enough to justify the cost. We recommend a mockup of the tube lighting and high bay fixtures during the detailed design phase to help select between Options 1, 2 and 3.

## **7.0 STATEMENT OF LIMITATIONS AND CONDITIONS**

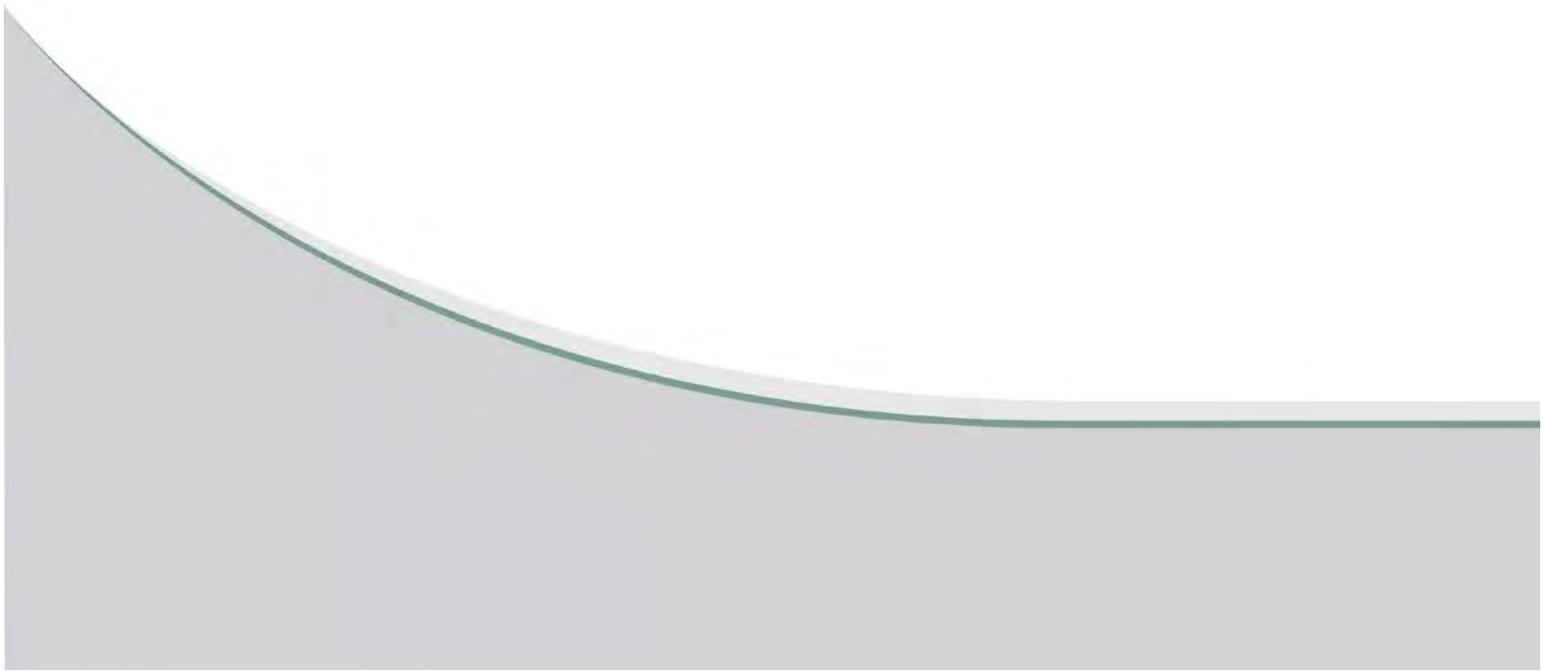
### **7.1 CAPITAL COST ESTIMATE STATEMENT OF LIMITATIONS**

The cost estimates included with this report have been prepared by KGS Group using its professional judgement and exercising due care consistent with the level of detail required for the stage of the project for which the estimate has been developed. These estimates represent KGS Group's opinion of the probable costs and are based on factors over which KGS has no control. These factors include, without limitation, site conditions, availability of qualified labour and materials, present workload of the Bidders at the time of tendering and overall market conditions. KGS does not assume responsibility to the client, in contract, tort or otherwise in connection with such estimates and shall not be liable to the client if such estimates prove to be inaccurate or incorrect.

### **7.2 THIRD PARTY USE OF REPORT**

This report has been prepared for the City of Winnipeg to whom this report has been addressed and any use a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

**APPENDIX A**  
**ACOUSTIC REPORT (INNOVA SOUND)**





**ACOUSTICAL ASSESSMENT OF  
PAN-AM POOL  
25 POSEIDON BAY, WINNIPEG, MB**

**PRESENTED TO THE CITY OF WINNIPEG BY INNOVA SOUND  
Division of Innova Poly Pro Inc.  
IN PARTNERSHIP WITH KGS ENGINEERING**

**WO Project No. 2017-033**

October 4<sup>th</sup>, 2017

Submitted by: Steve Whitty – President & Acoustic Practitioner – Innova Sound

14-1599 Dugald Road – Winnipeg, MB R2J 0H3

[s.whitty@innovasound.com](mailto:s.whitty@innovasound.com) – [www.innovasound.com](http://www.innovasound.com)

This document entitled "Acoustical Assessment Pan-Am Pool – Innova Sound" final draft report was prepared by Innova Poly Pro Inc. for "Innova Sound" and is for the account of KGS Engineering for furtherance to their client, The City of Winnipeg.

The contents of this document are intended to assist the City of Winnipeg with determining the feasibility of acoustic treatments at the Pan-Am Winnipeg Pool Facility. Any reliance on this document by a third party is strictly prohibited. The material reflects Innova Sound's professional judgement and the opinions in this document are based on field experience and observations, science, manufacturers specifications, scientific studies and conditions and information existing at the time that this document was published and do not consider any subsequent changes.

In preparing the document, Innova Sound has not verified all the information supplied by others, unless otherwise stated therein. Any use which a third party makes of this document is the responsibility of such third party and thus agrees that Innova Sound, Innova Poly Pro Inc. or our collaborators on this file and project shall not be responsible for costs or damages of any kind, if any, suffered by it or any third party because of decisions made or actions taken based on this document.

Innova Sound has completed acoustical measurements at the Pan-Am Pool in various conditions over a period of several weeks using Studio Six Digital LLC Series acoustical software and associated acoustical analysis tools...

Our Microphone has been factory calibrated and is an iTest Mic. 28dBA – 120dBA / Frequency Response 20Hz – 20kHz, +/- 3.0dB / 1/2" Nominal diameter and is omnidirectional. The Test Mic meets ANSI/ISO Type 2 specifications.

Steve Whitty – Innova Sound - \_\_\_\_\_

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2.0	Innova Sound – Acoustical Building Assessment
2.1	Current System Description
2.2	Ceiling Options
2.3	Wall Options
2.4	Conclusions & Recommendations

## 2.1 Current System Description

Innova Sound has examined the Acoustical Condition Pan Am Pool as well as the existing ceiling. Our methodology covers the following components.

1. Actual Noise Levels compared to Regulatory Public Health & Safety Guidelines
2. Current ceiling condition from an acoustical perspective
3. Determine acoustic surface properties of the main tank area

Regulatory Guidelines Established by Safe Work Manitoba

<https://www.safemanitoba.com/Page%20Related%20Documents/uploads/guidelines/hearing.pdf>

### Noise Assessment

(NIHL – Noise Induced Hearing Loss)

### Light Occupancy

SPL 76dBA to 83dBA – Below 85dBA guideline – (NIHL) is not Occurring

Speech Intelligibility on the pool deck at three meters is 50% - based on a 1-minute voice recording and assessment.

### Heavy Occupancy

SPL 88dBA to 97dBA – (NIHL) is a concern – LEX measurement should be taken

Speech Intelligibility on the pool deck at three meters is 15% based on a 1-minute voice recording and assessment.

### Reverberation Measurements

RT60 test measures the time it takes for an impulse sound to decay. This test is the result of six impulse tests from different locations within the deck and spectator areas and our final number is the average of the six measurements.

Overall RT60 Measurement – 3.9 Seconds

Target Reverberation is 1 second and not to exceed 2 seconds.

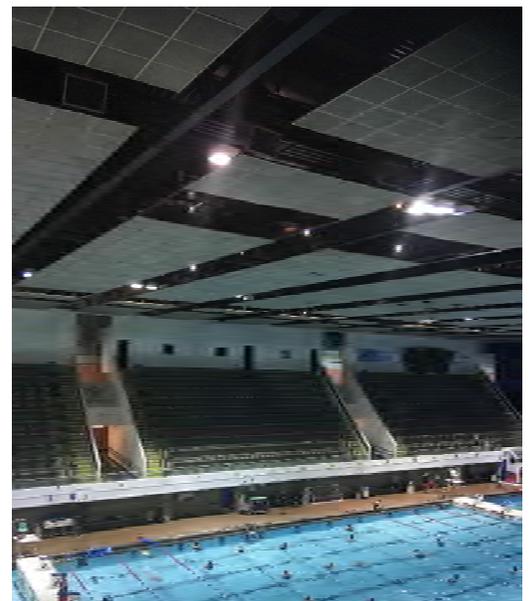
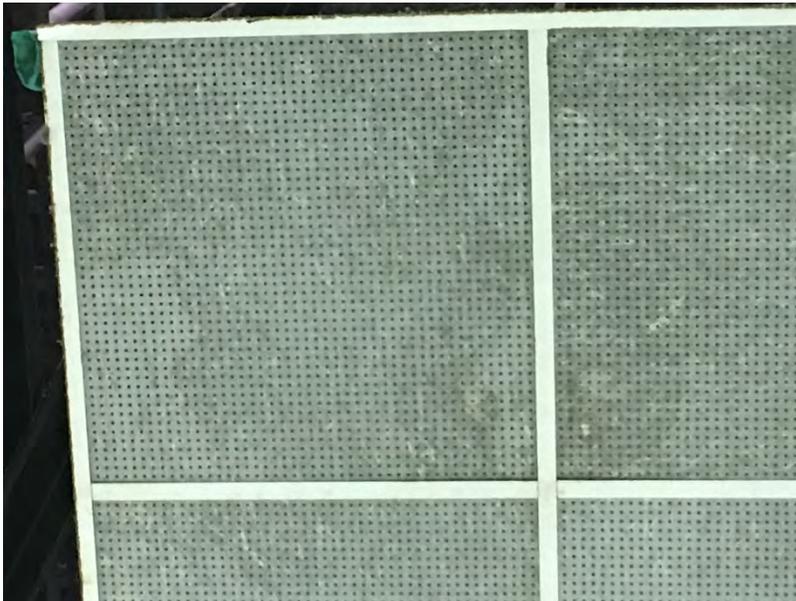
### Existing Ceiling

The current ceiling is made up of a TBAR suspended system and contains 2'X2' Perforated asbestos panels.

There is no significant acoustic dampening that these panels are providing. There is some diffusion that is occurring but we believe there the impact is negligible based on our measurements.

We also note that several panels are missing and that several suspension wires where they attach to the t bar grid system are heavily corroded.

Although inspection from a structural is recommended, we believe failure in part is possible and that asbestos panels or sections could fail.



### Diving Wall

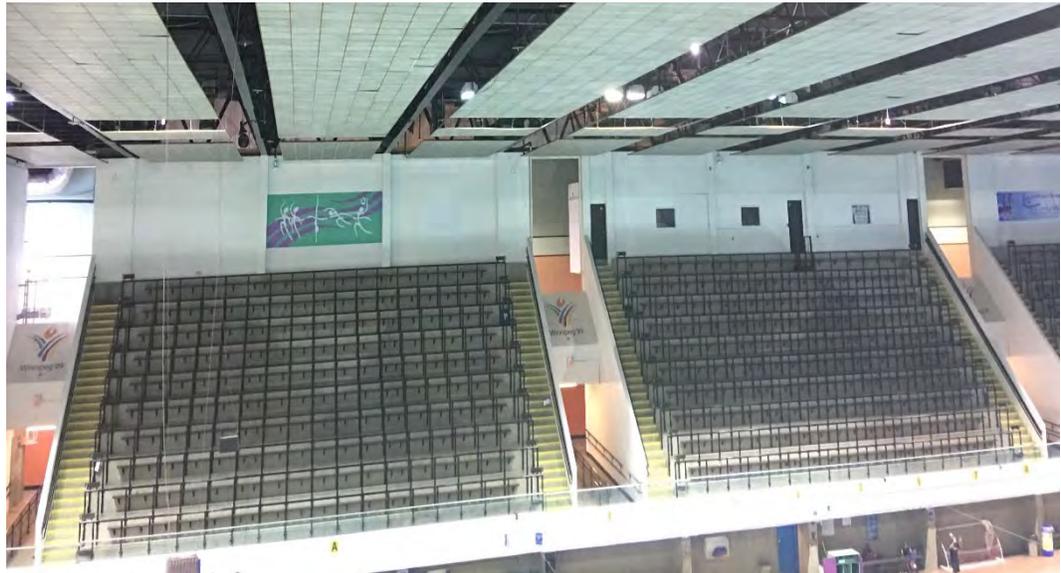
The diving wall is painted concrete which is 100% reflective. Each 180-degree angle creates and additional reflection points which is a significant contributor to excessive reverberation. Proper and accurate treatment of this of this surface is critical.

Currently this wall has an NRC (Noise Reduction Coefficient) of .00. Our target for this surface would be .60 - .70 which will reduce reflections significantly but will still allow some reflection to the opposite end of the pool and will still allow athletes to maintain their spatial awareness. Over attenuation of this surface could pose a serious safety concern.



### Spectator Area

Painted concrete with several 180-degree angles. Seats also create sound scattering but this is largely offset by increasing the sound absorbing properties of spectators. The back walls currently have an NRC of 0.00 and should have an NRC of .75 - .85. This will make a significant improvement on reverberation time.



### Gym Wall

This end wall is reflective however we feel that there the cost to attenuate this surface would not create a cost benefit that we believe is worth the gain.



## 2.2 Ceiling Options

### Core Materials:

- Melamine Open Cell Acoustic Foam – Water Resistant, Light Weight, Easily Formed, Fire Rated, Paintable (Non-Bridging Paint), Cost Effective, Resistant to Rot and Mildew, Impact Resistant
- Acoustic Fabric – Fire Rated, Printable, Acoustically Transparent, Easily Replaced, Extremely Durable, Washable
- PVC Acoustic Track System – Fabric easily installed and removable for fabric replacement or renovation.

### Ceiling Option 1 – Wave

Melamine base waves have an installed dimension of 4'X6' yet has a surface area of 4'X8'. This is acoustically strategic as it allows more absorption surface in less space. With these being suspended we have the added advantage of 2X efficiency by having both sides absorbing sound as opposed to a surface mounting system.

Ceiling Cable Grid System will be used to suspend the waves. Lighting wiring and hardware will piggy back on the cable system. Lighting pots can be incorporated directly through the melamine wave with the addition of a rigid aluminum frame for structural support of the light.

The melamine wave has a density of .5Lbs per cubic foot which makes each cloud extremely light weight which reduces risk of injury should a component ever fail. A wave would fall in a fashion like a falling leaf.

1380 (44160 square feet) waves would be installed on a cable grid system and can be raised in sections with out the need for a scaffold system.

See Innova Sound Drawing SK-1.0 –

Pinta Acoustic Whisper Waves – 4'X8'X1" - \$220,800.00

Saturn Industries - Ceiling Cable Grid System and Hardware – 11,000 Linear Feet - \$34,667.00

C&T Rentals – Man lift Articulation - \$7550.00

Installation – Based on Innova Calculation of eight days - \$35,200.00

**Total Installation Cost - \$298,217.00**

Ceiling Option 2 – Panel Tray System

Melamine based section that has two elevations. Each elevated section is color and the recessed sections are white. The color section runs the pool length.

Refer to Innova Drawing SK1.1

This option is also installed using the ceiling grid system and hardware. This is a self-supporting system and is suspended with corkscrew anchors.

Pinta Acoustics - 4' X 8' Flat White Melamine Panels .5 - 864 - \$49,593.60

Pinta Acoustics - 4' X 8' Painted Melamine Panels .5" – 432 - \$56,730.24

Pinta Acoustics – 1.5" Anchor Cork Screw 1.5" – 5200 - \$16,900.00

Adhesive - \$11,500.00

Saturn Industries - Ceiling Cable Grid System and Hardware – 11,000 Linear Feet - \$34,667.00

C&T Rentals – Man lift Articulation - \$7550.00

Installation – Based on Innova Calculation – \$39,225.00

**Total Installation Cost - \$216,165.84**

## 2.3 Wall Options

### Wall Option 1 – Fabricmate Wall System

Fabricmate Wall System was selected for all wall surfaces. This system is made up of a PVC Fabric Track, Guilford of Maine Fabric with Melamine Open Cell Foam as an acoustical core. The system is proven to be impact resistant, fabric change can be done quickly and easily and will stand up to the humid and harsh environment that makes it ideal to withstand the environmental conditions contained within a public aquatic facility.

### Upper Deck Spectator Area – Innova Drawing SK 2.1

Fabricmate Wall System – 5200 Square Feet - Includes PVC Track, Guilford of Maine Fabric, Pinta Acoustic Melamine Sound Panel, Installation.

**Total Installation Cost - \$65,300.00**

### Diving Wall – Option 2 Innova Drawing SK 3.1

Fabricmate Wall System – 5100 Square Feet - Includes PVC Track, Guilford of Maine Fabric with a color transition from blue to white, Pinta Acoustic Melamine Sound Panel Core, Installation.

**Total Installation Cost - \$65,050.00**

### Lower Deck – Innova Drawing

Perforated Aluminum Panel – 3640 Square Feet - Wellington Perforated Aluminum Panels, Pinta Acoustic Melamine Sound Panel Core, Installation.

**Total Installation Cost - \$19,300.00**

## 2.4 Conclusions and Recommendations

The acoustical component is concerned with the quality and reduction of sound and the control of noise within the pool deck, tank surface and spectator areas. Problems of acoustics are affected by both the design and usage of a space, specifically noise resulting from typical usage. A significant portion of the instructional process depends upon good hearing conditions. Poor sound quality is a problem that can be solved largely by a quality attenuation treatment strategy which takes all variable factors into consideration. Speech should be heard distinctly without effort. Sound reduction and sound control are problems that can plague public facilities where acoustics have not been properly engineered into a facility design and is often an after thought after unintended consequences are realized. Sound control relates to airborne problems (within instructional environments) and structure-borne problems (from creating a condition that falls within the noise tolerance levels through the suppression and isolation of noise, or transmission loss).

Good hearing conditions depend on adding sufficient sound-absorption materials to obtain the optimum reverberation time as it relates to function. Reverberation time is determined by the volume of space and the purpose of the space. Good hearing conditions also depend on retaining some sound reflective properties of the ceiling and walls to assure adequate transmission of sound from one end of the space to the other. Acoustical treatment is generally most effective if placed where large surfaces intersect at angles of less than 180 degrees.

Based on the acoustical measurements during light and heavy facility use, we find that poor sound quality is a constant and speech intelligibility is a major issue which does raise concern for public and employee safety and of course has a direct impact on instructional or directional communication.

In our opinion, based on instrumentation measurements and light and heavy occupancy testing of the main tank area, the Pan-Am Pool does comply with the standards set out by the "Guideline for Hearing Conservation and Noise Control" published by Workplace Safety & Health Division (Jan 2007) for light use of the main tank. During light use of the main tank area we observed 76dBA – 83dBA of noise. We recommend that the employer perform a Lex noise assessment (CAN/CSA Standard Z107.56-6, *Measurement of Occupational Exposure to Noise*).

In our opinion, based on conditions stated above, the Pan-Am Pool is complying however occupants are exposed to high dB during heavy occupancy use. We observed 88dBA – 97dBA SPL which exceeds Lex permissible limits however Lex measurements have not been taken by Innova. A worker is permitted a total of 30 minutes per day of an SPL of 97dBA. The increase in sound pressure is attributed to the "Lombard effect" where people involuntarily increase their vocal effort in loud noise to enhance the audibility of their voice. This condition is enhanced with excessive reverberation time in the space.

An RT60 (reverberation) measurement was also completed with no occupants in the main tank area and was measured with the balloon impulse noise from six different locations. We have determined that the main tank area has a reverberation time 3.9 Seconds. This reverberation time is very high and has a

significant impact on speech intelligibility. This raises concern over the quality of intelligible communication between bathers and the lifeguards or instructors. Children, people who speak English as a second language, hearing impaired people and seniors are at greater risk for miscommunication which in our opinion, causes concern.

