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Obtrusive Light Spill Report
Kareena Private Hospital
Akalan Projects Pty. Ltd

17 November 2008
Reference 38770
Revision 02

Connell Wagner

Document Control

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01	7.11.2008	Draft	YCH	YCH	MLM	JAC
02	17.11.2008	DA Submission	YCH	YCH	MLM	JAC

Contents

1. Introduction

Connell Wagner has been commissioned by Akalan Projects Pty. Ltd. to undertake obtrusive spill light analysis for the proposed development of Kareena Private Hospital. The main objective is to provide independent assessment of the potential obtrusive light effects on residents.

This report will summarise the results from modelling the proposed building and the adjacent residential properties. This report also aims to satisfy the request outlined in the Hassell DA Submission Requirement dated 15-Oct-08, reference item 10.

Connell Wagner have utilised Lighting Analysis Software AGI32 to complete the modelling and analysis of the luminaire performance.

1.1 Explanatory Statement

Exclusive Benefit and Reliance
Connell Wagner has prepared this report at the request of Akalan Pty. Ltd.

Third Parties
It is not possible to make a proper assessment of the report without a clear understanding of the terms of engagement under which the report has been prepared, including the scope of the instructions and directions given to and the assumptions made by the engineer who has prepared the report.

The report is a report scoped in accordance with instructions given by, or on behalf of Akalan Pty. Ltd. The report may not address issues which would need to be addressed with a third party if that party's particular circumstances, requirements and experience with such reports were known and may make assumptions about matters of which a third party is not aware.

Connell Wagner therefore does not assume responsibility for the use of the report by any third party and the use of the report by and third party is at the risk of that party.

Limited Scope
The limited scope of Connell Wagner's brief in this matter, including the scope of investigation requested by Akalan Pty. Ltd., means that the report necessarily concentrates on readily apparent major items. It does not take into account specific project requirements or characteristics.

Limits on Investigation and Information
The report contains information provided to Connell Wagner by other parties. The report is provided strictly on the basis that the information that has been provided to Connell Wagner is accurate, complete and adequate.

1.2 Contact

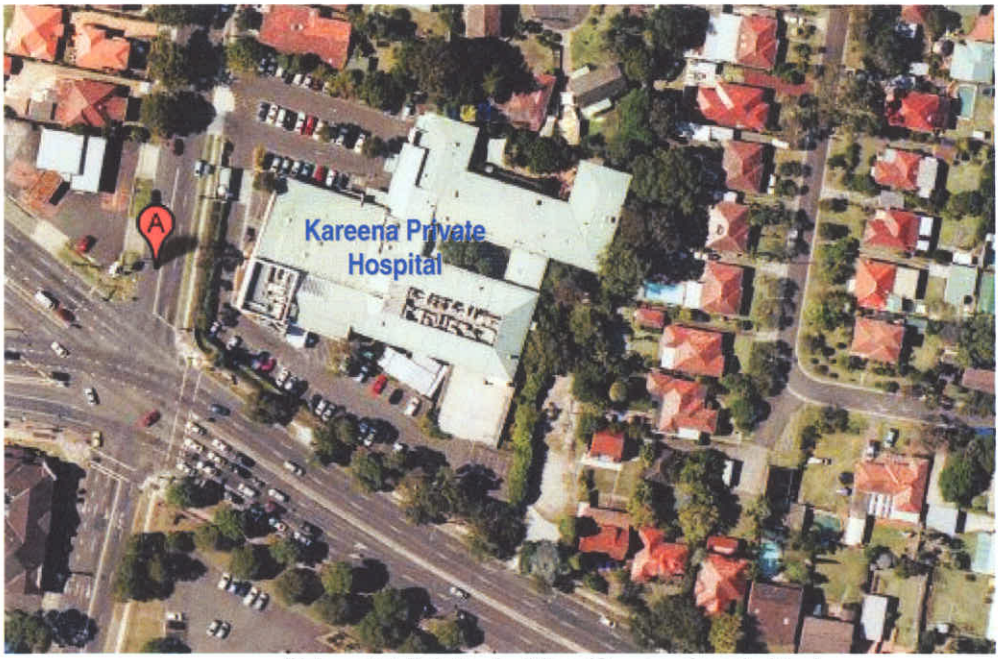
The contact at Connell Wagner:

Matt Magraith
Senior Electrical Engineer
Telephone: +61 2 9465 5535
email: MagraithM@conwag.com

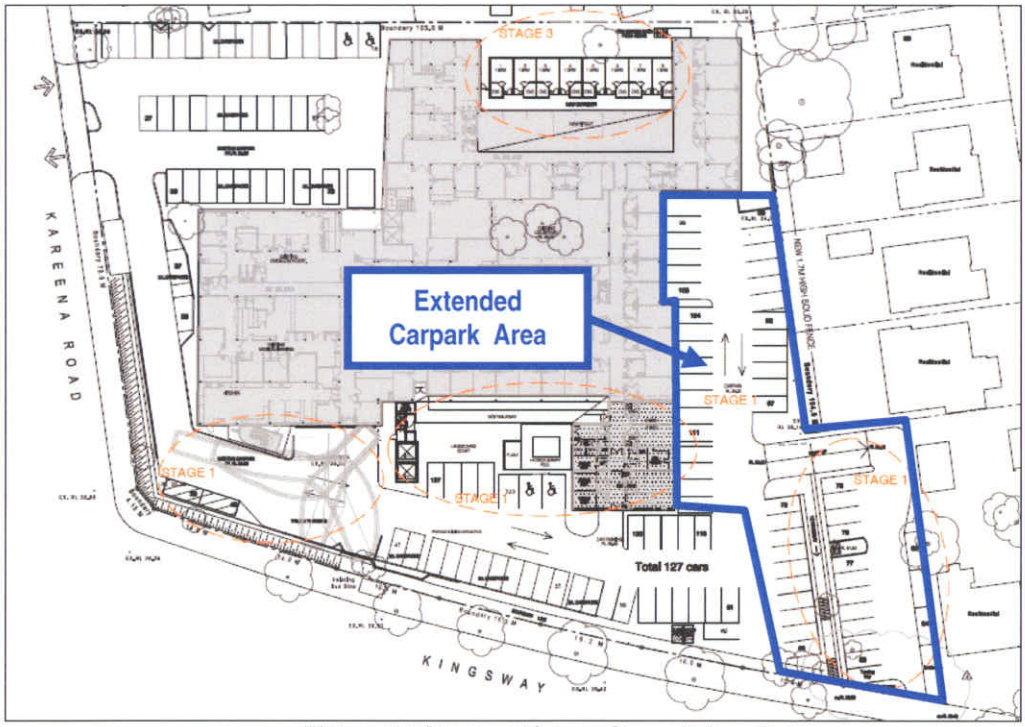
2. Analysis Area

The existing Kareena Private Hospital building and the surrounding area illustrated in Picture 2.1 (Sourced from Goggle Map). Picture 2.2 and 2.3 illustrate the proposed construction area involved in lower ground floor and ground floor expansion areas.

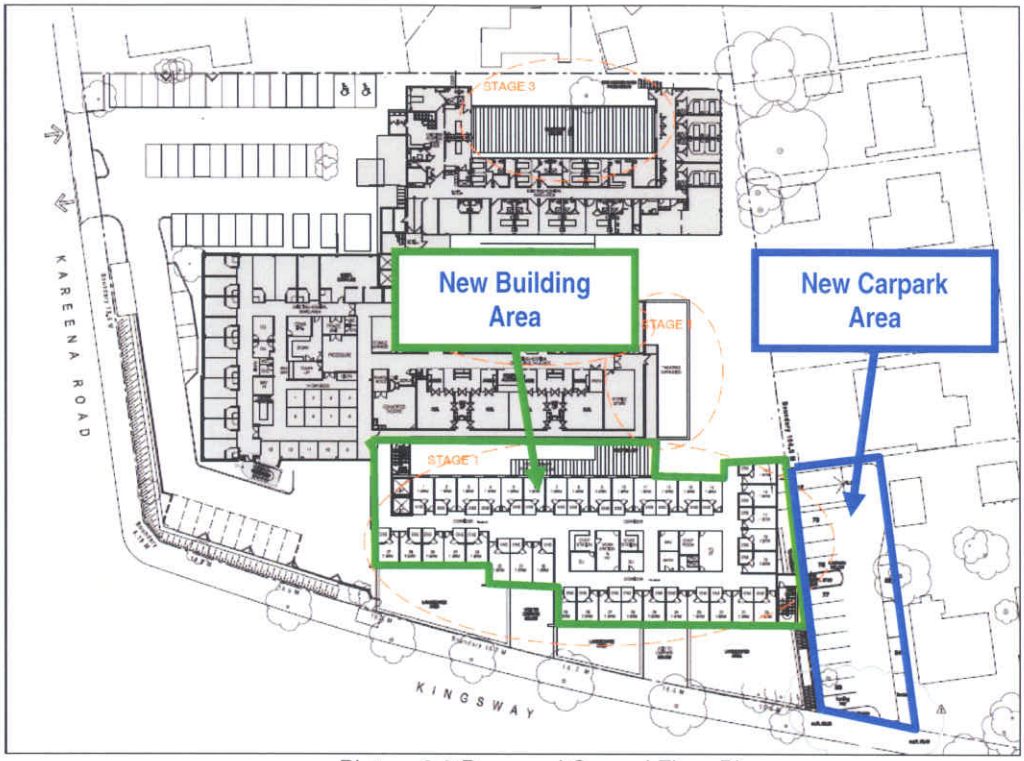
New outdoor luminaires shall be installed in the carpark area. Picture 2.4 illustrates the analysis area taken in this report.



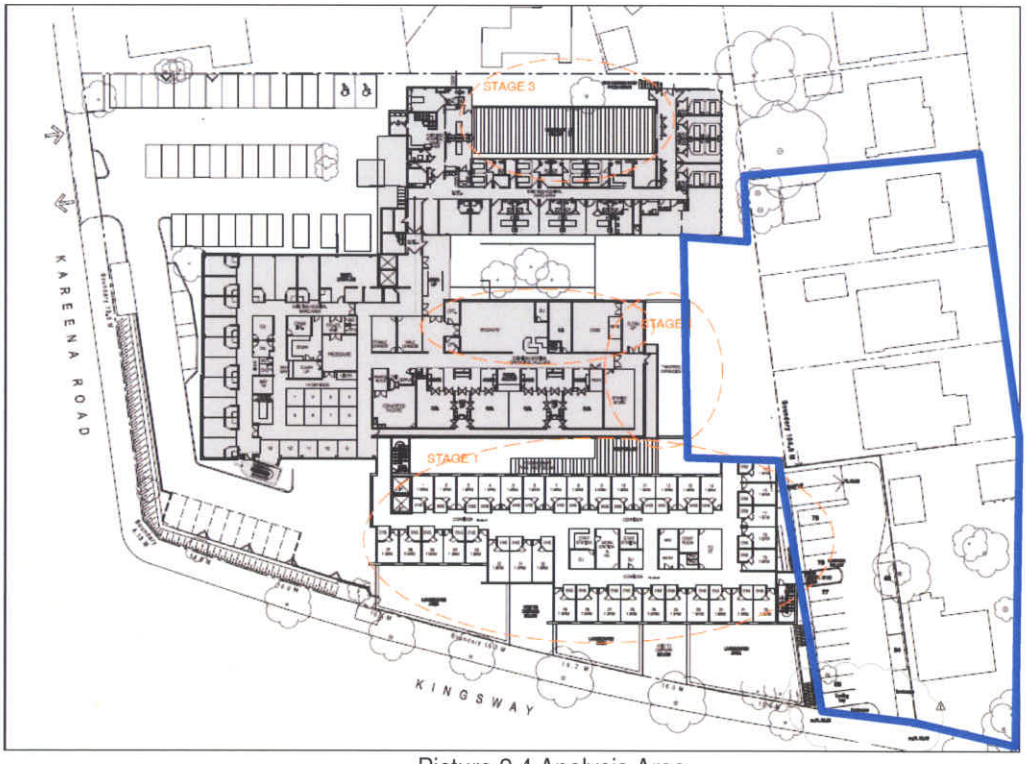
Picture 2.1 Existing building (Source: Google Map)



Picture 2.2 Proposed Lower Ground Floor Plan



Picture 2.3 Proposed Ground Floor Plan



Picture 2.4 Analysis Area

3. Luminaire Data

Whilst the final electrical design for the development has not been completed, we have undertaken a typical lighting design layout to satisfy the lighting design requirements for external carparking areas in accordance with the technical parametres outlined in AS 1158. For this analysis, we have simulates pole mounted luminaries in the open carpark area. The luminaire data is from a reputable international manufacturer details below:-

Manufacturer: Kim International Lighting
Name of the fitting: Wrap9 small
Maintenance Factor: 0.7
Lamp Type: 35W / 70W Metal Halide

Further information of the luminaire has attached in Appendix A.

