

# Green Square ICFS

## Lighting Design

External Lighting Report

**Prepared for:** School Infrastructure NSW

**Date:** 17 May 2021

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**Ref:** 301346826

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# Revision

Revision	Date	Comment	Prepared By	Approved By
001	02-03-2021	Preliminary Draft	PGM	PGM
001a	12-03-2021	Revised for Issue	PGM	PGM
001b	12-04-2021	Revised for Issue	PGM	PGM
002	17-05-2021	Final for Issue	PGM	PGM

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# 1. Introduction

Stantec have been engaged to complete the electrical and lighting design of the Green Square Integrated Community Facility and School. This report has been prepared to outline the strategy of the external lighting design and measures to reduce spill into the surrounding sensitive areas.

The proposed development is located at 3 Joynton Avenue Zetland. The development is known as the Green Square Integrated Community Facility and School (GSICFS). This is a joint project between School Infrastructure NSW and the City of Sydney.

The development will comprise a four-storey building made up of various indoor and outdoor functional spaces including:

- Primary education facilities for up to 600 kindergarten to year 6 students
  - o Indoor and outdoor learning spaces
  - o Administration and staff rooms
  - o Library and School community hall
- shared multi-function spaces within for school and community use
  - o 2 x multipurpose community facilities rooms to be operated solely by City of Sydney
  - o 2 x multipurpose rooms to be shared by the City of Sydney and the primary school
- At ground level there is:
  - o play spaces which will be a shared use between school and community.
  - o multipurpose games court

The operational hours of the Green Square Integrated Community and School will be from 7am to 11pm, 7 days per week.

Stantec have completed a design of the external lighting, in conjunction with BVN, to assess the suitability of confirming compliance with obtrusive and spill lighting standards and guidelines.

The design has been tested against the obtrusive lighting calculations and provides analysis of the compliance and illumination level impact on surrounding properties.

This report is provided as information for the the SEARs application number SSD-10381 and responds to item 6, Environmental Amenity *“Include a lighting strategy and measures to reduce spill into the surrounding sensitive receivers”*



## 2. Lighting Strategy

The lighting design looks to incorporate low level lighting, in a layered arrangement, to allow different scenes within the site. We have balanced the needs of security and accessibility with ambience and in the areas facing the site boundary, a limitation on any upward or outward light spill.

The lighting shall be integrated into the building architecture and achieve the illumination levels required by EFSG and City of Sydney. Areas of landscaping shall be lit with low-level and code-compliant lighting that washes horizontal surfaces with enough light for students, guests and out of hours cleaning staff to be able to distinguish trafficable surfaces and ramps. Some minimal facade mounted luminaires have been provided to enable CCTV cameras to detect adequate detail.

The external lighting has been designed to comply with AS1158.3 category PP3.

The lighting layout has been designed with reference to the *Dark Sky Planning Guideline June 2016* and incorporated the general design principles within.

A calculation of the external lighting has been prepared and the initial calculations show compliance with AS4282:1997 *Control of the obtrusive effects of outdoor lighting*. Calculation details have been appended to this report.

The buildings tested include the following:

- Buildings on 25 Geddes Ave – shown in image as 1
- Future buildings on 95A Portman Ave – shown in image as 2
- Future buildings on site 811 Elizabeth St – shown in image as 3



The site precinct includes many civic buildings, including the newly constructed Gunyama Park Aquatic Centre which will contribute to the ambient lighting after hours. Buildings labelled 4 (Aquatic Centre) and 5 (Workshop) are not included as sensitive receiver buildings as there is no residential dwellings within.

The external lighting will exclusively use a warmer colour temperature (2700-3500°K) to limit the emission of blue light.

The luminaires are set out in layers, from inground uplights to illuminate tree foliage to façade mounted area lights to ceiling and soffit linear lights. These layers allow the building users to have the appropriate lighting suitable for the purpose of the activity. These activities are proposed to be set out and programmed as lighting modes. An example of these lighting modes is users of the basketball court only will have full lights on the court and a lower level of illumination in the courtyard.

The lighting scheme will have several switching modes to allow purely security or ambience or circulation lighting to be provided. The switching for external lighting will be electronically controlled and can be operated by on site control switches and off-site web interface to select one of the programmed lighting modes. The calculation we have completed is with all luminaires on at 100%, or at the fixed dimming ratio, to show the worst case of the installation. This is not planned to be a regular occurrence as when the facility is being used one of the operation modes will limit the luminaires in use.

This design is based on design development luminaire selections on a detailed design layout plan. The final layouts and luminaire selections are subject to change; however, we are providing the calculation as proof of concept of the external lighting and the ability of the design to achieve obtrusive lighting standards compliance.

### 3. Spill Reduction Measures

The lighting spill has been reduced through the following measures:

#### Positioning

The luminaires have been positioned to direct the light within the site boundaries. Careful attention has been paid to the illumination of reflective structures to ensure the subsequent glow from this effect will not be in excess of obtrusive lighting parameters. The design allows for the understanding of the lighting layouts and proof of limited illumination spread beyond the project boundary.