Our final recommendations are as follows;

1. A Dosimeter should be carried by lifeguards for a period of 2 weeks to establish actual exposure levels and duration.
2. The ceiling needs to be treated acoustically with a cloud type of panel. Baffles are less effective in this environment. Ceiling treatment is expected to bring the reverberation time down to 2.7 seconds.
3. The second priority should be the deck area. This will help with speech intelligibility on the deck area. We would see an overall reduction of reverberation time of .4 seconds by treating this area. Down to 2.3 seconds
4. Third priority is the diving wall. We expect to see a .6 second reduction by treating this surface. Brings the reverberation time down to 1.7 seconds
5. Fourth priority is the spectator area. We would see a .5 second reduction bringing the overall RT down to 1.1 Seconds

Prepared by:

Steve Whitty – President and Acoustic Practitioner – Innova Sound

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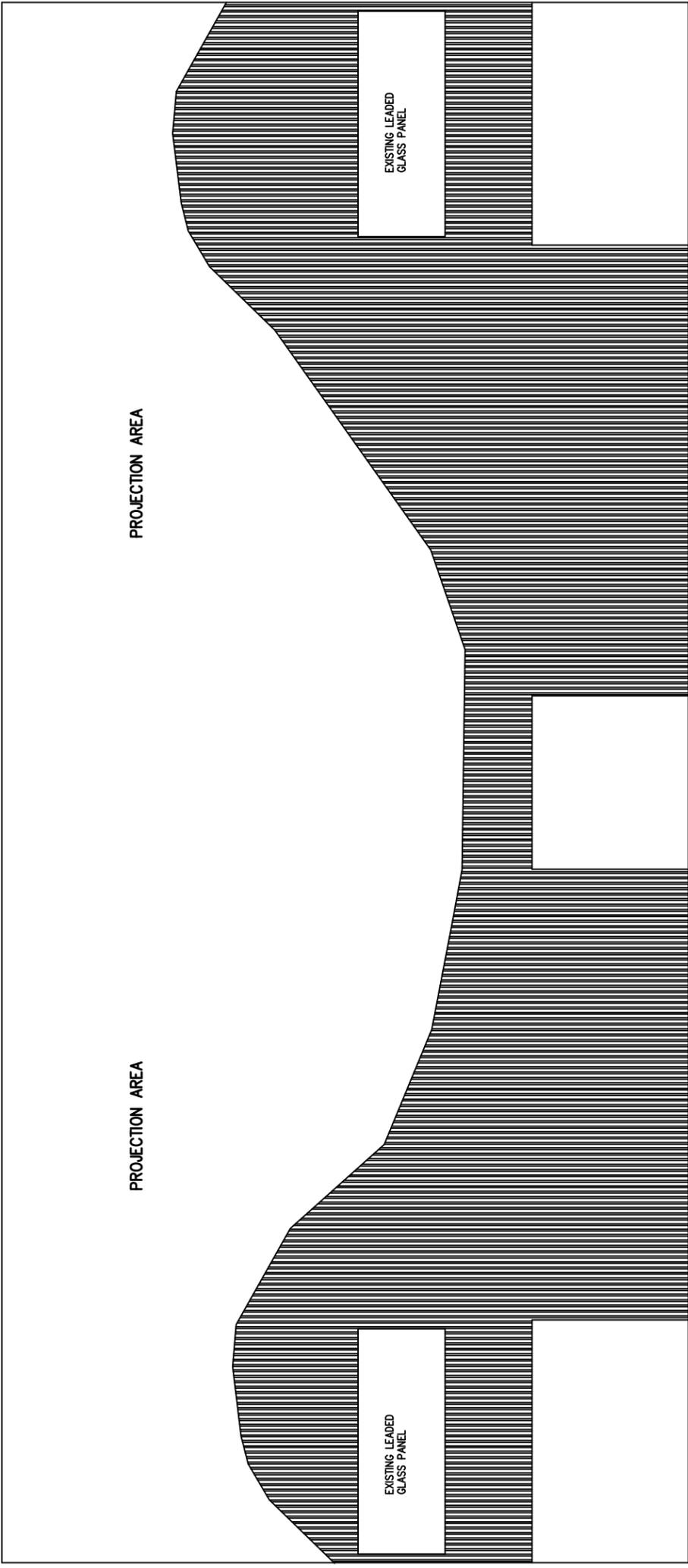
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-	-	-
No.	Revision/Issue	Date



Project Name and Address  
**PAN AM POOL**

Title <b>DIVING WALL DETAIL</b>		Sheet <b>SK-3.0</b>
Date <b>SEPT., 2017</b>	Scale <b>as noted</b>	



**1** ELEVATION - DIVING BOARD WALL  
**SK-3.0** 1/8" = 1'-0"

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**PAINT COLOURS.**  
ALL COLOURS ARE BENJAMIN MOORE

CC-290 STRAW HAT

**NICHES**

COLUMNS BY BENCHES

AF-230 BUTTERED YAM

DIVING BOARD  
DOORS

HC-149 BUXTON BLUE

UPPER DECK WALLS  
CEILING TILES

CC-640 SEA GRASS

UPPER DECK WALLS  
CEILING TILES

CC-270 DENIM WASH

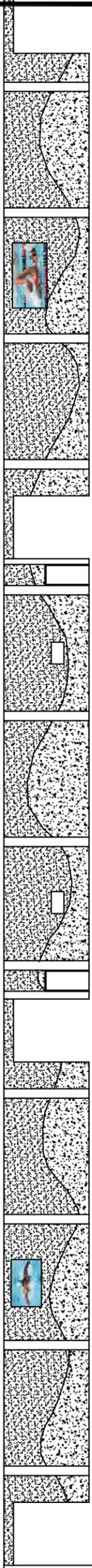
UPPER DECK COLUMNS  
CEILING TILES

No.	Revision/Issue	Date
-	-	-

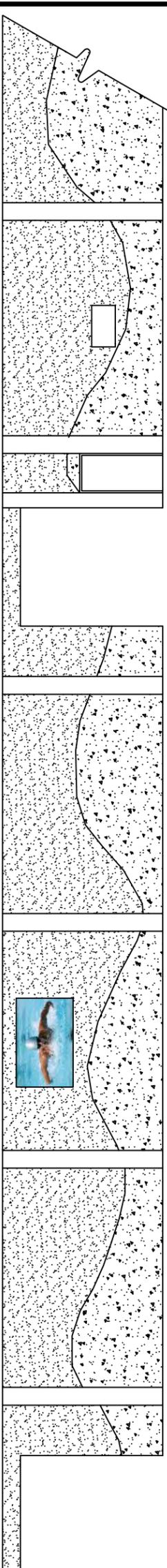


Project Name and Address  
**PAN AM POOL**

Title	WALL DETAIL	Sheet	SK-2.1
Date	SEPT., 2017	Scale	as noted

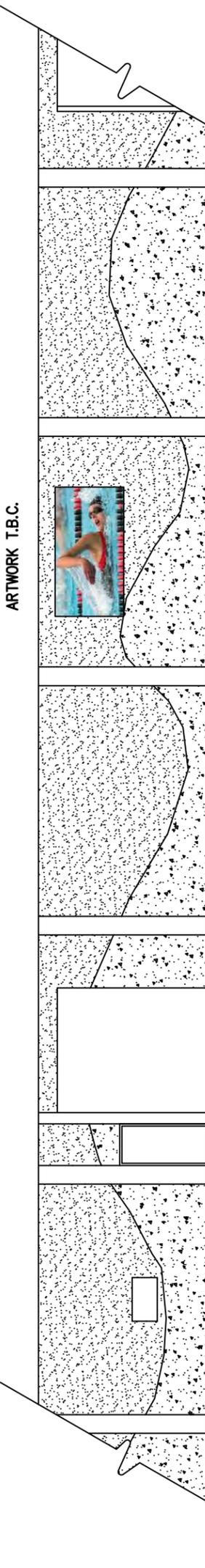


**1** ELEVATION - UPPER DECK WALL  
SK-2.1 N.T.S.



ARTWORK T.B.C.

**2** ELEVATION - UPPER DECK WALL DETAIL  
SK-2.1 3/32" = 1'-0"



ARTWORK T.B.C.

**3** ELEVATION - UPPER DECK WALL DETAIL  
SK-2.1 3/32" = 1'-0"

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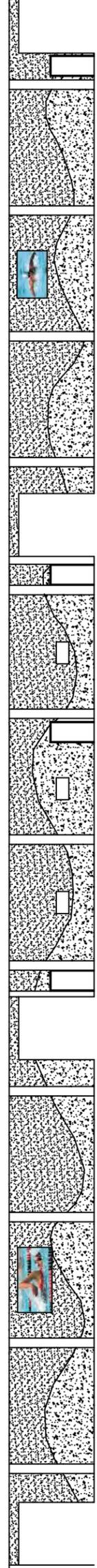
- PAINT COLOURS:**  
 ALL COLOURS ARE BENJAMIN MOORE
- CC-290 STRAW HAT  
NICHES  
COLUMNS BY BENCHES
  - AF-230 BUTTERED YAM  
DIVING BOARD  
DOORS
  - HC-149 BUXTON BLUE  
UPPER DECK WALLS  
CEILING TILES
  - CC-640 SEA GRASS  
UPPER DECK WALLS  
CEILING TILES
  - CC-270 DENIM WASH  
UPPER DECK COLUMNS  
CEILING TILES

No.	Revision/Issue	Date
-	-	-

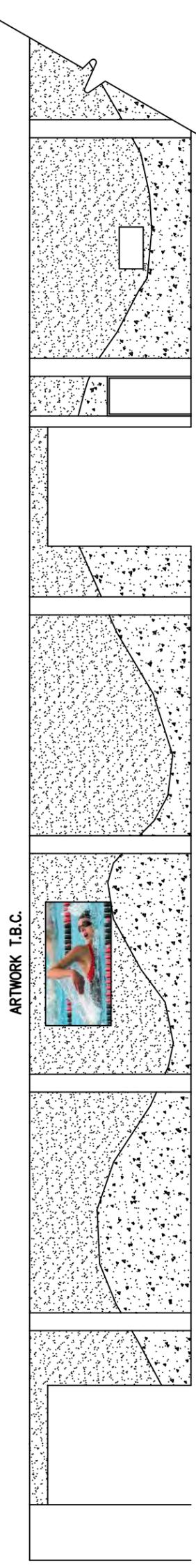


Project Name and Address:  
**PAN AM POOL**

Title	Sheet
WALL DETAIL	SK-2,0
Date	SEPT., 2017
Scale	as noted

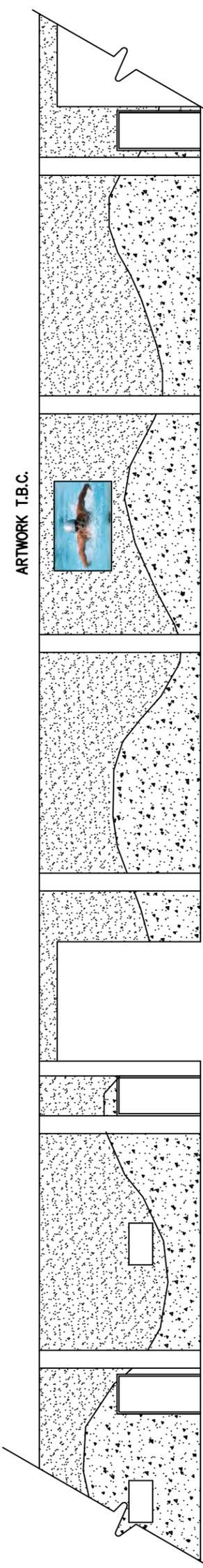


**1** ELEVATION - UPPER DECK WALL  
 SK-2,0 N.T.S.



ARTWORK T.B.C.

**2** ELEVATION - UPPER DECK WALL DETAIL  
 SK-2,0 3/32" = 1'-0"



ARTWORK T.B.C.

**3** ELEVATION - UPPER DECK WALL DETAIL  
 SK-2,0 3/32" = 1'-0"

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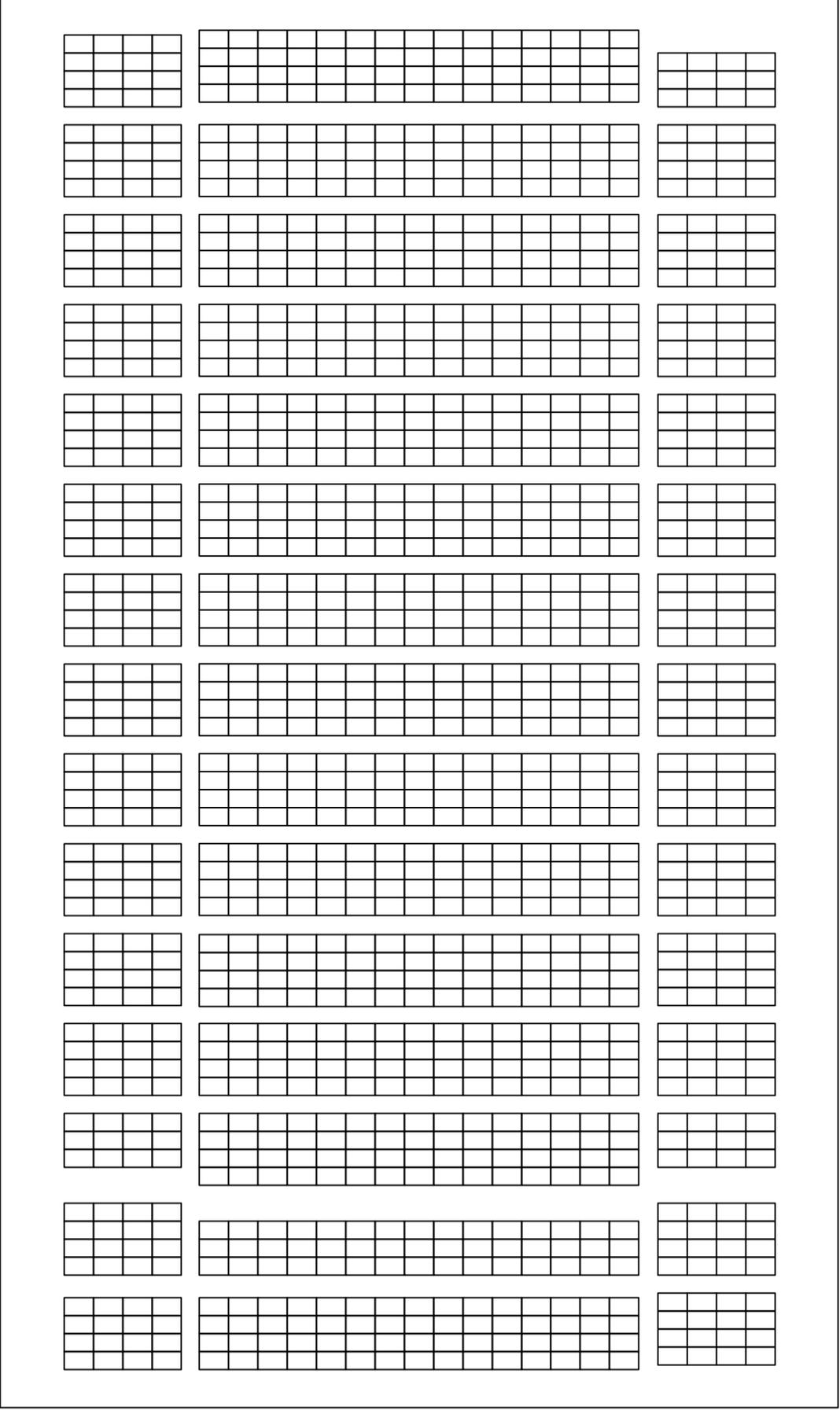
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No.	Revision/Issue	Date
-	-	-



Project Name and Address  
**PAN AM POOL**

Title <b>CEILING DETAIL</b>	Sheet <b>SK-1.0</b>
Date <b>SEPT., 2017</b>	Scale <b>as noted</b>



**1** PLAN - CEILING DETAIL  
**SK-1.0** 1/32" = 1'-0"



CEILING PANELS TO BE SIMILAR TO ABOVE  
 4' X 8' MELAMINE PANELS MOLDED TO FORM THE WAVE  
 MOLDED TO FORM IS 4' X 6'

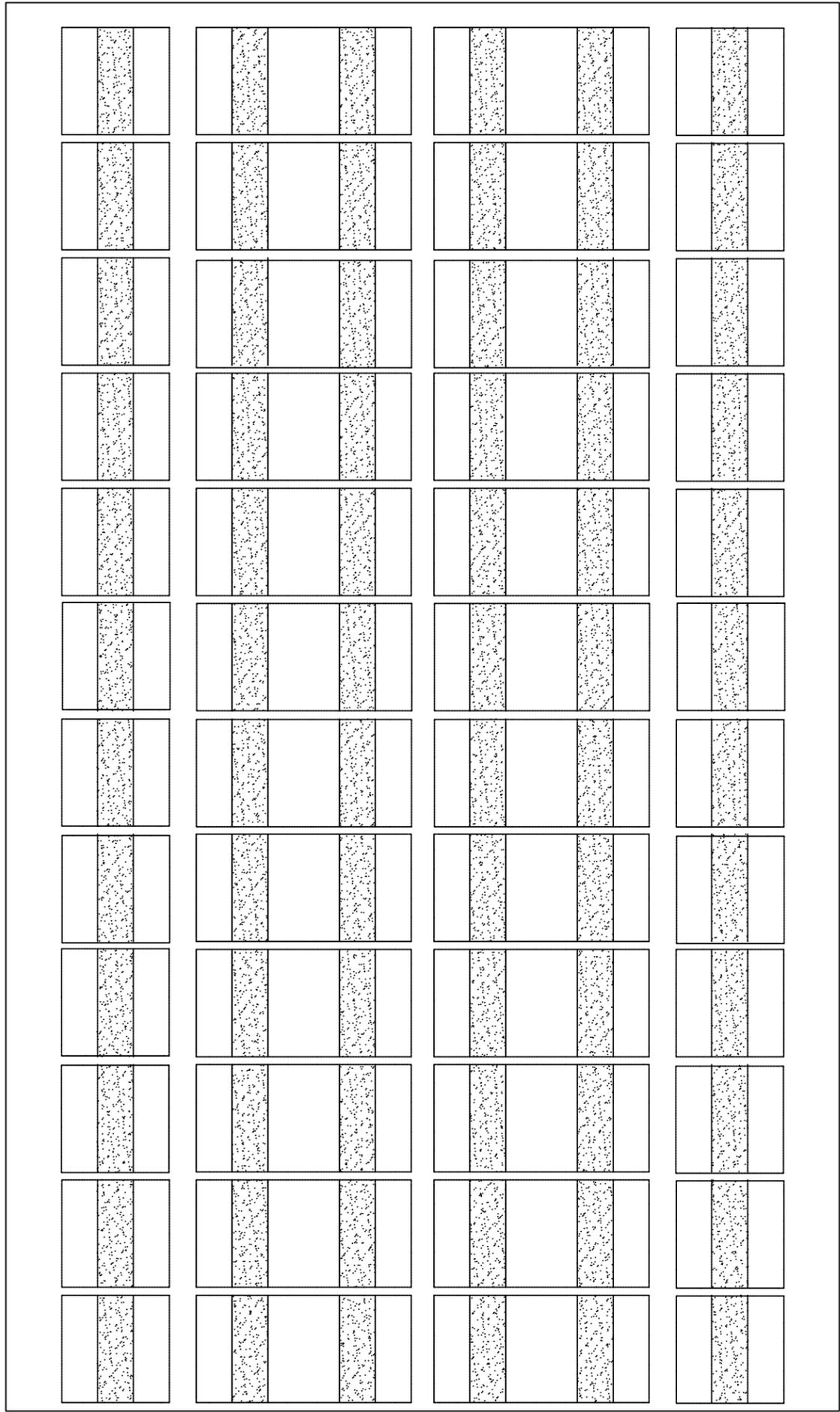
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No.	-	Revision/Issue	-
			Date



Project Name and Address  
**PAN AM POOL**

Sheet  
**CEILING OPT 2**  
 Date  
**OCT., 2017**  
 Scale  
**as noted**  
**SK-1.1**



**1** PLAN - CEILING DETAIL  
 SK-1.2 1/32" = 1'-0"



**2** DETAIL - PANEL DESIGN  
 SK-1.2 1/8" = 1'-0"

**3** DETAIL - PANEL DESIGN  
 SK-1.2 1/8" = 1'-0"

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No.	-	Revision/Issue	Date
	-		