4. Modelling Software

Connell Wagner utilise the industry standard lighting analysis software (AGI32) to undertake lighting calculations and modelling. AGI uses the inverse square law method for the calculation of illuminance.

AGI32 is a software tool used to predict the photometric performance of selected luminaires or daylight penetration in a simulated environment. The environments that can be considered by AGI32 range from a simple interior space to a multilevel interchange or complex auditorium. AGI32 provides the appropriate tools to deliver the lighting analysis regardless of project complexity.

AGI32 is capable of a number of lighting specific computations aside from the basic incident illuminance (lux) on any real or imaginary surface.

To provide realistic and consistent results for comparative purposes Maintenance Factors have been applied to the lighting calculations.

4.1 Defining the Factors

Obtrusive light – the illuminance on any calculation grid point on a vertical plane at a height of 1.5m within the specified area, derived in the specified manner.

Note: 1. This definition is identical to that of the point vertical illuminance, which this measure of obtrusive light at any give point.
2. The required value of obtrusive light is a maximum for compliance of the lighting scheme.

Point vertical illumance - the illuminance on any calculation grid point on a vertical plane at a height of 1.5m within the specified area, derived in the specified manner.

Note: 1. The required value of obtrusive light is a minimum for compliance of the lighting scheme.
2. It also used as the measure of obtrusive light at any given pint.

Average Illuminance - the arithmetic mean of the values of illuminance in a horizontal plane at floor level, either calculated or measured, for the grid of points at with such calculations.

Curfew Hour – the operation hours beyond 11 pm .

5. Standards

The Australian Standards for obstructive spill light have been referenced for this analysis AS/NZS 4282:1997 – Control of the obtrusive effects of outdoor lighting and AS/NZS 1158.3.1:2005 Pedestrian area (Category P) lighting –Performance and design requirements.

The new ground floor carpark area shall be designed as lighting category P11b with average horizontal illuminance 7 lux and point vertical illuminance 1.5 lux as stated in AS/NZS 1158.3.1:2005.

AS/NZS 4282:1997 Table 2.1 recommended maximum illuminance values in vertical plan in curfewed hours for the light surrounded residential areas is 2 lux. The calculations should be made for a grid of points spaced at intervals of not more than 1 metre in the plane of the surrounding residential windows.

6. Model Parametres

Physical Area / Room characteristics:

Height of Hospital	12 m
Height of Residential Houses to underside of eaves	
Single Storage	3 m
Double Storage	6 m
Height of fences	1.8 m
Walls Reflectance:	0.50
Fences Reflectance	0.50
Ground Reflectance:	0.10

Calculation Grid:

Horizontal grid point: 1 m x 1 m on ground

Vertical grid point: single storage - 0.3 m x 0.3 m @ 1 to 2.2 metre above ground
double storage - 0.3 m x 0.3 m @ 1 to 5.5 metre above ground

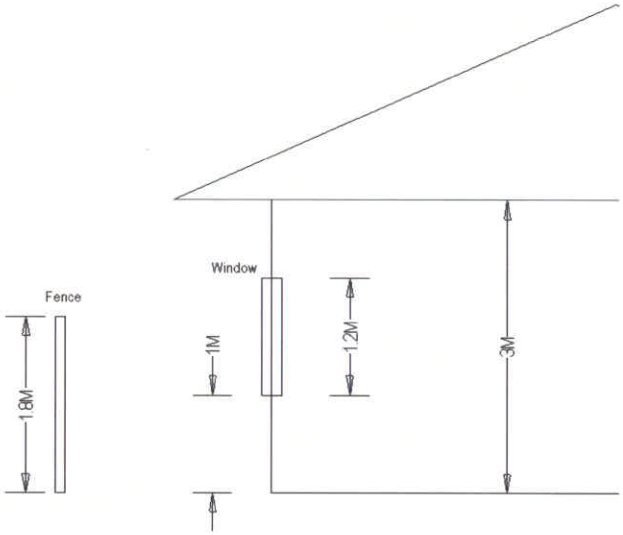


Figure 6.1 – modelling dimension

7. Model

The model has been created using reference architectural plans by Hassell to represent the physical characteristics of the building. The model is built as in Figure 7.1. The obtrusive spill light study examines in two typical carpark lighting environments. This report examines the obtrusive light effects to the resident in two different carpark lighting design, one with 4.5 metre height pole and the other with 6 metre height pole. The vertical calculation grids on residential windows are labelled in Figure 7.2.

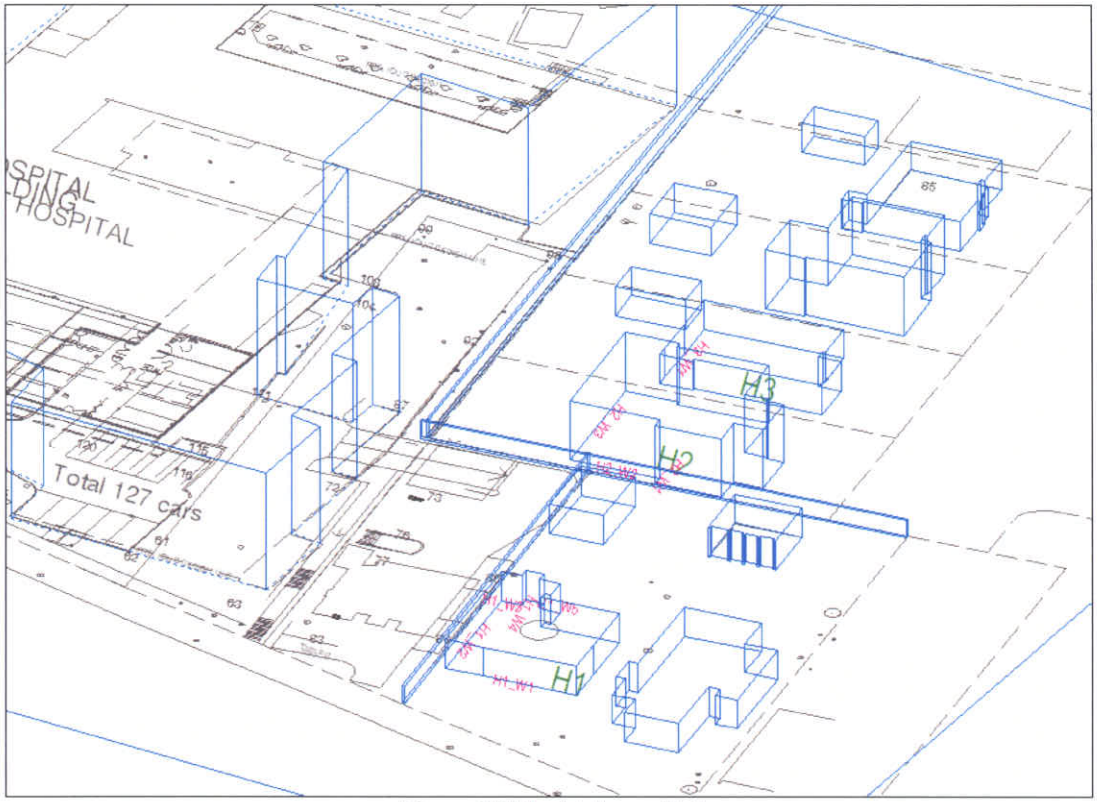


Figure 7.1 Model (Isometric)

Figure 7.2 – Model (Plan view)

8. Results

8.1 Design 1 – 4.5 metres height pole luminaire

Carpark illuminance level
Average: 7.0
Vertical: 5.1

Residential vertical illuminance level

	Average	Maximum	Compliant
H1_W1	0.02	0.2	Yes
H1_W2	0.42	0.9	Yes
H1_W3	0.32	0.6	Yes
H1_W4	0.48	0.7	Yes
H1_W5	0.15	0.3	Yes
H2_W1	0.00	0.0	Yes
H2_W2	0.04	0.1	Yes
H2_W3	0.00	0.1	Yes
H3_W1	0.00	00	Yes

Note: refer to Figure 7.6 for label location

8.2 Design 2 – 6 metres height pole luminaire

Carpark illuminance level
Average: 8.21
Vertical: 4.17

Residential vertical illuminance level

	Average	Maximum	Compliant
H1_W1	0.06	0.3	Yes
H1_W2	1.07	1.9	Yes
H1_W3	0.58	0.7	Yes
H1_W4	1.05	1.2	Yes
H1_W5	0.29	0.4	Yes
H2_W1	0.08	0.1	Yes
H2_W2	0.18	1.5	Yes
H2_W3	0.08	0.8	Yes
H3_W1	0.00	0.0	Yes

Note: refer to Figure 7.6 for label location

9. Conclusion

This report provides Akalan with the technical analysis of the potential obtrusive spill light from the proposed building effect on the residents.

The new carpark shall be designed as category P11b with minimum average horizontal illuminace of 7 lux level and minimum vertical illuminace of 1.5 lux. Design 1 provides 7.0 average horizontal lux level and 5.1 vertical lux, and design 2 provides 8.21 average horizontal lux level and 4.17 vertical lux level. In the results, the average vertical illuminance level on residential properties does not exceed 2 lux, i.e. comply AS 4285:1997. In addition, the individual vertical point of the results does not exceed 2 lux.

The model demonstrates the potential obtrusive spill light on residents from the proposed development of Kareena Private Hospital, and illustrates the evidence of compliance with AS 4285 and AS 1168. This report also satisfied the request outlined in the Hassell DA Submission Requirement dated 15-Oct-08, reference item 10.

Appendix A

Luminaires Technical Data and Test Reports

KIM LIGHTING

WP9SM

WARP9™- Small, magnetic

revision 6/8/07 • wp9sm.pdf

Type:
Job:
Catalog number:

/ / / /

Mtg. Fixture — See page 2 | Electrical Module — See page 3 | Finish | Options — See pages 4-5

Select pole from Kim Pole Catalog. If pole is provided by others indicate O.D. for arm fitting.