Existing lighting along the laneway to the south of the development shall be removed and the laneway shall be illuminated through building mounted pathway luminaires.

#### Light Control

The layered arrangement of the lighting design allows for different modes of illumination for the site. The light spill calculation has been provided to show the maximum output of lighting and still be compliant with the Australian Standards for obtrusive lighting. The lighting installation will be provided with dimming and switching control to reduce the illumination levels further, which will be commissioned at the end of the project.

The lighting control extends to the internal spaces of the school and community areas. Lights along the windows shall be switched separately to the main space within the internal areas. External lighting control to be triggered by a combination of light sensors, run-on timers and time clocks. The control of the lighting shall be as per the Educational Facilities Guidelines DG63.08.01, as outlined below:

*Pre-dawn Function: With the selector switch in the "auto" position, all access lighting is turned on by the time switch between 5:00 am and 9:30 am (Monday to Friday) and turned off at sunrise via a photocell, to allow safe entry to the school for cleaners.*

*Night Function: With the selector switch in the "auto" position, access lighting can operate after hours via a pushbutton in the administration block. This function is only to operate at night and be controlled via a Photocell. At the end of the night function the lighting is turned off at this panel or will run for a total of 2 hours. A 15-minute run-on timer allows safe departure from site before the lighting goes off. The pre-dawn function will continue to operate and will reset the system, if the night function is not turned off.*

# Luminaires

All the luminaires considered in the design have been selected to ensure the suitability for the application, particularly the beam angle and orientation of light to ensure the direction of the light emission is away from the site boundary. The colour temperature of all light sources is proposed to be 2700-3500°K to further minimise the emission of high frequency, short wavelengths.

The selected luminaires are of high quality, suitable for urban conditions and have life spans in excess of 70,000 hours operation. The luminaires are a typical design type and will be able to be replaced with a like for like installation at end of life. This will maximise timeline of the lighting strategy and ensure the design intent is maintained for the life span of the buildings.