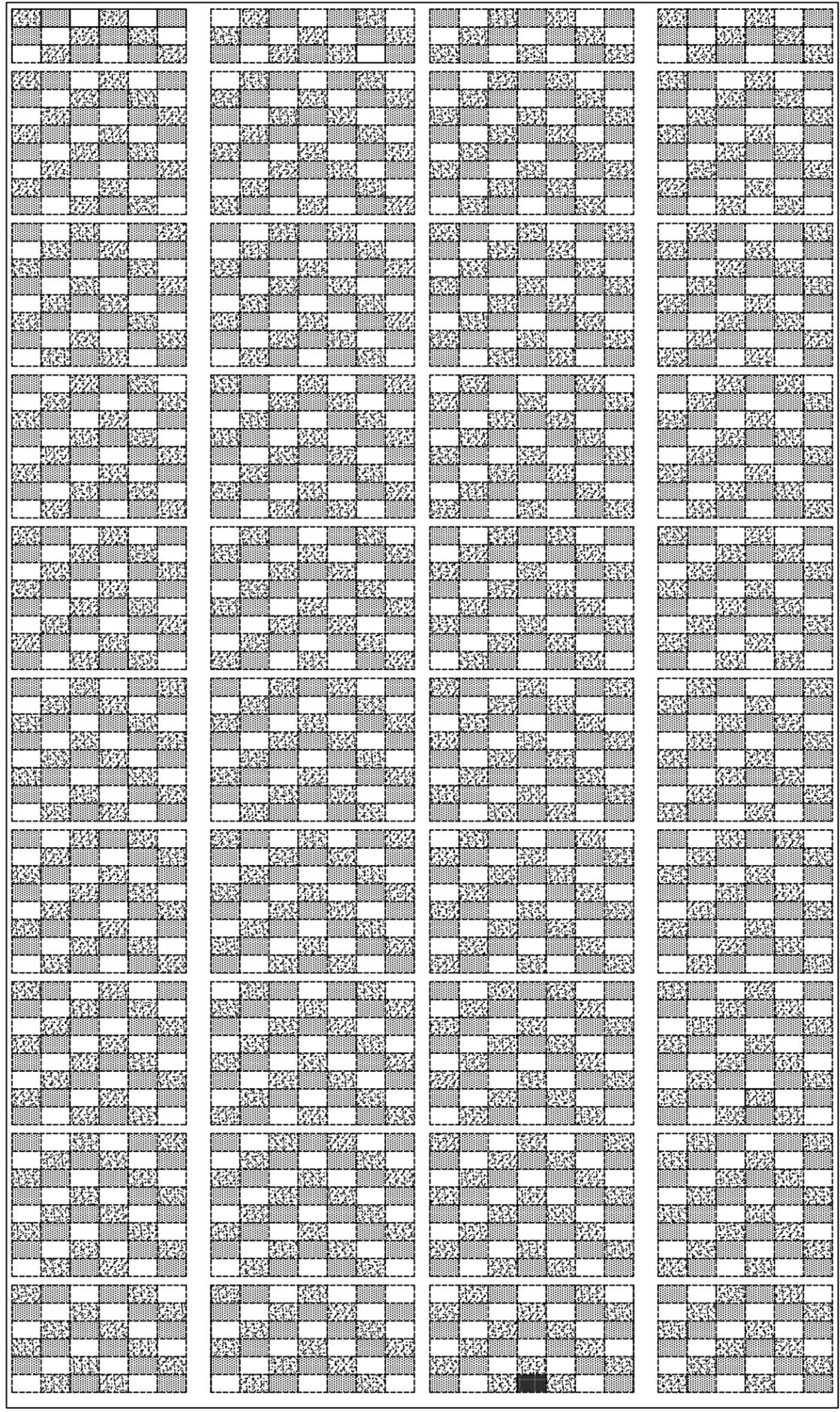
Project Name and Address  
**PAN AM POOL**

Sheet  
**SK-1.0**

Title  
**CEILING OPT1 - REV**

Date  
**OCT., 2017**

Scale  
*as noted*

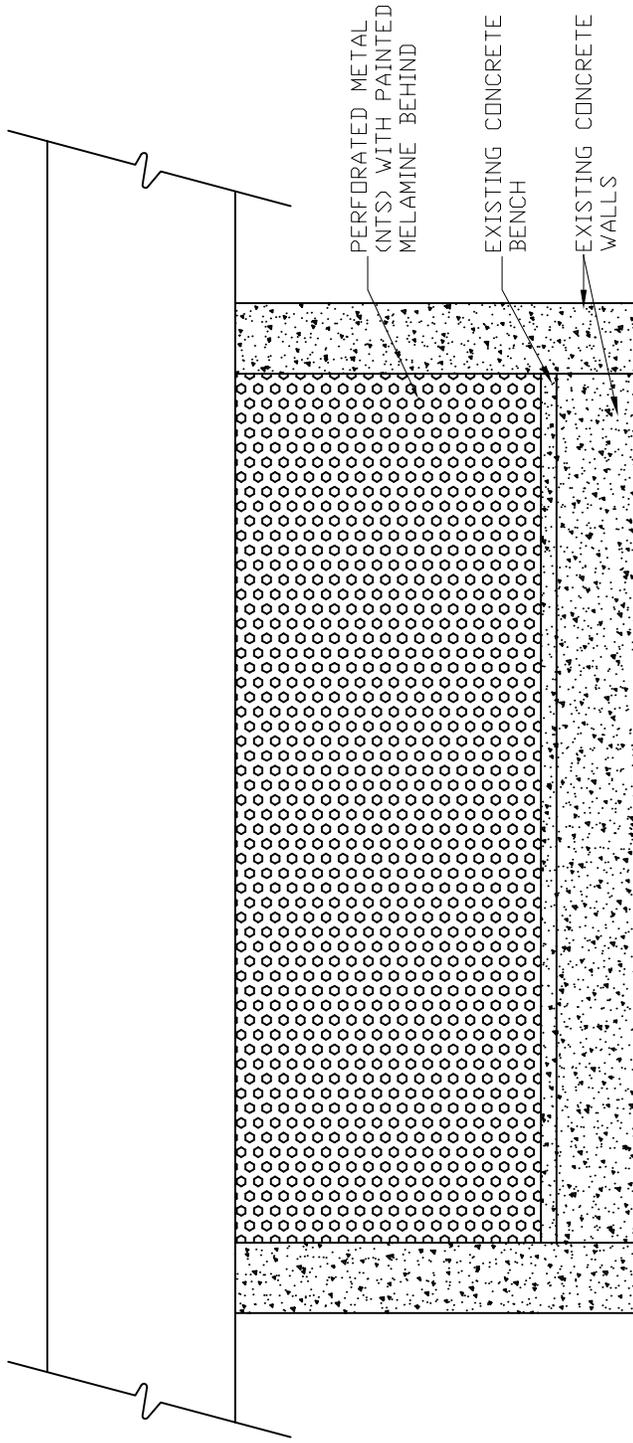


**1** PLAN - CEILING DETAIL  
**SK-1.2** 1/32" = 1'-0"



CEILING PANELS TO BE SIMILAR TO ABOVE  
 4' X 8' MELAMINE PANELS MOLDED TO FORM THE WAVE  
 MOLDED TO FORM IS 4' X 6'





1 ELEVATION - SWIMMING BENCH DETAIL  
 SK-4.0 1/4" = 1'-0"



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Project Name and Address <b>PAN AM POOL</b>	
Drawing Title <b>POOL BENCH WALL DETAIL</b>	Date <b>as noted</b>
Scale <b>OCT. 2017</b>	

Sheet 1

SK-4.0

**INNOVA SOUND**  
Acoustic Consulting & Design

Client:	City of Winnipeg / KGS
Project:	Pan Am Pool- LED LIGHTING REPLACEMENT FEASIBILITY ASSESSMENT
Project No.:	17-0107-013
Location:	Winnipeg , Manitoba

Revision:	Date
A	4-Oct-17

Labour Rate/Hour: \$92.00

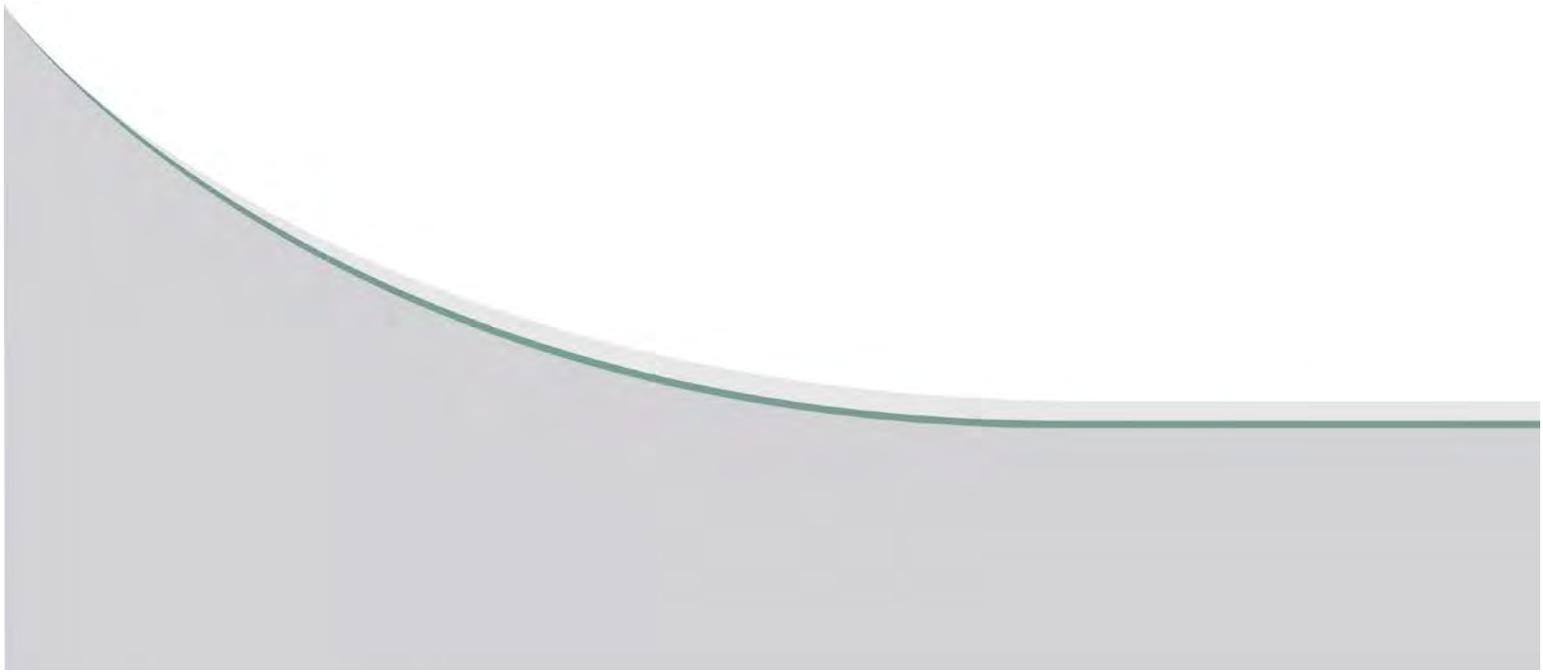
**Capital Cost Estimate**

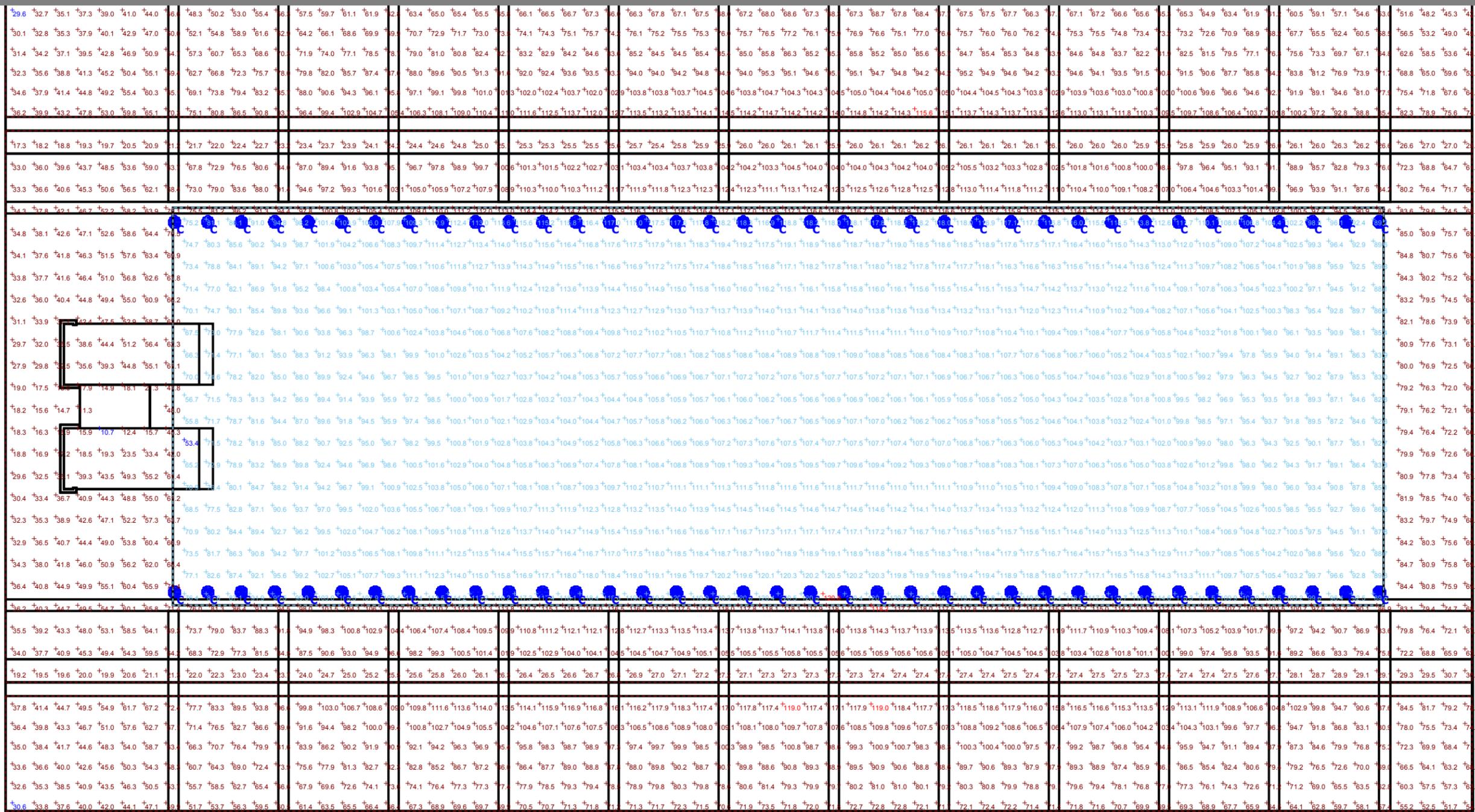
ITEM	DESCRIPTION	QTY.	UNIT	UNIT	MATERIAL & COST	LABOUR			TOTAL
						Hours / Unit	Total Hours	Cost	
<b>2.0</b>	<b>Acoustic Options</b>								
<b>2.2.1</b>	<b>Ceiling Option 1 - Suspended Melamine Wave</b>								
	Pinta Acoustic Whisper Waves - 4'X8'X1"	1380	each	\$160	\$220,800	240.00	60.00	\$14,400	\$235,200
	Saturn Industries - Ceiling Cable Grid System - 11,000 Feet	1	each	\$34,667	\$34,667	350.00	60.00	\$21,000	\$55,667
	C&T Rentals - Man Lift	1	each	\$7,550	\$7,550				\$7,550
	<b>Engineering Design Fees</b>								\$15,500
	<b>Contingency - 20%</b>								\$59,683
	<b>Sub-Total Ceiling Option 1 - Suspended Melamine Wave</b>								<b>\$373,600</b>
<b>2.2.2</b>	<b>Ceiling Option 2 - Panel Tray System</b>								
	Pinta Acoustic Flat WHITE Panel - 4'X8'X1/2"	864	each	\$57.40	\$49,594	100.00	60.00	\$6,000	\$55,594
	Pinta Acoustic Flat PAINTED Panel - 4'X8'X1/2"	432	each	\$131.32	\$56,730	80.00	60.00	\$4,800	\$61,530
	Pinta Acoustic CORKSCREW Hangars	5200	each	\$3.25	\$16,900	20.00	60.00	\$1,200	\$18,100
	Melamine Adhesive	460	each	\$24.77	\$11,394	20.00	60.00	\$1,200	\$12,594
	Saturn Industries - Ceiling Cable Grid System - 11,000 Feet	1	each	\$34,667	\$34,667	320.00	60.00	\$19,200	\$53,867
	Framing	72	each	\$227.75	\$16,398	155.00	60.00	\$9,300	\$25,698
	C&T Rentals - Man Lift	1	each	\$7,550	\$7,550				\$7,550
	<b>Engineering Design Fees</b>								\$8,974
	<b>Contingency - 20%</b>								\$19,942
	<b>Sub-Total Ceiling Option 2 - Panel Tray System</b>								<b>\$263,849</b>
<b>2.2.3</b>	<b>Upper Deck Spectator Fabric Wall</b>								
	Pinta Acoustic Flat Panel 1/2	5200	ft/sq	\$1.85	\$9,620	60.00	60.00	\$5,520	\$15,140
	Fabric Track	3500	linear feet	\$3.25	\$11,375	30.00	60.00	\$5,520	\$16,895
	Guilford of Maine - Acoustic Fabric	5500	ft/sq	\$2.95	\$16,225	100.00	60.00	\$5,520	\$21,745
	<b>Engineering Design Fees</b>								\$4,840
	<b>Contingency - 20%</b>								\$10,756
	<b>Sub-Total Upper Deck Spectator Fabric Wall</b>								<b>\$69,376</b>
<b>2.2.4</b>	<b>Diving Wall - Option 1 Acoustic Treatment</b>								
	Pinta Acoustic Flat Panel Melamine	5100	Sq/Ft	\$1.85	\$9,435	40.00	60.00	\$5,520	\$14,955
	Fabric Track	2500	linear Feet	\$3.25	\$8,125	80.00	60.00	\$5,520	\$13,645
	Guilford of Maine - Acoustic Fabric	5300	Sq/Ft	\$2.95	\$15,635	60.00	60.00	\$5,520	\$21,155
	<b>Engineering Design Fees</b>								\$4,478
	<b>Contingency - 20%</b>								\$6,960
	<b>Sub-Total Diving Wall - Option 1 Acoustic Treatment</b>								<b>\$61,193</b>
<b>2.2.5</b>	<b>Option 2 - Diving Wall with Perforated Aluminum Façade</b>								
	Pinta Acoustic Flat Panel Melamine	5100	Sq/Ft	\$1.85	\$9,435	40.00	60.00	\$2,400	\$11,835
	Wellington Perforated	5500	Sq/Ft	\$3.95	\$21,725	100.00	60.00	\$6,000	\$27,725
	Mounting Brackets	800	each	\$3.05	\$2,440	80.00	60.00	\$5,520	\$7,960
	<b>Engineering Design Fees</b>								\$4,277
	<b>Contingency - 20%</b>								\$9,504
	<b>Sub-Total Option 2 - Diving Wall with Perforated Aluminum Façade</b>								<b>\$61,301</b>
<b>2.2.6</b>	<b>Lower Deck - Seating Area Perforated Aluminum Wall</b>								
	Wellington Perforated - Perforated Abluminum	3640	sq/ft	\$3.95	\$14,378	48.00	60.00	\$5,520	\$19,898
	Pinta Acoustic Flat Melamine Panel - BLACK -	3640	sq/ft	\$3.76	\$13,686	20.00	60.00	\$5,520	\$19,206
	Mounting Brackets	200	each	\$3.05	\$610	20.00	60.00	\$5,520	\$6,130
	<b>Engineering Design Fees</b>								\$4,071
	<b>Contingency - 20%</b>								\$9,047
	<b>Sub-Total BaseLower Deck - Seating Area Perforated Aluminum Wall</b>								<b>\$58,352</b>

**Capital Cost Estimate Statement of Limitations**

The cost estimates has been prepared by Innova Sound using its professional judgment and exercising due care consistent with the level of detail required for the stage of the project for which the estimate has been developed. These estimates represent Innova's opinion of the probable costs and are based on factors over which Innova has no control. These factors include, without limitation, site conditions, availability of qualified labour and materials, present workload of the Bidders at the time of tendering and overall market conditions. Innova Sound does not assume any responsibility to the Client, in contract, tort or otherwise in connection with such estimates and shall not be liable to the Client if such estimates prove to be inaccurate or incorrect.

