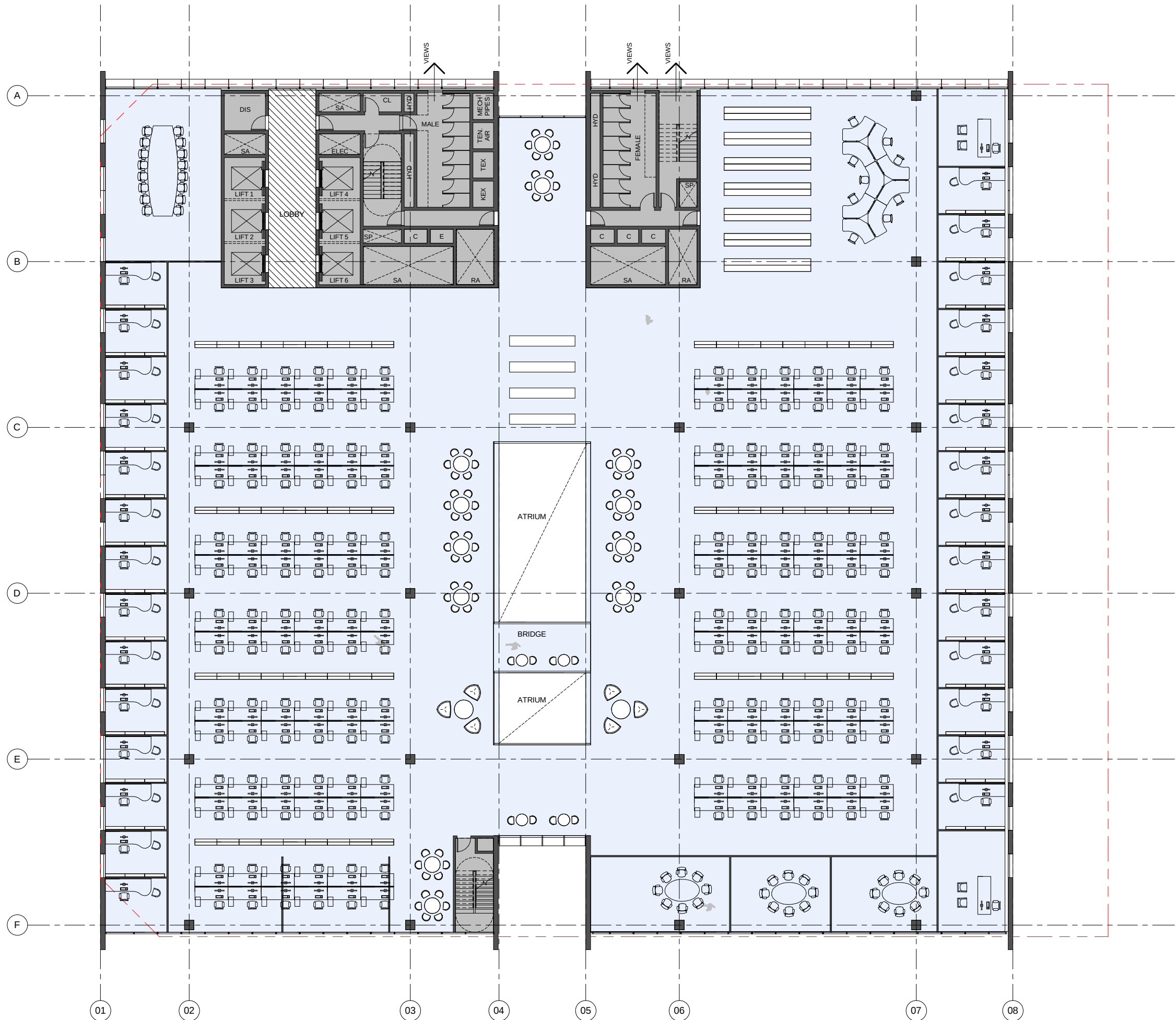
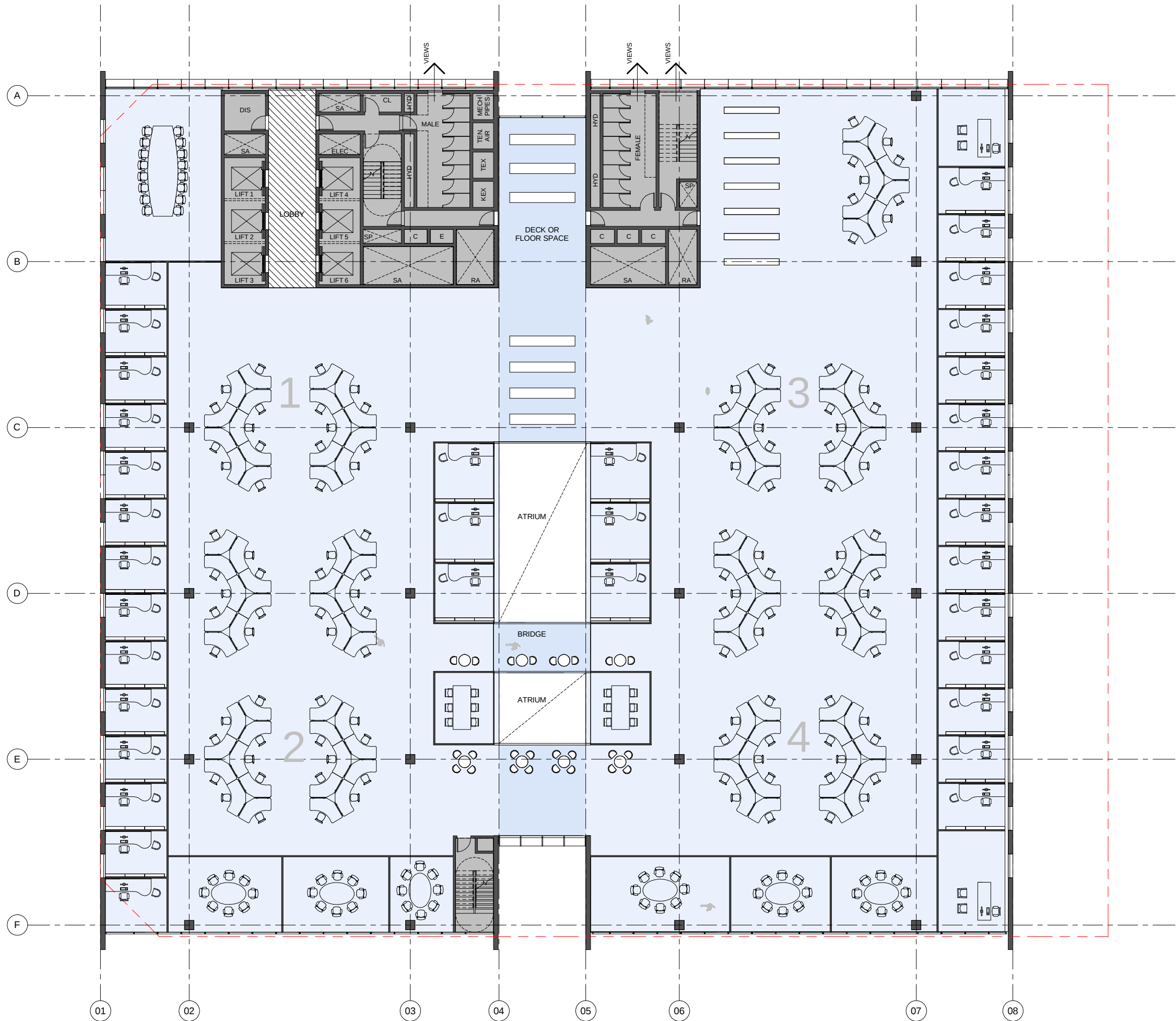
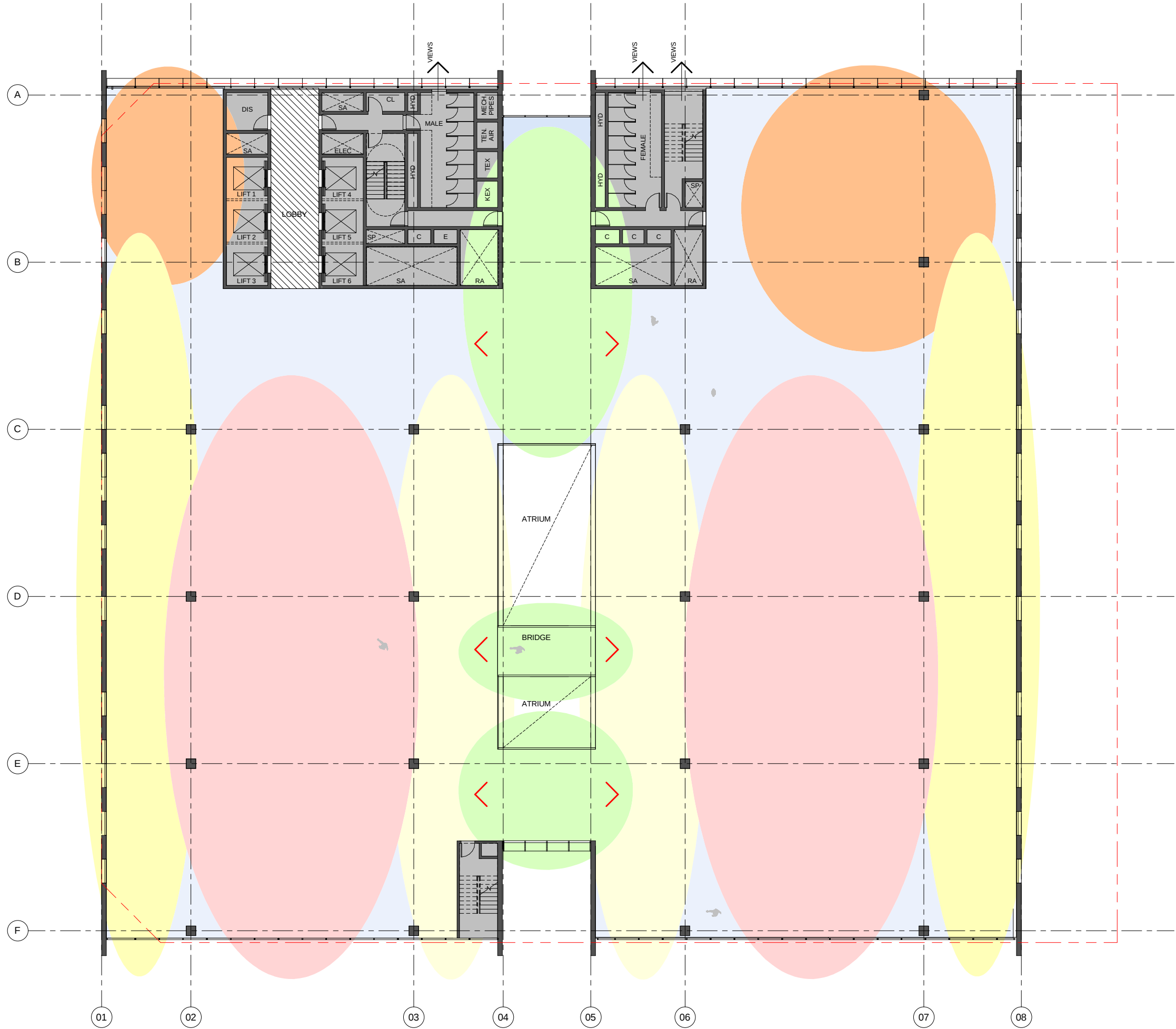




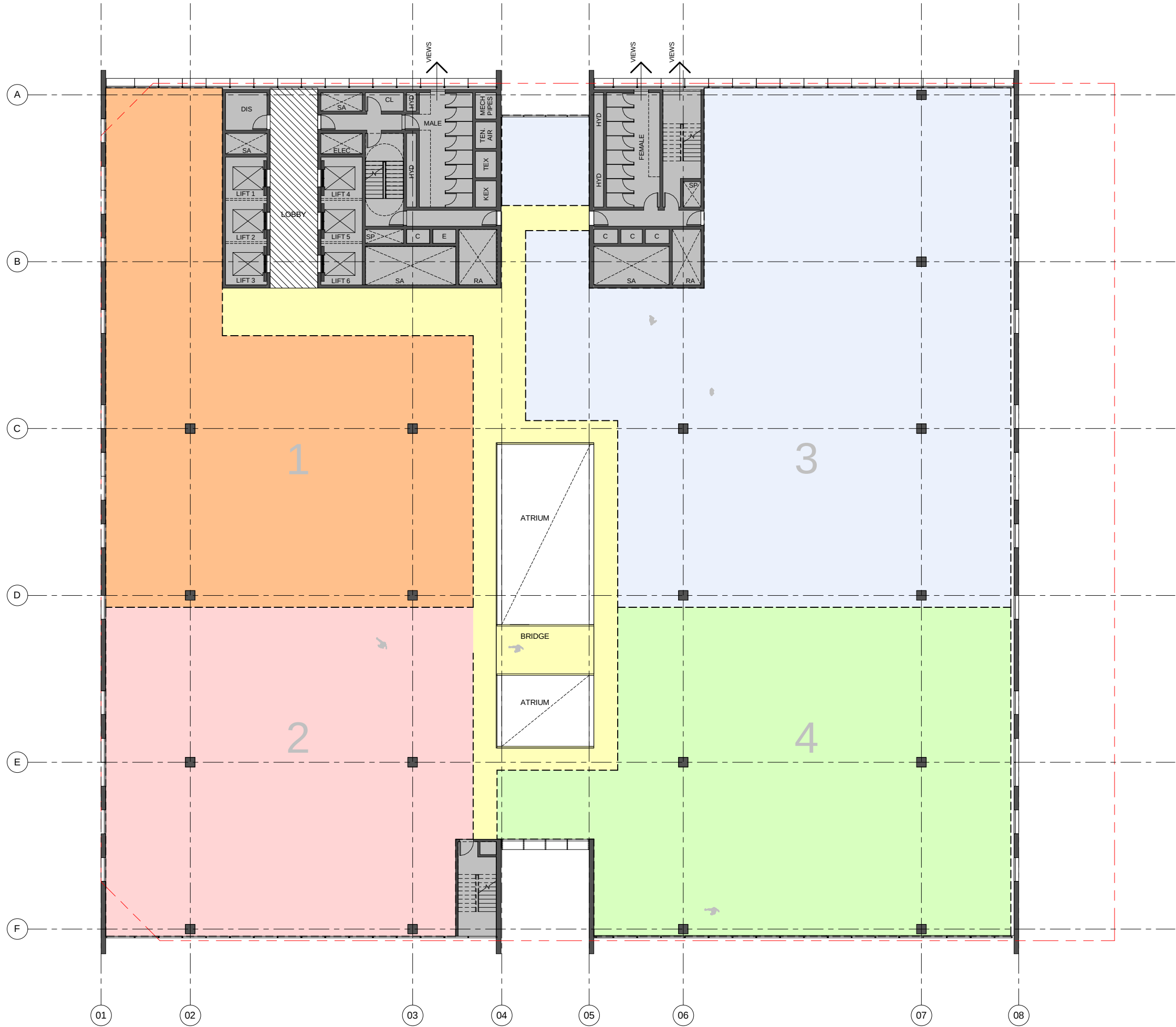




LEGEND :