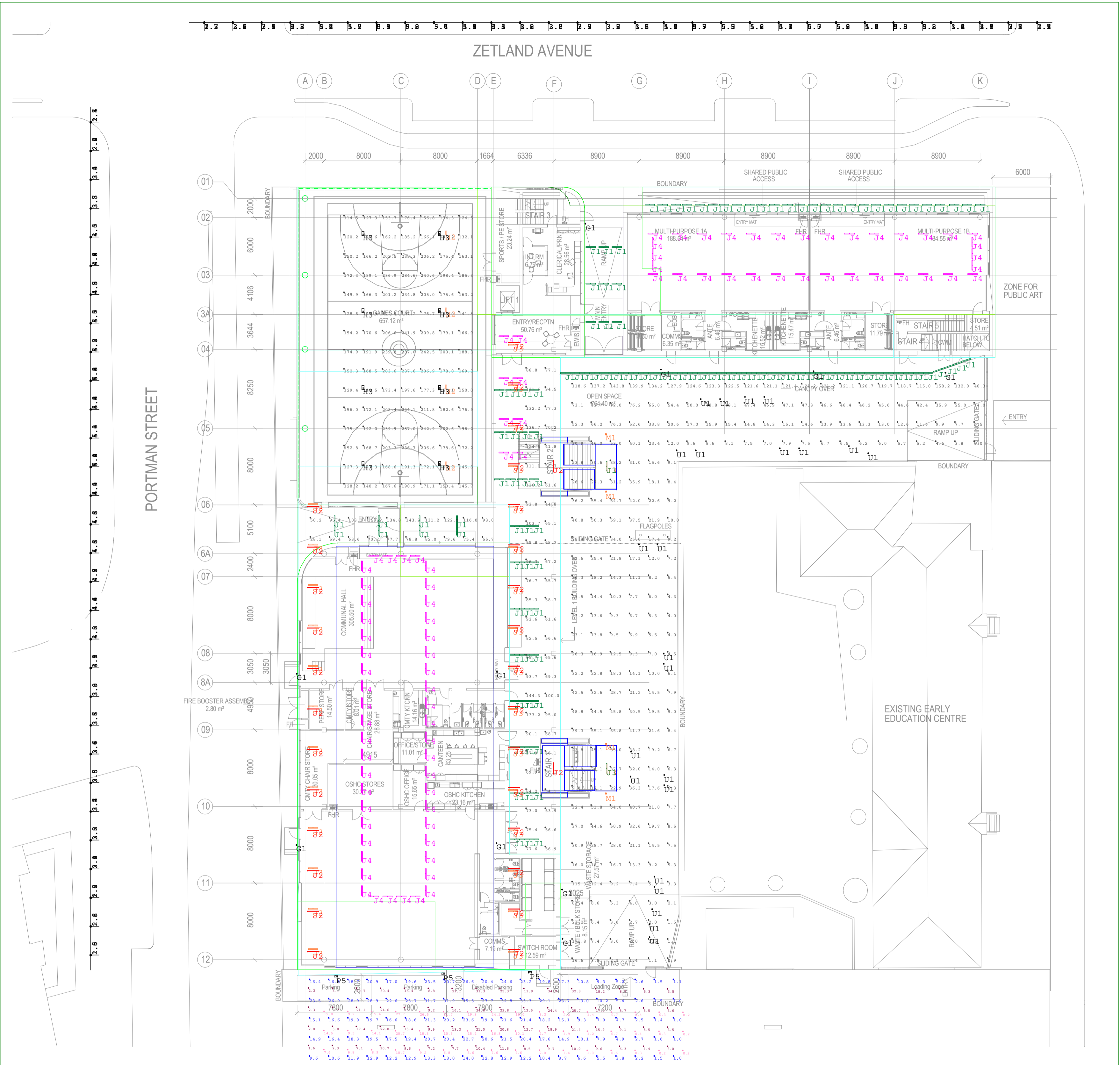
## 4. Conclusion

The design lighting layout has been provided to show a proof of concept of an external lighting design which shows compliance with AS4282:1997 *Control of the obtrusive effects of outdoor lighting*. The report details the measures taken to reduce the spill light into the surrounding sensitive receivers. The detail design phase of the project will outline installation, cabling and control elements to ensure standards compliance and spill light reduction measures.

## 5. Calculations



# Green Square ICFS - External Lighting Calculation



## Obtrusive Light - Compliance Report

AS 4282-1997, Pre-Curfew, Residential - Light Surrounds  
 Filename: 210413c - Light Calc - Ground level  
 13/04/2021 12:06:58 AM

**Illuminance**  
 Maximum Allowable Value: 10 Lux

Calculations Tested (2):

Calculation Label	Test Results	Max. Illum.
ObtrusiveLight_Portman Street_III_Seg1	PASS	6.6
ObtrusiveLight_Zetland Ave_III_Seg1	PASS	7.4

## Luminous Intensity (Cd) Per Luminaire

Maximum Allowable Value: 50000 Cd  
 Control Angle: 83 Degrees

Luminaire Locations Tested (306)  
 Test Results: **PASS**



**P3**  
 GE Evolve P4P5  
 3000K 1780lm 20W IP66 IK09  
 mounted at 5000  
 500mm x 300mm



**H1+H2**  
 Fagerhult Hero Wide Beam  
 4000K 19605lm 136W IP66 IK07/IK10  
 H1 mounted at 8100 and H2 mounted at 8100 aimed at artwork on wall  
 500mm wide



**J1, J2, J3, J4**  
 Darkon Slim C IP67  
 3000K 1300lm 20W/m  
 J1 mounted underside Level 1 soffit, dimmed to 70%  
 J2 mounted underside Level 2 soffit  
 J3 mounted underside Level 3 soffit  
 J4 mounted under shade structure on Roof Level  
 45mm wide, 68mm high