**APPENDIX B**  
**LIGHTING SIMULATION RESULTS**



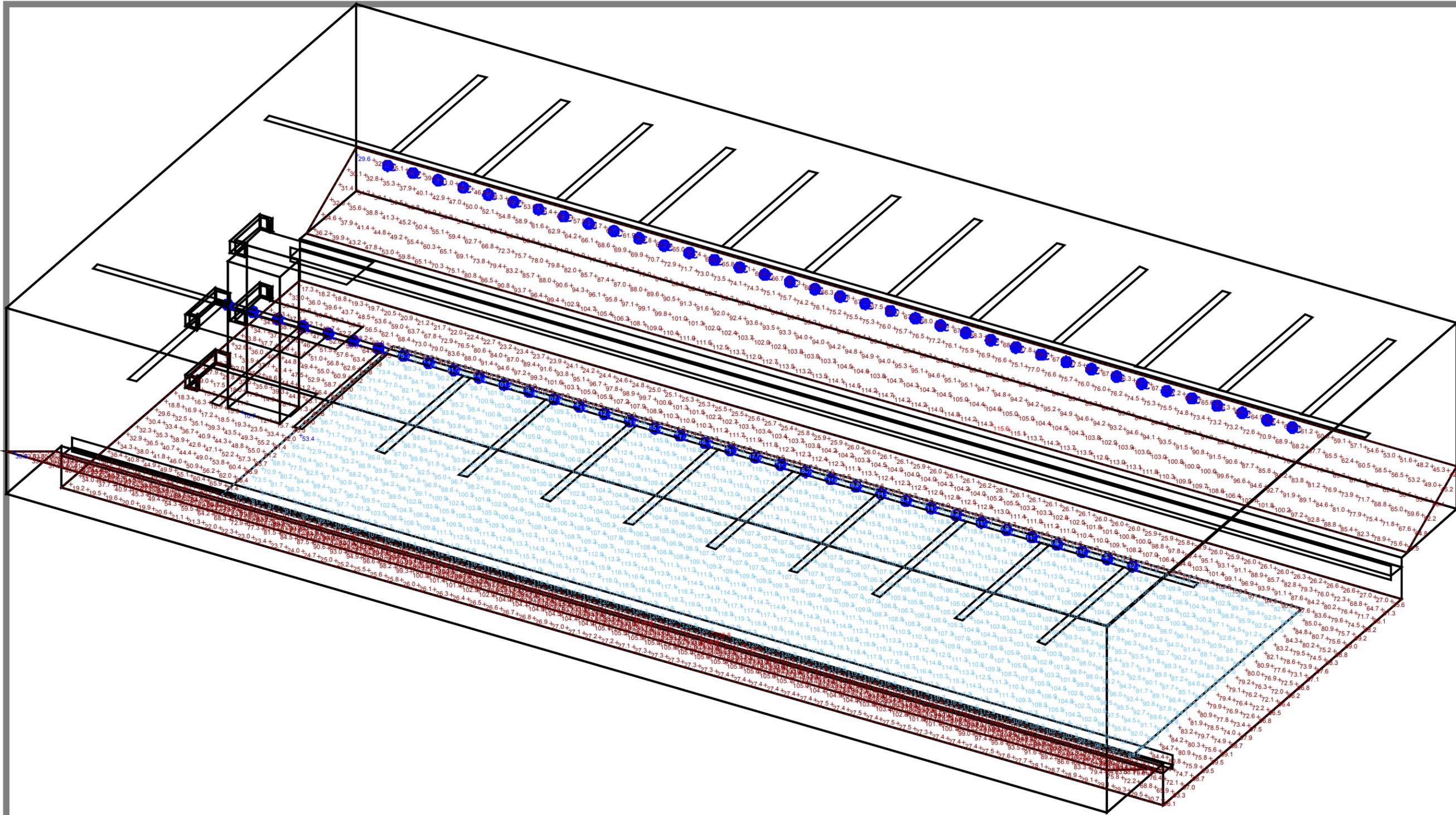


**Plan View**  
Scale - 1" = 20'

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Deck and Water Surface	+	89.8 fc	120.2 fc	0.0 fc	N/A	N/A
North Stands	+	78.4 fc	115.6 fc	29.6 fc	3.9:1	2.6:1
Pool Deck	+	71.2 fc	118.2 fc	10.7 fc	11.0:1	6.7:1
South Stands	+	82.3 fc	119.0 fc	30.6 fc	3.9:1	2.7:1
Water Surface	+	105.0 fc	120.8 fc	53.4 fc	2.3:1	2.0:1

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**



**PAN AM POOL  
LIGHTING SIMULATION  
OPTION 1**

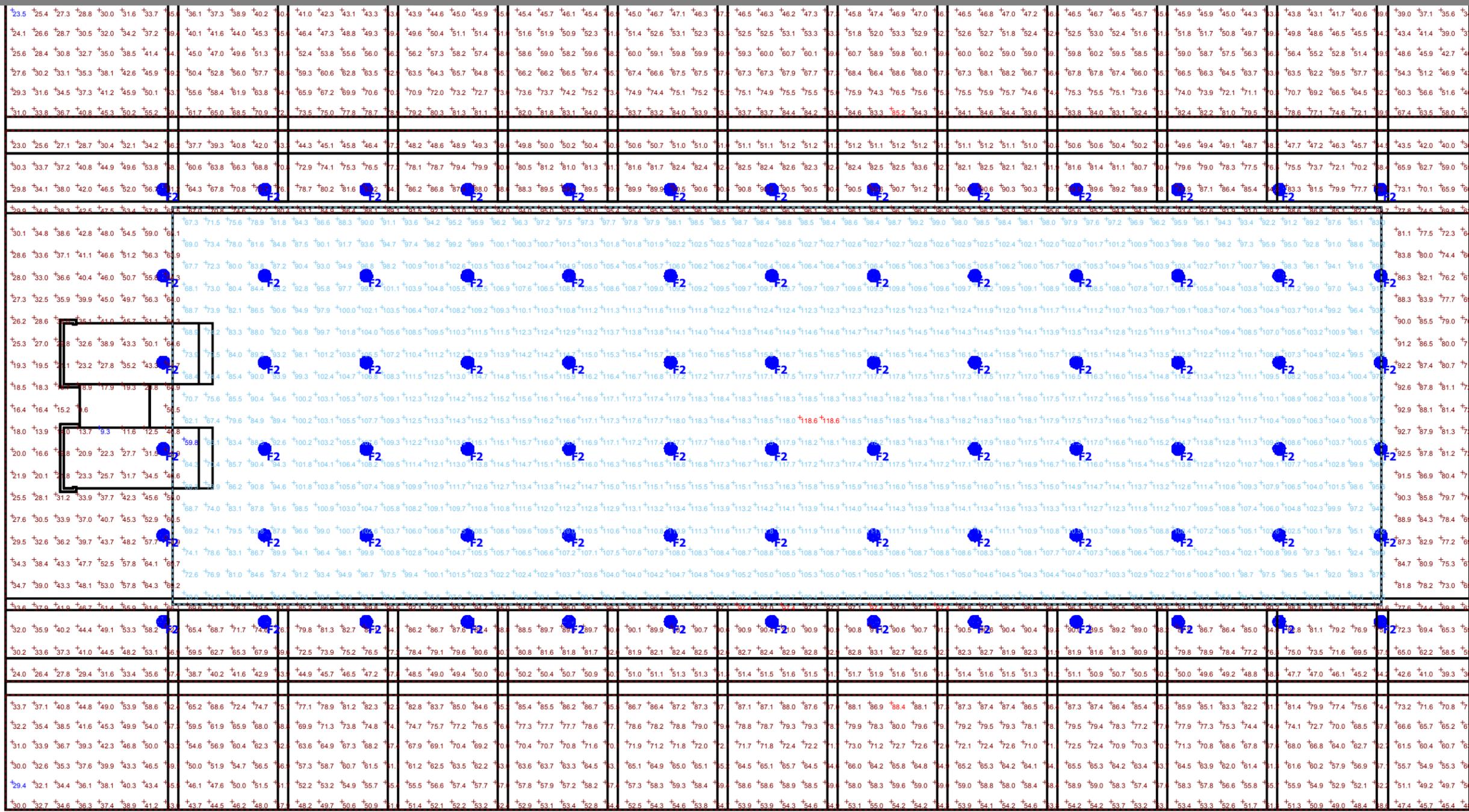
**South East View**

**Schedule**

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens Per Lamp	Light Loss Factor	Wattage
	<b>C</b>	74	Holophane	PHZL 70L 40K 80CRI M FR	Phuzion Large 7000LM 4000K 80CRI Medium Frosted Optic	LED	1	PHZL_70L_40K_80CRI_M_FR.ies	59037	0.8	589

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**



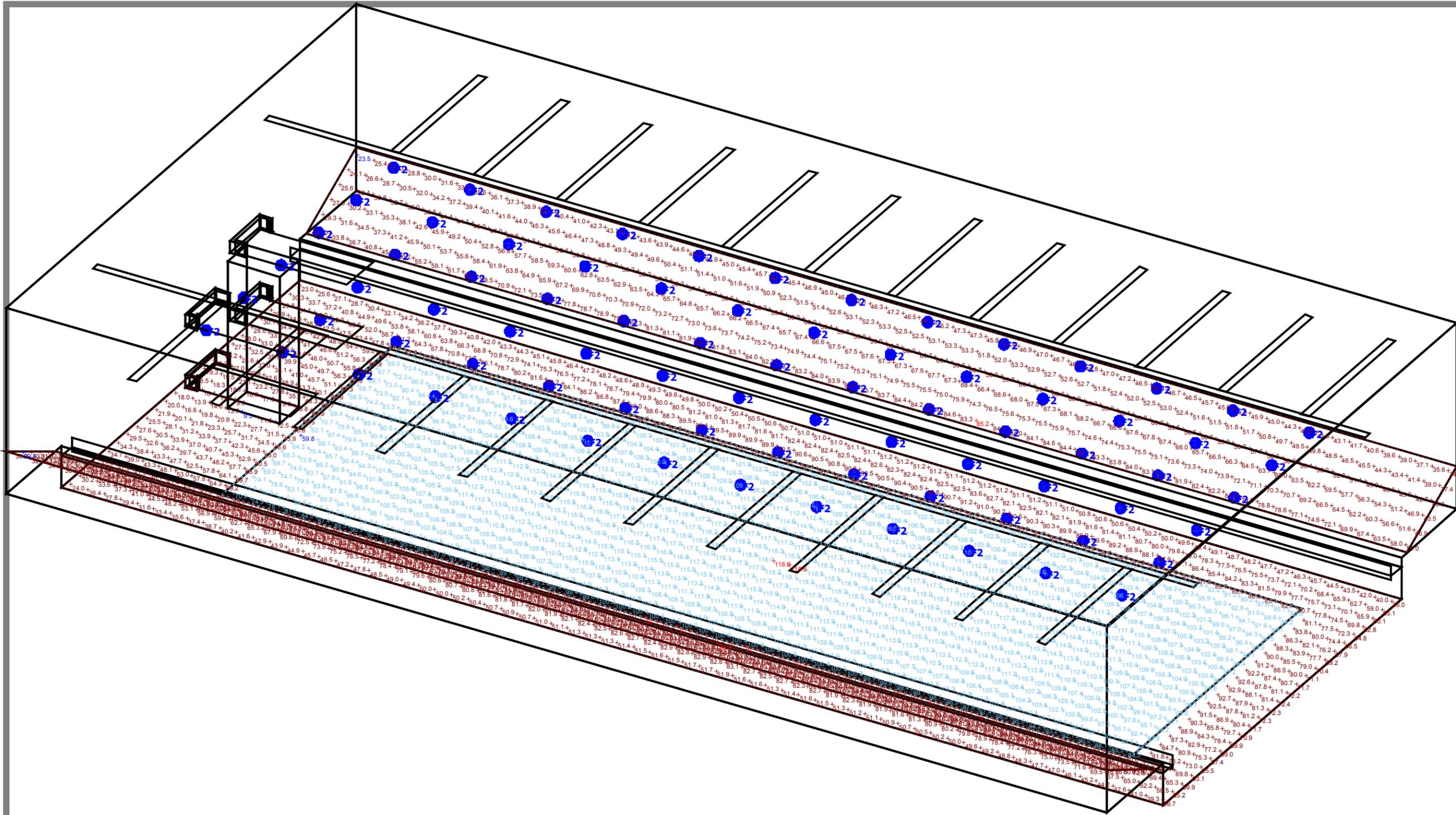
**Plan View**  
Scale - 1" = 20'

**Statistics**

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Deck and Water Surface	+	88.0 fc	118.6 fc	0.0 fc	N/A	N/A
North Stands	+	57.6 fc	85.2 fc	23.5 fc	3.6:1	2.5:1
Pool Deck	+	65.9 fc	97.4 fc	9.3 fc	10.5:1	7.1:1
South Stands	+	63.1 fc	88.4 fc	29.4 fc	3.0:1	2.1:1
Water Surface	+	105.0 fc	118.6 fc	59.8 fc	2.0:1	1.8:1

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**



**PAN AM POOL  
LIGHTING SIMULATION  
OPTION 2**

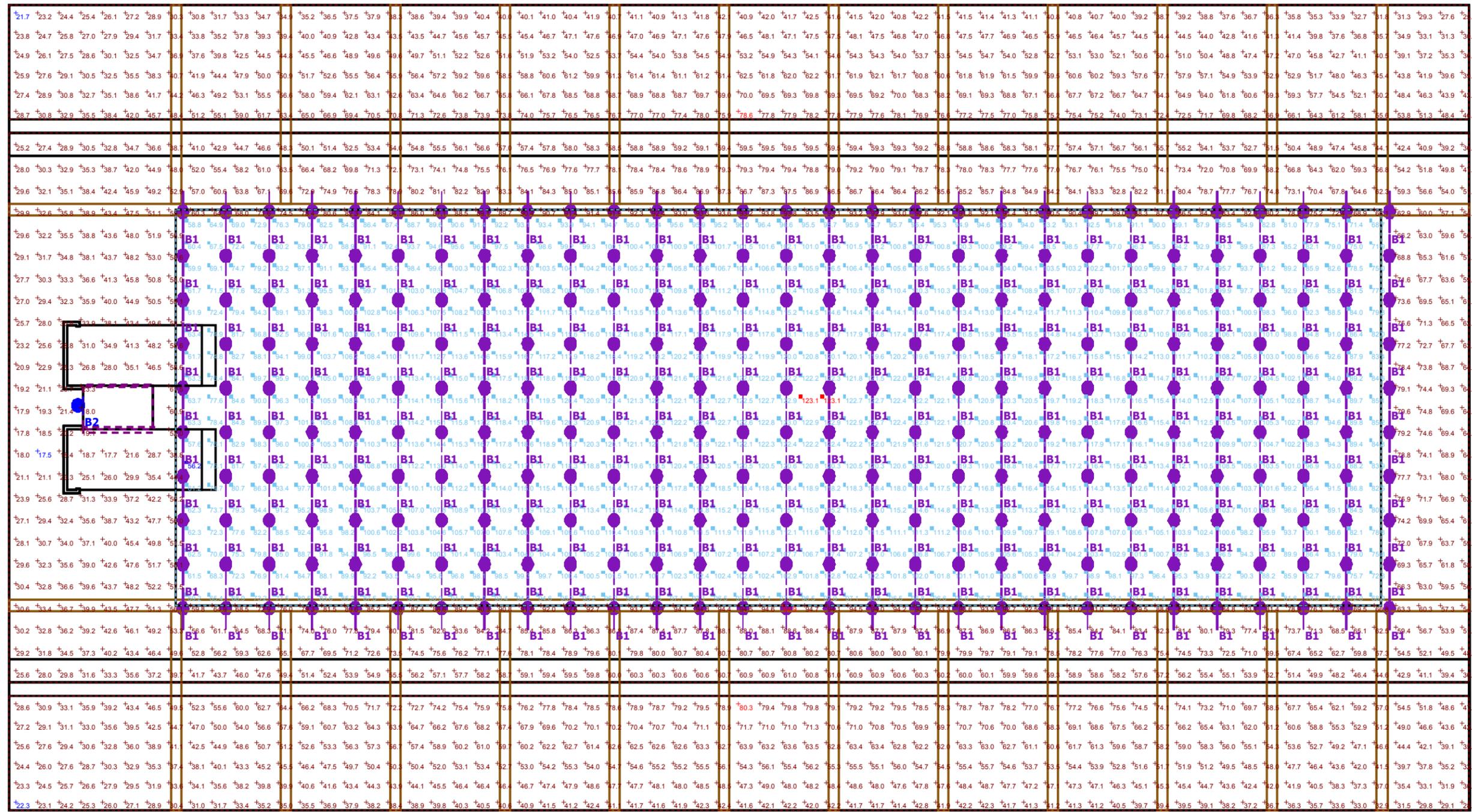
**South East View**

**Schedule**

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens Per Lamp	Light Loss Factor	Wattage
	<b>F2</b>	78	Holophane	PHZL 60L 40K 80CRI M FR	Phuzion Large 60000LM 400K 80CRI Medium Frosted Optic	LED	1	PHZL_60L_40K_80CRI_M_FR.ies	50807	0.8	511

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**



**Plan View**  
Scale - 1" = 20'

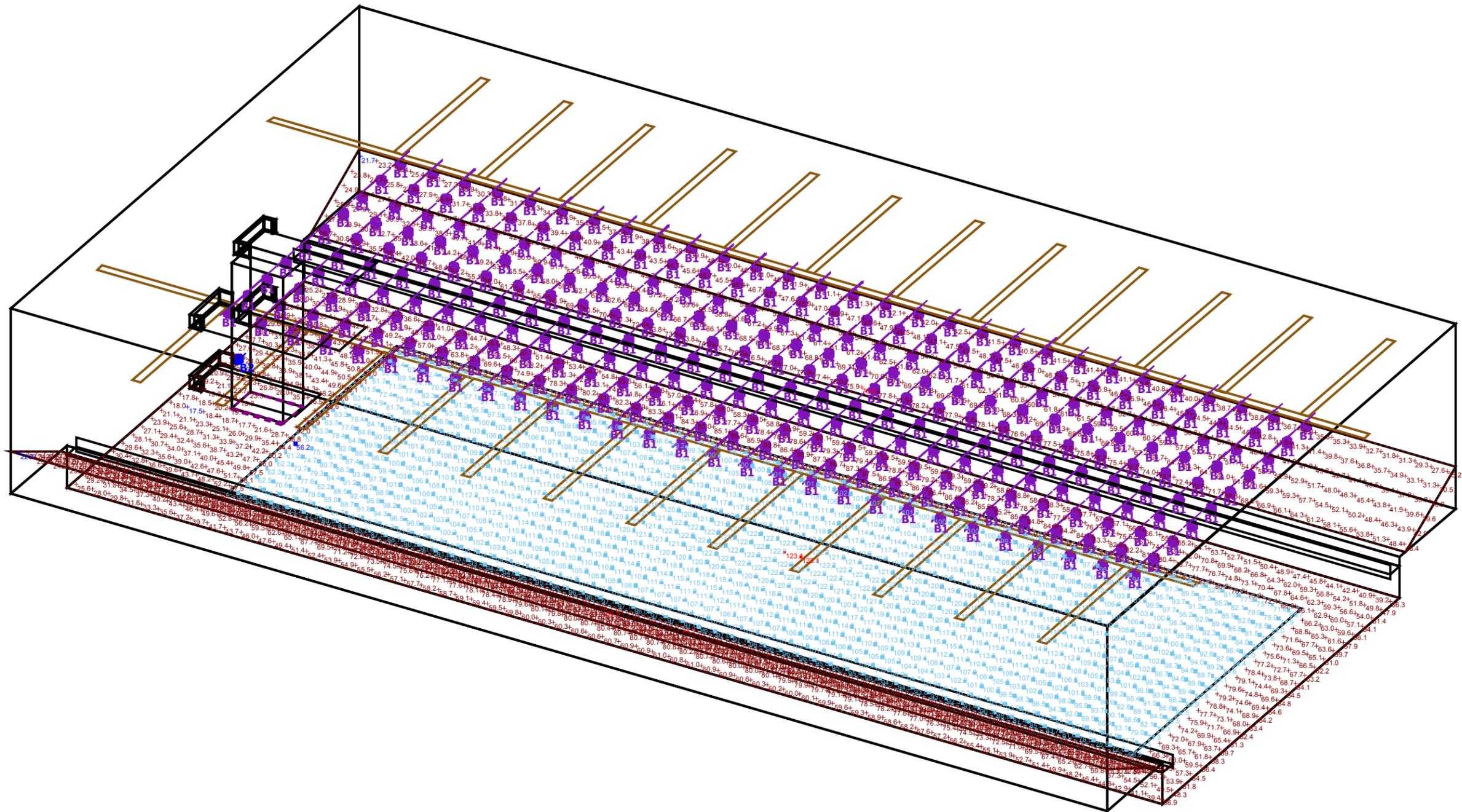
**Statistics**

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Deck and Water Surface	+	85.7 fc	123.3 fc	0.0 fc	N/A	N/A
North Stands	+	50.8 fc	78.6 fc	21.7 fc	3.6:1	2.3:1
Pool Deck	+	62.7 fc	94.9 fc	17.5 fc	5.4:1	3.6:1
South Stands	+	51.7 fc	80.3 fc	22.3 fc	3.6:1	2.3:1
Water Surface	■	103.3 fc	123.1 fc	56.2 fc	2.2:1	1.8:1