- Perimeter Office Zone
- Still Zone
- Open Plan Zone
- Edge Zone
- Atrium/Bridge Zone
- Core/Services Zone

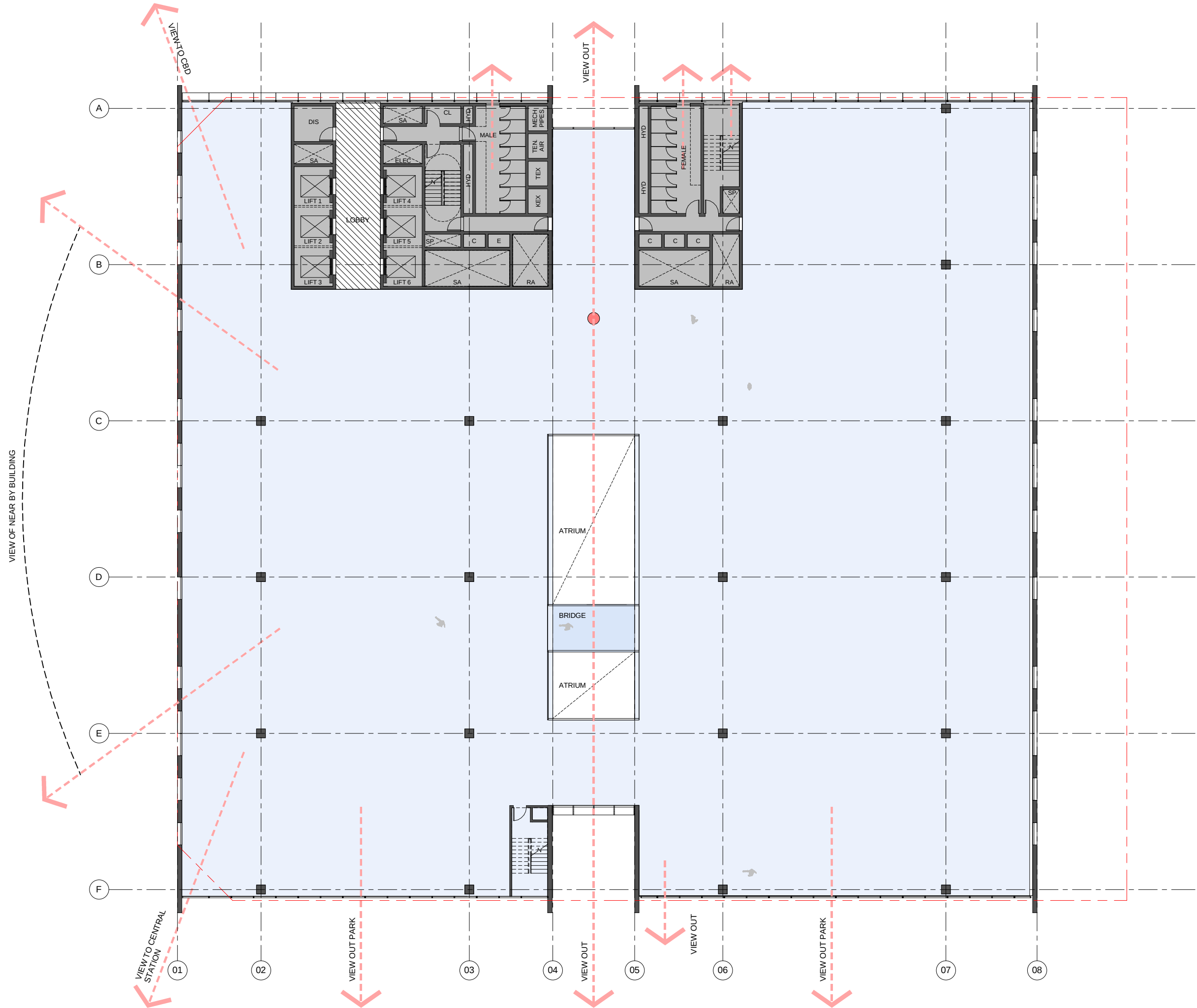


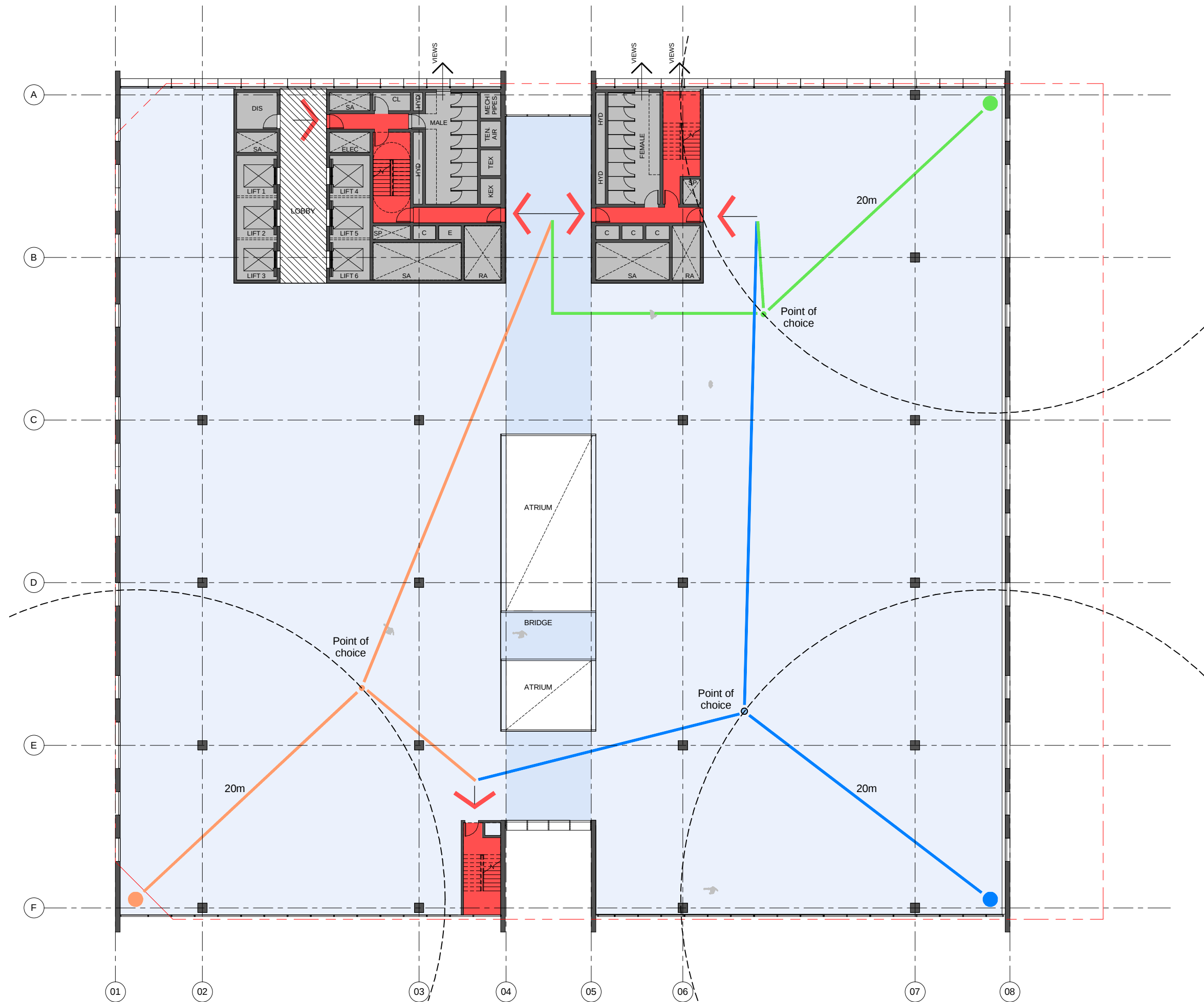


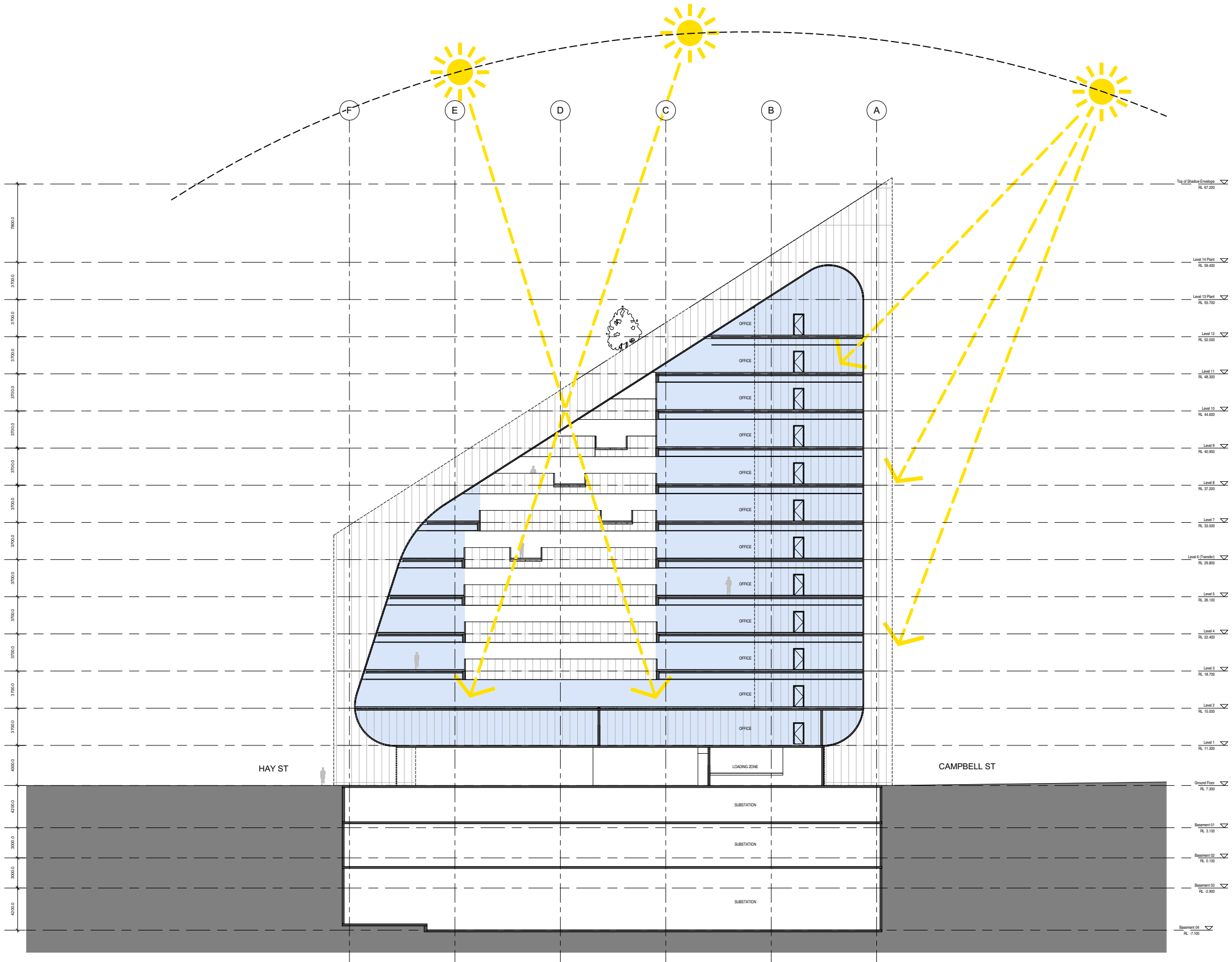
LEGEND :

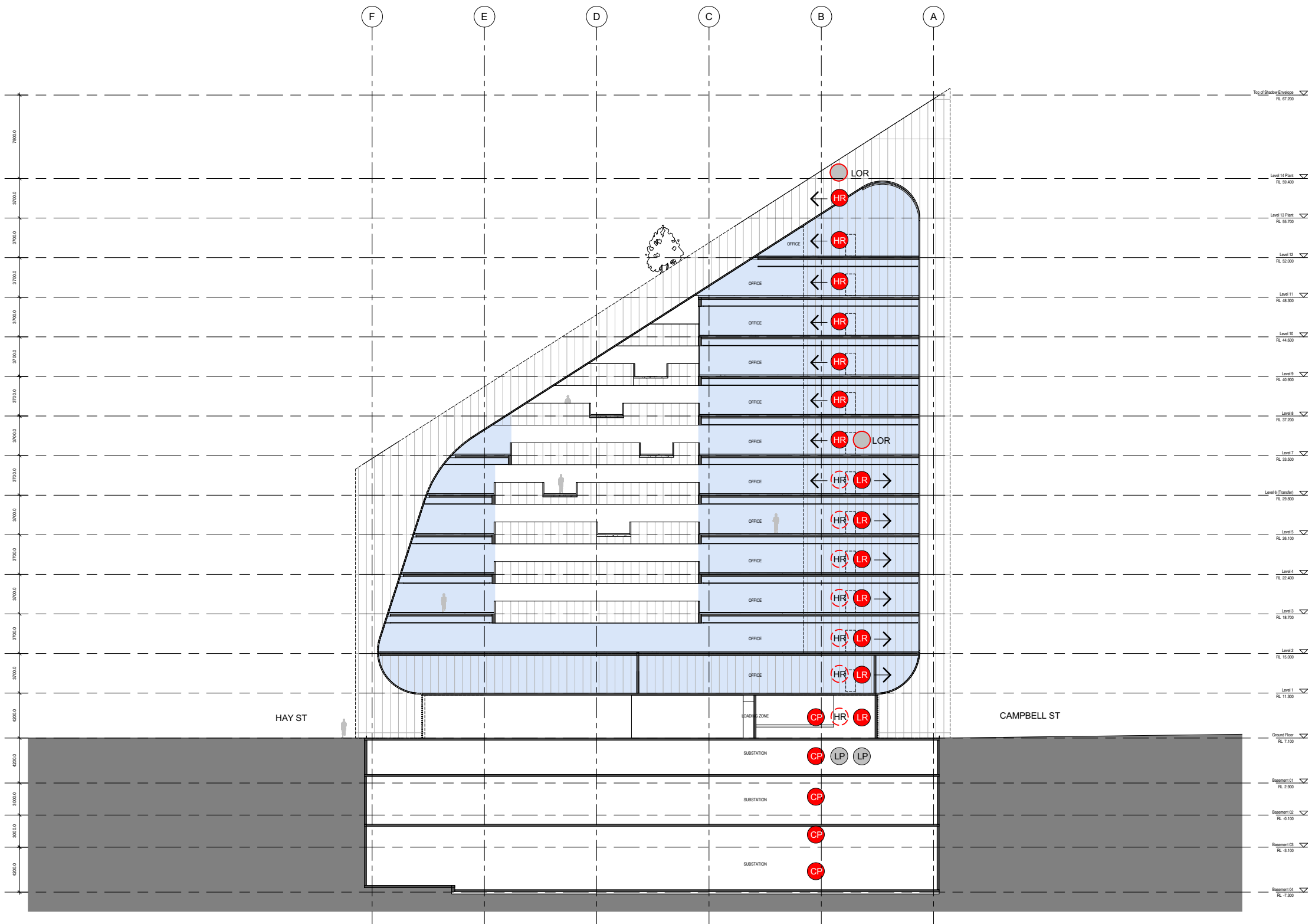
- Corridor Zone
- Tenancy 1
- Tenancy 2
- Tenancy 3
- Tenancy 4