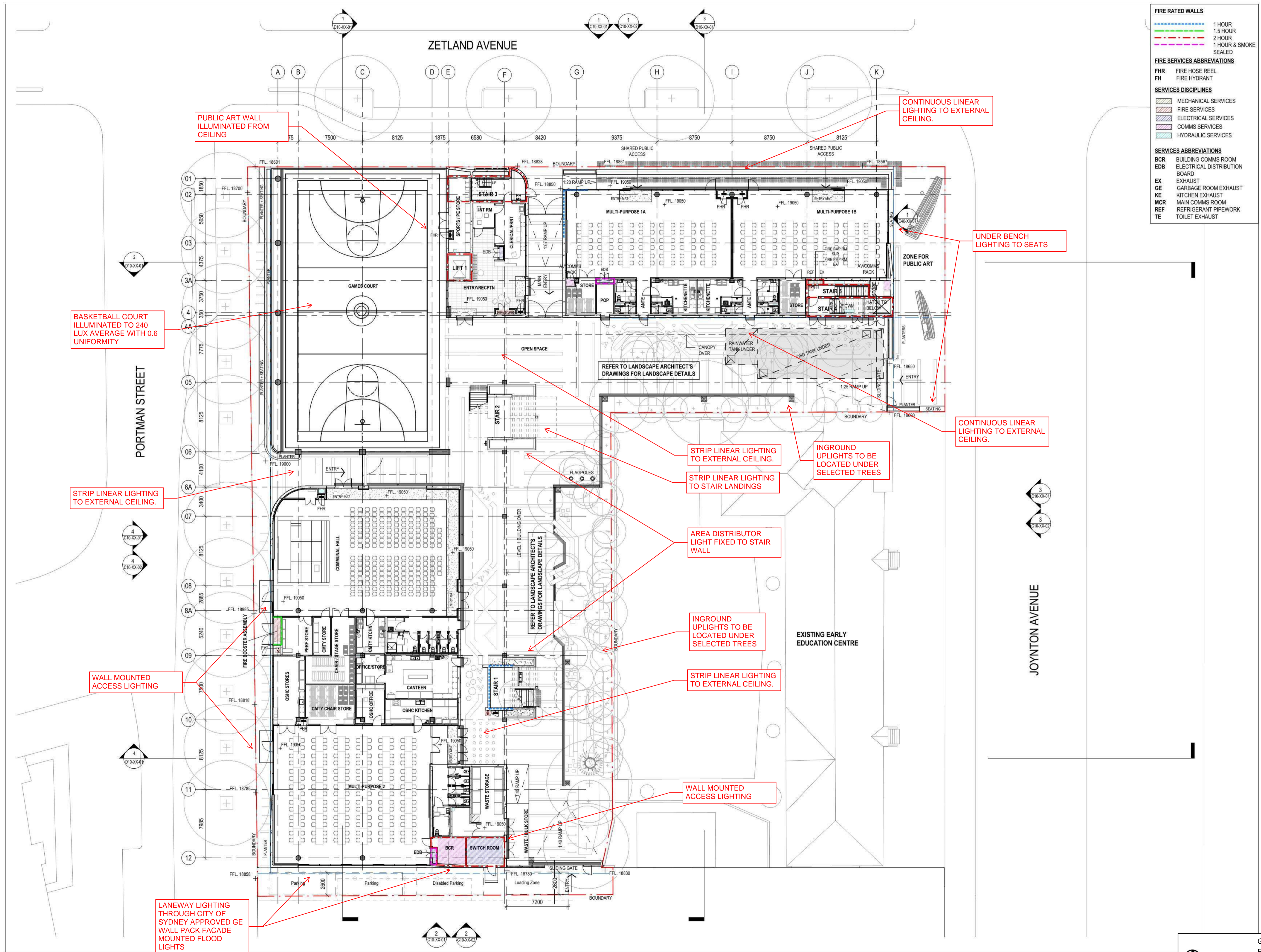
**M1**  
 Ligman - Tango  
 3000K 3377lm 46W IP65 IK08  
 mounted at 6800  
 186mm dia, 270mm high



**G1**  
 Ligman - Marvik  
 3000K 1780lm 20W IP65 IK08  
 mounted at 3000  
 100mm dia, 220 high

Tag	Symbol	Qty	Arrangement	Total Lamp Lumens	Description	LIF
M1	[Symbol]	4	SINGLE	N.A.	Ligman Tango - TA-31873-W30	0.800
H2	[Symbol]	4	SINGLE	N.A.	Eagle Hero Wide 3151-461 aimed at wall	0.300
H3	[Symbol]	8	SINGLE	N.A.	Eagle Hero Wide 3151	1.000
G1	[Symbol]	10	SINGLE	N.A.	Ligman Marvik MV-30011-W30	0.800
J1	[Symbol]	127	SINGLE	1237.5	Darkon Slim C IP67 3000K Low Level	0.600
J2	[Symbol]	30	SINGLE	1237.5	Darkon Slim C IP67 3000K Mid Level	0.600
J3	[Symbol]	32	SINGLE	1237.5	Darkon Slim C IP67 3000K Mid Level	0.600
J4	[Symbol]	90	SINGLE	1237.5	Darkon Slim C IP67 3000K High Level	0.600
U1	[Symbol]	23	SINGLE	N.A.	Ligman Harrier HA-60037-S-M-9040	1.000
P5	[Symbol]	3	SINGLE	N.A.	GE Wall Pack RWAS01-A4AF740	1.000

Label	CalcType	Units	Avg	Max	Min	Min/Avg	Min/Max
Basketball Court	Illuminance	Lux	180.59	287.0	114.5	0.63	0.40
BBALL CRT GR	Illuminance	Lux	168.33	274.3	90.1	0.54	0.33
BBALL CRT GR	Glare Rating	N.A.	10.84	15.6	10.0	0.92	0.64
BBALL CRT GR	Glare Rating	N.A.	10.00	10.0	10.0	1.00	1.00
Ext Courtyard	Illuminance	Lux	33.03	171.8	0.9	0.03	0.01
GF Grid E-F	Illuminance	Lux	82.34	144.3	41.8	0.51	0.29
Int Corr G6	Illuminance	Lux	88.67	143.2	28.1	0.32	0.20
Laneway	Illuminance	Lux	15.25	35.5	1.0	0.07	0.03
Laneway Vert Facing East	Illuminance	Lux	8.19	27.7	0.2	0.02	0.01
Laneway Vert Facing West	Illuminance	Lux	13.31	34.0	1.6	0.12	0.05
ObtrusiveLight_Portman Street_Cd_Seg1	Obtrusive Light - Cd	N.A.	50.95	150	4	0.08	0.03
ObtrusiveLight_Portman Street_III_Seg1	Obtrusive Light - Ill	Lux	3.72	5.5	1.5	0.40	0.27
ObtrusiveLight_Zetland Ave_Cd_Seg1	Obtrusive Light - Cd	N.A.	50.12	178	4	0.08	0.02
ObtrusiveLight_Zetland Ave_III_Seg1	Obtrusive Light - Ill	Lux	4.23	6.0	1.7	0.40	0.28