Approvals:

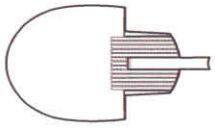
Date:

Specifications

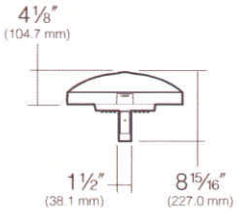
WP9SM
Small Magnetic Ballast
70 to 175 watt
PMH, HPS and MH
Medium Base Lamps

EPA: .52

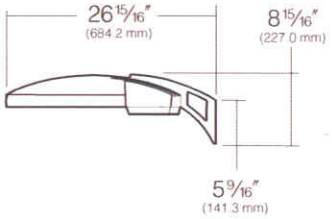
Maximum weight:
21 lb. magnetic



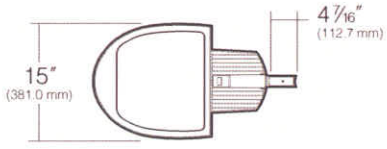
TOP



FRONT



SIDE



BOTTOM

Housing: One-piece die-cast, low copper alloy (<0.6% Cu) aluminum with integral cooling ribs over the electrical compartment. Solid barrier wall separates optical and electrical compartments. A single die-cast aluminum cam-latch provides positive locking and sealing of the optical chamber. A one-piece extruded and vulcanized silicone gasket seals the housing against the lens surface.

Magnetic Ballast Module: One-piece die-cast, low copper alloy (<0.6% Cu) aluminum with integral cooling ribs over exposed bottom surface. Integral hinges and slide latch with stainless steel hardware provides no-tool mounting and removal from housing. All electrical components are UL and CSA recognized and mounted directly to the ballast tray for maximum heat dissipation.

Lens: Clear 3/16" thick tempered glass lens retained by a stainless steel piano hinge and a single die-cast aluminum cam-latch. The edges are camouflaged to conceal the outer portion of the housing.

Reflector Module: High specular optical segments are rigidly mounted within carrier plates to maintain form. No fasteners are placed on the reflective surface. The entire assembly is rotatable in 90° increments and fastened to the housing as a one-piece module. The appropriate socket is rigidly attached to the reflector module.

Support Arm: Heavy cast, low copper alloy aluminum with stainless steel mounting bolts. A pole reinforcing plate is provided with wire strain relief. Arm is circular cut for specified round pole.

Finish: Super TGIC thermoset polyester powder coat paint, 2.5 mil nominal thickness, applied over a titanated zirconium conversion coating; 2500 hour salt spray test endurance rating. Standard colors are Black, Dark Bronze, Stealth Gray, Platinum Silver, or White. Custom colors are available

CAUTION: Fixtures must be grounded in accordance with national, state and/or local electrical codes, Failure to do so may result in serious personal injury.

Listings and Ratings			
UL cUL 1598[1]	CE	IP66 Rated	25C Ambient

[1]Suitable for wet locations.

KIM LIGHTING RESERVES THE RIGHT TO CHANGE SPECIFICATIONS WITHOUT NOTICE.

HUBBELL®
Hubbell Lighting, Inc.

 • P.O. BOX 60080, CITY OF INDUSTRY, CA 91716-0080 • TEL: 626/968-5666 • FAX: 626/369-2695

Standard Features

Mounting
3Y configuration is available for round poles only.

Plan View:

							Wall Mount
EPA:	0.52	1.04	0.82	1.3	1.3	1.5	n/a
Cat. No.:	☐ **1A**	☐ **2B**	☐ **2L**	☐ **3T**	☐ **3Y**	☐ **4C**	☐ **1W**

Fixture
Cat. No. designates fixture and light distribution.

See the Kim Warp9 Catalog for detailed information on reflector design and application.

Horizontal Lamp

Light Distribution:	Type II Full Cutoff	Type III Full Cutoff	Type IV Forward Throw Full Cutoff	Type V Square Full Cutoff
Cat. No.:	☐ **WP9SM2**	☐ **WP9SM3**	☐ **WP9SM4**	☐ **WP9SM5**

 • P.O. BOX 60080, CITY OF INDUSTRY, CA 91716-0080 • TEL: 626/968-5666 • FAX: 626/369-2695

Optional Features

Electrical Module
MH = Metal Halide
HPS = High Pressure Sodium
PMH = Pulse Start Metal Halide

Lamp Watts	Lamp Type	Line Volts
150	**HPS**	**277**

Cat. Nos. for Electrical Modules available:

	Metal Halide	High Pressure Sodium		
	☐ **175MH120**	☐ **70HPS120**	☐ **100HPS120**	☐ **150HPS120**
	☐ **175MH208**	☐ **70HPS208**	☐ **100HPS208**	☐ **150HPS208**
	☐ **175MH240**	☐ **70HPS240**	☐ **100HPS240**	☐ **150HPS240**
	☐ **175MH277**	☐ **70HPS277**	☐ **100HPS277**	☐ **150HPS277**
	☐ **175MH347**	☐ **70HPS347**	☐ **100HPS347**	☐ **150HPS347**
	☐ **175MH480**	☐ **70HPS480**	☐ **100HPS480**	☐ **150HPS480**
Lamp	E-17, Clear	E-17, Clear	E-17, Clear	E-17, Clear
Socket	Medium Base	Medium Base	Medium Base	Medium Base
ANSI Ballast	M57	S62	S54	S55

	Pulse Start Metal Halide		
	☐ **70PMH120**	☐ **100PMH120**	☐ **150PMH120**
	☐ **70PMH208**	☐ **100PMH208**	☐ **150PMH208**
	☐ **70PMH240**	☐ **100PMH240**	☐ **150PMH240**
	☐ **70PMH277**	☐ **100PMH277**	☐ **150PMH277**
	☐ **70PMH347**	☐ **100PMH347**	☐ **150PMH347**
	☐ **70PMH480**	☐ **100PMH480**	☐ **150PMH480**
Lamp	ED-17 or T-6, Clear	E-17, Clear	E-17 or T-6, Clear
Socket	Med or G12 Base	Medium Base	Med or G12 Base
ANSI Ballast	M98 or M143	M90	M102 or M142

Finish
Super TGIC powder coat paint over a titanated zirconium conversion coating.

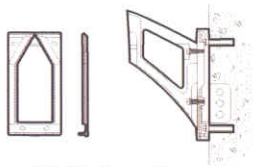
Color: Black Dark Bronze Stealth Gray Platinum Silver White Custom Color[1]
Cat. No.: ☐ **BL** ☐ **DB** ☐ **SG** ☐ **PS** ☐ **WH** ☐ **CC**

[1]Custom colors subject to additional charges, minimum quantities and extended lead times. Consult representative. Custom color description: _____

Optional Features

Wall Mounting
Cat. No. **1W**
Select from Mounting on page **2**.

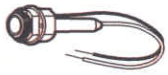
A cast aluminum mounting plate is mounted to the wall with four bolts (by others). Fixture and arm are mounted to the cast aluminum cover plate before attaching to the wall mounting plate. The fixture-arm-cover plate assembly is hooked to the wall mounting plate and secured with stainless steel screws provided. Field splices are made at the opening in the cover plate. Cover is finished to match arm and fixture color.


Wall Mounting

Fusing (internal only):
Cat. No. **(see chart at right)**
☐ **No Option**

High temperature fuse holders factory installed inside the fixture housing. Fuse is included.

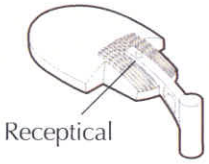
Line Volts:	120V	208V	240V	277V	347V	480V
Cat. No.:	☐ **SF**	☐ **DF**	☐ **DF**	☐ **SF**	☐ **SF**	☐ **DF**

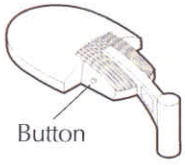

Single Fuse

Photocell Controls
Cat. Nos. *receptacle*
☐ **A-25**
☐ **No Option**

Button	*Line Volts*
☐ **A-30**	120V
☐ **A-31**	208V
☐ **A-32**	240V
☐ **A-33**	277V
☐ **A-34**	480V
☐ **A-35**	345V
☐ **No Option**	

Two types of photocell controls are available. A receptacle for a NEMA base photocell or an internal photocell button sensor on the back of the fixture facing the pole.


Receptical

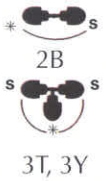

Button

Mounting (see page **2**)

✳ – Fixture with Photocell Receptacle
S – slave unit(s)


1A, 1W

2L


2B

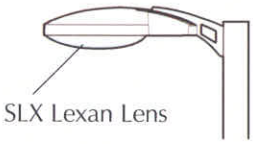
3T, 3Y


4C

SLX Lexan® Lens
Cat. No. ☐ **SLX**
☐ **No Option**

One-piece non-yellowing vacuum formed advanced polymer (SLX Lexan® from GE Advanced Materials) enclosure covers standard tempered glass lens..

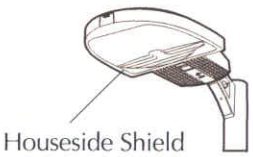
CAUTION: Use only when vandalism is anticipated to be high.


SLX Lexan Lens

Houseside Shield
Cat. No. ☐ **HS**
☐ **No Option**

Stamped aluminum louvers that pass streetside light and block houseside light. Recommended for use with clear lamps only. Effectiveness is reduced for coated lamps.

Note: For use with Types II, III, or IV distributions only.


Houseside Shield

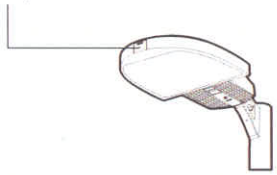
Optional Features

Tamper-Resistant Latch
Cat. No. ☐ **TL**
☐ **No Option**

Standard die-cast latch is provided with a captive 10-32 stainless steel flat socket-head screw to prevent unauthorized opening.

NOTE: Required only for vandal protection in locations where fixtures can be reached by unauthorized persons.

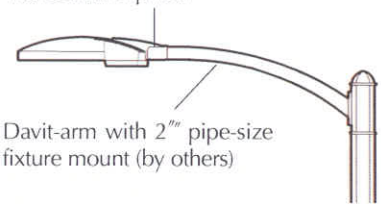
Tamper Resistant Latch



Horizontal Slipfitter Mount
Cat. No. ☐ **HSF**
☐ **No Option**

Replaces standard mounting arm with a cast aluminum fitter to adapt to a horizontal 2″ pipe-size mounting end (2⅜″ OD). The casting has a 5° adjustment to accommodate davit arms that are not horizontal. Horizontal pipe must be field drilled at one set screw location to insure against fixture rotation Finish to match fixture color.

Horizontal Slipfitter



Davit-arm with 2‴ pipe-size fixture mount (by others)

Vertical Slipfitter Mounts
Cat. No. includes Mounting
Cat. No. **(See right)**
☐ **No Option**

Allows fixture or fixtues with standard mounting arm to mount to a pole with a 2″ pipe-size tenon (2⅜″ OD). Minimum 4″ tenon length required.

Specify configuration (1A, 2B, 3T, 3Y, 4C) 4″ round or square aluminum with flush cap. Finish to match fixture and arm.

NOTE: 3Y only available on round slipfitter.