**PAN AM POOL  
LIGHTING SIMULATION  
OPTION 3**

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**

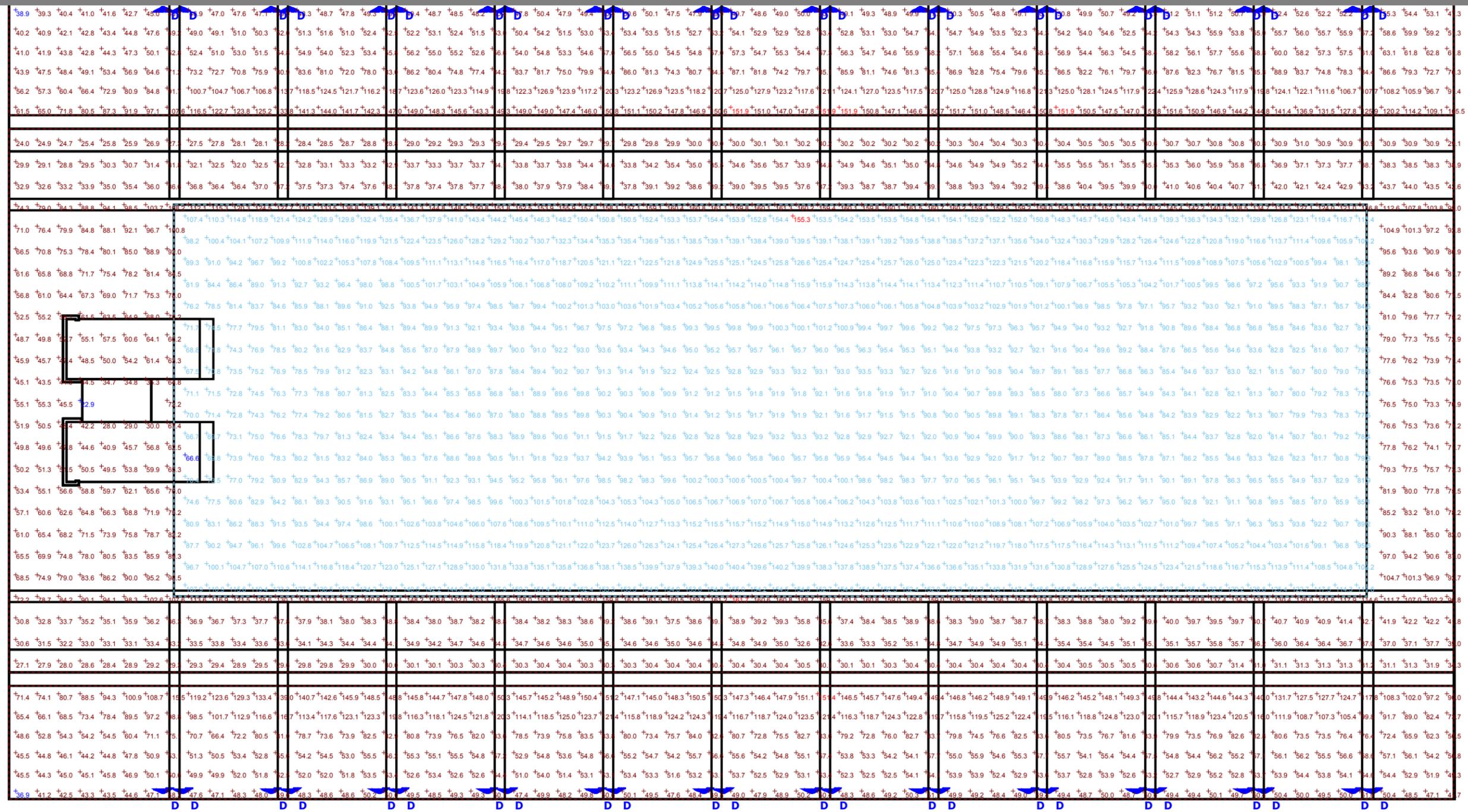


**PAN AM POOL  
LIGHTING SIMULATION  
OPTION 3**

**South East View**

Schedule											
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens Per Lamp	Light Loss Factor	Wattage
	<b>B1</b>	290	G&G LED LLC	WPX8-HO-50K	8ft connectorized harsh environment linear LED fixture, high output	240 white LEDs	1	WPX8-HO-50K.ies	12133	0.8	94
	<b>B2</b>	1	G&G LED LLC	WPX4-SO-50K	4ft connectorized harsh environment linear LED fixture, standard output	120 white LEDs	1	WPX4-SO-50K.ies	4188	0.8	32.012

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**  
  
**Summary**



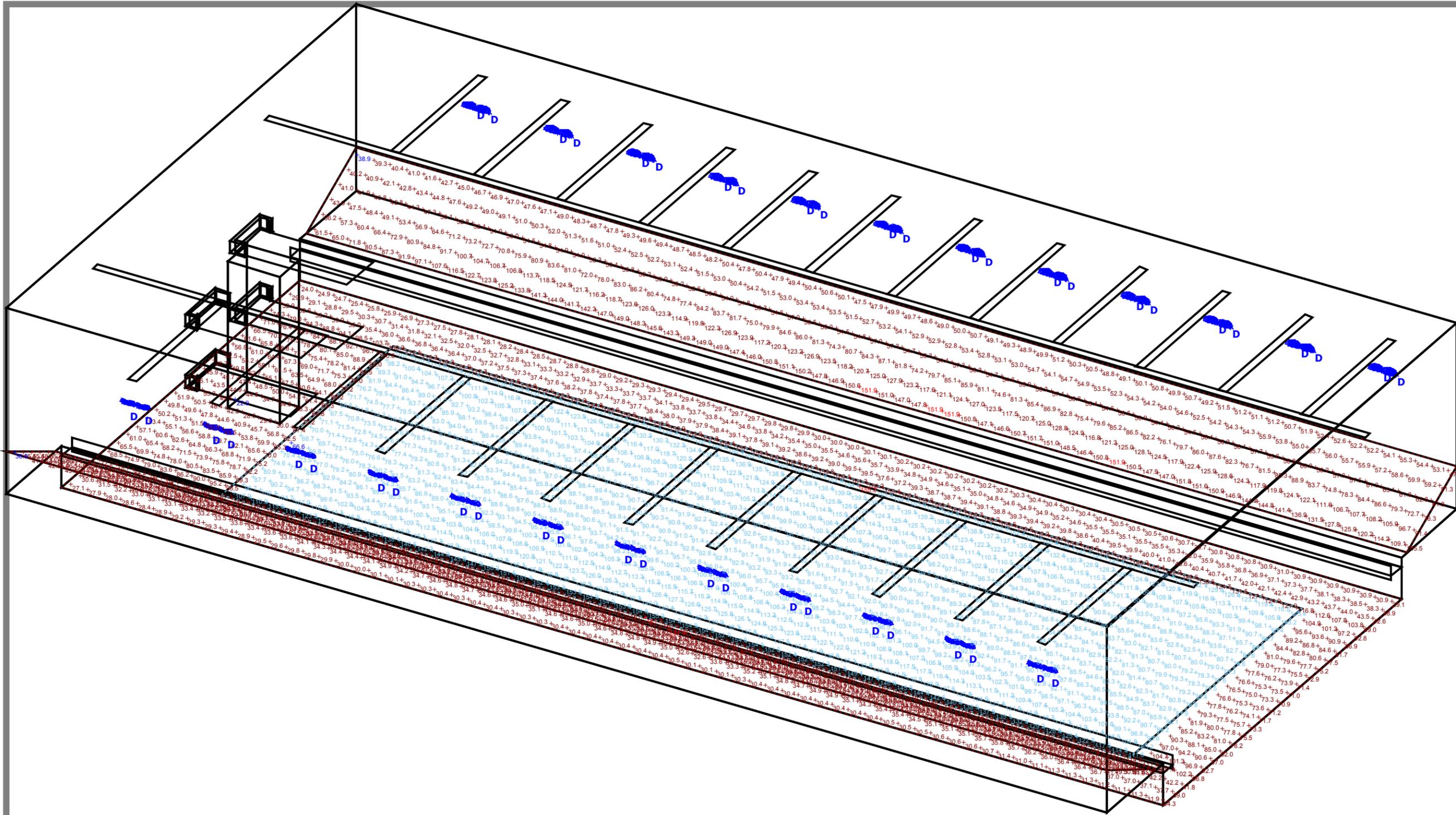
**Plan View**  
Scale - 1" = 20'

**Statistics**

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Deck and Water Surface	+	84.2 fc	161.7 fc	0.0 fc	N/A	N/A
North Stands	+	80.4 fc	151.9 fc	38.9 fc	3.9:1	2.1:1
Pool Deck	+	62.9 fc	161.7 fc	22.9 fc	7.1:1	2.7:1
South Stands	+	79.4 fc	151.4 fc	36.9 fc	4.1:1	2.2:1
Water Surface	+	103.7 fc	155.3 fc	66.6 fc	2.3:1	1.6:1

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**



**PAN AM POOL  
LIGHTING SIMULATION  
OPTION 4**

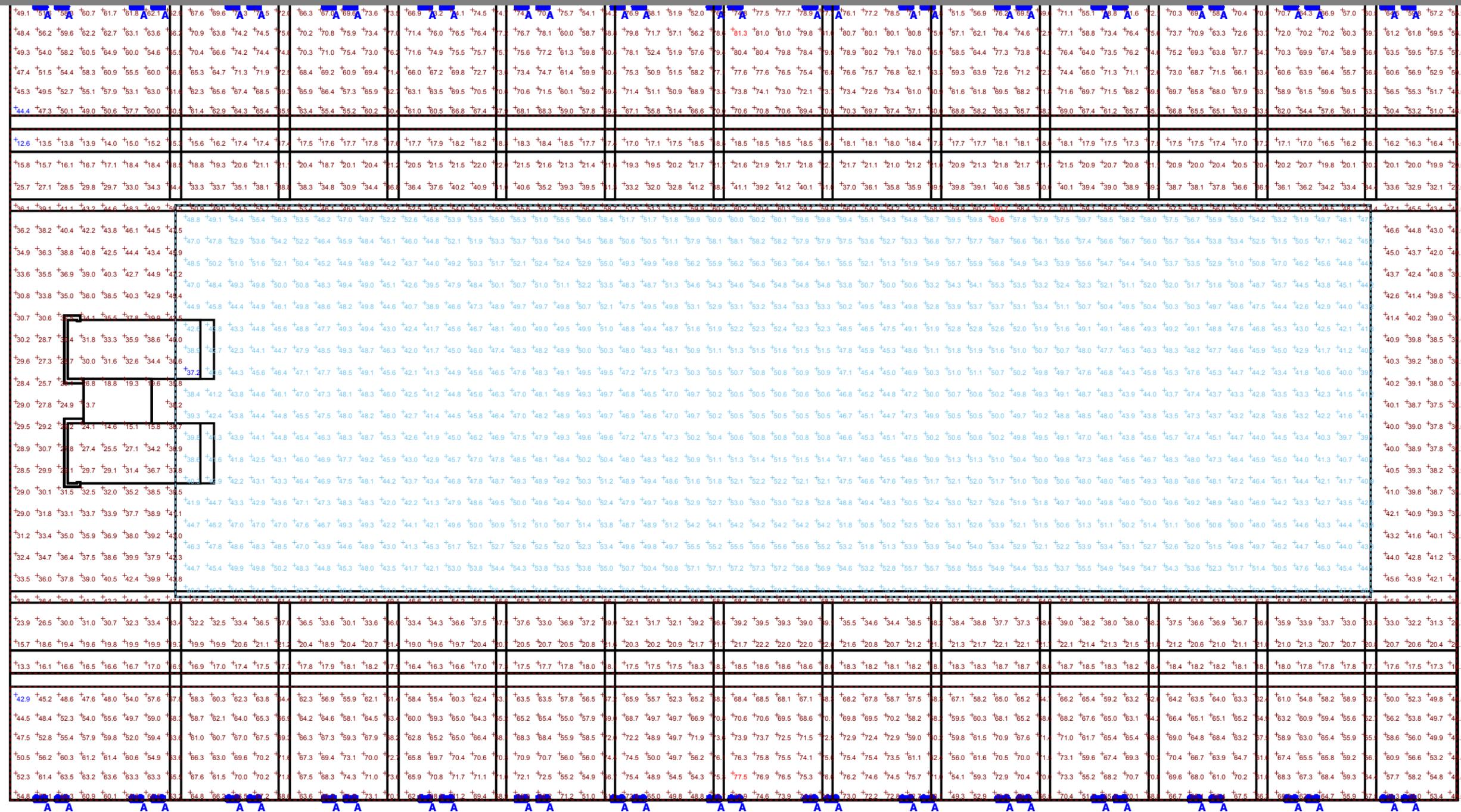
**South East View**

**Schedule**

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens Per Lamp	Light Loss Factor	Wattage
	<b>D</b>	48	SPECGRADELED	AFL-1000-XXXXK-85x135	AFL SERIES ARCHITECTURAL FLOOD	LED	1	AFL-1000-85x135.IES	115677	0.8	1103

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**



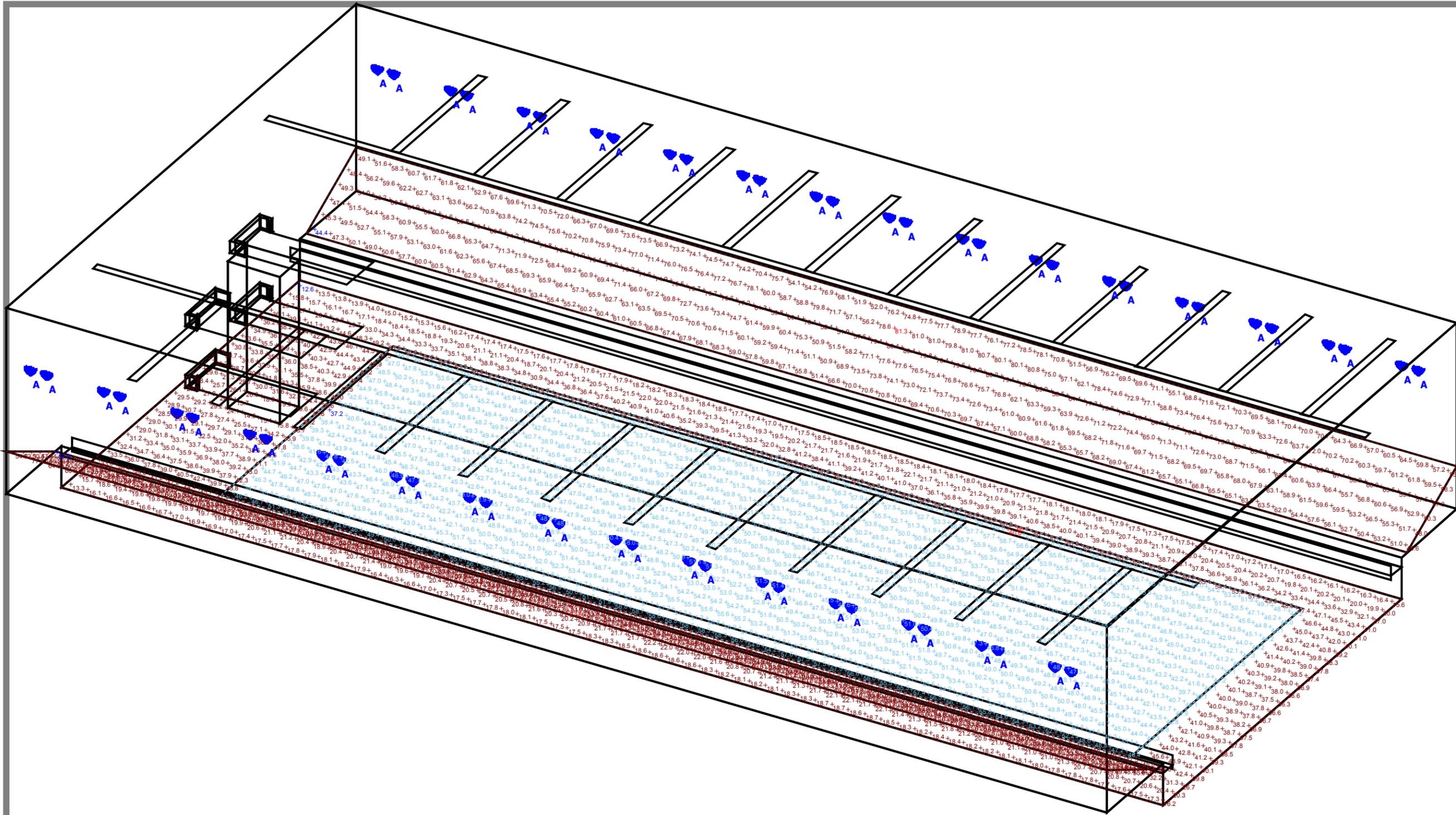
**Plan View**  
Scale - 1" = 20'

**Statistics**

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Deck and Water Surface	+	41.9 fc	60.7 fc	0.0 fc	N/A	N/A
North Stands	+	66.3 fc	81.3 fc	44.4 fc	1.8:1	1.5:1
Pool Deck	+	32.8 fc	60.7 fc	12.6 fc	4.8:1	2.6:1
South Stands	+	63.7 fc	77.5 fc	42.9 fc	1.8:1	1.5:1
Water Surface	+	49.5 fc	60.6 fc	37.2 fc	1.6:1	1.3:1

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**



**South East View**

**PAN AM POOL  
LIGHTING SIMULATION  
OPTION 5**

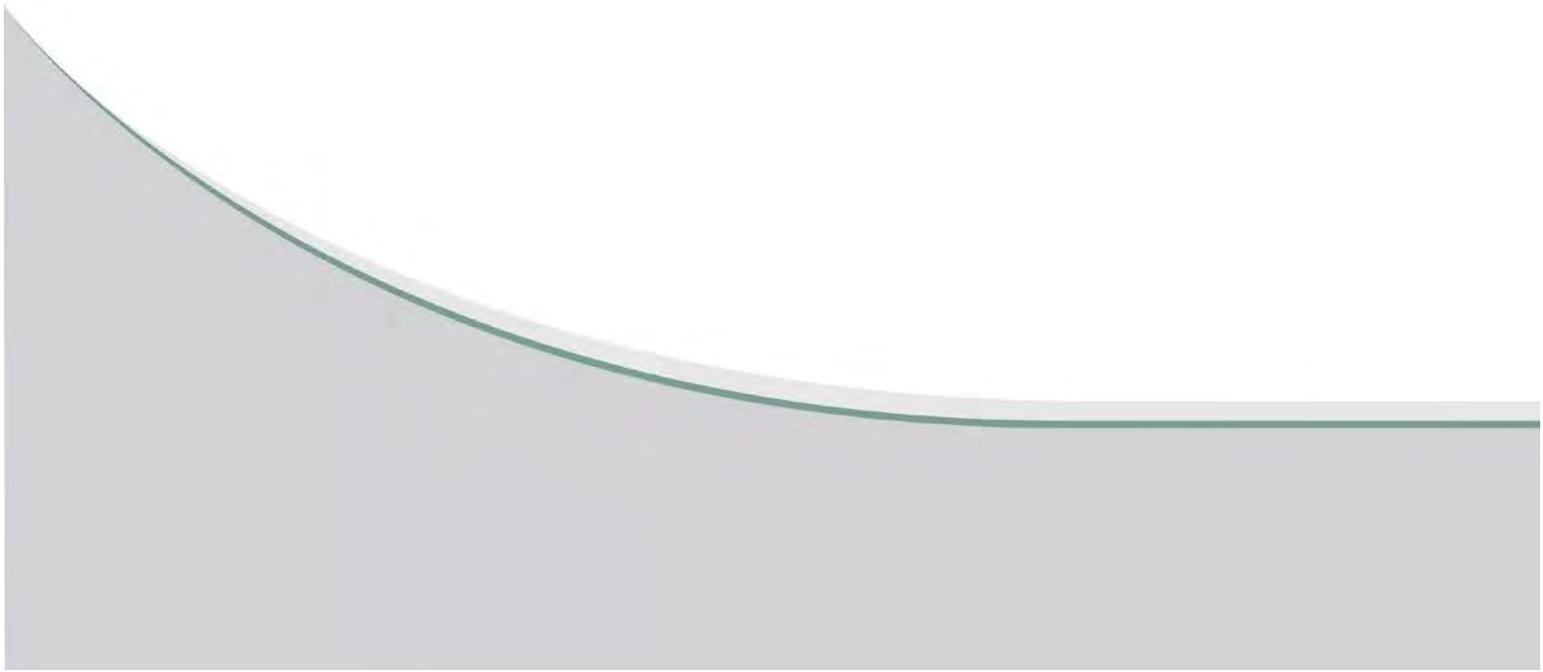
**Schedule**

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens Per Lamp	Light Loss Factor	Wattage
	<b>A</b>	60	SPECGRADELED	AFL-1000-XXXXK-60X90	AFL SERIES ARCHITECTURAL FLOOD	LED	1	AFL-1000-60x90.IES	117115	0.8	1048.6

**Designer**  
SEB  
**Date**  
10/04/2017  
**Scale**  
Not to Scale  
**Drawing No.**

**Summary**

**APPENDIX C**  
**DETAILED COST ESTIMATE**



**KGS GROUP**  
**Consulting Engineers & Project Managers**

<b>Client:</b>	City of Winnipeg
<b>Project:</b>	Pan Am Pool- LED LIGHTING REPLACEMENT FEASIBILITY ASSESSMENT
<b>Project No.:</b>	17-0107-013
<b>Location:</b>	Winnipeg , Manitoba