FIRE RATED WALLS	
	1 HOUR
	1.5 HOUR
	2 HOUR
	1 HOUR & SMOKE SEALED

FIRE SERVICES ABBREVIATIONS	
FHR	FIRE HOSE REEL
FH	FIRE HYDRANT

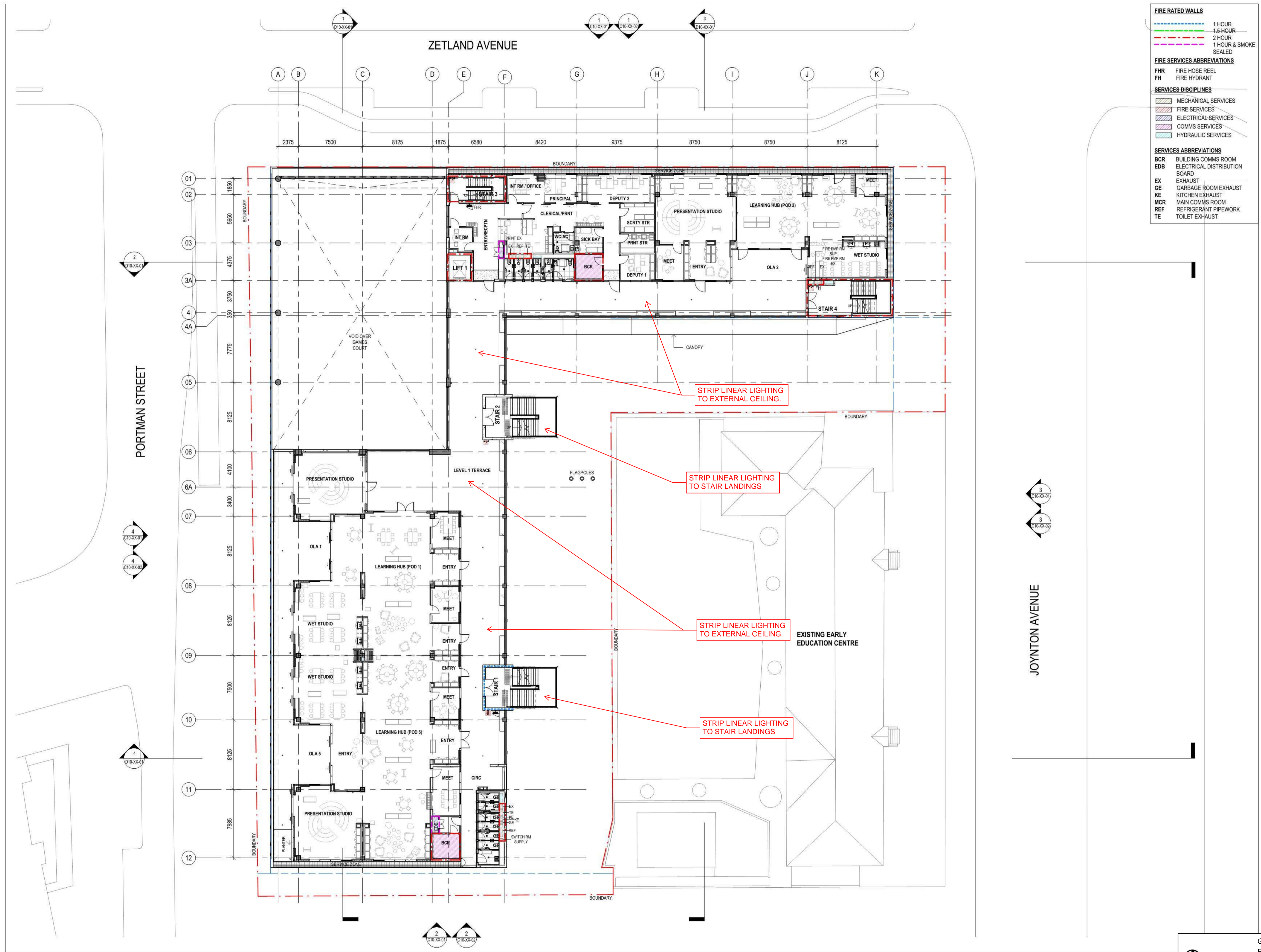
SERVICES DISCIPLINES	
	MECHANICAL SERVICES
	FIRE SERVICES
	ELECTRICAL SERVICES
	COMMS SERVICES
	HYDRAULIC SERVICES