Cat. No.
☐ **VSF-1SA**
☐ **VSF-2SB**
☐ **VSF-2SL**
☐ **VSF-3ST**
☐ **VSF-3SY**
☐ **VSF-4SC**

Round

Stainless steel set screws

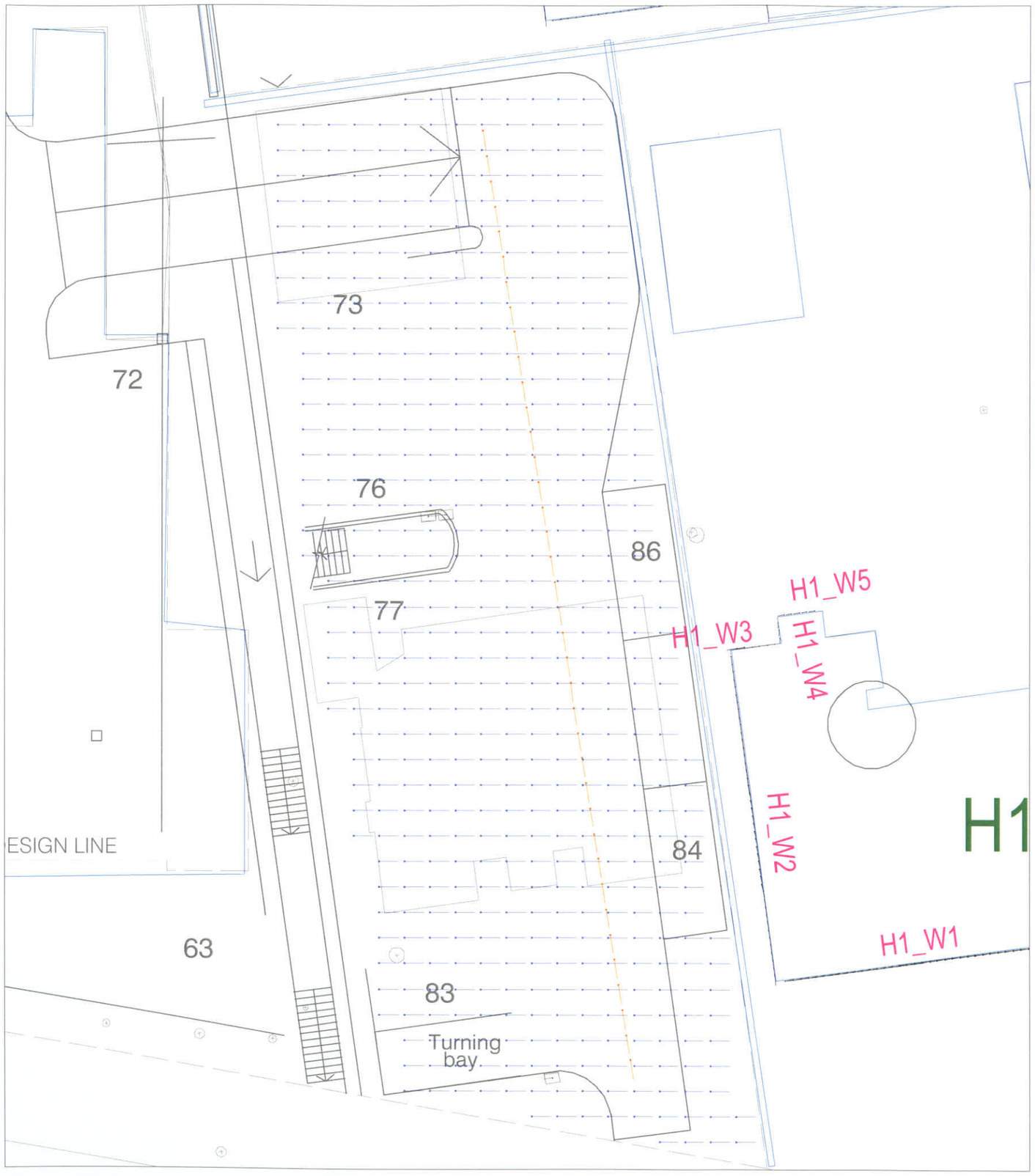
Square

Cat. No.
☐ **SVSF-1SA**
☐ **SVSF-2SB**
☐ **SVSF-2SL**
☐ **SVSF-3ST**
☐ **SVSF-4SC**

Mounting Configuration
1SA -single arm mount
2SB -2 at 180°
2SL -2 at 90°
3ST -3 at 90°
3SY -3 at 120°
4SC -4 at 90°

Appendix B

AGI32 Test Results



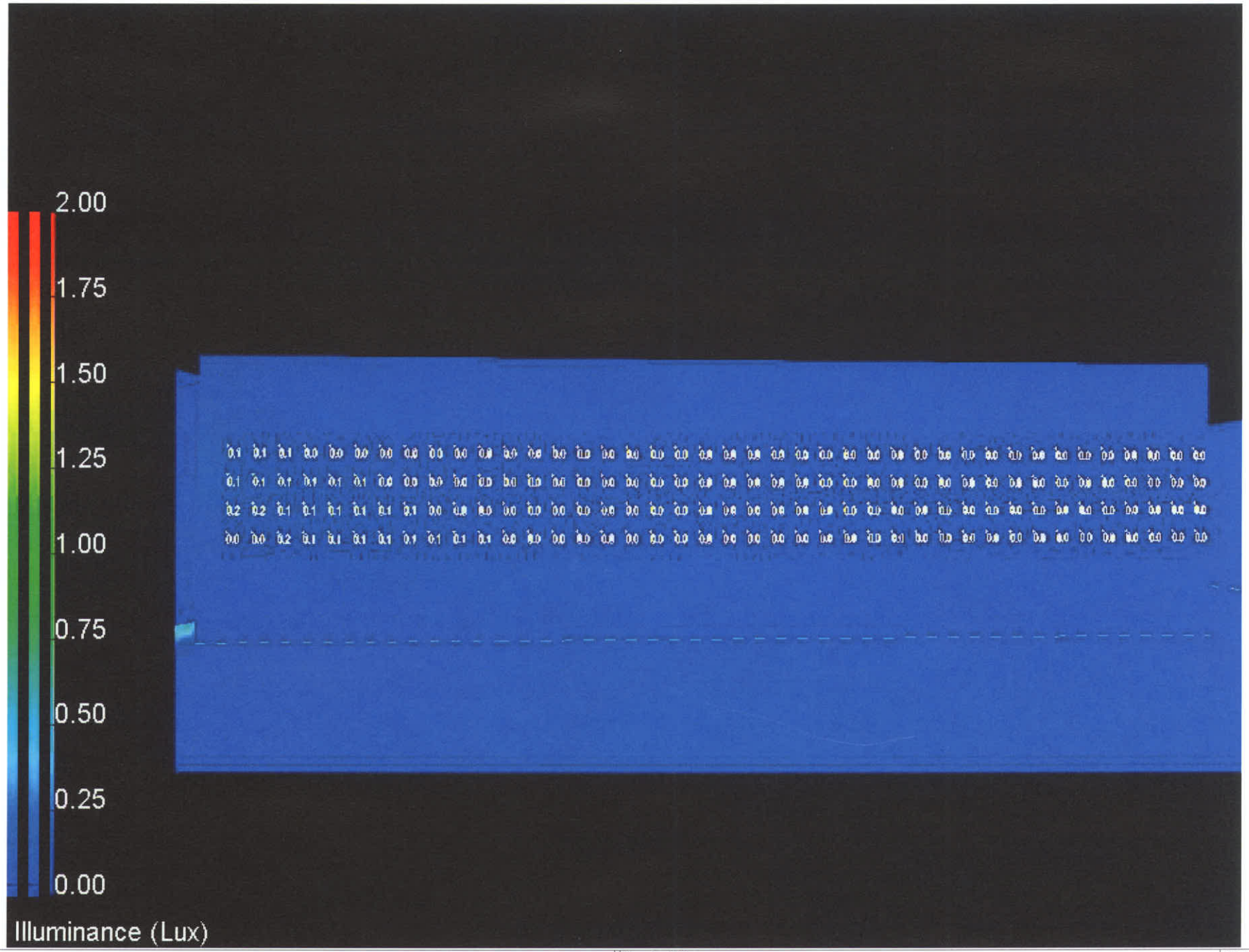
Luminaire Schedule						
Symbol	Label	Description	Qty	Arrangement	Lumens	LLF
	wp9s2-35p-BB	wp9s2-070p	1	BACK-BACK	3300	0.700
	wp9s2-035p	wp9s2-070p	1	SINGLE	3300	0.700

Numeric Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Vert	Illuminance	Lux	5.10	8.9	0.3	0.06	0.03
H1_W5	Illuminance	Lux	0.15	0.3	0.0	N.A.	N.A.
H1_W1	Illuminance	Lux	0.02	0.2	0.0	N.A.	N.A.
H1_W2	Illuminance	Lux	0.42	0.9	0.0	N.A.	N.A.
H1_W3	Illuminance	Lux	0.32	0.6	0.0	N.A.	N.A.
H3_W1	Illuminance	Lux	0.00	0.0	0.0	N.A.	N.A.
H1_W4	Illuminance	Lux	0.48	0.7	0.2	0.42	0.29
H2_W1	Illuminance	Lux	0.00	0.0	0.0	N.A.	N.A.
H2_W2	Illuminance	Lux	0.04	0.1	0.0	N.A.	N.A.
H2_W3	Illuminance	Lux	0.00	0.1	0.0	N.A.	N.A.
Carpark	Illuminance	Lux	7.00	32.2	0.8	0.11	0.02

Filename: S:\38770\Eng\Electrical\Calculations\4.5 meter height Rev 1.AGI

Connell Wagner

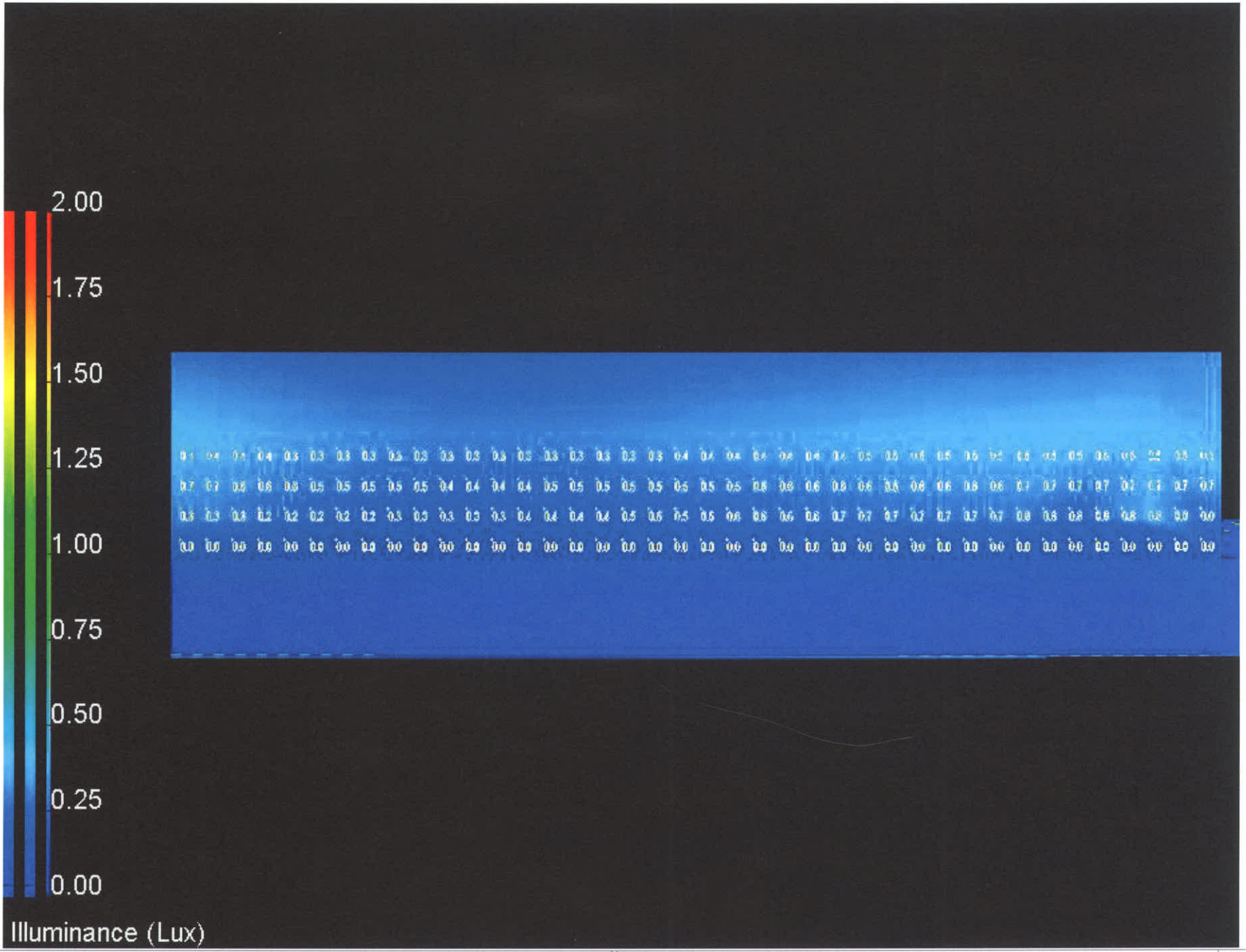
Drawing Title	4.5 METER HEIGHT POLE - LIGHTING LAYOUT
Date	6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL
Revision	01