<b>Revision:</b>	<b>Date</b>
A	4-Oct-17

**Labour Rate/Hour:** \$92.00

**Capital Cost Estimate**

ITEM	DESCRIPTION	QTY.	UNIT	UNIT	MATERIAL & EQUIPMENT COST	LABOUR			TOTAL
						Hours / Unit	Total Hours	Cost	
<b>1.0</b>	<b>Base System Upgrade</b>								
1.1	<b>General Conditions</b>								
	Mobilization/Demobilization	1	LS	\$40,000	\$40,000				\$40,000
	Overhead and Profit (est. 15%)	1	LS	\$30,000	\$30,000				\$30,000
	Permits	1	LS	\$10,000	\$10,000				\$10,000
									\$70,000
1.2	<b>Existing Tile Removal</b>								
	Construction Estimate from the City of Winnipeg (Note 1)	1	LS	\$350,000	\$350,000				\$350,000
1.3	<b>Demolition</b>								
	Demolition of Existing Pool Lighting	1	LS	\$25,000	\$25,000				\$25,000
	Demolition of Existing Gallery Lighting	1	LS	\$10,000	\$10,000				\$10,000
									\$35,000
	<b>Engineering Design Fees</b>								\$50,000
	<b>Contingency - 20%</b>								\$91,000
	<b>Sub-Total Base System Upgrade</b>								<b>\$455,000</b>
4.0	<b>LIGHTING - POOL</b>								
4.1.1	<b>DOWN LIGHTING OPTIONS</b>								
4.1.1	<b>Option 1 - Replace Existing Fixtures with LED</b>								
	New LED Fixtures	74	each	\$1,800	\$133,200	4.00	296.00	\$27,232	\$160,432
	Wiring	74	each	\$100	\$7,400	1.00	74.00	\$6,808	\$14,208
	Mounting	74	each	\$500	\$37,000	2.00	148.00	\$13,616	\$50,616
	<b>Engineering Design Fees</b>								\$20,273
	<b>Contingency - 20%</b>								\$45,051
	<b>Sub-Total Option 1 - Replace Existing Fixtures with LED</b>								<b>\$290,580</b>
4.1.2	<b>Option 2 - Add Multiple Rows of LED Fixtures</b>								
	New LED Fixtures	88	each	\$1,500	\$132,000	4.00	352.00	\$32,384	\$164,384
	Wiring	88	each	\$400	\$17,600	2.00	176.00	\$16,192	\$33,792
	Mounting	88	each	\$500	\$44,000	2.00	176.00	\$16,192	\$60,192
	<b>Engineering Design Fees</b>								\$23,253
	<b>Contingency - 20%</b>								\$51,674
	<b>Sub-Total Option 2 - Add Multiple Row of LED Fixtures</b>								<b>\$333,295</b>
4.1.3	<b>Option 3 - Install Liner Tube Fixtures</b>								
	New LED Fixtures	312	each	\$500	\$156,000	1.50	468.00	\$43,056	\$199,056
	Remote Ballasts	16	each	\$200	\$3,120	1.00	15.60	\$1,435	\$4,555
	Wiring	312	each	\$25	\$7,800	0.50	156.00	\$14,352	\$22,152
	Mounting	312	each	\$25	\$7,800	1.00	312.00	\$28,704	\$36,504
	<b>Engineering Design Fees</b>								\$23,604
	<b>Contingency - 20%</b>								\$12,642
	<b>Sub-Total Option 3 - Install Liner Tube Fixtures</b>								<b>\$298,513</b>
4.1.4	<b>Option 4 - Install Floodlighting</b>								
	New LED Fixtures	74	each	\$1,600	\$118,400	4.00	296.00	\$27,232	\$145,632
	Wiring	74	each	\$200	\$14,800	3.00	222.00	\$20,424	\$35,224
	Mounting	74	each	\$1,500	\$111,000	2.00	148.00	\$13,616	\$124,616
	<b>Engineering Design Fees</b>								\$27,492
	<b>Contingency - 20%</b>								\$61,094
	<b>Sub-Total Option 4 - Install Floodlighting</b>								<b>\$394,059</b>
4.2.1	<b>Option 5 - Wallmount above Galleries</b>								
	New LED Fixtures	48	each	\$1,600	\$76,800	4.00	192.00	\$17,664	\$94,464
	Wiring	48	each	\$1,000	\$48,000	8.00	384.00	\$35,328	\$83,328
	Mounting	48	each	\$250	\$12,000	1.00	48.00	\$4,416	\$16,416
	<b>Engineering Design Fees</b>								\$17,479
	<b>Contingency - 20%</b>								\$38,842
	<b>Sub-Total Base Option 5 - Wallmount above Galleries</b>								<b>\$250,528</b>

**KGS GROUP**  
*Consulting Engineers & Project Managers*

<b>Client:</b>	City of Winnipeg
<b>Project:</b>	Pan Am Pool- LED LIGHTING REPLACEMENT FEASIBILITY ASSESSMENT
<b>Project No.:</b>	17-0107-013
<b>Location:</b>	Winnipeg , Manitoba

<b>Revision:</b>	<b>Date</b>
A	4-Oct-17

**Labour Rate/Hour:** \$92.00

**Capital Cost Estimate**

ITEM	DESCRIPTION	QTY.	UNIT	UNIT	MATERIAL & EQUIPMENT COST	LABOUR			TOTAL
						Hours / Unit	Total Hours	Cost	
<b>4.3</b>	<b>Additional Optional Lighting and Lighting Control Upgrades</b>								
<b>4.3.1</b>	<b>Add Lighting for Diving Area</b>								
	New LED Fixtures	2	each	\$1,500	\$3,000	6.00	12.00	\$1,104	\$4,104
	Replace HPS Fixtures	2	each	\$1,000	\$2,000	6.00	12.00	\$1,104	\$3,104
	Wiring	150	each	\$1	\$150	0.03	0.00	\$0	\$150
	<b>Contingency - 20%</b>								\$651
	<b>Sub-Total Base - Add Lighting for Diving Area</b>								<b>\$8,009</b>
<b>4.3.2</b>	<b>Add Lighting for Bench Seating</b>								
	New LED Fixtures	24	each	\$450	\$10,800	2.00	48.00	\$4,416	\$15,216
	Wiring	24	each	\$150	\$3,600	2.00	48.00	\$4,416	\$8,016
	<b>Contingency - 20%</b>								\$4,646
	<b>Sub-Total Base - Add Lighting for Bench Seating</b>								<b>\$27,878</b>
<b>4.3.3</b>	<b>Automate Lighting Control</b>								
	Remove Existing Pushbuttons	1	each	\$1,500	\$1,500	4.00	4.00	\$368	\$1,868
	New Graphic Screen	1	each	\$3,500	\$3,500	4.00	4.00	\$368	\$3,868
	Investigate Wiring	1	each	\$5,000	\$5,000	0.00	0.00	\$0	\$5,000
	Programming	1	LS	\$5,000	\$5,000		0.00	\$0	\$5,000
	<b>Contingency - 20%</b>								\$3,147
	<b>Sub-Total Base - Automate Lighting Control</b>								<b>\$18,883</b>
<b>4.3.4</b>	<b>Replace Lighting in Foyer and Running Track</b>								
	Demo existing fixtures	1	LS	\$15,000	\$15,000	12.00	12.00	\$1,104	\$16,104
	New LED Fixtures (Quantity Estimated)	40	each	\$1,500	\$60,000	12.00	480.00	\$44,160	\$104,160
	<b>Engineering Design Fees</b>								\$10,824
	<b>Contingency - 20%</b>								\$24,053
	<b>Sub-Total Base - Replace Lighting in Foyer and Running Track</b>								<b>\$155,141</b>

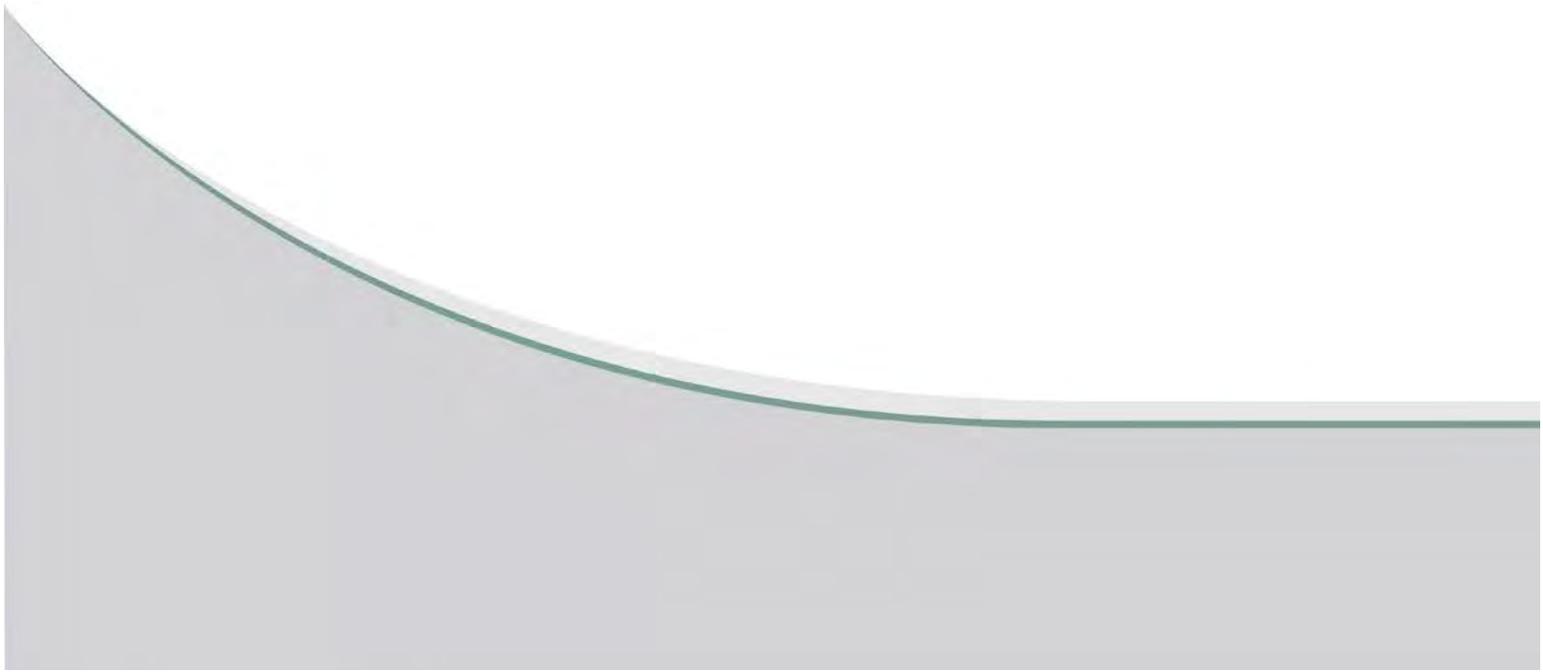
**Capital Cost Estimate Statement of Limitations**

The cost estimates has been prepared by KGS Group using its professional judgment and exercising due care consistent with the level of detail required for the stage of the project for which the estimate has been developed. These estimates represent KGS Group's opinion of the probable costs and are based on factors over which KGS has no control. These factors include, without limitation, site conditions, availability of qualified labour and materials, present workload of the Bidders at the time of tendering and overall market conditions. KGS does not assume any responsibility to the Client, in contract, tort or otherwise in connection with such estimates and shall not be liable to the Client if such estimates prove to be inaccurate or incorrect.

**Notes**

1. Pricing was given by the City of Winnipeg. KGS believes this amount to be low depending on the type of abatement required.

**APPENDIX D**  
**LIGHTING FIXTURE CUTSHEETS**





# POLARIS: AFL FLOOD LED

Precision optics and seven lumen packages combined with a state-of-the-art thermal management system, coupled with a six year flawless track record, its designed to give you confidence.



**POLARIS AFL**  
AFL 80W & 100W



**POLARIS AFL**  
AFL 200W



**POLARIS AFL**  
AFL 300W & 400W



**POLARIS AFL**  
AFL 500W & 600W



**POLARIS AFL**  
AFL 800W & 1000W



**AVAILABLE FROM 80W UP TO 1000W**



**EXPECTED LIFE OVER 100,000 HRS.**



**REVIT & IES FILES AVAILABLE AT [WWW.SPECGRADELED.COM](http://WWW.SPECGRADELED.COM)**



**LUMINAIRE RATED IP 65 LIGHT ENGINE RATED IP66**



**EASY ACCESS DRIVER HOUSING**



**TEMPERED GLASS**



**DIMMABLE 0-10V OPTIONAL**

**SIX OPTICS**

Advanced LED technology and proprietary optics that distribute the light to the target area in a prescribed manner. This creates sites with incredible uniformity and visual comfort while requiring fewer lumens

15° x 15°  
30° x 30°

60° x 60°  
60° x 135°

85° x 135°

**NATATORIUM FINISH**

Corrosive resistant powder coated finish  
Stainless steel hardware  
Chlorine resistant treated gasket

**LUXEON LUMILEDS DELIVERS EXCEPTIONAL BEAM UNIFORMITY**

**ADJUSTABLE TRUNION**

**ENGRAVED PROTRATOR FOR ACCURATE AIMING**

**REDUNDANCY**

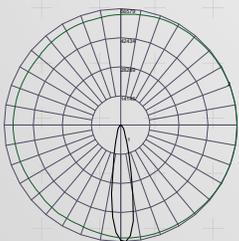
Built in redundancy to ensure minimal chance of total luminaire failure.

**PATENT PENDING THERMAL MANAGEMENT**

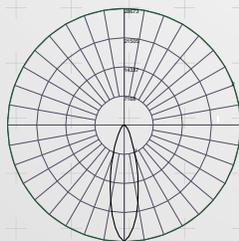
The proprietary patented thermal management design, ensures low LED junction temperature while maintaining its extremely light weight. It has become the go-to series of engineers and specifiers for exterior and interior use



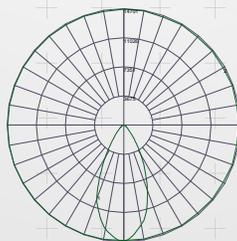
**PHOTOMETRICS**



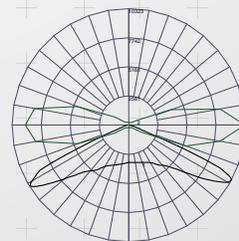
15° x 15°



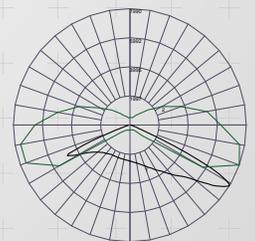
30° x 30°



60° x 60°



60° x 135°



85° x 135°

# POLARIS FLOOD

## AFL 300W & 400W

**REPLACES UP TO A 1000-WATT  
METAL HALIDE FIXTURES**



### ELECTRICAL

Wattages; 300W & 400W  
Input Line Voltage: 120/277VAC;  
347-480 VAC (optional)  
Input line frequency: 50/60 Hz  
Power factor: >95%  
Dimmable: 0-10V (optional)  
Surge protection device:  
UL 1449/ANSI C62.41.2  
Category C, 10kA/10Kv (optional)  
THD: <20%

### MATERIALS

Housing: Rugged corrosion  
resistant die-cast aluminum  
Lens: Tempered glass  
Driver: Philips/Meanwell  
LEDs: Lumileds Luxeon-T

### LISTINGS

ETL Approved  
DLC (Design Lights Consortium)  
NAT: Natatorium Finish (optional)

### PERFORMANCE

Rated life: Over 100,000 hrs.  
CRI: 74 (80 & 90 available)  
Color Temp: 3000K, 4000K,  
5000K, 5700K

### MISC

Operating Temp: -25°C-65°C  
Weight: 38/42 lbs.  
Rating: Lighting Engine Rated: IP65  
Vibration Rating: 1.5G per ANSI 136.31  
Finish: Protective UV stabilized  
powder coated  
Photo Cell: (optional)

### WARRANTY

15 year warranty on the LED board  
5 year warranty on the driver  
(see full warranty at:  
[www.SpecGradeLED.com](http://www.SpecGradeLED.com))

### 300W & 400W EPA SPECS

**WITHOUT GLARE SHIELD** WIND DIRECTION (ft<sup>2</sup>)

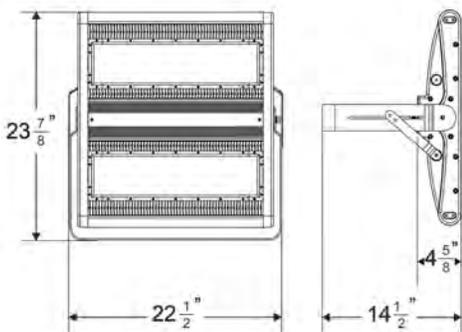
FIXTURE ANGLE	FRONT	SIDE
90° From Horizontal	4.6 ft <sup>2</sup>	0.8 ft <sup>2</sup>
45° From Horizontal	2.8 ft <sup>2</sup>	0.8 ft <sup>2</sup>
0° From Horizontal	0.8 ft <sup>2</sup>	0.8 ft <sup>2</sup>

### 300W & 400W EPA SPECS

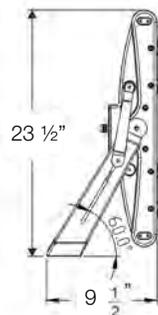
**WITH GLARE SHIELD** WIND DIRECTION (ft<sup>2</sup>)

FIXTURE ANGLE	FRONT	SIDE
90° From Horizontal	4.6 ft <sup>2</sup>	1.3 ft <sup>2</sup>
45° From Horizontal	2.8 ft <sup>2</sup>	1.3 ft <sup>2</sup>
0° From Horizontal	0.8 ft <sup>2</sup>	1.3 ft <sup>2</sup>

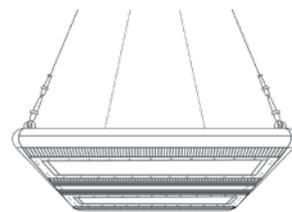
### ↓ DIMENSIONS



### ↓ OPTIONAL: TILT MOUNTING BRACKET (TL)



### ↓ OPTIONAL: CABLE MOUNT AVAILABLE (CM)



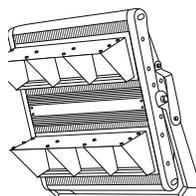
### ↓ POLARIS: AFL OPTIONAL EQUIPMENT



**OS:** Occupancy  
sensor for wet  
location (IP65)



**CTAX-2:** 300W, 400W, 600W,  
800W, 1000W Slipfitter for  
2-3/8" tenon size



**GLARE SHIELD (GS)**

### ↓ PHOTOCELLS



**APC-1:** 110-130V  
**APC-2:** 208-277V



**PRODUCT SPECIFICATIONS | ORDERING INFORMATION: POLARIS AFL 300W & 400W**

SERIES	WATTS	SYST. PWR	BEAM	INPUT VOLT.	COLOR TEMPERATURES DELIVERED LUMENS				FINISH OPTIONS	OPTIONS
					WW   3500K	NW   4000K	CW   5000K	CW   5700K		
AFL	300W	330W	15° x 15°	90-305V	31000 lm	32500 lm	34200 lm	36000 lm	WT   White	DIM   0-10V Dimmable
	400W	440W	30° x 30°	347-480V (optional)	41100 lm	43300 lm	45600 lm	48000 lm	BL   Black	CTAX-2   Slipfitter
			60° x 60°						RAL   Colors Avail. w/RAL# (optional)	OS   Occupancy Sensor
			60° x 90°						NAT Natatorium Finish (optional)	TL   Tilt Mount Bracket
			60° x 135°							APC-1   Adj. Photo Cell 110-130V
			85° x 135°							APC-2   Adj. Photo Cell 208-277V
										FL   Frosted Lens
										GS   Glare Shield
										CM   Cable Mount
										SP10   Surge Protector 10KA
										SP20   Surge Protector 20KA

AFL - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

Due to continuous improvement and innovation, product appearance and specifications may change without notice. Actual performance may differ as a result of end-user environment and application.

REVIT & IES Files are located at [www.SpecGradeLED.com](http://www.SpecGradeLED.com)

WW | Warm White    NW | Natural White    CW | Cool White

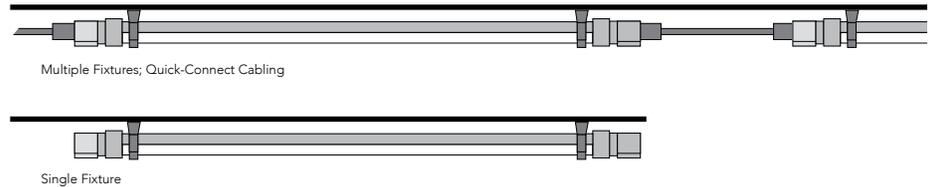


Date \_\_\_\_\_

Project \_\_\_\_\_



**IP68  
IP69K  
CERTIFIED**



## LINEAR IP68/IP69K LED LUMINAIRE

### Product Features

#### Easy to Install Quick-Connect Cabling

Convenient push-and-click connectors and cabling make WPX Series fixtures easy to install and daisy chain

#### Embedded Aluminum Heatsink

Embedded aluminum heatsink provides ample cooling for a long lifetime and allows the fixture to operate in cold and hot weather environments

#### Superior Chemical & UV Resistance

Seamless polymeric outer shell provides IP68/IP69K ingress protection and is specialized for superior chemical resistance. An additional protective coating is available which integrates a UV inhibitor and UV blocker for outdoor applications.