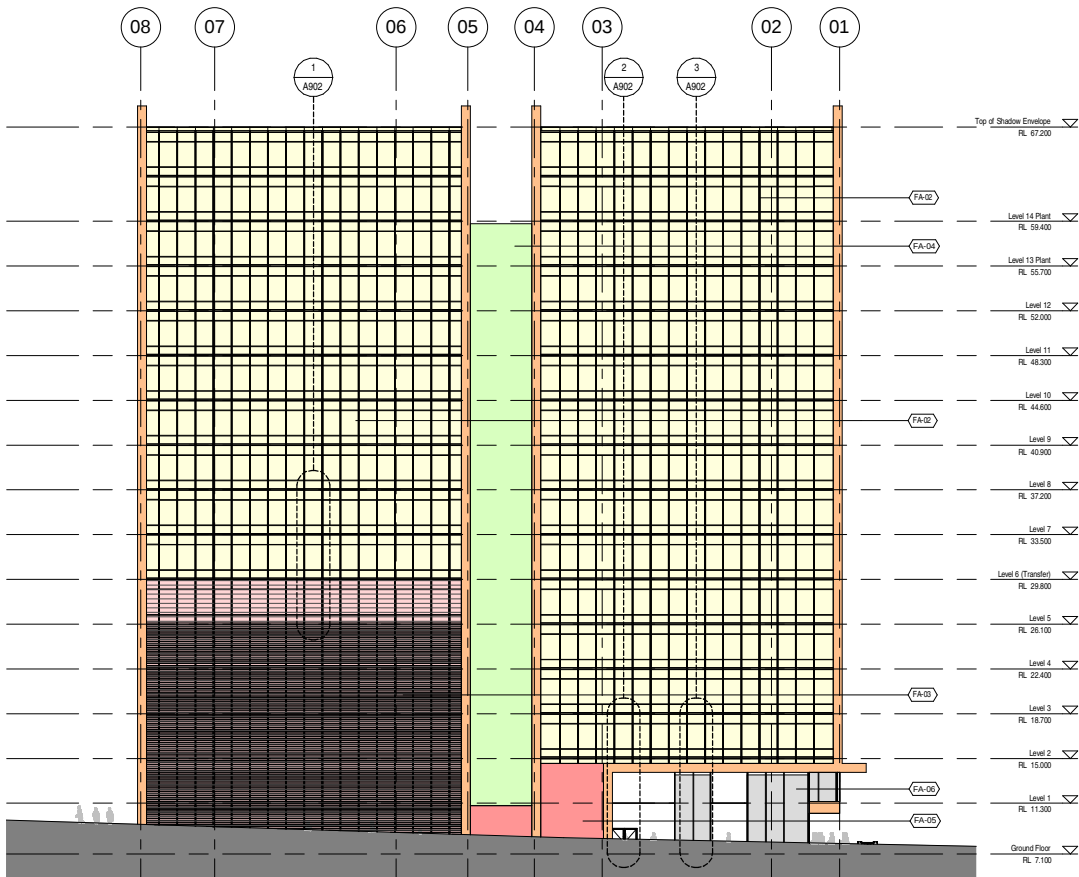




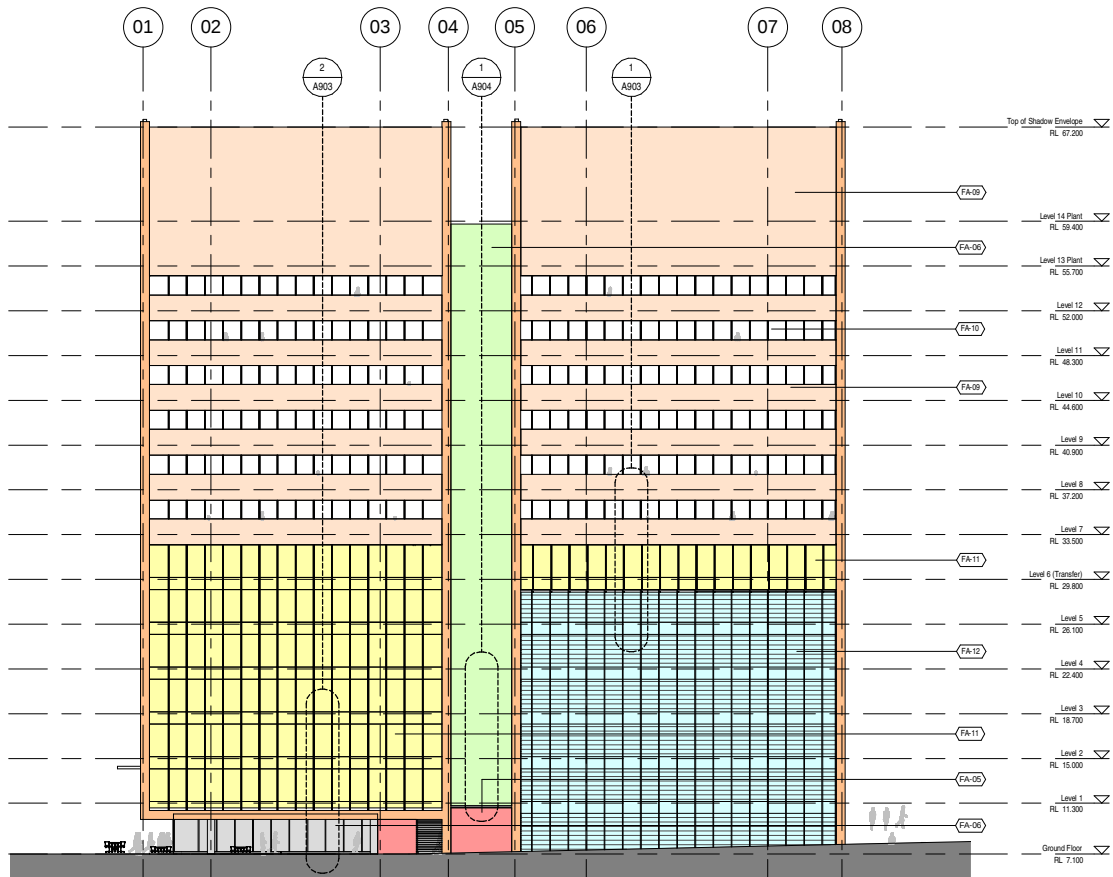


LEGEND :

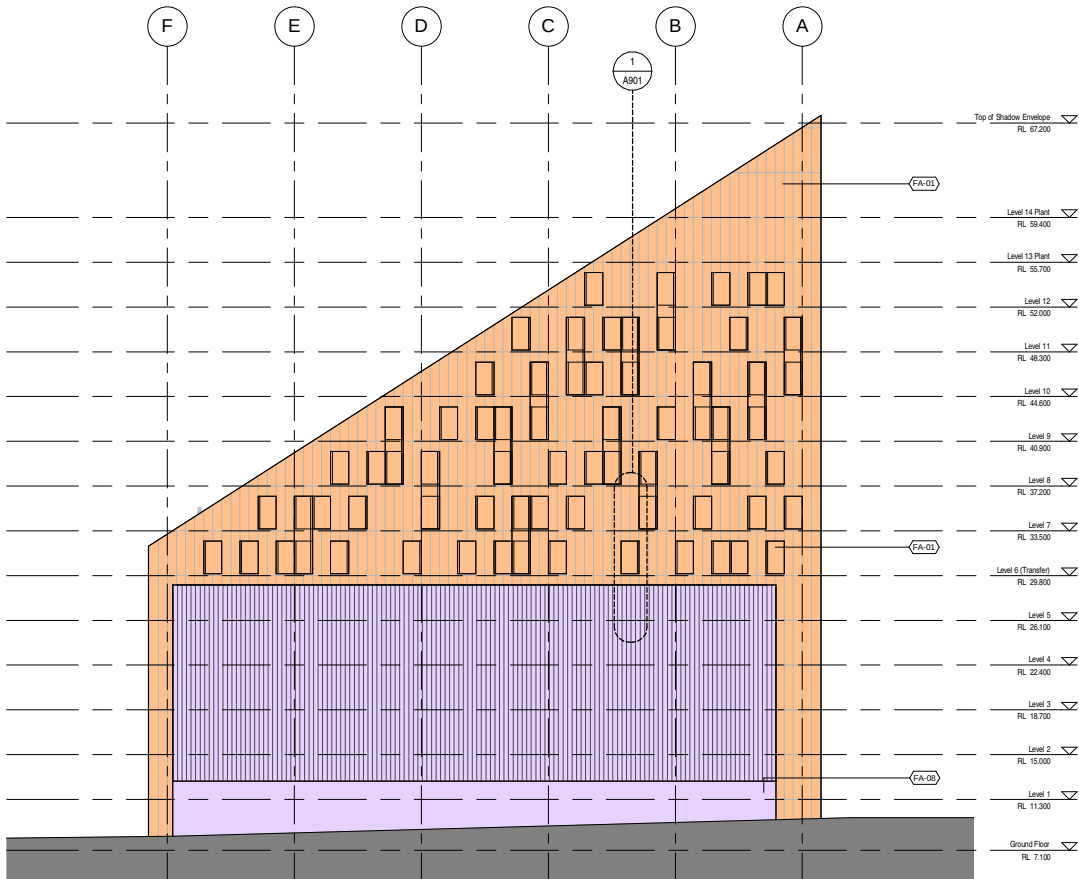
- ← HR → High Rise Lifts (x3)
- LR → Low Rise Lift (x3)
- CP → CarPark Lifts (x2)
- LP → Lift Pit
- LOR → Lift Overrun



1 North Elevation - Key
1 : 250



3 South Elevation Key
1 : 250



2 East Elevation Key
1 : 250

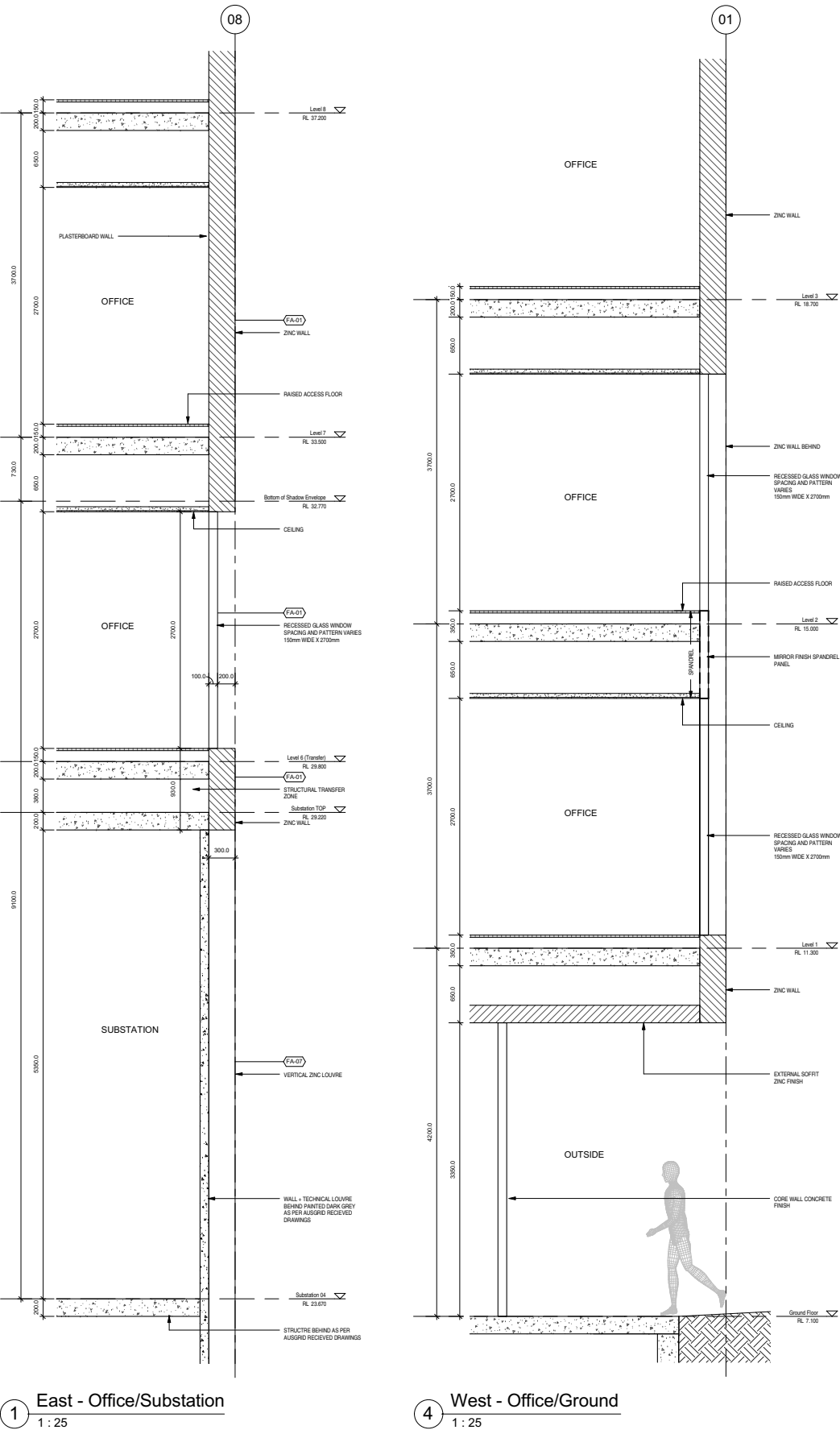


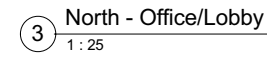
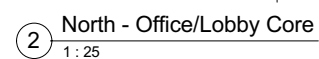
4 West Elevation Key
1 : 250