Connell Wagner

Filename: S:\38770\Eng\Electrical\Calculations\4.5 meter height Rev 1.AGI

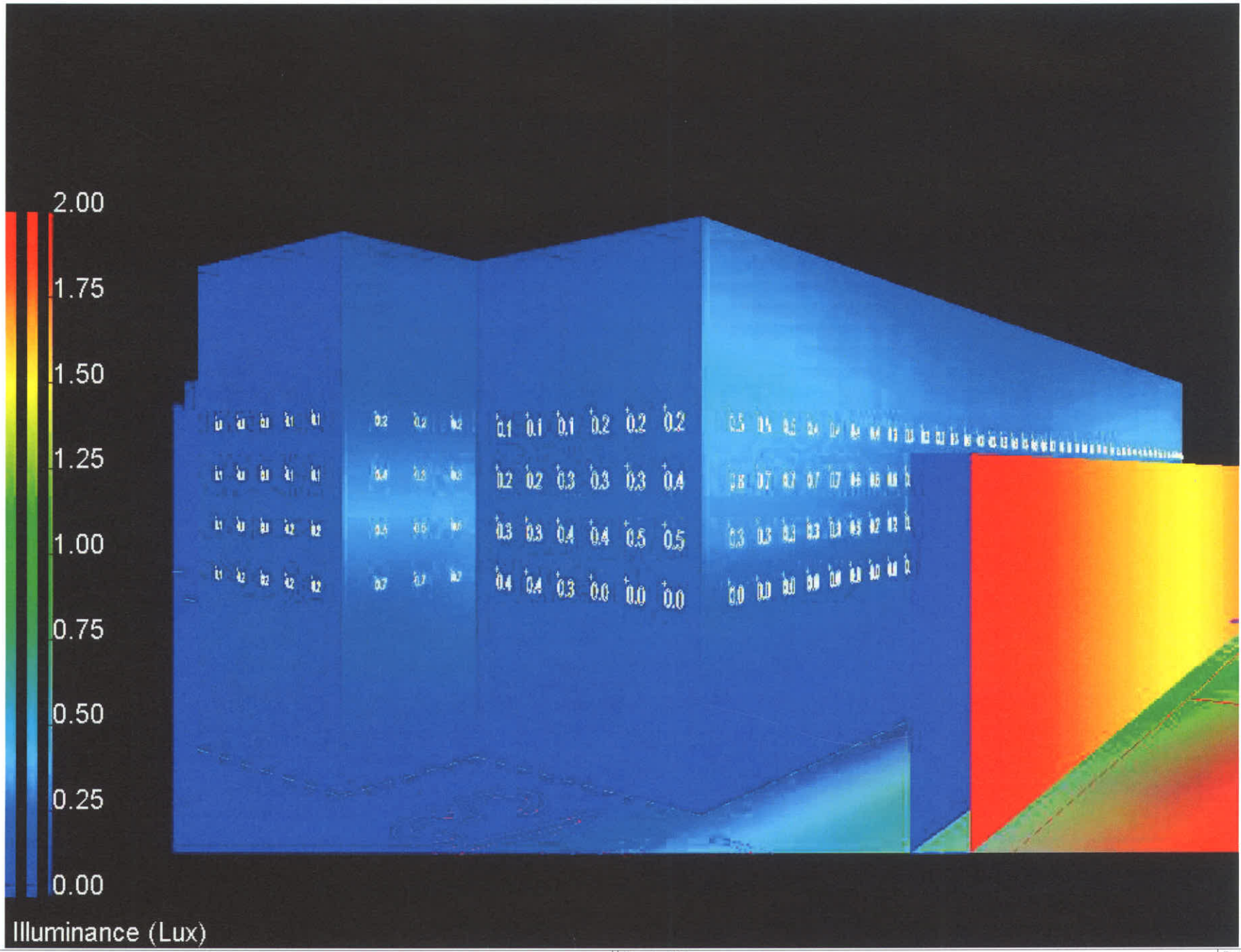
Drawing Title	4.5 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H1_W1	Date: 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision: 01



Connell Wagner

Filename: S:\38770\Eng\Electrical\Calculations\4.5 meter height Rev 1.AGI

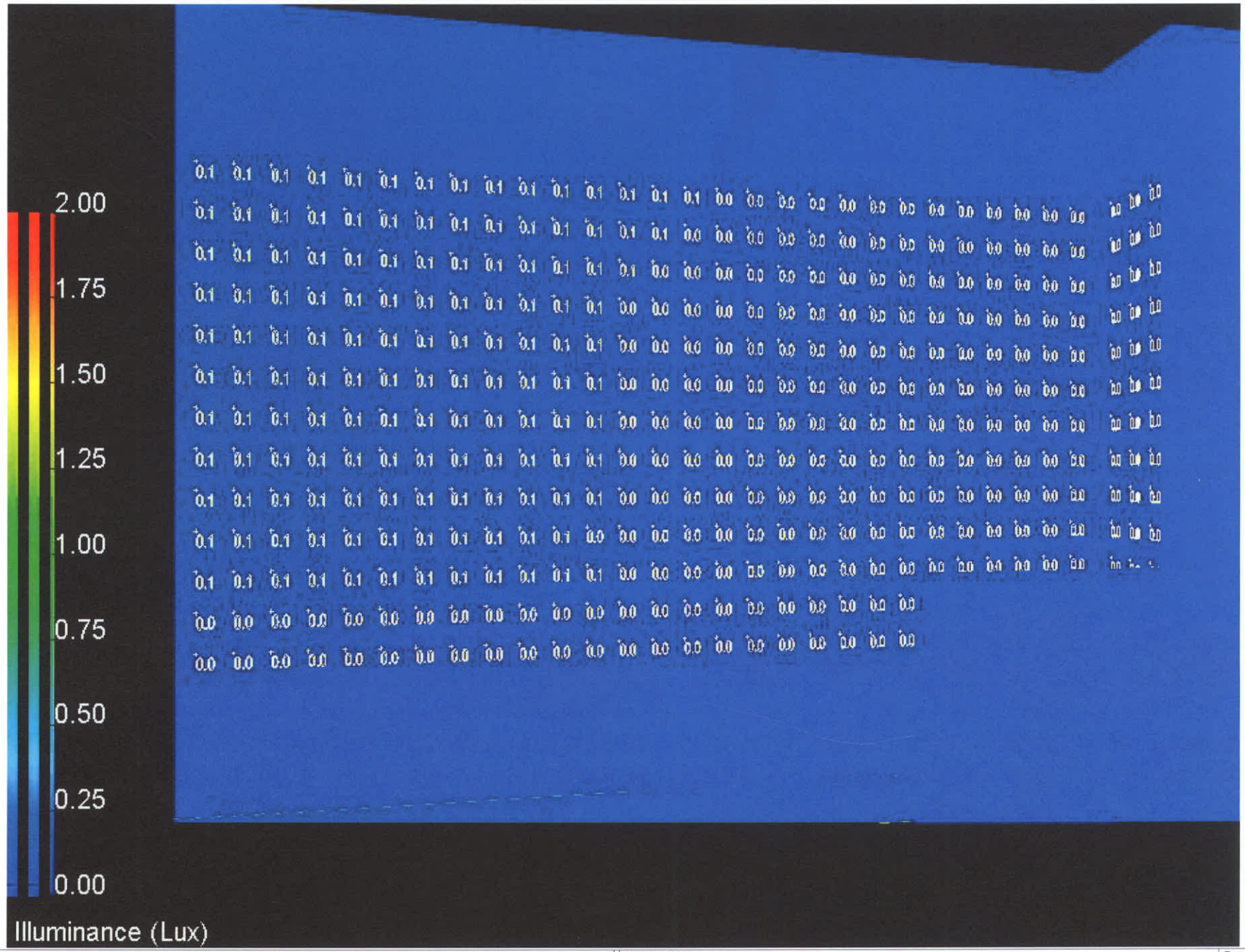
Drawing Title	4.5 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H1_W2	Date 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision 01



Connell Wagner

Filename: S:\38770\Eng\Electrical\Calculations\4.5 meter height Rev 1.AGI

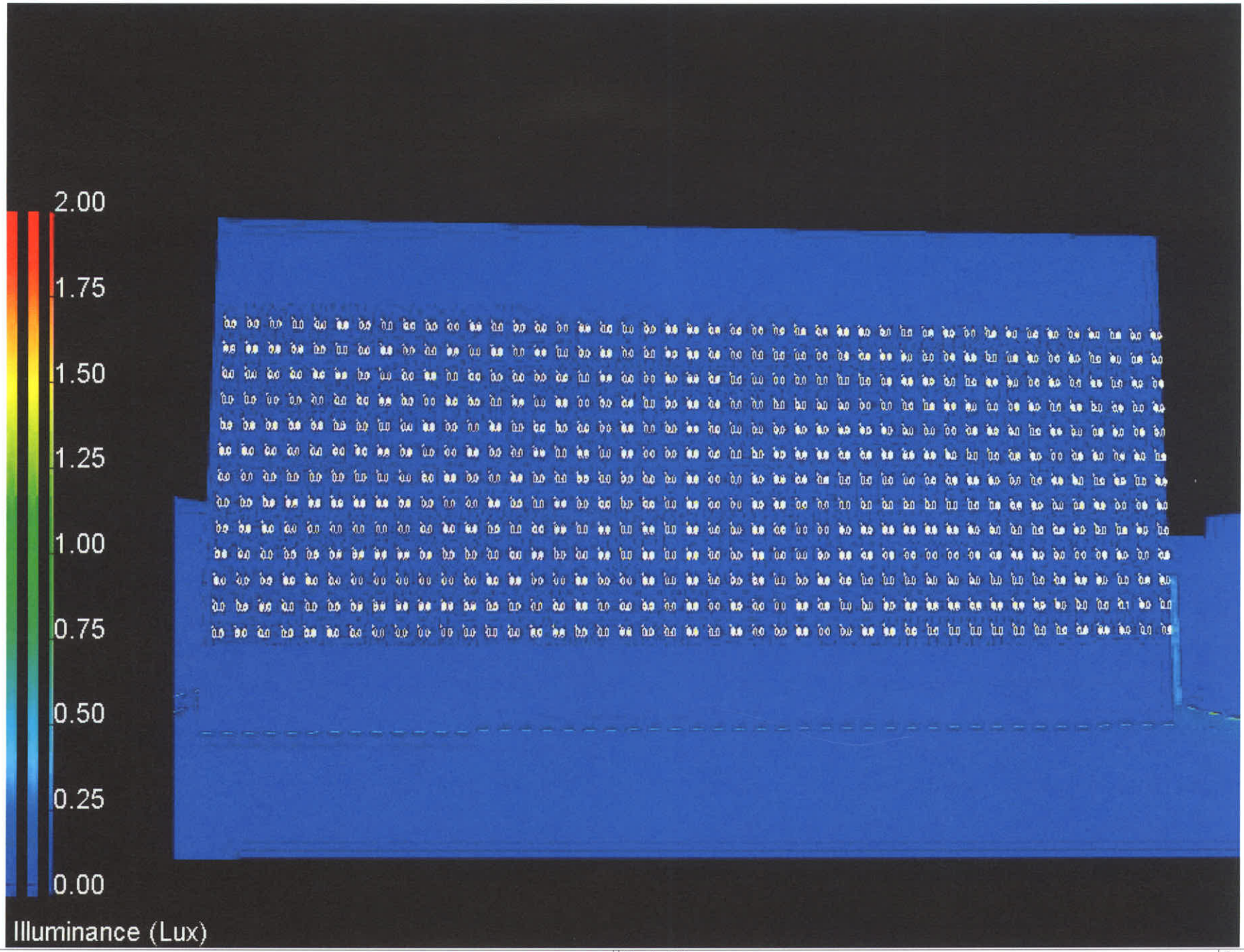
Drawing Title	4.5 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H1_W3, 4, 5	Date 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision 01