SERVICES ABBREVIATIONS	
BCR	BUILDING COMMS ROOM
EDB	ELECTRICAL DISTRIBUTION BOARD
EX	EXHAUST
GE	GARBAGE ROOM EXHAUST
KE	KITCHEN EXHAUST
MCR	MAIN COMMS ROOM
REF	REFRIGERANT PIPEWORK
TE	TOILET EXHAUST



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PORTMAN STREET

ZETLAND AVENUE

JOYNTON AVENUE

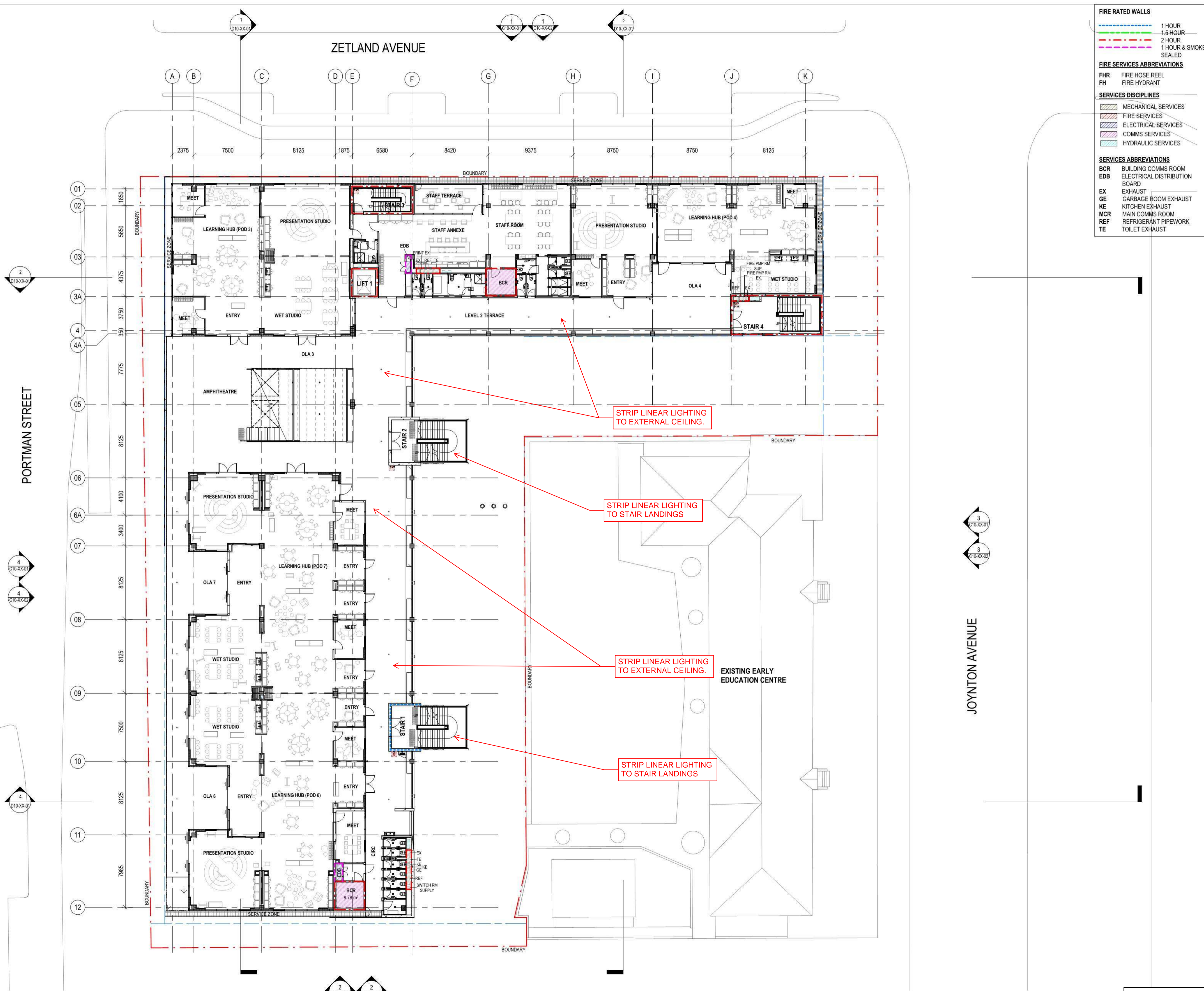
STRIP LINEAR LIGHTING TO EXTERNAL CEILING.

STRIP LINEAR LIGHTING TO STAIR LANDINGS

STRIP LINEAR LIGHTING TO EXTERNAL CEILING.