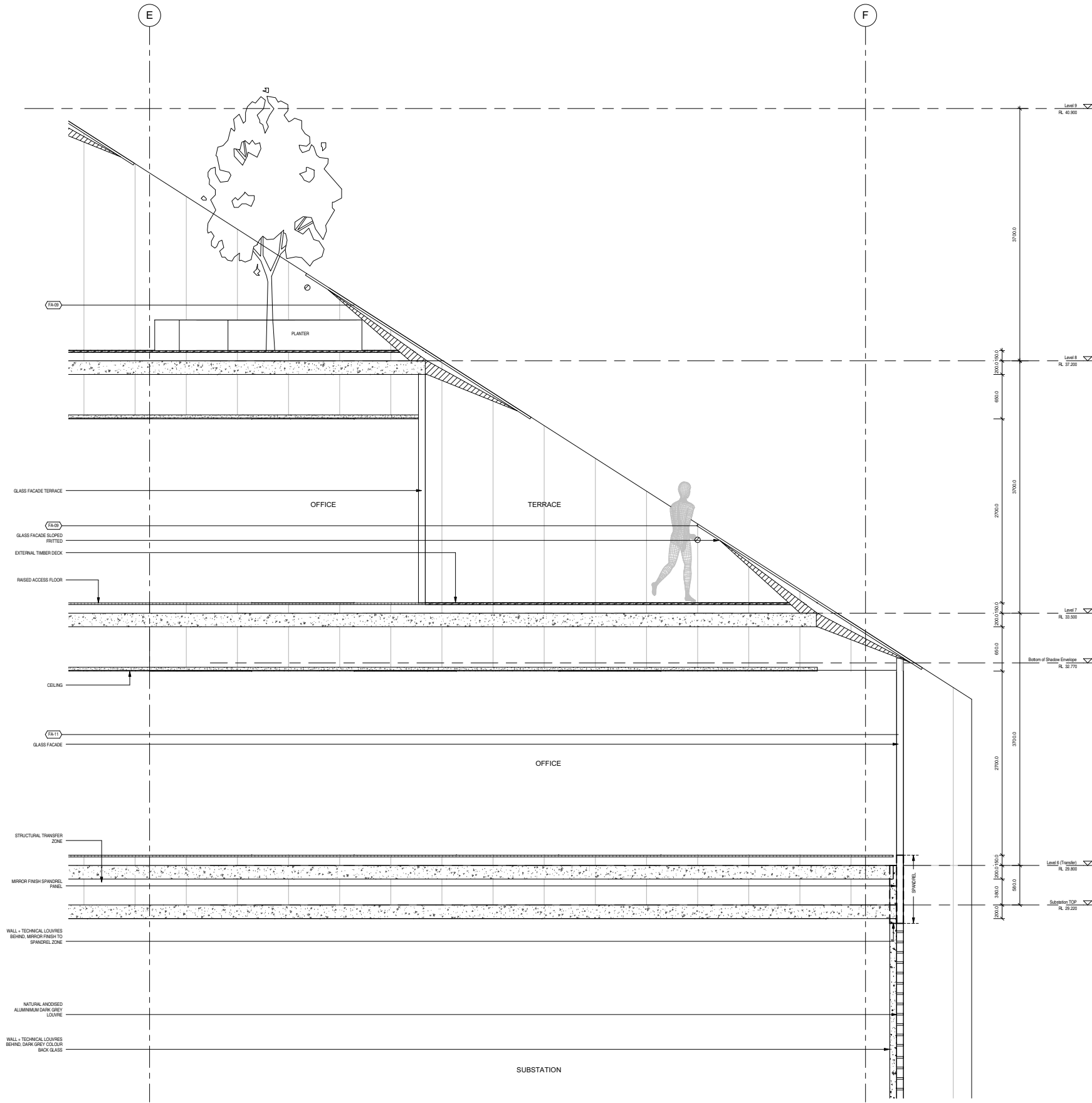
LEGEND :

- FA-01 - ZINC WALL WITH RECESSED GLASS WINDOW, SPACING AND PATTERN VARIES
- FA-02 - NORTH FACADE GLAZING WITH ZINC LOUVRE, MIRRORED SPANDREL PANEL
- FA-03 - NORTH FACADE SUBSTATION WITH ZINC AND NATURAL ANODISED ALUMINIUM DARK GREY LOUVRES. SUBSTATION WALL AND TECHNICAL LOUVRE BEHIND CHARCOL COLOUR BACK GLASS FINISH, MIRRORED FINISH TO SPANDREL ZONE
- FA-04 - SLOPED GLASS FACADE ATRIUM
- FA-05 - ROLLER SHUTTER TO CARPARK AND LOADING DOCK ENTRY.
- FA-06 - GROUND FLOOR GLASS FACADE
- FA-07 - EAST FACADE SUBSTATION VERTICAL ZINC LOUVRE. SUBSTATION WALL AND TECHNICAL LOUVRE BEHIND PAINTED CHARCOL GREY
- FA-08 - EAST FACADE EXISTING SUBSTATION PRECAST WALL (NOT PART OF THIS APPLICATION)
- FA-09 - GLASS FACADE SLOPED + FRITTED
- FA-10 - GLASS FACADE TERRACE
- FA-11 - GLASS FACADE WITH MIRROR FINISH SPANDREL PANEL
- FA-12 - NATURAL ANODISED ALUMINIUM DARK GREY LOUVRE WITH MIRROR FINISH SPANDREL PANEL OR LOUVRES AS REQUIRED. SUBSTATION WALL AND TECHNICAL LOUVRE BEHIND CHARCOL COLOUR BACK GLASS FINISH, MIRRORED FINISH TO SPANDREL ZONE

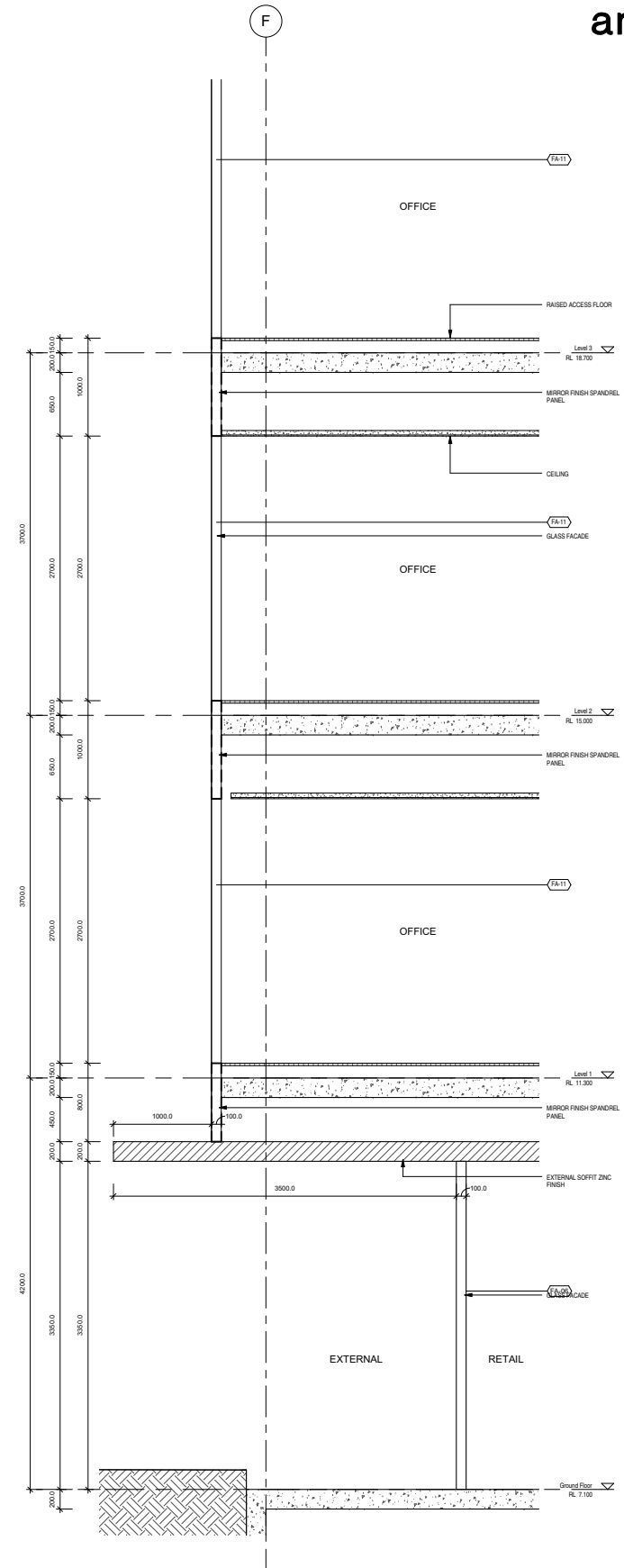






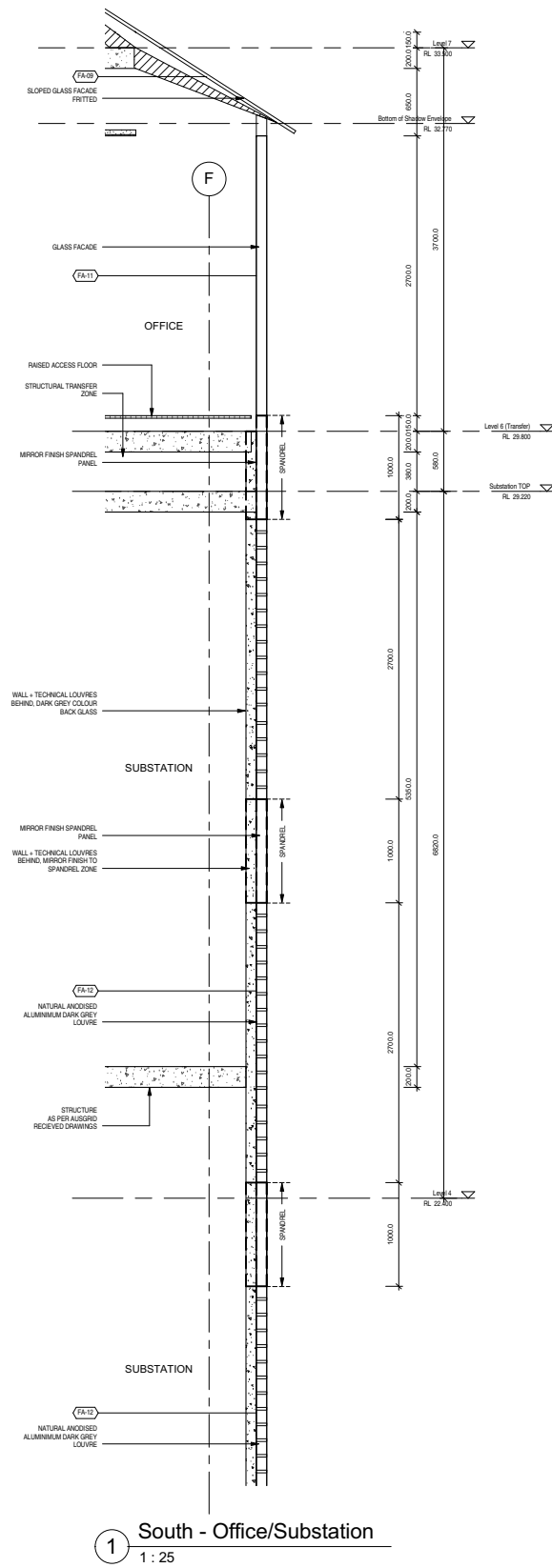


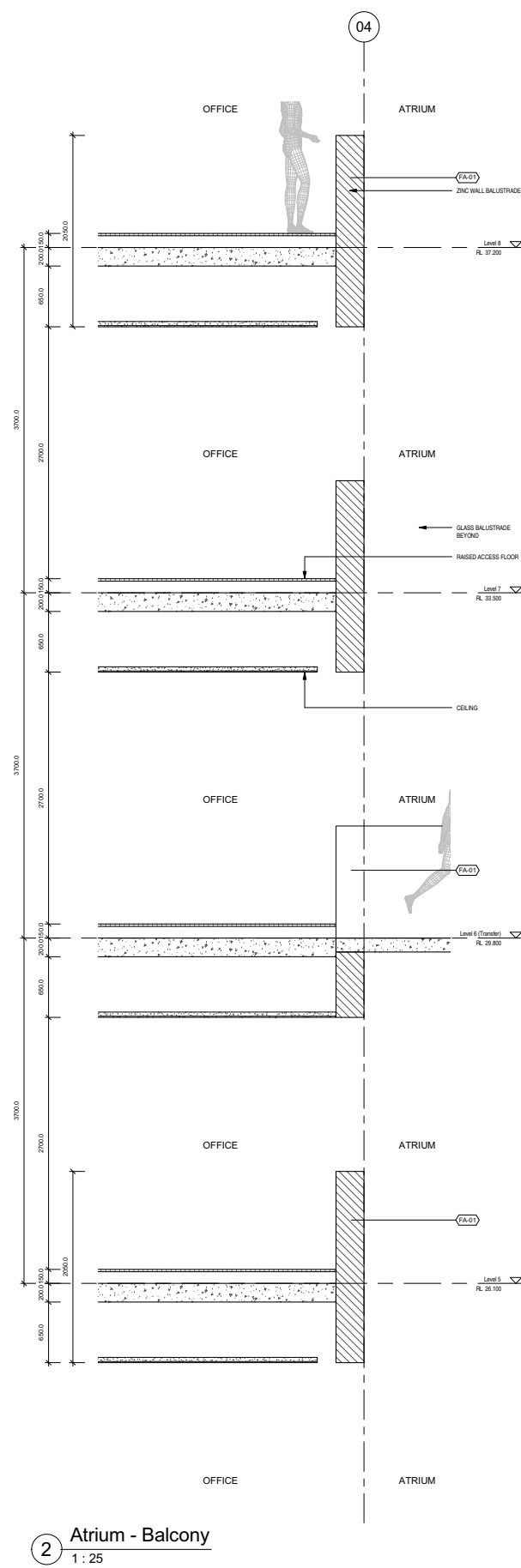
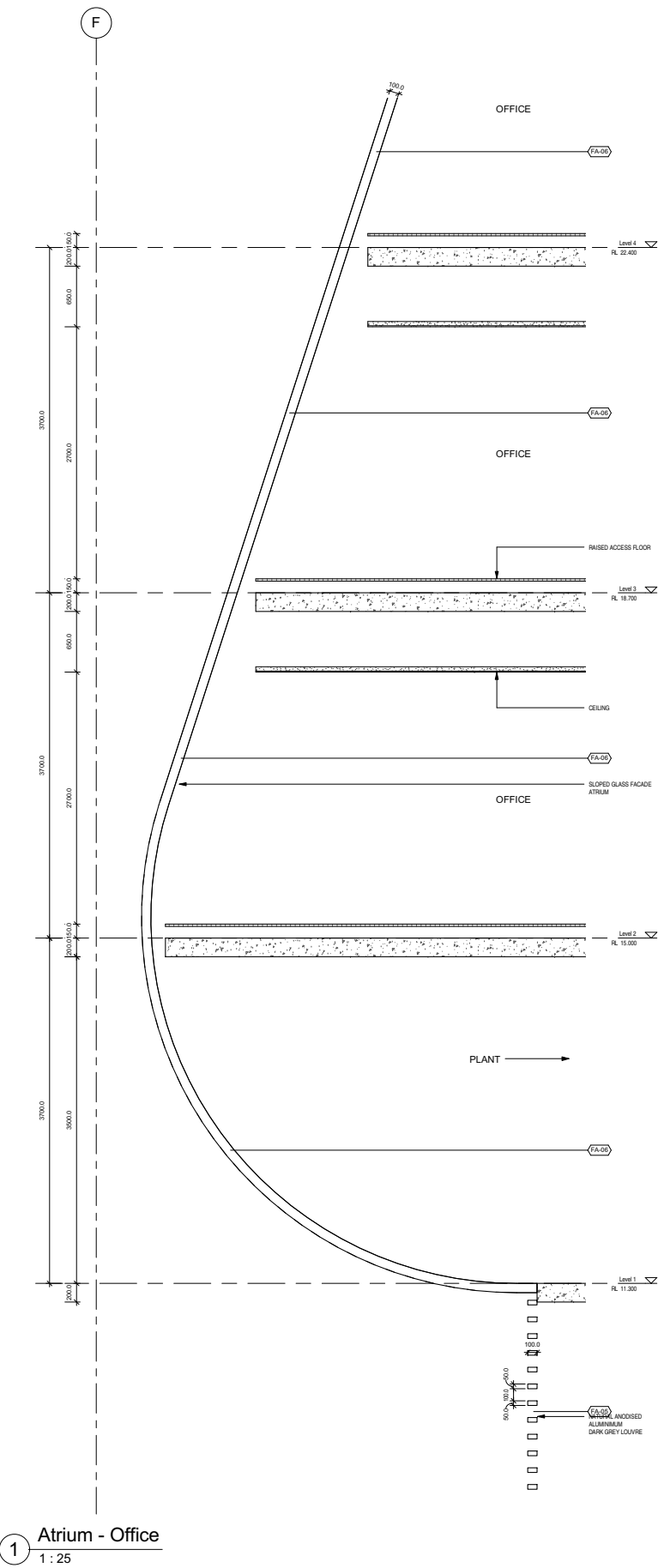
2 South - Office/Terrace
1 : 25