Connell Wagner

Filename: S:\38770\Eng\Electrical\Calculations\4.5 meter height Rev 1.AGI

Drawing Title	4.5 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H2_W1, 2	Date 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision 01



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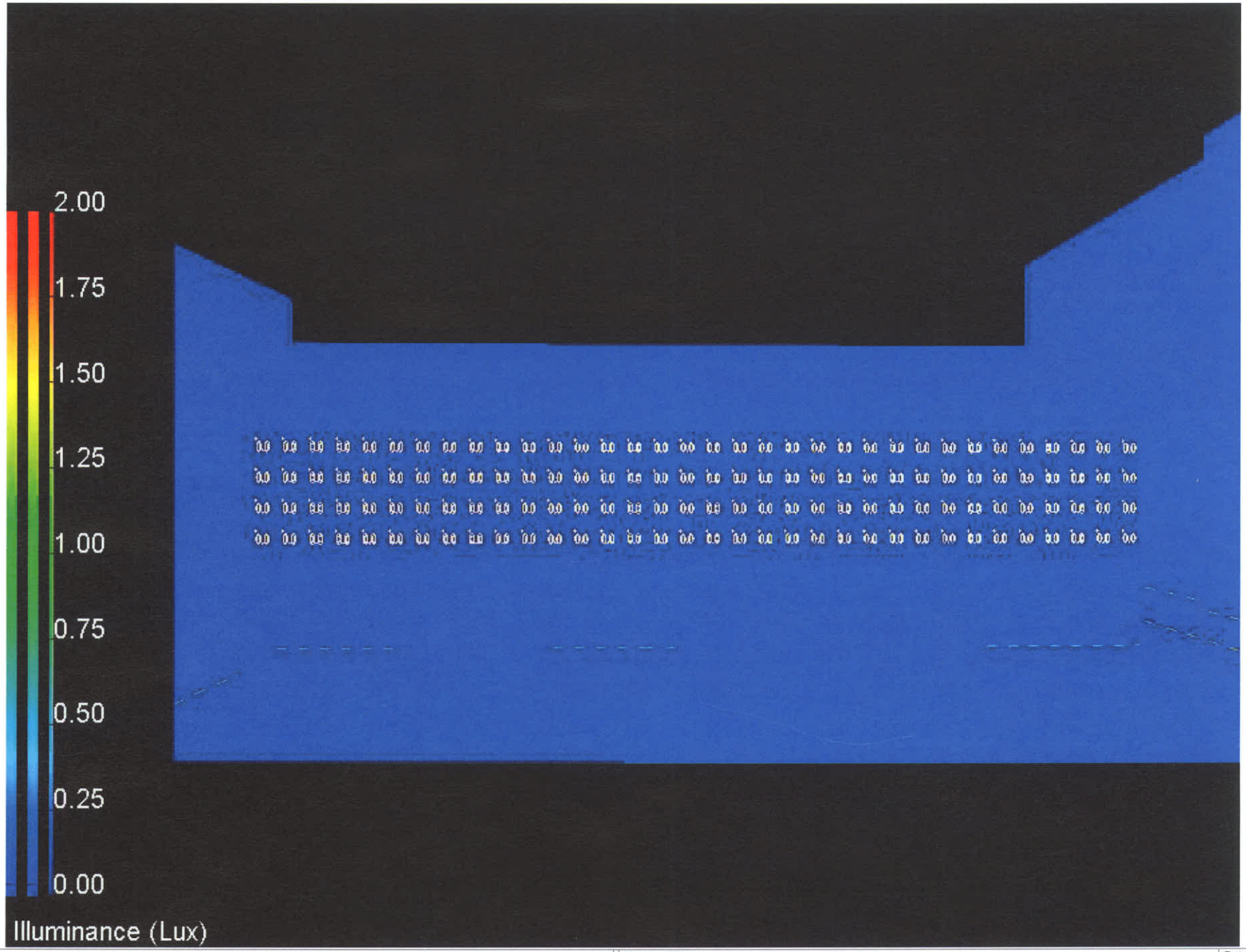
Filename: S:\38770\Eng\Electrical\Calculations\4.5 meter height Rev 1.AGI

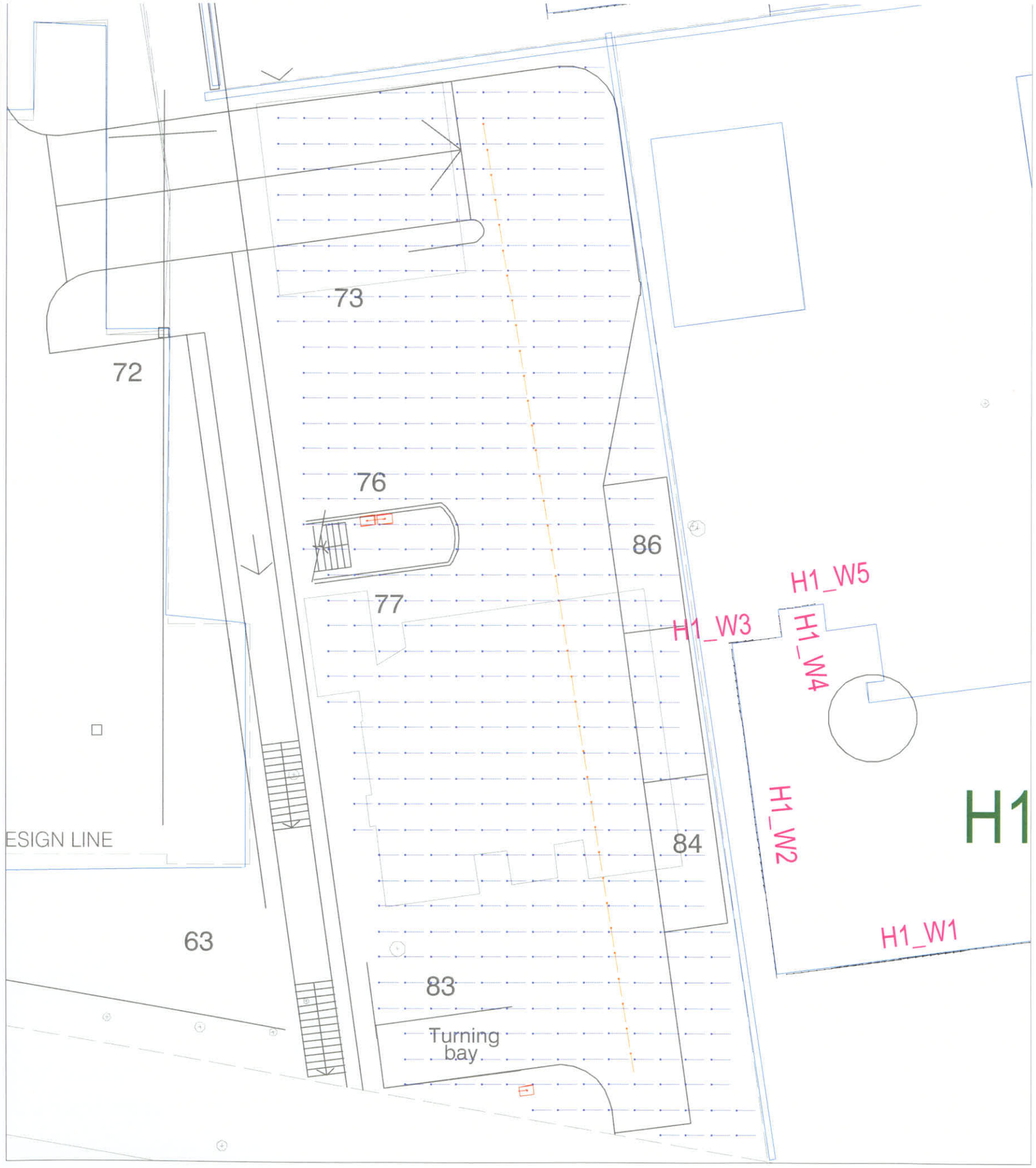
Drawing Title	4.5 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H2_W3	Date 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision 01



Connell Wagner

Filename: S:\38770\Eng\Electrical\Calculations\4.5 meter height Rev 1.AGI

Drawing Title	4.5 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H3_W1	Date 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision 01



Luminaire Schedule						
Symbol	Label	Description	Qty	Arrangement	Lumens	LLF
	wp9s2-035p	35W MH Wrap9	1	SINGLE	3300	0.700
	wp9s2-070p-B	70W MH Wrap9 Small mounte	1	BACK-BACK	5500	0.700

Numeric Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Vert	Illuminance	Lux	4.17	5.4	1.9	2.19	2.84
H1_W5	Illuminance	Lux	0.29	0.4	0.2	1.45	2.00
H1_W1	Illuminance	Lux	0.06	0.3	0.0	N.A.	N.A.
H1_W2	Illuminance	Lux	1.07	1.9	0.0	N.A.	N.A.
H1_W3	Illuminance	Lux	0.58	0.7	0.0	N.A.	N.A.
H3_W1	Illuminance	Lux	0.00	0.0	0.0	N.A.	N.A.
H1_W4	Illuminance	Lux	1.05	1.2	0.9	1.17	1.33
H2_W1	Illuminance	Lux	0.08	0.1	0.0	N.A.	N.A.
H2_W2	Illuminance	Lux	0.18	1.5	0.0	N.A.	N.A.
H2_W3	Illuminance	Lux	0.08	0.8	0.0	N.A.	N.A.
Carpark	Illuminance	Lux	8.21	30.4	1.3	6.32	23.38

Note:
1. The report contains information provided to Connell Wagner by other parties. The report is provided strictly on the basis that the information that has been provided to Connell Wagner is accurate, complete and adequate.
2. Connell Wagner therefore does not assume responsibility for the use of the report by any third party and the use of the report by and third party is at the risk of that party.