### Performance Summary

**Delivered Light Output:** Up to 12,000 Lumens

**Efficacy:** Up to 140 LPW

**CRI:** Typical 85 CRI

**CCT:** 5000K & 4000K

**Lifetime:** Designed to last 100,000 Hours at 25°C

**Warranty:** 5 Years (see ggled.net for terms)

**Mounting:** Ceiling or Wall

**Dimensions:** Length Varies, Width 1.25" x Height 1.75"

**Run Length:** Up to 72' of luminaires (not including jumpers)

### Ordering Information

Product	Length	Lumen Output	Color Temp.	Dimming	Lens Diffusion	UV Protection
<b>WPX</b>	—	—	—	—	—	—
<b>8</b> 8-Foot	<b>4</b> 4-Foot	<b>SO</b> (standard) Standard Output (1000 Lumens/Ft)	<b>50K</b> (standard) 5000 Kelvin	<b>Blank</b> (standard) No Dimming	<b>Blank</b> (standard) Chemical Resistant Clear Lens	<b>Blank</b> (standard) No Coating, Rated for Indoor Use
<b>6</b> 6-Foot	<b>2</b> 2-Foot	<b>HO</b> High Output (1500 Lumens/Ft)	<b>40K</b> 4000 Kelvin	<b>DIM</b> 0-10V Dimming	<b>GC</b> (glare control) Chemical Resistant Lens with Added Diffusion Sheet	<b>UVO</b> Outdoor-Rated with UV-Blocking Coating

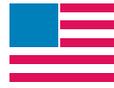
### Power & Connection Accessories

Cable	Type	Length	Wire
WPX-JMP-1	Jumper	1ft / End-to-End	14 AWG SJOOW
WPX-JMP-2	Jumper	2ft	14 AWG SJOOW
WPX-JMP-4	Jumper	4ft	14 AWG SJOOW
WPX-JMP-8	Jumper	8ft	14 AWG SJOOW
WPX-JMP-12	Jumper	12ft	14 AWG SJOOW
WPX-JMP-16	Jumper	16ft	14 AWG SJOOW
WPX-JMP-20	Jumper	20ft	14 AWG SJOOW
WPX-LDR-8	Leader Cable	8ft	14 AWG SJOOW
WPX-LDR-25	Leader Cable	25ft	14 AWG SJOOW

Power Supply	Max Output	Enclosure	Voltage
WPX-PSU-40	40W	IP67	120-277 VAC
WPX-PSU-80	80W	IP67	120-277 VAC
WPX-PSU-120	120W	IP67	120-277 VAC
WPX-PSU-240	240W	IP67	120-277 VAC
WPX-PSU-320	320W	IP67	120-277 VAC
WPX-PSU-600	600W	IP67	120-277 VAC

Cable Joiners	Description
WPX-CBJ-2P	Waterproof Cable Connector, 2-Pin
WPX-CBJ-3P	Waterproof Cable Connector, 3-Pin (Dimming)

Mounting Hardware	Description
WPX-MNT-NM	Non-Metallic Quick Latch
WPX-MNT-SS	Stainless Steel Bolt Latch



## LINEAR IP68/IP69K LED LUMINAIRE

### Product Specifications

#### Construction & Materials

Convenient push-and-click connectors let you easily and rapidly install Leader Cables and Jumper Cables. Multiple cable lengths support a variety of layouts.

Integrated aluminum heat spreader.

Seamless copolyester outer shell provides IP68/IP69K ingress protection and is specialized for superior chemical resistance. Additional protective coating is available which integrates a UV inhibitor and UV blocker for outdoor applications.

All G&G luminaires and components (with the exception of our LED boards and drivers) are proudly manufactured and assembled in the USA.

#### Electrical System

Power Factor: 0.9 nominal.

Input Power: Stays consistent over life.

Temperature Rating: Designed to operate in temperatures -40°C to 55°C.

Total Harmonic Distortion: < 20%

#### Regulatory Qualifications

cULus listed.

IP68/IP69K system.

UL listed for wet locations.

DLC listed

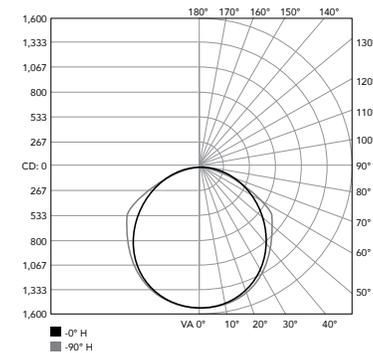
### Photometry

#### WPX Series

Based on DTC Report Test #: 14404-T

Fixture photometry has been conducted by a NVLAP accredited testing laboratory in accordance with IESNA LM-79-08. IESNA LM-79-08 specifies the entire luminaire as the source resulting in a fixture efficiency of 100%.

#### Polar Candela Distribution



#### Zonal Lumen Summary

Zone	Luminaire
0-30	26.2%
0-40	43.2%
0-60	77.4%
0-90	98.5%
0-180	100%

### Data: Lumen Output / Power Requirements

Length & Output	5000K		4000K		Fixture Watts	Fixtures Supported per Power Supply					
	Lumens	Lumens Per Watt	Lumens	Lumens Per Watt		PSU-40	PSU-80	PSU-120	PSU-240	PSU-320	PSU-600
WPX8 - SO	8,000 L	140 LPW	7,600 L	133 LPW	57 W	0	1	1	3	5	9
WPX6 - SO	6,000 L	140 LPW	5,700 L	133 LPW	43 W	0	1	2	5	6	10
WPX4 - SO	4,000 L	140 LPW	3,800 L	133 LPW	29 W	1	2	3	7	9	15
WPX2 - SO	2,000 L	140 LPW	1,900 L	133 LPW	15 W	2	4	6	12	18	22
WPX8 - HO	12,000 L	132 LPW	11,400 L	125 LPW	91 W	0	0	1	2	3	5
WPX6 - HO	9,000 L	132 LPW	8,550 L	125 LPW	68 W	0	1	1	3	4	7
WPX4 - HO	6,000 L	132 LPW	5,700 L	125 LPW	45 W	0	1	2	4	6	9
WPX2 - HO	3,000 L	132 LPW	2,850 L	125 LPW	23 W	1	3	4	8	12	16

**PhuzionL™**  
Large LED High Bay



DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at [www.designlights.org](http://www.designlights.org) to confirm which versions are qualified.

Catalog Number	
Notes	Type

**Description**

The Phuzion LED luminaire takes high-bay lighting to new levels of lumen output and temperature tolerance. By marrying the latest in LED technology with the legendary illuminating dynamics of HoloPhane's prismatic glass, the Phuzion high bay brings to the industrial environment LED lighting of unparalleled performance and reliability.

**Optics**

- Prismatic borosilicate glass maintains highest levels of luminosity over time.
- Glass doesn't fade, discolor or otherwise degrade in harsh environments.
- Four distributions with glass; Focus, narrow, medium and wide. Two distributions in Acrylic; narrow and wide to maximize versatility.
- Highly engineered LED system ensures superior uniformity and maximizes spacing.

**Mechanical**

- Robust cast aluminum housing with low copper content (0.6% CU content) withstands hot and dirty environments.
- Pendant mount standard.
- Exterior parts are protected by a zinc infused Super Durable TGIC thermoset powder that provides superior resistance to corrosion.

**Electrical**

- 0-10V dimming driver is standard (must specify the D option to enable dimming).

- Luminaire Surge Protection - Designed to withstand up to 10kV/5kA per ANSI C82.77-5-2015 of the American National Standard for Lighting Equipment-Voltage Surge Requirements.
- CRI 70, 80 and 90 (minimums).
- 3000K, 3500K, 4000K, 5000K CCT available.
- Aluminum core printed circuit board.

**Listings**

- CSA Certified for ambient temperatures up to 149°F (65°C). See "Ambient Temperature Ratings" chart.
- Designed and tested for reliable operation in ambient temperatures up to 149°F (65°C) through use of dynamic temperature sensing.
- IP66 rated.
- Suitable for use in wet locations.

**Warranty**

5-year limited warranty. Complete warranty terms located at: [www.acuitybrands.com/CustomerResources/Terms\\_and\\_Conditions.aspx](http://www.acuitybrands.com/CustomerResources/Terms_and_Conditions.aspx)

**NOTE:** Actual performance may differ as a result of end-user environment and application.

All values are design or typical values, measured under laboratory conditions at 25 °C.

Specifications subject to change without notice.

**Typical Applications**

- Heavy industrial
- Light manufacturing
- Steel Mills
- Convention Center
- Foundries
- Pulp Paper Mills

**Dimensions:** Inches (millimeters) unless otherwise noted.

- Diameter: 28.49"
- Height: 20.98"
- Weight: 55 lbs

**A+ Capable Luminaire**

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® or XPoint™ Wireless control networks marked by a **shaded background\***

To learn more about A+, visit [www.acuitybrands.com/aplus](http://www.acuitybrands.com/aplus).

\*See ordering tree for details

A+ Capable options indicated by this color background.

**ORDERING INFORMATION**

**Example:** PHZL 60L 50K 80CRI AS P W W

Series	Lumens <sup>1</sup>	Color temperature	Color Rendering Index	Voltage	Mounting	Finish	Optics
PHZL	50L 50,000 nominal lumens	3K 3000K 35K 3500K	70CRI 80CRI	AS Auto sensing (120-277) 27 277V	P Pendant Q Quick disconnect	G Gray super durable	F Focus (Glass) N Narrow (Glass)
	60L 60,000 nominal lumens	4K 4000K	90CRI	12 120V AH Auto sensing (347/480)	N Non-disconnect thru-wiring	W White super durable	M Medium (Glass) W Wide (Glass)
	70L 70,000 nominal lumens	5K 5000K		20 208V 24 240V 34 347V 48 480V	QR Quick disconnect retrofit NR Non-disconnect thru-wiring retrofit	L Satin nickel super durable K Black super durable	NA Narrow (Acrylic) WA Wide (Acrylic)

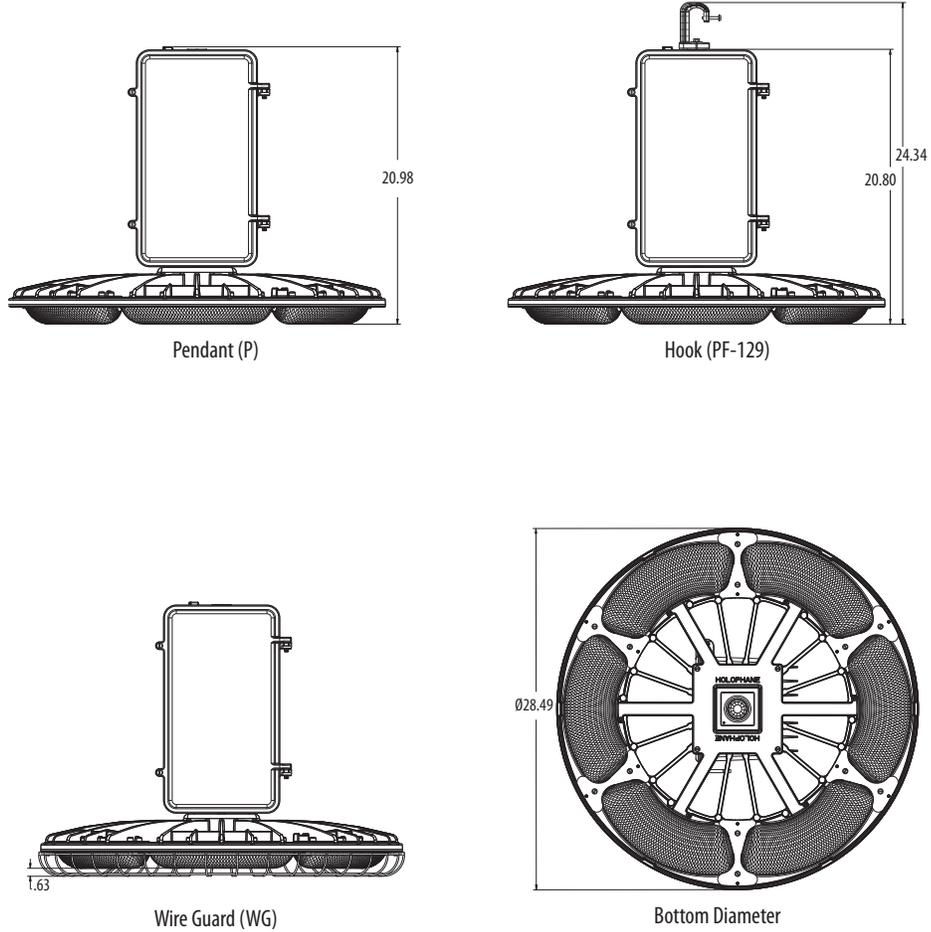
Options							
AXA10	XPoint Wireless enabled <sup>1,2</sup>	nPP16D	nLight control on/off with dimming <sup>4</sup>	PF-105	Loop 3/4" male		
A0	Field adjustable output.	CDP-L5-15-X	120V cord and plug <sup>5,6</sup>	PF-121-A	Hook 3/4" male		
MSE6NWL	360° motion sensor embedded, high bay 15-45 ft., on/off. <sup>1,3</sup>	CDP-L6-15-X	208V/240V cord and plug <sup>5,6</sup>	PF-129	Anti-rotational hook, 3/4" male		
MSE10NWL	360° motion sensor embedded, low bay 8-15 ft., on/off. <sup>1,3</sup>	CDP-L7-15-X	277V cord and plug <sup>5,6</sup>	PF-291	Wet listed hook, 3/4" male		
MSE62L3VWL	360° motion sensor embedded, high bay 15-45 ft., on/off with second time-out period, goes to a dimmed state before turning off max./ 3volt min. dim setting. <sup>1,2,3</sup>	CDP-L24-20-X	347V cord and plug <sup>5,6</sup>	CD-3	3 ft. cord <sup>5</sup>		
MSE102L3VWL	360° motion sensor embedded, low bay 8-15 ft., on/off with a second time-out period, goes to a dimmed state before turning off max 3 volt min. dim setting. <sup>1,2,3</sup>	CDP-L8-20-X	480V cord and plug <sup>5,6</sup>	CD-6	6 ft. cord <sup>5</sup>		
MSE6NDL DSCNWL	High bay 15-45ft., photocell with two selectable modes of operation. Defaults to on/off mode. Photocell has full control during periods of occupancy. <sup>1,3</sup>	CDP-5-15-X	Straight blade 120V plug and cord <sup>5,6</sup>	CD-X	X ft. cord <sup>5,6</sup>		
MSE10NDL DSCNWL	Low bay 8-15ft., photocell with two selectable modes of operation. Defaults to on/off mode. Photocell has full control during periods of occupancy. <sup>1,2,3</sup>	A	Holoflex I ( Must specify voltage, dry listed)	C3	3 ft. Safety chain		
MSE6XAWL DSCXA	XPoint Wireless enabled with photocell sensor & occupancy sensor <sup>1,2</sup>	S	Holoflex II (Must specify voltage, dry listed)	C6	6 ft. Safety chain		
MSE10XAWL DSCXA	XPoint™ enabled with photocell sensor & occupancy sensor <sup>1,2</sup>	CDPW-L5-15-X	120V cord and Daniel Woodhead plug (includes PF-291) <sup>6</sup>	CX	X ft. Safety chain <sup>6</sup>		
		CDPW-L6-15-X	208V/240V cord and Daniel Woodhead watertight plug (includes PF-291) <sup>6</sup>	D	Dimming terminal <sup>7</sup>		
		CDPW-L7-15-X	277V cord and Daniel Woodhead watertight plug (includes PF-291) <sup>6</sup>	PHCB	Powerhook cord for 120V-277V, 347V <sup>8</sup>		
		CDW-3	3 ft. cord (includes PF-291)	PHCB-L8-480	Powerhook cord for 480V <sup>8</sup>		
		CDW-6	6 ft. cord (includes PF-291)	PHZLWG	Wire guard installed		
		CDW-X	X ft. cord (includes PF-291) <sup>6</sup>	FR	Frosted glass		
				BSL722	0-25°C max, 23W (Internal) <sup>1,9</sup>		
				BSL722R	0-40°C max, 23W (Remote) <sup>1,9</sup>		

Accessories: Order as separate catalog number.							
PHZCHAIN3	3 ft. safety chain	PF-116-A	Loop, 3/4" female	PF-122-A	Safety hook, 3/4" female		
PHZCHAIN6	6 ft. safety chain	CDCW-L5-15-3	120V white cord and Daniel Woodhead watertite connector (wet locations) <sup>11</sup>	PF-129-A	Anti-rotational hook, 3/4" male		
PHZCHAINX	X ft. safety chain <sup>6</sup>	CDCW-L6-15-3	208/240V white cord and Daniel Woodhead watertite connector (wet locations) <sup>12</sup>	PF-105-B	Loop, 3/4" male		
UPH-35-***-WH	Thru-way powerhook for 120V, 208V, 240V, 277V and 347V <sup>10</sup>	CDCW-L7-15-3	277V white cord and Daniel Woodhead watertite connector (wet locations) <sup>13</sup>	PF-121-A	Safety hook, 3/4" male		
UPH-35-L8-480-WH	Thru-way powerhook for 480V			PHZLWGA	Wire guard		
UPH-36-***-WH	Powerhook for 120V, 208V, 240V, 277V and 347V <sup>10</sup>						
UPH-36-L8-480-WH	Pendant powerhook for 480V						

**Notes**

- 1 See chart Maximum Ambient Temperature Rating for All Voltages.
- 2 Not available with D option.
- 3 Not available with XPoint.
- 4 Not available with D option, AXA10 option, MSE62L3VWL, MSE102L3VWL, MSE6XAWL DSCXA, MSE10XAWL DSCXA, MSE6XAWL, MSE10XAWL. Available with 120, 240, 277, 347 voltages only.
- 5 Order PF also; 3ft to 6ft standard cord length. Not available with PHCB and not compatible with any UPH accessory. Damp listed only.
- 6 X = length of cord/chain in feet; 6 feet is standard.
- 7 Not available with MSE62L3VWL, AXA10, MSE6XADL DSCXA.
- 8 Order UPH also, PF-105 installed.
- 9 Option requires unswitched power for the emergency module, fixture can use switched power. Available with CD cord options. Not available with CDP options. Battery pack ships separate. Remote emergency battery pack provided with 20-ft flex conduit. Not available in 347/480 voltages.
- 10 \*\*\* = voltage.
- 11 Must order matching CDPW- L5-15-X.
- 12 Must order matching CDPW-L6-15-X.
- 13 Must order matching CDPW-L7-15-X.

**DIMENSIONAL DATA**



**OPERATIONAL DATA**

**Operating Characteristics**

Lumen Package	Distribution	Delivered Lumens 3000K 70CRI @25°C	Delivered Lumens 3500K 70CRI @25°C	Delivered Lumens 4000K 70CRI @25°C	Delivered Lumens 5000K 70CRI @25°C	Delivered Lumens 3000K 80CRI @25°C	Delivered Lumens 3500K 80CRI @25°C	Delivered Lumens 4000K 80CRI @25°C	Delivered Lumens 5000K 80CRI @25°C	Delivered Lumens 3000K 90CRI @25°C	Delivered Lumens 3500K 90CRI @25°C	Delivered Lumens 4000K 90CRI @25°C	Delivered Lumens 5000K 90CRI @25°C	Watts @ 120V	LPW @ 5000K, 70 CRI
50L	F	45906	47138	49295	49603	41284	43133	43441	43133	25701	27158	28351	29808	432	115
	F FR	41994	43122	45095	45377	37767	39458	39740	39458	23512	24845	25935	27268	432	105
	M	49374	50699	53019	53350	44403	46391	46723	46391	27643	29210	30492	32060	432	123
	M FR	45440	46659	48794	49099	40865	42695	43000	42695	25441	26883	28063	29505	432	113
	N	49285	50608	52924	53254	44323	46308	46639	46308	27593	29157	30438	32002	432	123
	N FR	45637	46862	49006	49312	41043	42880	43187	42880	25551	26999	28185	29633	432	114
	NA	48749	50058	52348	52675	43842	45805	46132	45805	27293	28840	30107	31654	432	121
	W	49143	50463	52772	53101	44196	46175	46505	46175	27514	29074	30350	31910	432	122
	W FR	45728	46956	49104	49411	41125	42966	43273	42966	25601	27053	28241	29692	432	114
WA	48355	49653	51925	52249	43487	45434	45759	45434	27072	28607	29864	31399	432	121	
60L	F	54242	55698	58247	58611	48782	50966	51330	50966	30368	32090	33499	35221	511	115
	F FR	49621	50953	53284	53617	44625	46623	46956	46623	27781	29356	30645	32220	511	105
	M	58340	59906	62647	63038	52467	54816	55208	54816	32663	34514	36030	37882	511	123
	M FR	53691	55133	57655	58015	48286	50448	50809	50448	30060	31764	33159	34864	511	113
	N	58235	59798	62534	62925	52372	54718	55108	54718	32603	34452	35965	37813	511	123
	N FR	53924	55372	57905	58267	48496	50667	51029	50667	30190	31903	33303	35015	511	114
	NA	57602	59148	61854	62241	51803	54123	54509	54123	32249	34078	35574	37402	511	121
	W	58068	59627	62355	62744	52222	54560	54950	54560	32511	34354	35862	37705	511	123
	W FR	54032	55483	58021	58384	48593	50769	51131	50769	30251	31966	33370	35085	511	114
WA	57136	58670	61354	61738	51384	53685	54068	53685	31989	33802	35287	37100	511	121	
70L	F	63029	64721	67682	68105	56684	59222	59645	59222	35288	37289	38925	40927	589	115
	F FR	57658	59206	61915	62302	51854	54176	54563	54176	32281	34111	35609	37439	589	106
	M	67790	69610	72795	73250	60966	63695	64150	63695	37954	40105	41867	44018	589	124
	M FR	62389	64063	66995	67413	56108	58620	59039	58620	34929	36909	38531	40511	589	114
	N	67668	69485	72664	73118	60856	63581	64035	63581	37886	40033	41791	43939	589	124
	N FR	62659	64341	67285	67706	56351	58875	59295	58875	35081	37070	38697	40687	589	115
	NA	66933	68729	71874	72323	60194	62890	63339	62890	37474	39598	41337	43461	589	123
	W	67474	69285	72455	72908	60681	63398	63851	63398	37776	39919	41670	43813	589	124
	W FR	62785	64470	67420	67841	56464	58992	59414	58992	35151	37144	38775	40768	589	115
WA	66391	68174	71293	71738	59708	62381	62827	62381	37170	39278	41002	43110	589	122	