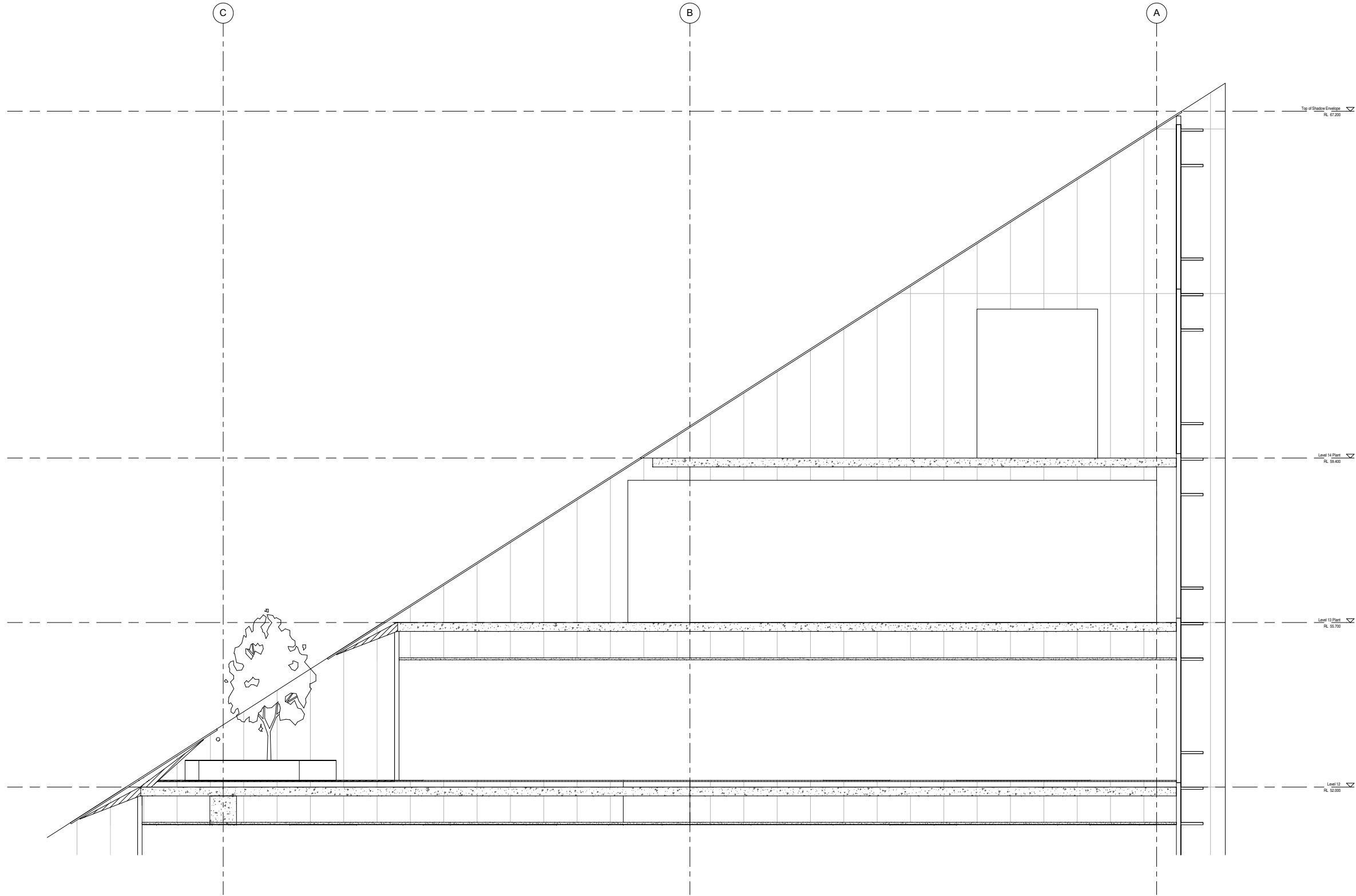


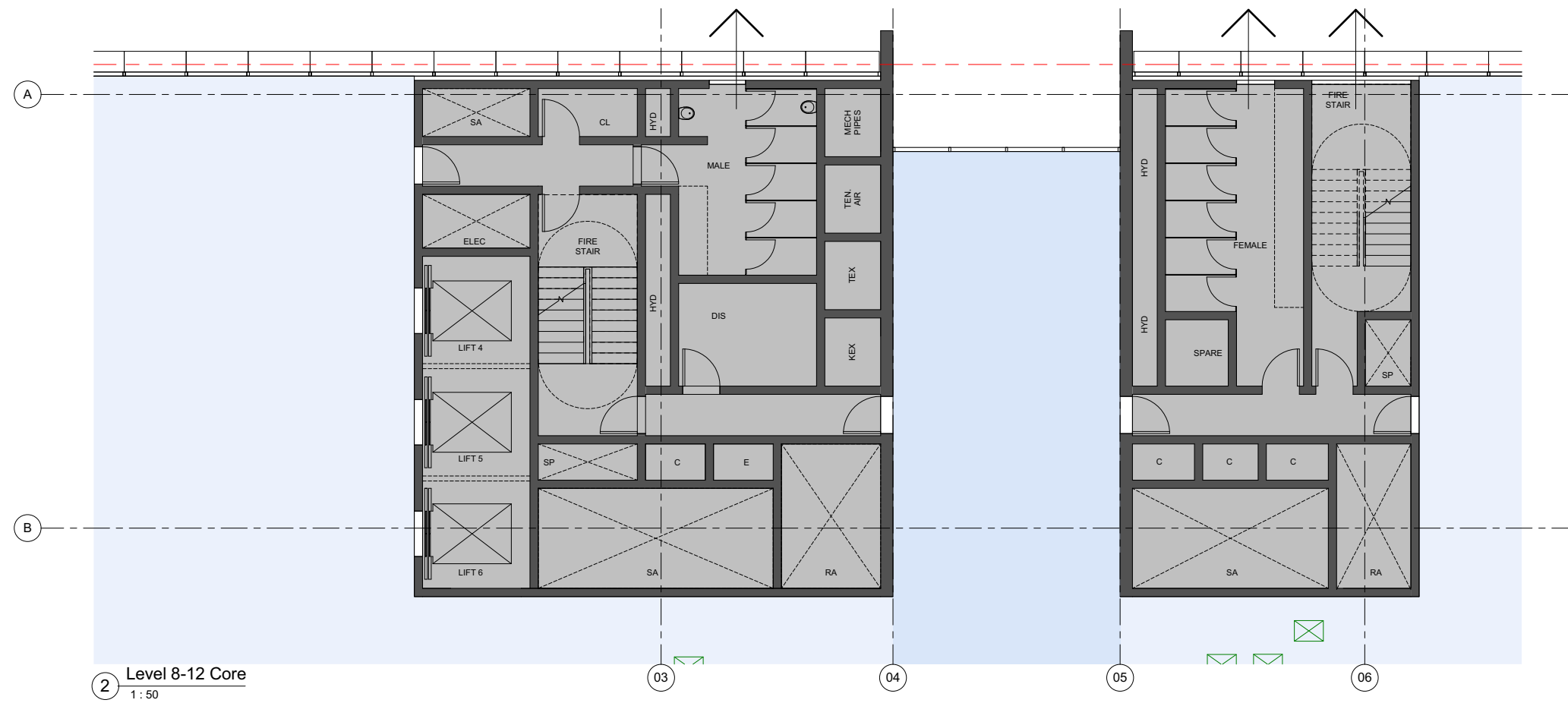
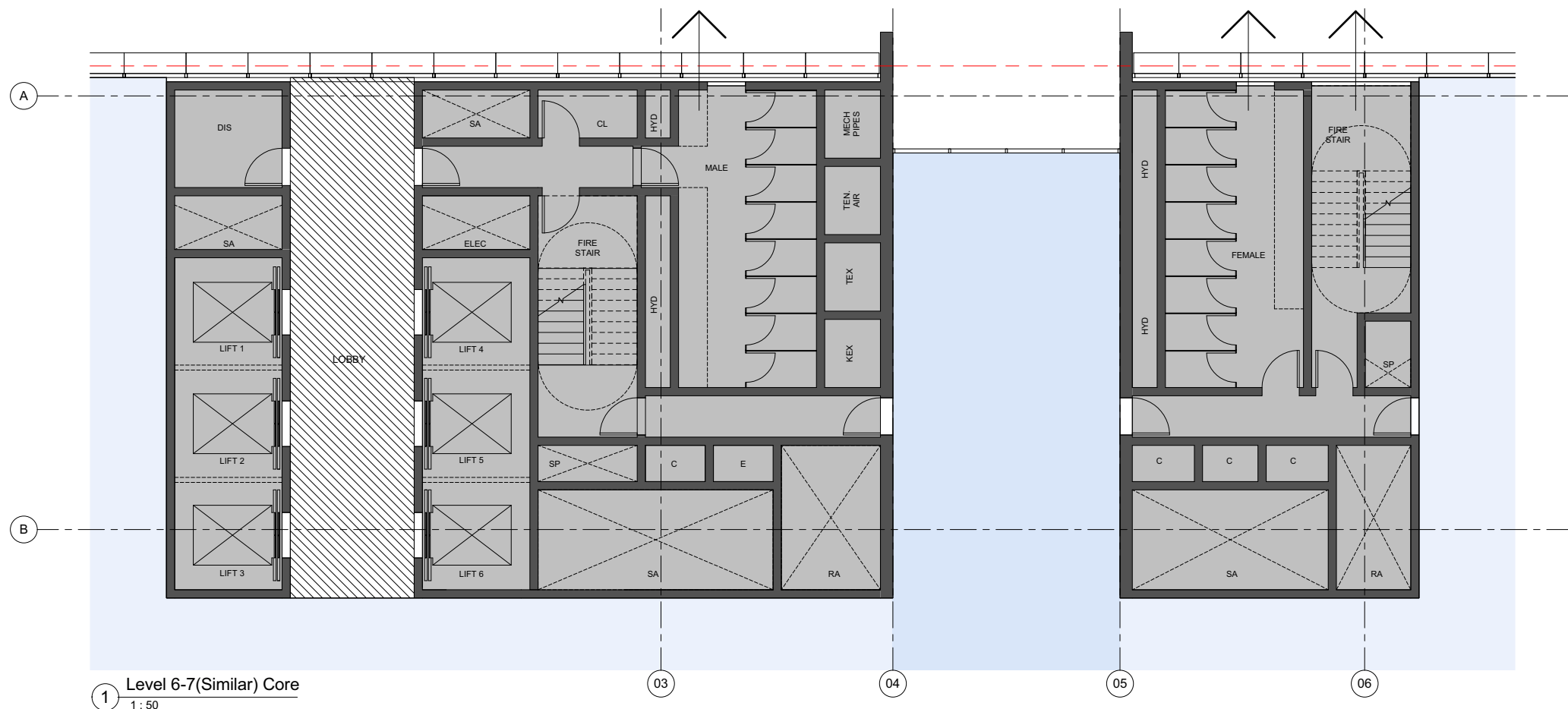
1 South Office/Ground
1 : 25















Zinc (Pigmento rouge/red)