Filename: S:\38770\Eng\Electrical\Calculations\6 meter height Rev 1.AGI

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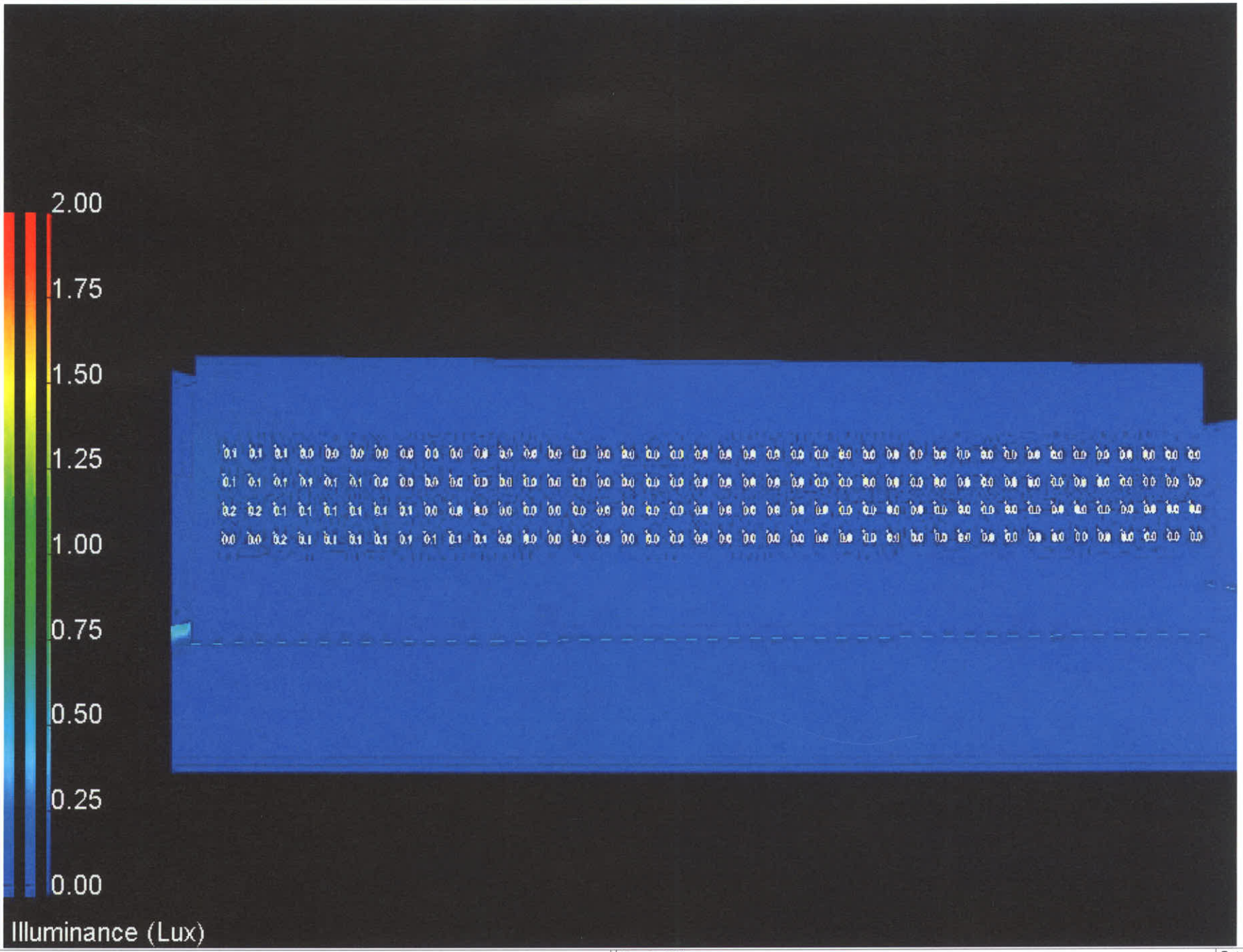
Drawing Title	6 METER HEIGHT POLE - LIGHITNG LAYOUT
Project Name	38770 - KAREENA PRIVATE HOSPITAL
Date	6 NOV 08
Revision	01



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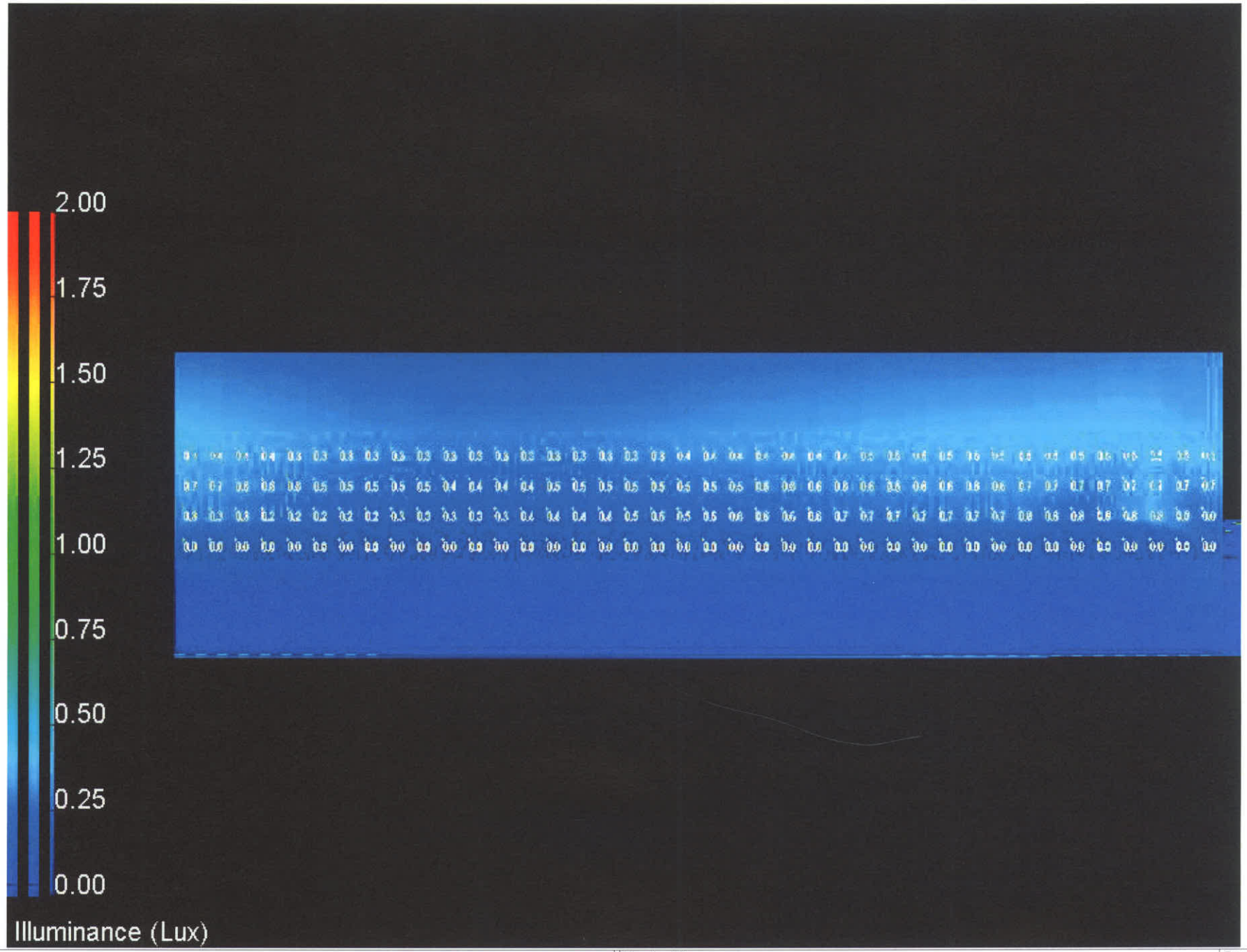
Filename: S:\38770\Eng\Electrical\Calculations\6 meter height Rev 1.AGI

Drawing Title	6 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H1_W1	Date 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision 01



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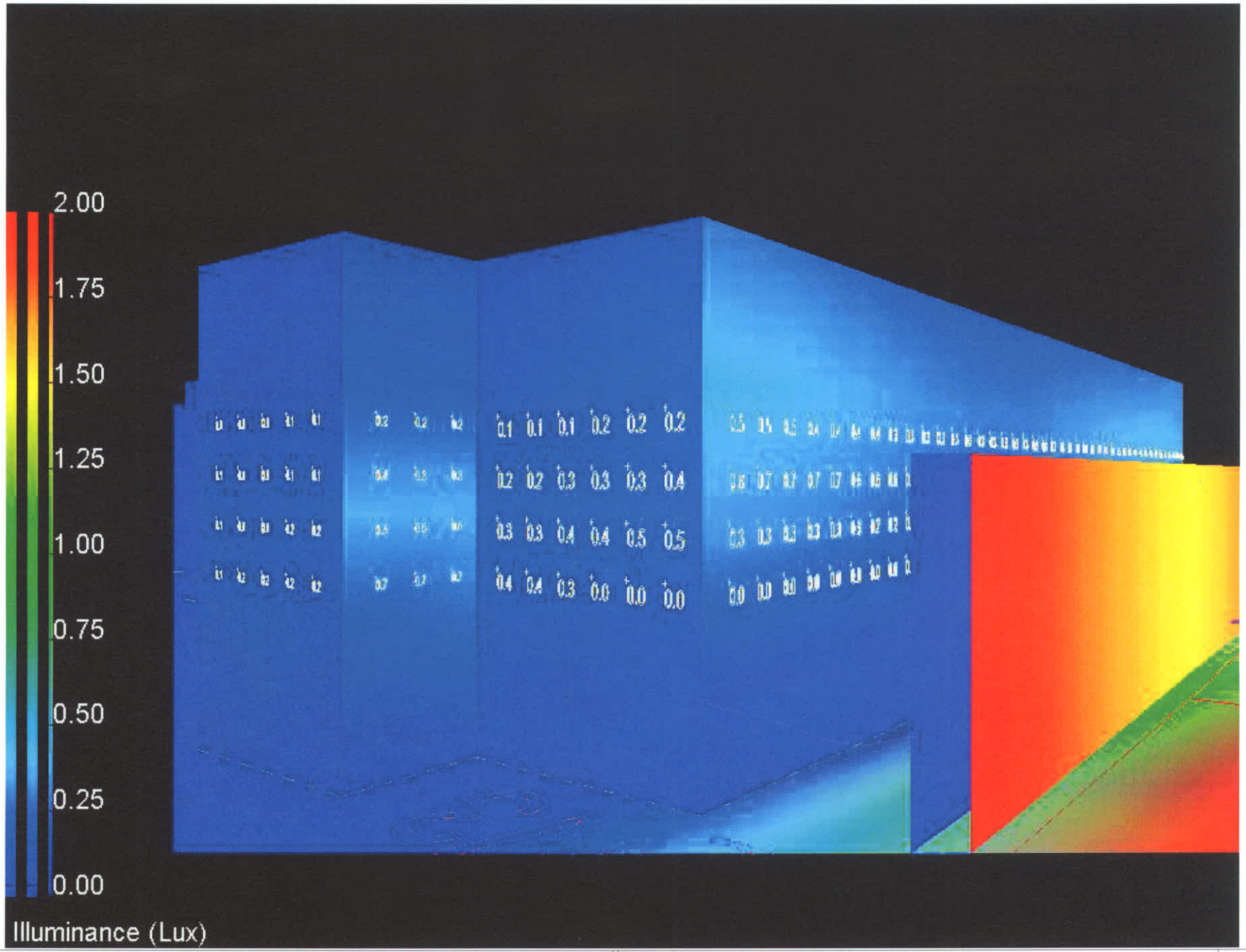
Filename: S:\38770\Eng\Electrical\Calculations\6 meter height Rev 1.AGI

Drawing Title	6 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H1_W2	Date: 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision: 01