**Maximum Ambient Temperature Ratings**

Mounting	OCC sensor	QDH or Non-disconnect	Xpoint	Nlight	Voltage	Ambient C° 50L	Ambient C° 60L	Ambient C° 70L	Ambient 50L, 60L, 70L w/ Emergency Internal	Ambient 50L, 60L, 70L w/ Emergency External	Supply Wire
Ceiling	No	Yes	No	No	120-277	65C	55C	50C	25C	40C	90C
Pendant	No	No	No	No	120-277	65C	55C	50C	25C	40C	90C
Ceiling	No	Yes	No	No	347/480	60C	55C	50C	NA	NA	90C
Pendant	No	No	No	No	347/480	60C	55C	50C	NA	NA	90C
Ceiling	Yes	Yes	Yes	Yes	120-277	40C	40C	40C	NA	40C	90C
Pendant	Yes	No	Yes	Yes	120-277	40C	40C	40C	NA	40C	90C
Ceiling	Yes	Yes	No	No	347/480	40C	40C	40C	NA	NA	90C
Pendant	Yes	No	No	No	347/480	40C	40C	40C	NA	NA	90C
Ceiling	Yes	Yes	Yes	Yes	*347/480	40C	40C	40C	NA	NA	90C
Pendant	Yes	No	Yes	Yes	*347/480	40C	40C	40C	NA	NA	90C

\* Using a Step-down transformer

**OPERATIONAL DATA CONTINUED**

**PHZL Performance Specifications (4K 70CRI M)**

Fixture	Lumens at 25°C	Watts	LPW	Lumens at 55°C	100K HR LM(25°C)	100K HR LM(55°C)	Max Ambient
50L	53,017	432	123	49,894	0.95	0.89	60°C
60L	62,644	511	123	57,238	0.95	0.89	55°C
70L	72,709	589	124	-	0.94	0	50°C

**Ambient Temperature Ratings**

Lumens	All Mountings	BSL722 (Internal battery)	BSL722R (Remote battery)	Sensors, nLight, Xpoint
50L	60°C	25°C	40°C	40°C
60L	55°C	25°C	40°C	40°C
70L	50°C	25°C	40°C	40°C

**Emergency Lumens**

Optic	Focus	Narrow	Medium	Wide
Estimated Minimum Delivered Lumens for 50L, 60L, 70L	2,610	2,841	2,841	2,841
LM/W	113	123	123	123

**Lumen Maintenance - PHZL 50L**

Ambient	0 Hours	15,000 Hours	30,000 Hours	45,000 Hours	60,000 Hours	100,000 Hours
25	1.00	0.98	0.98	0.97	0.97	0.95
30	1.00	0.98	0.98	0.97	0.96	0.95
35	1.00	0.98	0.97	0.97	0.96	0.94
40	1.00	0.98	0.97	0.96	0.96	0.94
45	1.00	0.98	0.97	0.96	0.95	0.93
50	1.00	0.96	0.95	0.94	0.93	0.91
55	1.00	0.96	0.95	0.94	0.93	0.89
60	1.00	0.96	0.94	0.93	0.92	0.88
65	Dynamic Temperature Sensing, See LAT Factors to calculate this information.					

**Lumen Maintenance - PHZL 60L**

Ambient	0 Hours	15,000 Hours	30,000 Hours	45,000 Hours	60,000 Hours	100,000 Hours
25	1.00	0.98	0.98	0.97	0.96	0.95
30	1.00	0.98	0.97	0.97	0.96	0.94
35	1.00	0.98	0.97	0.97	0.96	0.94
40	1.00	0.98	0.97	0.96	0.96	0.93
45	1.00	0.97	0.96	0.95	0.94	0.92
50	1.00	0.96	0.95	0.94	0.93	0.9
55	1.00	0.96	0.95	0.93	0.92	0.89
60	Dynamic Temperature Sensing, See LAT Factors to calculate this information.					
65	Dynamic Temperature Sensing, See LAT Factors to calculate this information.					

**OPERATIONAL DATA CONTINUED**

**Lumen Maintenance - PHZL 70L**

Ambient	0 Hours	15,000 Hours	30,000 Hours	45,000 Hours	60,000 Hours	100,000 Hours
25	1.00	0.98	0.97	0.97	0.96	0.94
30	1.00	0.98	0.97	0.97	0.96	0.94
35	1.00	0.98	0.97	0.96	0.95	0.93
40	1.00	0.96	0.95	0.94	0.94	0.91
45	1.00	0.96	0.95	0.94	0.93	0.9
50	1.00	0.96	0.95	0.93	0.92	0.89
55	Dynamic Temperature Sensing, See LAT Factors to calculate this information.					
60	Dynamic Temperature Sensing, See LAT Factors to calculate this information.					
65	Dynamic Temperature Sensing, See LAT Factors to calculate this information.					

**LAT Factors**

Ambient	70L	60L	50L
25	100%	100%	100%
30	99%	99%	99%
35	98%	98%	98%
40	97%	97%	98%
45	96%	96%	97%
50	95%	95%	96%
55	94%	95%	95%
60	85%	90%	94%
65	71%	74%	80%

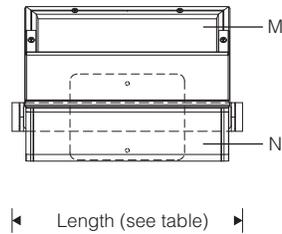
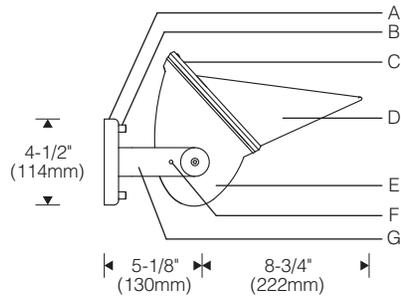
\* Shaded Cells include active dynamic temperature sensing

**PERFORMANCE WITH AO\* Field Adjustable Output**

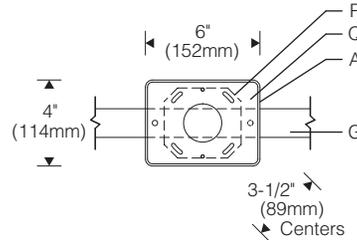
FAO Position	Light Output	Power Consumption
8	100%	100%
7	100%	100%
6	100%	100%
5	90%	85%
4	80%	73%
3	68%	60%
2	57%	49%
1	41%	34%

\* Same for all configuration.

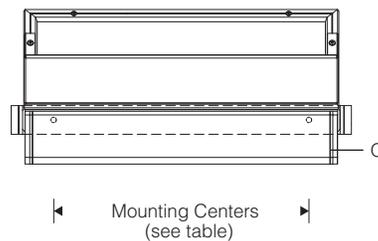
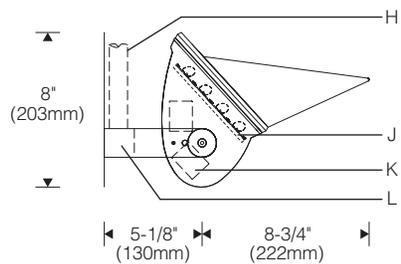
**Z Mount** 1:10 Scale



**Mounting Plate** (Z mount)



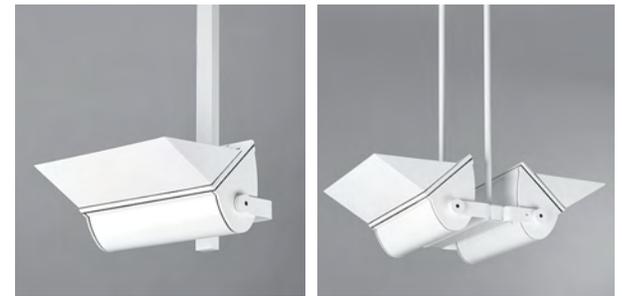
**Y Mount** 1:10 Scale



# of LEDs	Length	Mounting*
36	12-1/16*** (306mm)	8-7/8*** (225mm)
72	17-13/16" (452mm)	14-5/8" (370mm)
108	24-7/8*** (632mm)	21-11/16*** (550mm)

\*Mounting dimensions shown for Y mount only.

\*\*For mounting codes 1, 2, 3, 4:  
Length = 17-13/16"



**Specifications**

- |   |   |   |  |
|---|---|---|--|
| <b>A</b> Aluminum canopy (Z mount)                              | <b>F</b> Locking set screw  | <b>K</b> Integral drivers   | <b>N</b> Extruded aluminum housing     |
| <b>B</b> Chrome cap nuts  | <b>G</b> Aluminum yoke  | <b>L</b> Integral splice compartment with conduit entry and removable cover (Y mount) | <b>O</b> Aluminum reveal plate (black) |
| <b>C</b> Mitred extruded aluminum door frame w/ silicone gasket | <b>H</b> Conduit (by others)  | <b>M</b> Micro-prismatic tempered glass lens  | <b>P</b> Outlet box (by others)        |
| <b>D</b> Solid cutoff visor (included)                          | <b>J</b> Field serviceable light engine with <b>fraqtir™</b> asymmetric optic |   | <b>Q</b> Aluminum mounting plate       |
| <b>E</b> Die-cast end plates with aiming marks                  |   |   |  |

**Optic Assembly:**

Two-piece extruded aluminum heat sink housing and light engine. Exterior heat sink anodized for maximum emissivity. Removable interior extrusion treated to maximize thermal conductivity. Precision formed asymmetric optical light bar of high temperature, water-clear acrylic. Tempered micro-prismatic glass lens with elliptical distribution holographic diffuser; maximizes lateral distribution without disturbing asymmetric forward throw.

**Finish:**

Painted surfaces – 6 stage pretreatment and electrostatically applied thermoset polyester powder coating for a durable abrasion, fade and corrosion resistant finish. Formed aluminum visor.

Extruded aluminum heat sink/housing, canopy, yoke, door frame and decorative end plates are finished in semigloss white. All luminaire hardware is stainless steel; mounting hardware is zinc or electroplated steel.

**Mounting:**

Z mount – wall plate mounts to recessed outlet box (by others). Canopy conceals mounting plate and hardware.

Y mount – surface mounted yoke attaches with 1/4-20 fasteners (by others) concealed under splice cover.

Uplight pendant (back-to-back) or cantilever mounting assembly ordered separately; specify X mount.

One, two, three or four-way cluster pendant assembly ordered separately (see Accessories); specify 1, 2, 3 or 4 mount.

**Electrical:**

Use 90°C wire for supply connections. Integral electronic HPF constant current driver. For complete driver specifications, see website, reference document [MA-1303](#).

**Standard:**

CSA certified to UL1598, UL8750, CSA C22.2 for dry locations; specify VP option for damp locations. Where pendant or cantilever may be exposed to wind, consult factory. 5 year warranty, maximum ambient temperature 45°C (113°F).

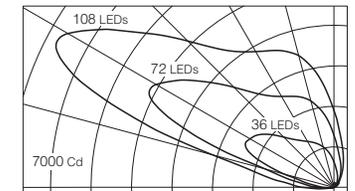
**Features**

- Maintains over 90% of initial light output after 36,000 hours
- 2700K through 4000K at 70+, 80+ or 90+ CRI
- All aluminum and stainless steel construction
- Fully adjustable and lockable aiming with aiming index
- Universal voltage drivers and light engines are serviceable for replacement or upgrade

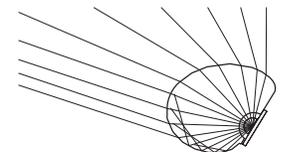


**Performance**

*fraqtir technology uses a combination of refraction and total internal reflection, creating a distribution of light ideal for illuminating surfaces uniformly. Glare is minimized while light delivered to the target is maximized, resulting in high application efficiency.*



L90(10k) > 60,000 hrs @ 25°C per TM-21



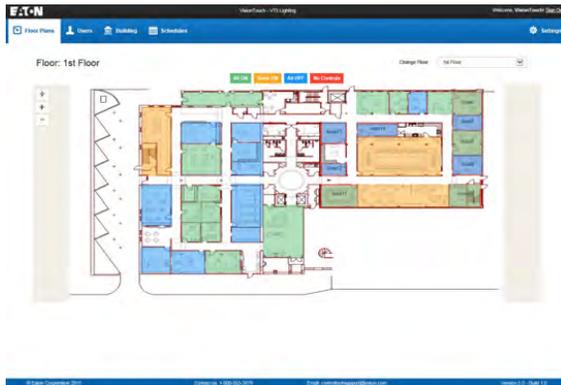
For photometric and lumen maintenance reports, visit [thelightingquotient.com](http://thelightingquotient.com)





# VisionTouch 5

Catalog#	Prepared by
Project	Date
Comments	Type



## Overview

VisionTouch allows facility manager to configure and maintain their facility Greengate lighting control system. Using this intuitive web-based software application, facility managers are able to easily create schedule, view the status of all devices.

## Features

- Web-based user interface – Eliminates the need to install any software on computing devices. This enables users to securely access the VisionTouch application from any device with a valid web browser.
- Interactive floor plan – Allows users to get the status of the devices (fixtures, daylight sensors) from the floor plan and easily send override commands to a group of fixtures via a simple click on the group of devices within the floor plan.
- Up to 500 simultaneous users - Allow users to easily change the lighting levels and mood within a space via a simple press of a button. Access to the various control features are regulated on a user profile basis.
- Up to 10 simultaneous facility managers – Allows a single lighting control system to be shared by multiple tenants. Each tenant able to customize the lights within their area without having to rely on a facility manager.
- Import AutoCAD (DXF) or jpeg files – Reduce non-value added engineering by leveraging the AutoCAD drawings of each floor and the content available on these drawings such as device location and device type.
- Integrated with Greengate Keeper Enterprise Software – Reduce non-value added engineering by automatically creating the system’s hierarchy based on data stored in Keeper Enterprise.

## Specifications

<b>Users can access VisionTouch using the following web browsers</b>	
<b>Supported Web Browsers</b>	Internet Explorer 11+ Google® Chrome 40+
<b>Screen Resolution</b>	1024 x 768 or higher
<b>VisionTouch is shipped installed on a server with these requirements</b>	
<b>Operating System Requirements</b>	Windows 7 IIS Server PostgreSQL
<b>Hardware Requirements</b>	2 GB RAM 400GB Hard Drive CD ROM 10/100 MB Network Card

## Installation Site Requirements

The Keeper Enterprise database created during startup of the Greengate lighting control panels must be made available to be uploaded into VisionTouch.

A dedicated Ethernet Interface Module (EIM) must be included on the project bill of materials to provide continuous access to the lighting control system from the VisionTouch server.

Floor plans need to be defined prior to VisionTouch setup. These floor plans should include the following.

- Image for the floor plan (DXF or JPEG)
- Defined areas on the floor plan for control
- Defined outputs from the Keeper Enterprise database that report to each area
- Defined remote commands from the Keeper Enterprise database that report to each area
- Defined analog inputs from the Keeper Enterprise database that report to each area

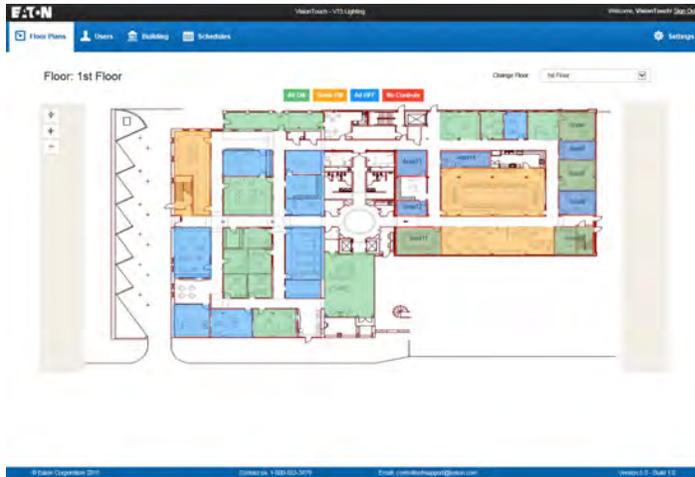
## User Interface

The VisionTouch web-based user interface allows users to access the system from any computer with access to the building LAN. Access to VisionTouch will provide access to the Greengate system composed of network Greengate panels and Room Controllers. The user interface has been optimized to allow facility managers to easily add areas of control and status, as well as simplified centralized scheduling.

Using a toolbar, users can access the various programming and management modules. The toolbar is comprised of the following main modules:

1. Floor plan – Facility managers and users can quickly see area status, override areas and individual devices within the area.
  - Area status is easily recognizable with color coding
  - Area details can be seen by clicking on the area. (Area details includes individual device status and control, schedules affecting this area)
2. User – Facility Managers can create user accounts and assign access privileges.
3. Building – Facility Managers can add new floors, import DXF or jpeg based floorplans
  - Areas can be created on the floor plans
  - Drag and drop relays, dimmers, remotes and analogs into the defined areas for controls and status
4. Scheduling – Using a calendar, users can schedule switching or dimming of lights in areas where occupancy control is not appropriate. Users can create multiple schedules that can be employed for areas as small as a zone within a room.
  - Schedules can be individual day or set for recurrence
  - Color coded day schedules for easy sorting
  - Each schedule can trigger multiple areas/outputs to different states (On/Off/Dim)
5. Settings – The settings area allows configuration and backup of VisionTouch database and communication settings.
  - Upload previously configured Keeper Enterprise database, completed during startup
  - Backup and Restore of floor plans, area and schedule information
  - Define lighting control daily clock synchronization

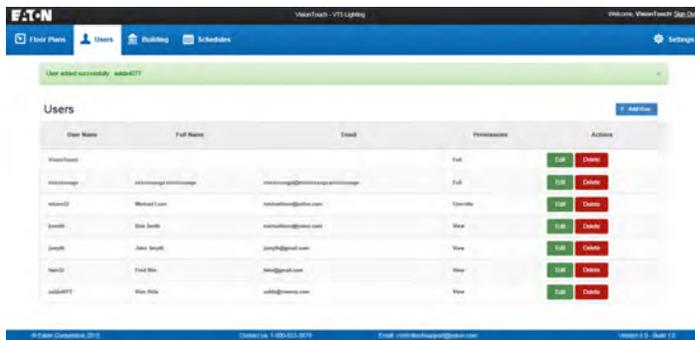
1



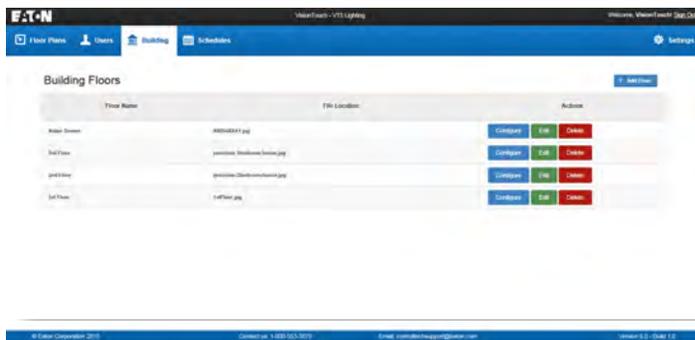
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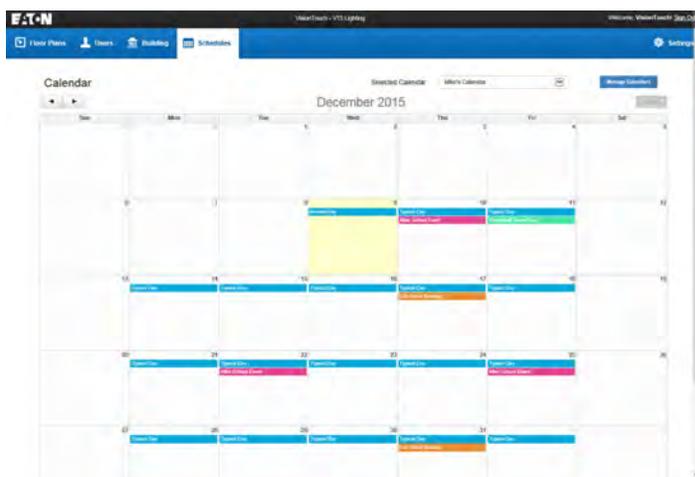
2



3



4



August 2016

## Ordering

This is an accessory for the Greengate Network Lighting Control Panels.

<b>Catalog #</b>	<b>Description</b>
SOFTVT5	VisionTouch 5 Server with Software Application
SOFTVT5-USB	VisionTouch 5 Software Installation USB (requires 3rd party provided computer meeting specifications for installation)
SOFTVT-Screens	Graphic screen layout services by our technical support team

\*VT5 allows the end user to create their own graphic screens. However, at least Qty 1 SOFTVT-Screens should be included by default to allow Eaton to setup the first graphic screen and train the end user.

## Required Accessories

<b>Catalog #</b>	<b>Description</b>
EIM	Ethernet Interface Module (required for all Greengate installations)

**Eaton**  
1000 Eaton Boulevard  
Cleveland, OH 44122  
United States  
Eaton.com

Eaton  
Lighting systems – Controls products  
203 Cooper Circle  
Peachtree City, GA 30269  
www.eaton.com/lightingsystems

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