Clear Glass



Mirror



Aluminium Dark Grey Louvres



Dark Grey Colour Back Glass

architectus™

Architecture
Urban Design
Planning
Interior Architecture



Landscaping



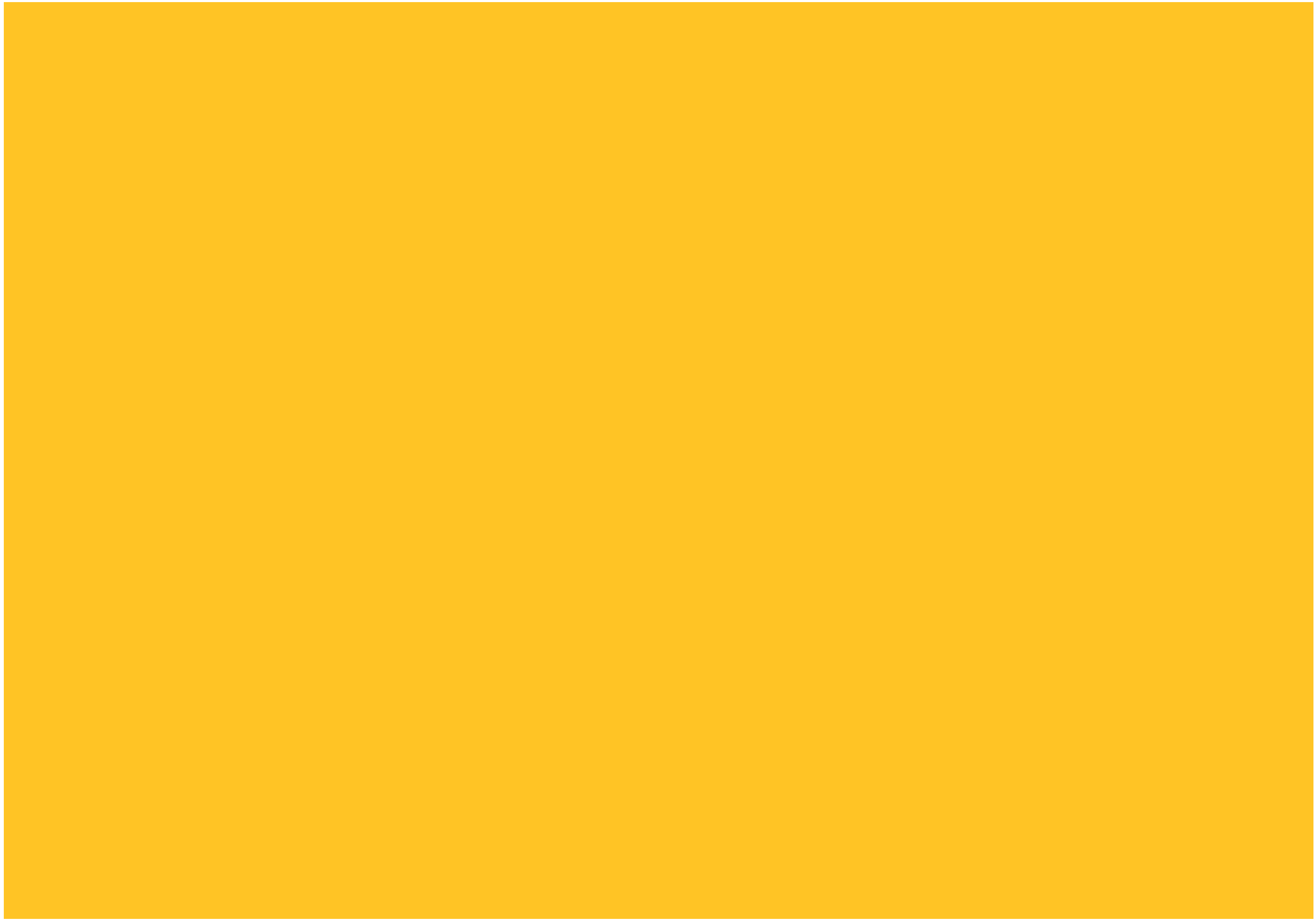
Timber Flooring



Concrete

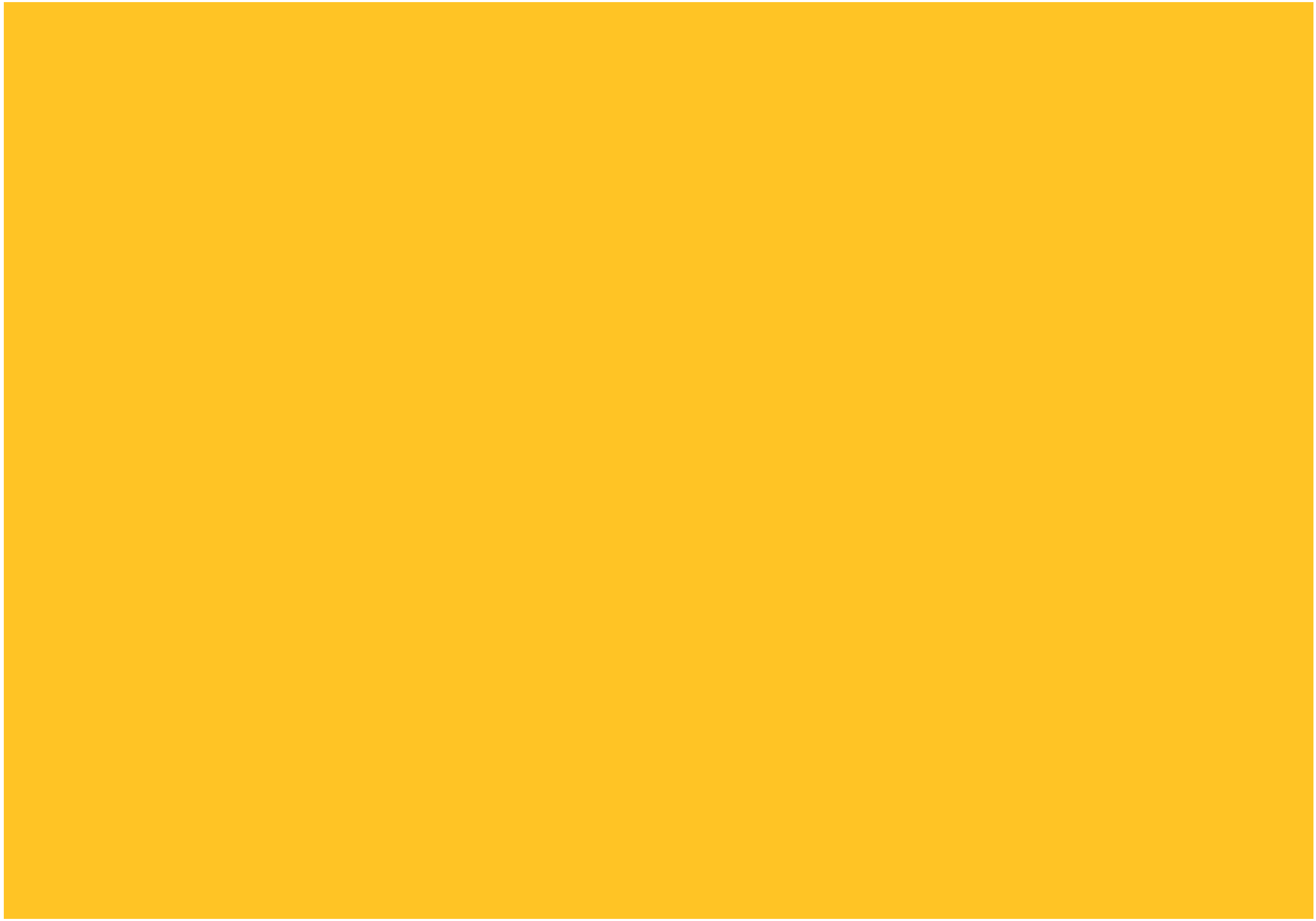


Austral Black Granite



Appendix B

Landscape

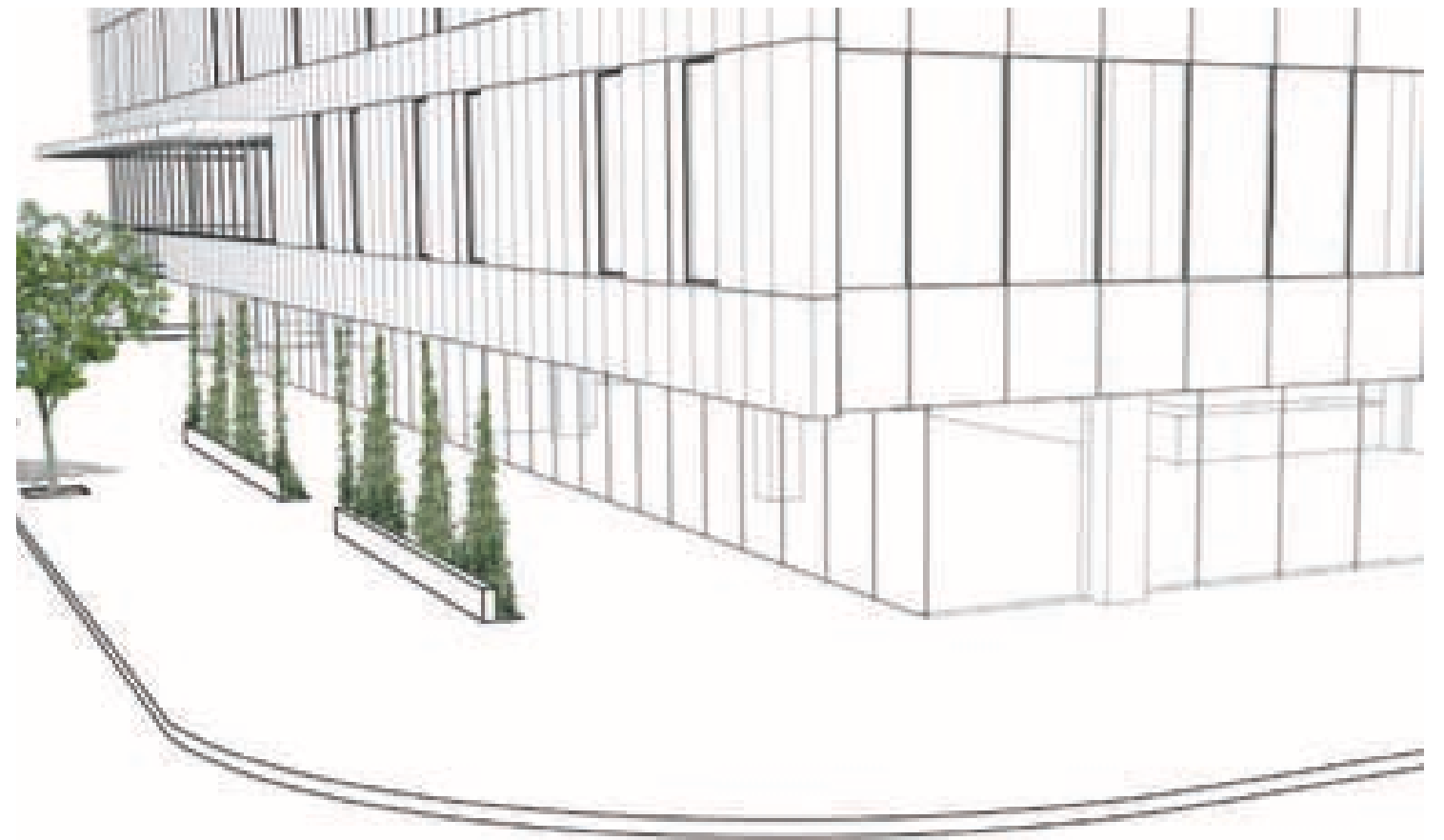






THROUGH SITE LINK

RETAIL AT CORNER OF PITT AND HAY STREETS



STREET TREE SPECIES
CITY OF SYDNEY STREET TREE MASTER PLAN 2011



Pitt Street - 3 x Existing
Platanus acerifolia - London Plane Tree

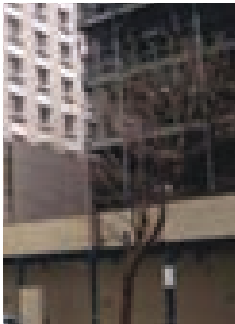


Hay Street - New Trees
Flindersia australis - Crows Ash

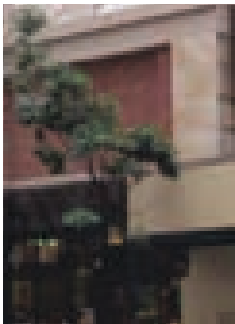


Campbell Street - New Trees
Lophostemon confertus - Brush Box

EXISTING STREET TREES RETAINED



Campbell Street - Existing Tree 13
Fraxinus sp - Ash

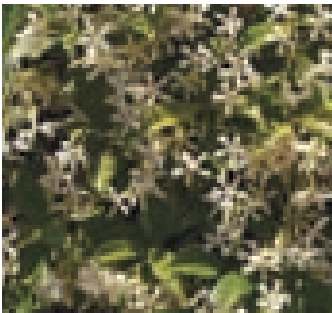


Campbell Street - Existing Tree 15
Lophostemon confertus - Brush Box

THROUGH SITE LINK - CLIMBERS & CREEERS



Pandorea jasminoides
Climber



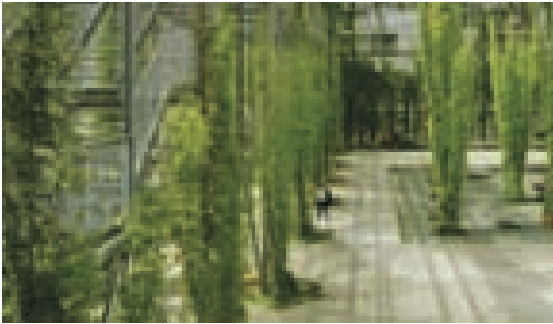
Trachelospermum jasminoides
Climber



Cissus romboldifolia
Climber / Creeper



Hedera Helix - English Ivy
Creeper / Climber



Climbers @MFO Park in Neu-Oerlikon



Climbers @MFO Park in Neu-Oerlikon



TERRACE TREE SPECIES OPTIONS



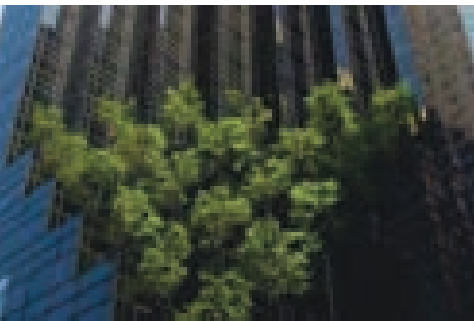
Magnolia Little Gem - Ever Green



Ficus lyrata - Fiddle Leaf Fig
Ever Green



Pyrus calleryana 'Red Spire' - Deciduous



Pyrus @ Trump Tower NY

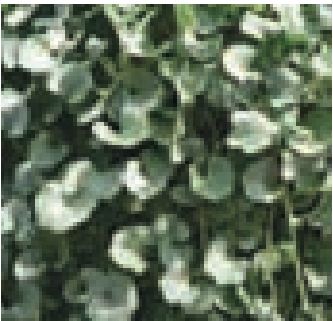
TERRACE GOUND COVER AND
CREEPER OPTIONS



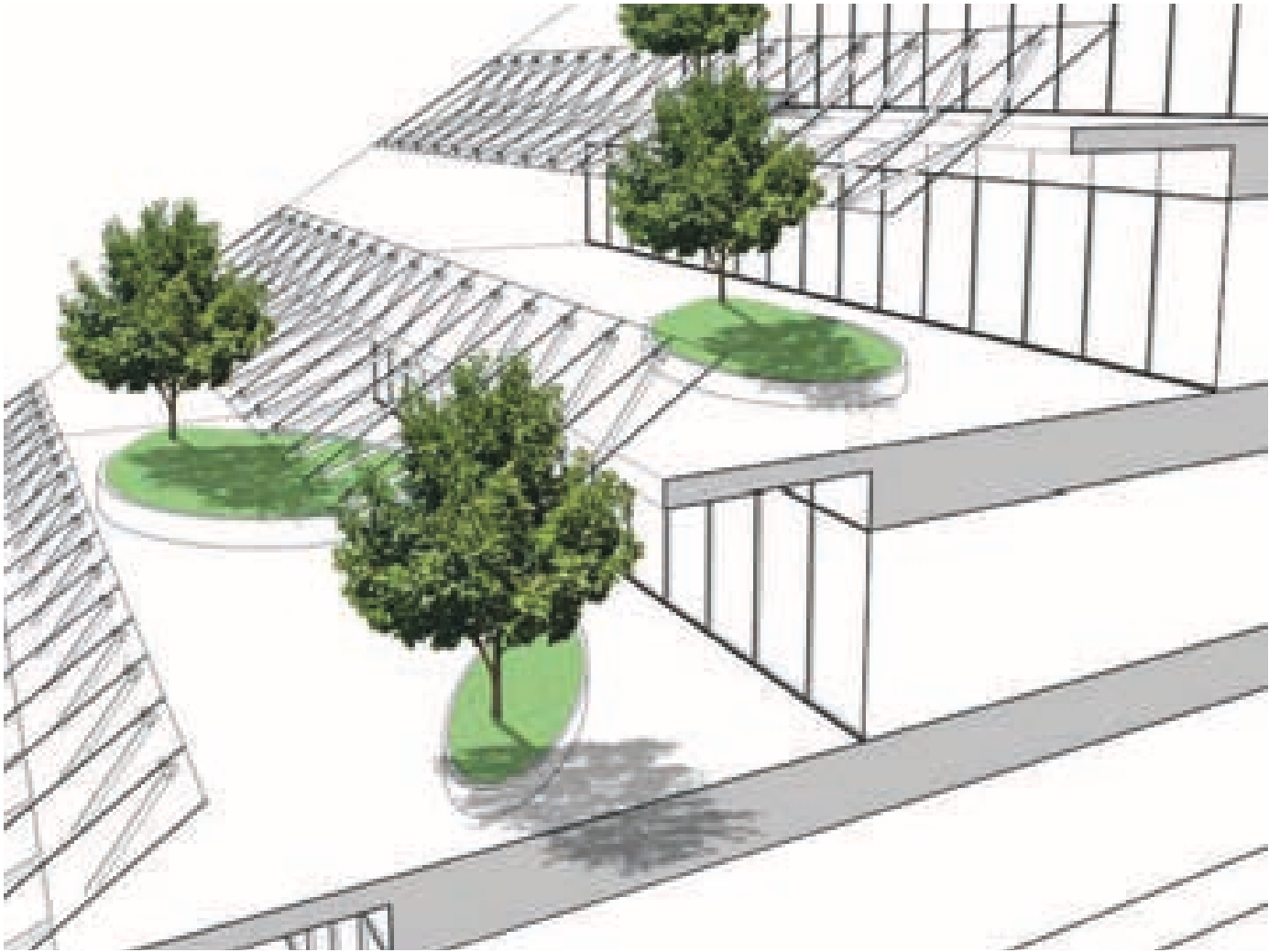
Carpobrotus glaucescens - Pig Face
Creeper