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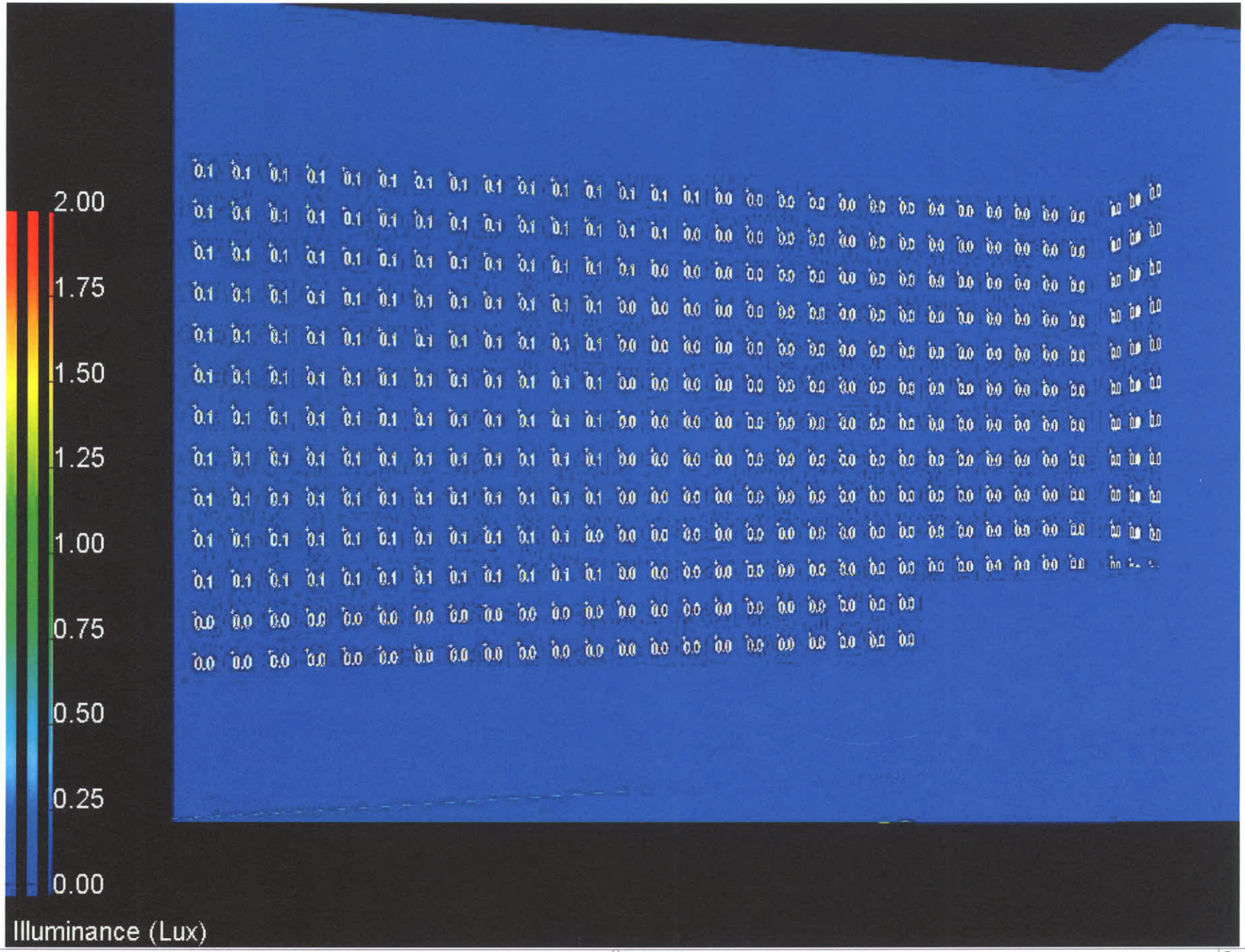
Filename: S:\38770\Eng\Electrical\Calculations\6 meter height Rev 1.AGI

Drawing Title: 6 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H1_W3, 4, 5		Date: 6 NOV 08
Project Name: 38770 - KAREENA PRIVATE HOSPITAL		Revision: 01



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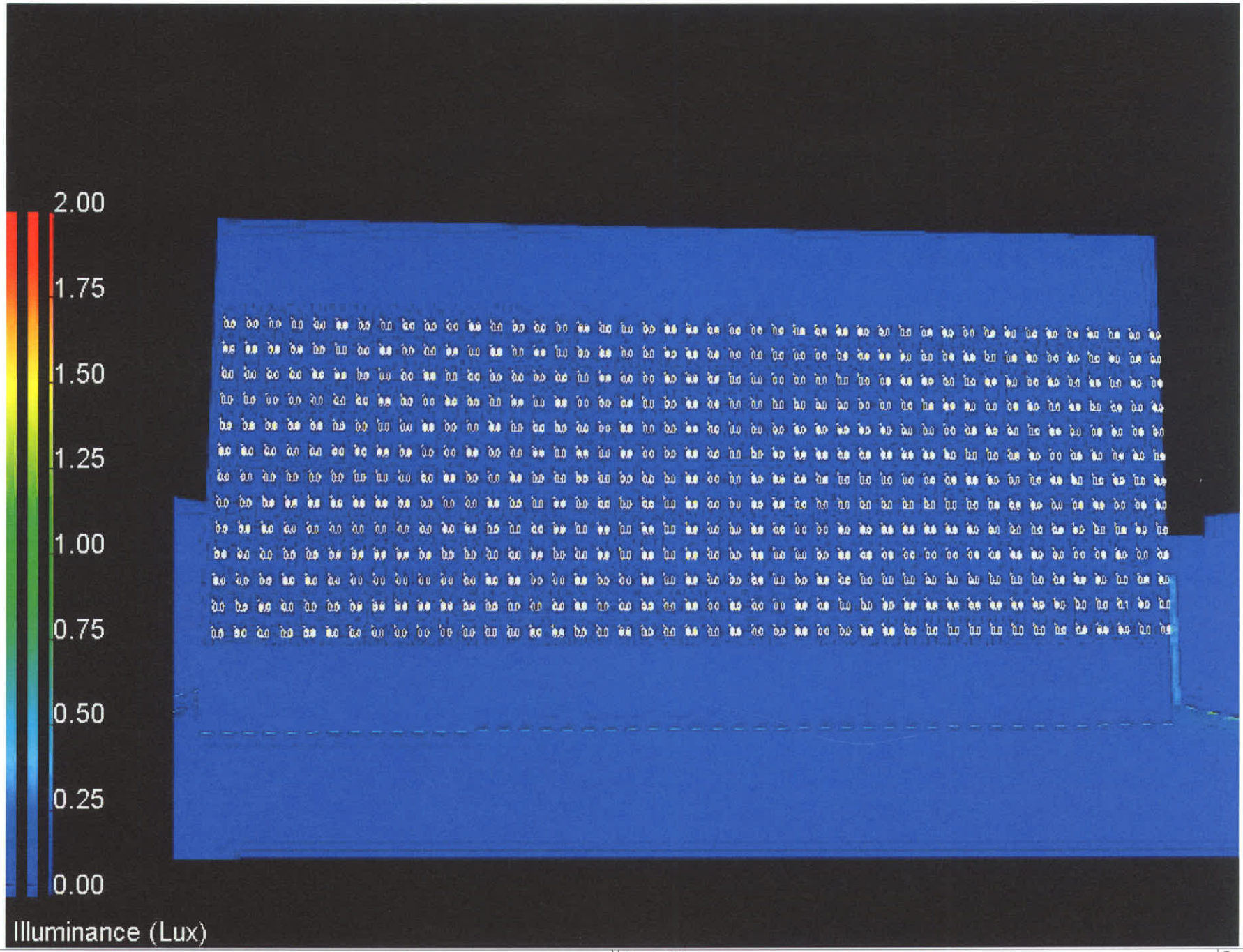
Filename: S:\38770\Eng\Electrical\Calculations\6 meter height Rev 1.AGI

Drawing Title	6 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H2_W1, 2	Date 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision 01



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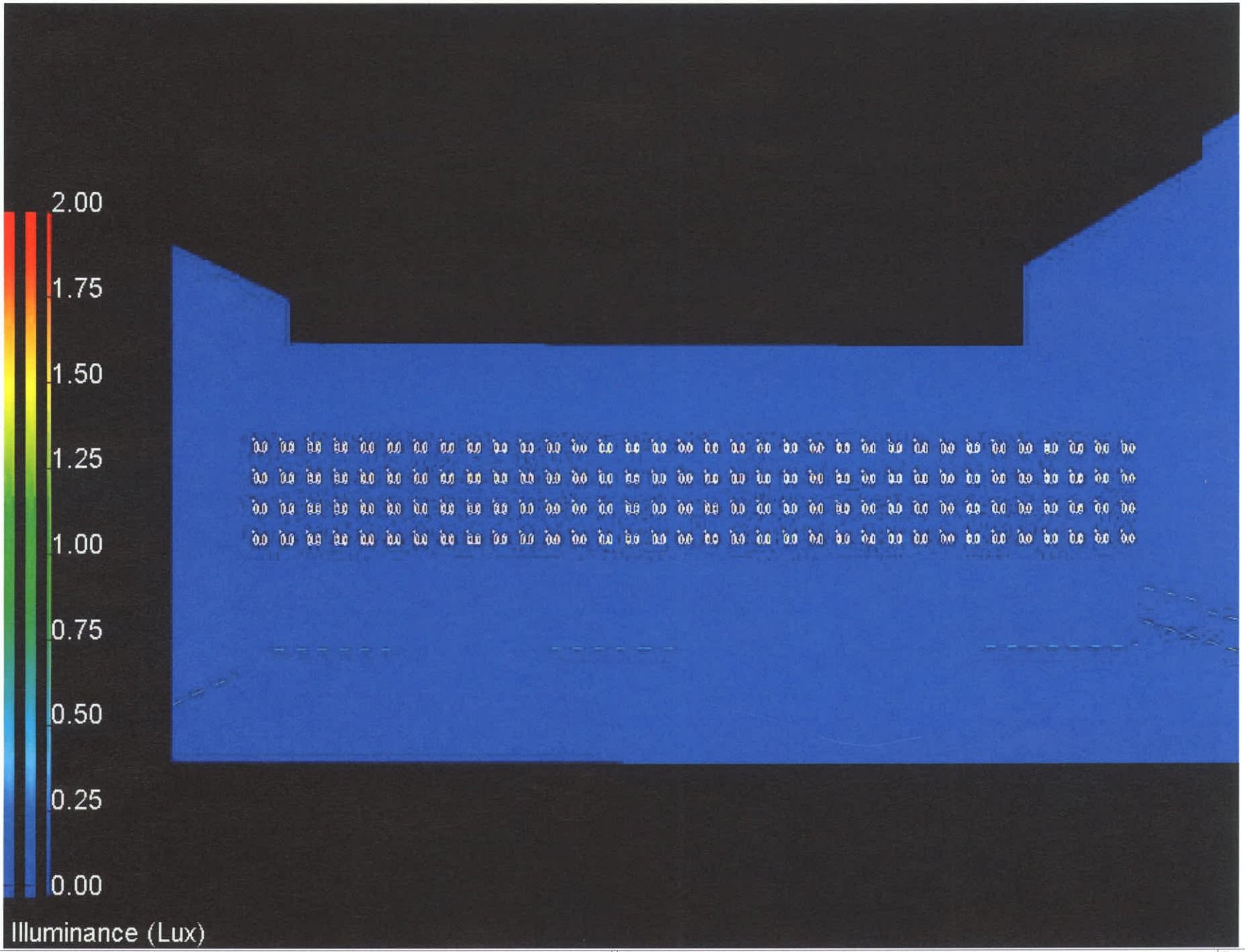
Filename: S:\38770\Eng\Electrical\Calculations\6 meter height Rev 1.AGI

Drawing Title: 6 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H2_W3	Date: 6 NOV 08
Project Name: 38770 - KAREENA PRIVATE HOSPITAL	Revision: 01



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Filename: S:\38770\Eng\Electrical\Calculations\6 meter height Rev 1.AGI

Drawing Title	6 METER HEIGHT POLE - VERTICAL ILLUMINANCE ON H3_W1	Date: 6 NOV 08
Project Name	38770 - KAREENA PRIVATE HOSPITAL	Revision: 01