STRIP LINEAR LIGHTING TO STAIR LANDINGS

EXISTING EARLY EDUCATION CENTRE



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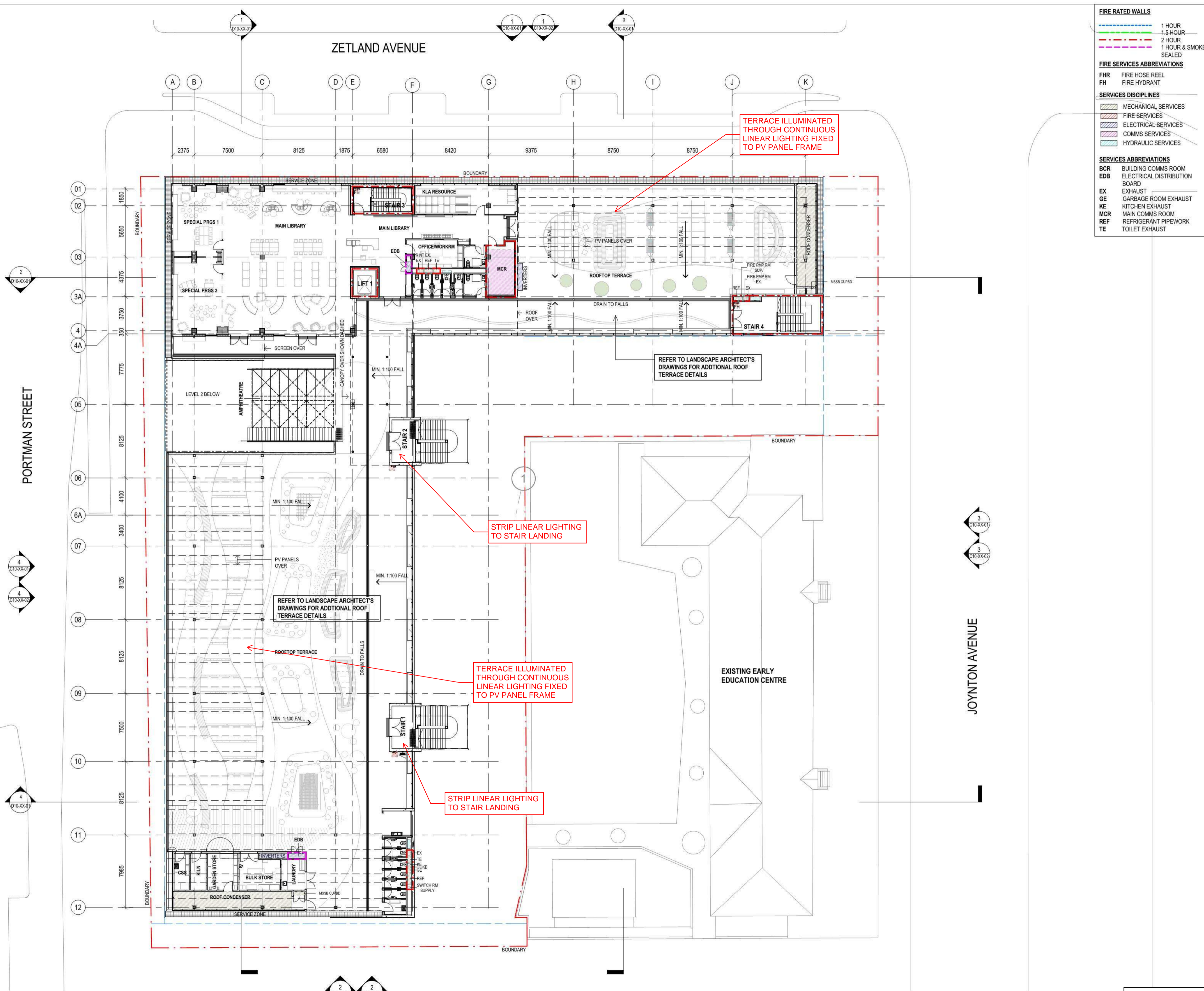
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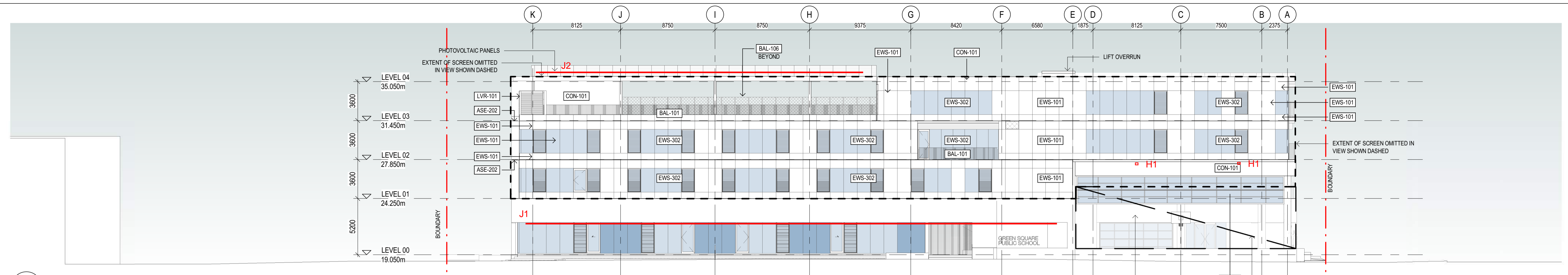
- FHR FIRE HOSE REEL
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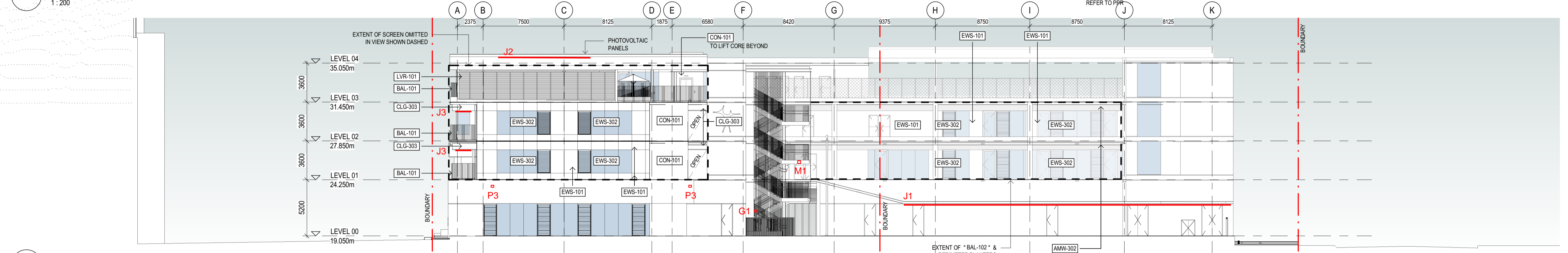
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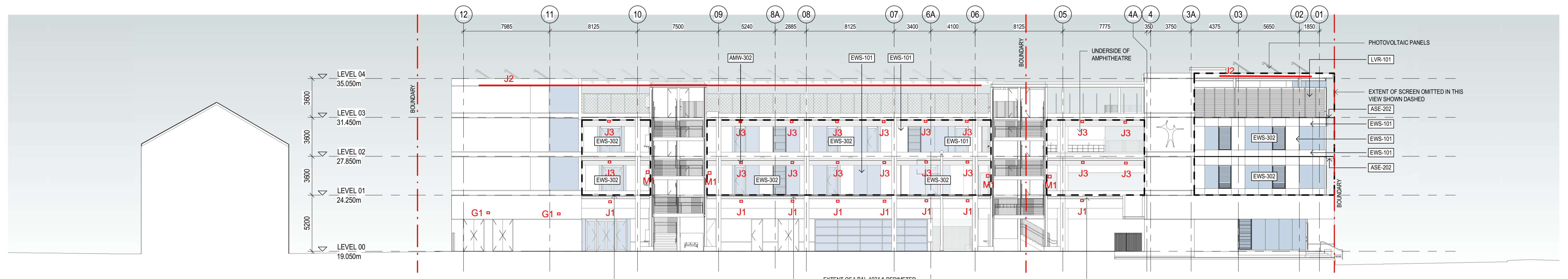