Hedera Helix - English Ivy
Creeper / Climber



Dicondra 'Silver Falls'
Creeper

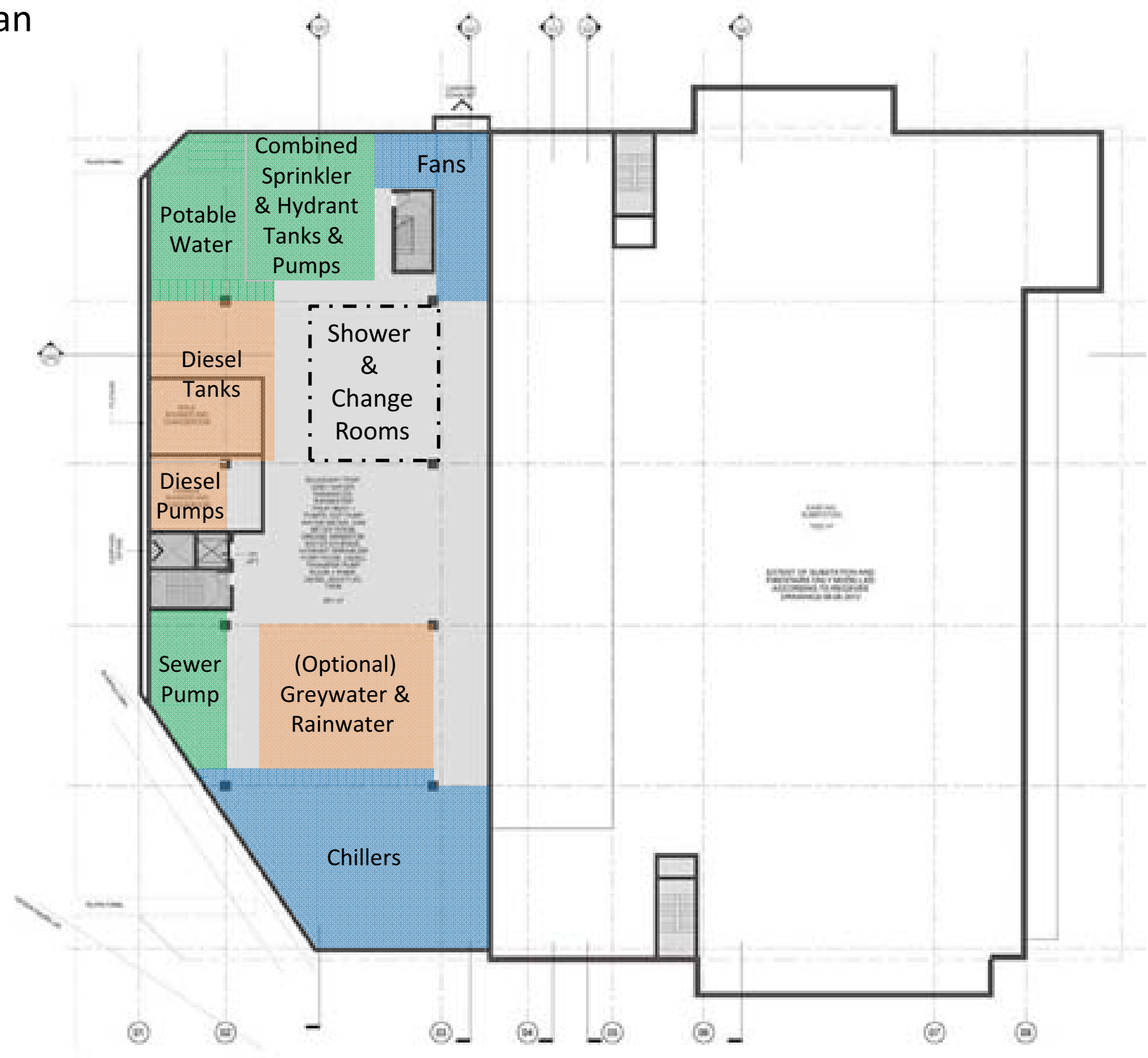


ROOF TERRACES

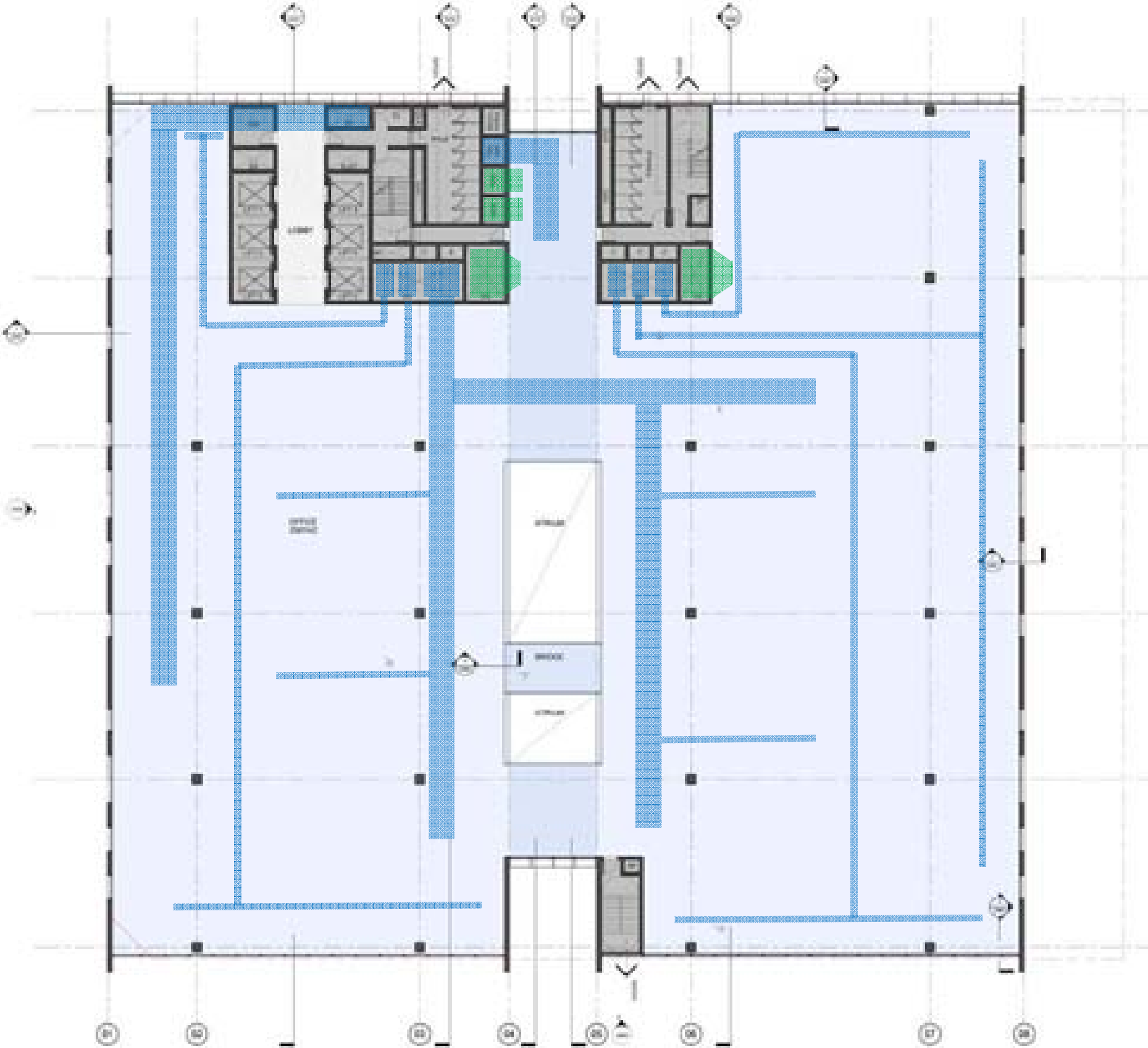
Appendix C

Services

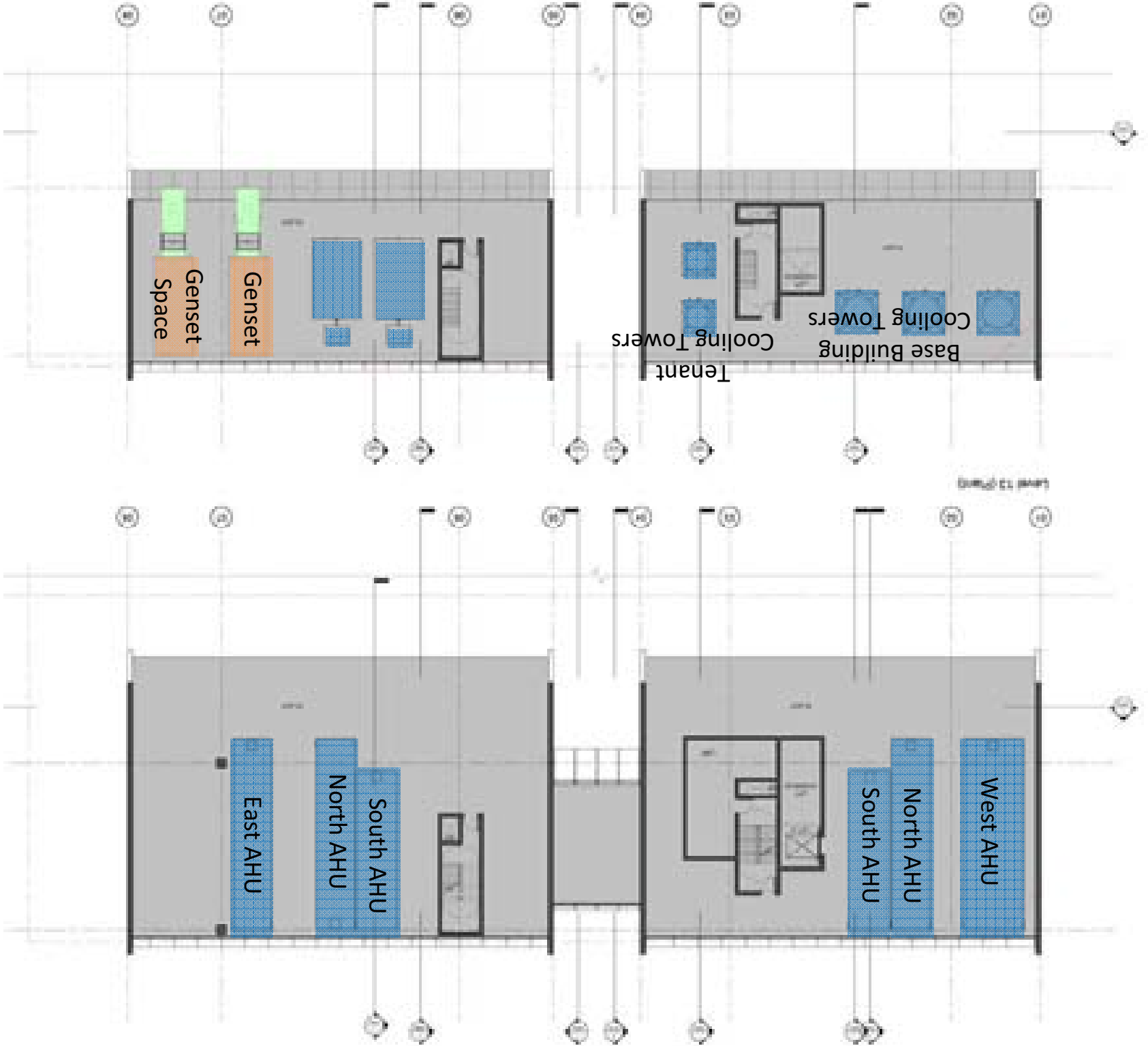
Basement Plan

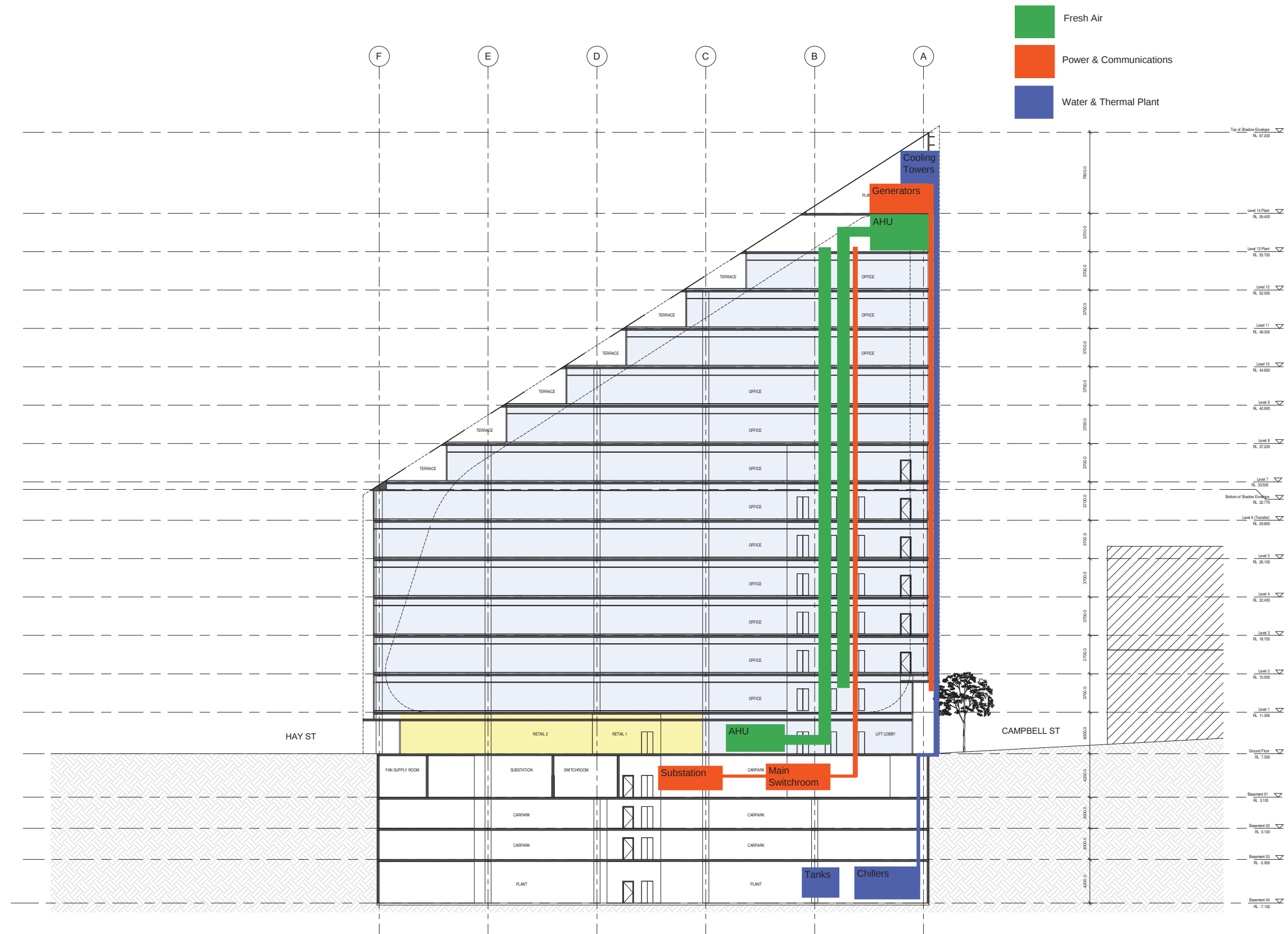


Level 6 Plan



Level 13 & 14 Plan





Smoke Control Strategy

Strategy subject to detailed CFD modelling and will include:

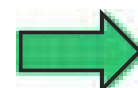
- pressurised fire stairs; automatic fire detection; sprinkler protection