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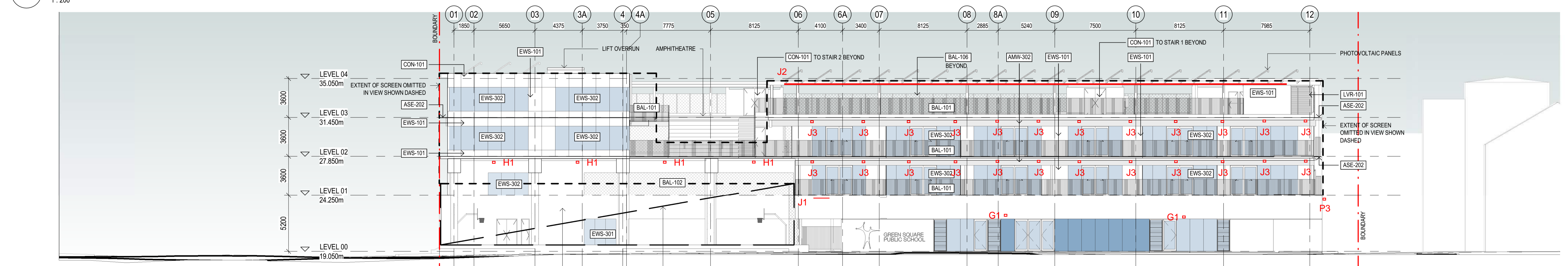
1 NORTH ELEVATION  
1:200



2 SOUTH ELEVATION  
1:200



3 EAST ELEVATION  
1:200



4 WEST ELEVATION  
1:200

Design with  
community in mind

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For more information please visit  
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