- smoke extract from atrium roof
- smoke extract on floor
- smoke reservoir (depth subject to CFD modelling) + concealed downstands at atrium edge
- 8 x 2.1m diameter smoke extract fans



Fire Scenario 1
- fire in atrium base



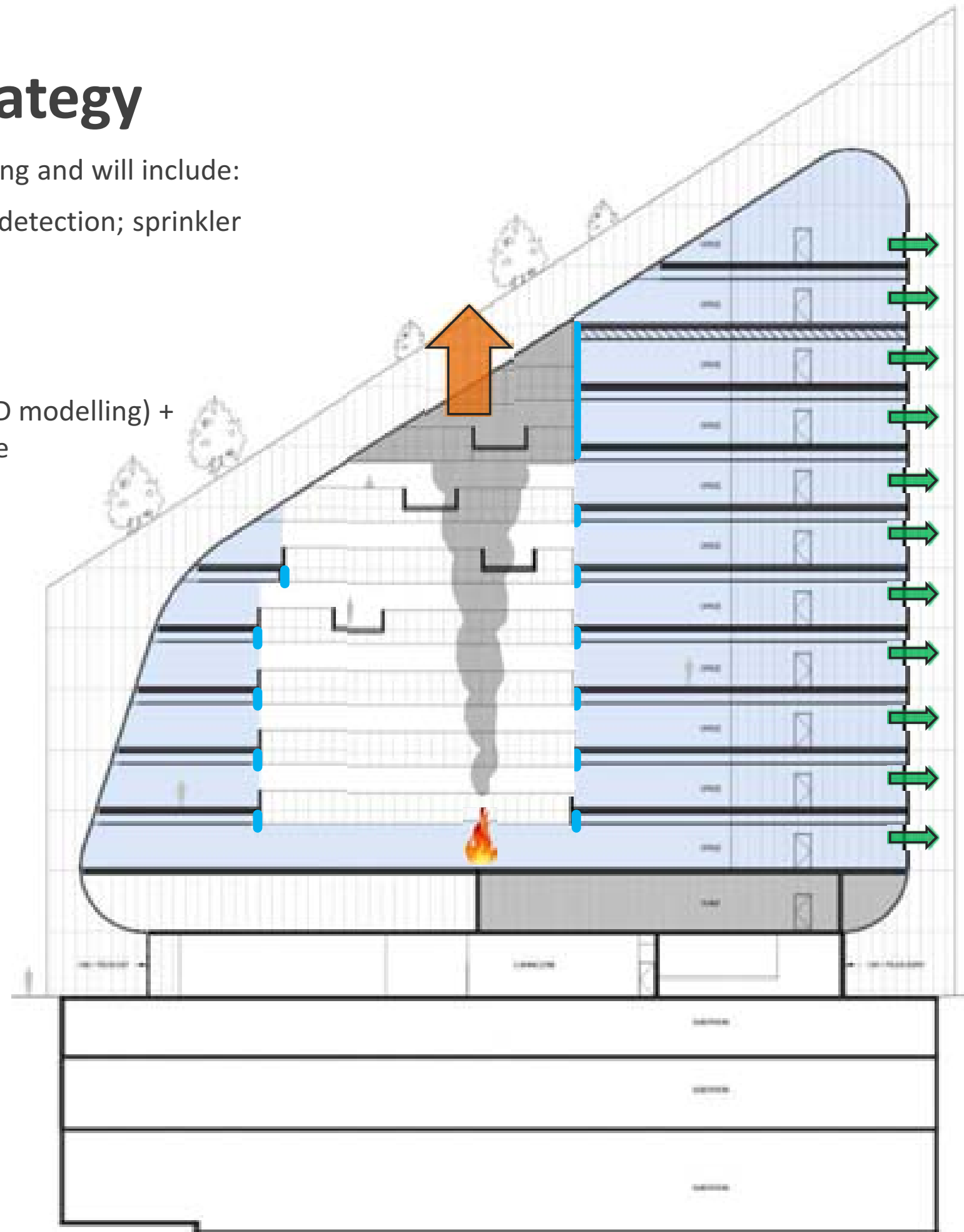
250m³/s
- atrium smoke extract

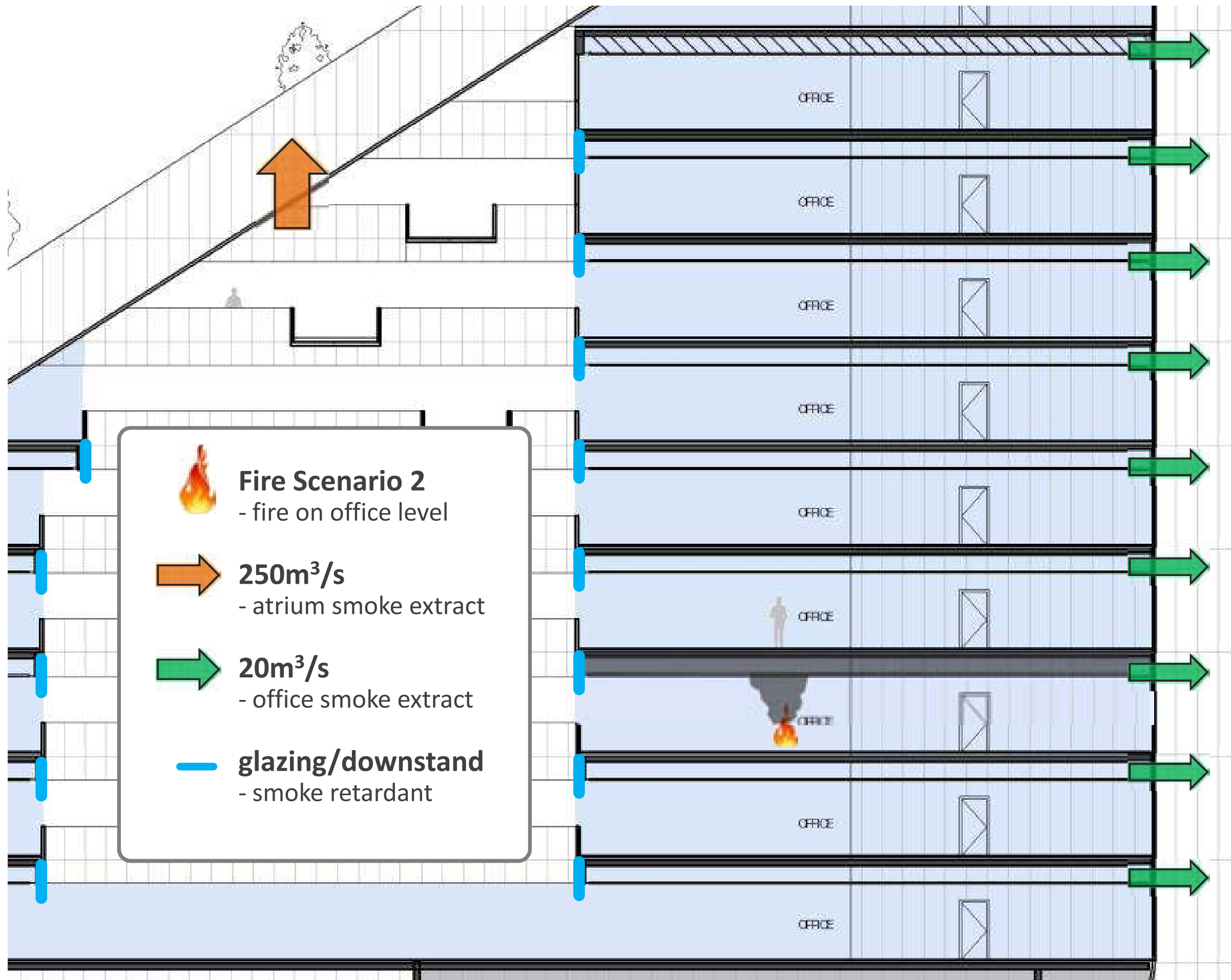


20m³/s
- office smoke extract



glazing/downstand
- smoke retardant



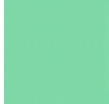


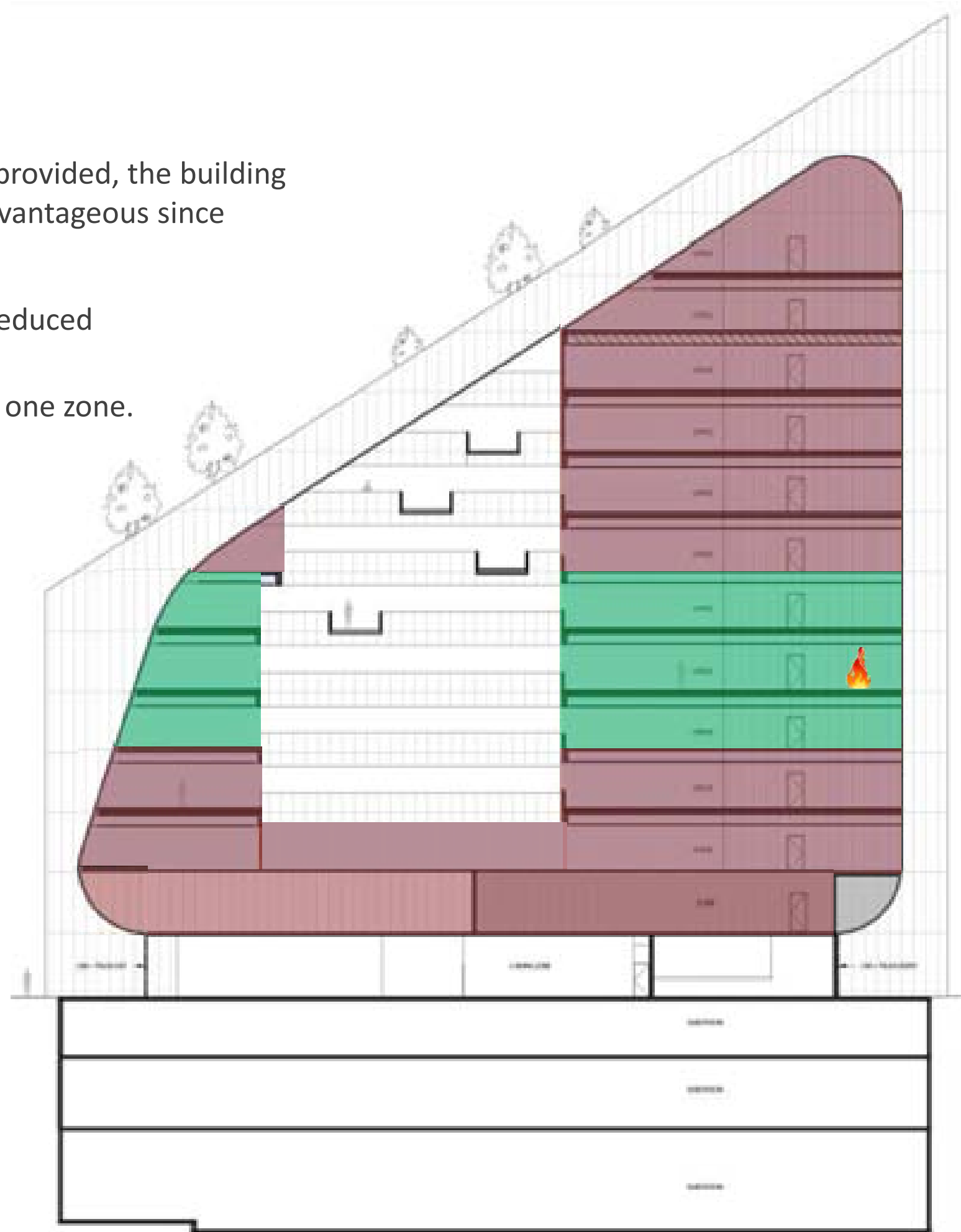
Evacuation Strategy

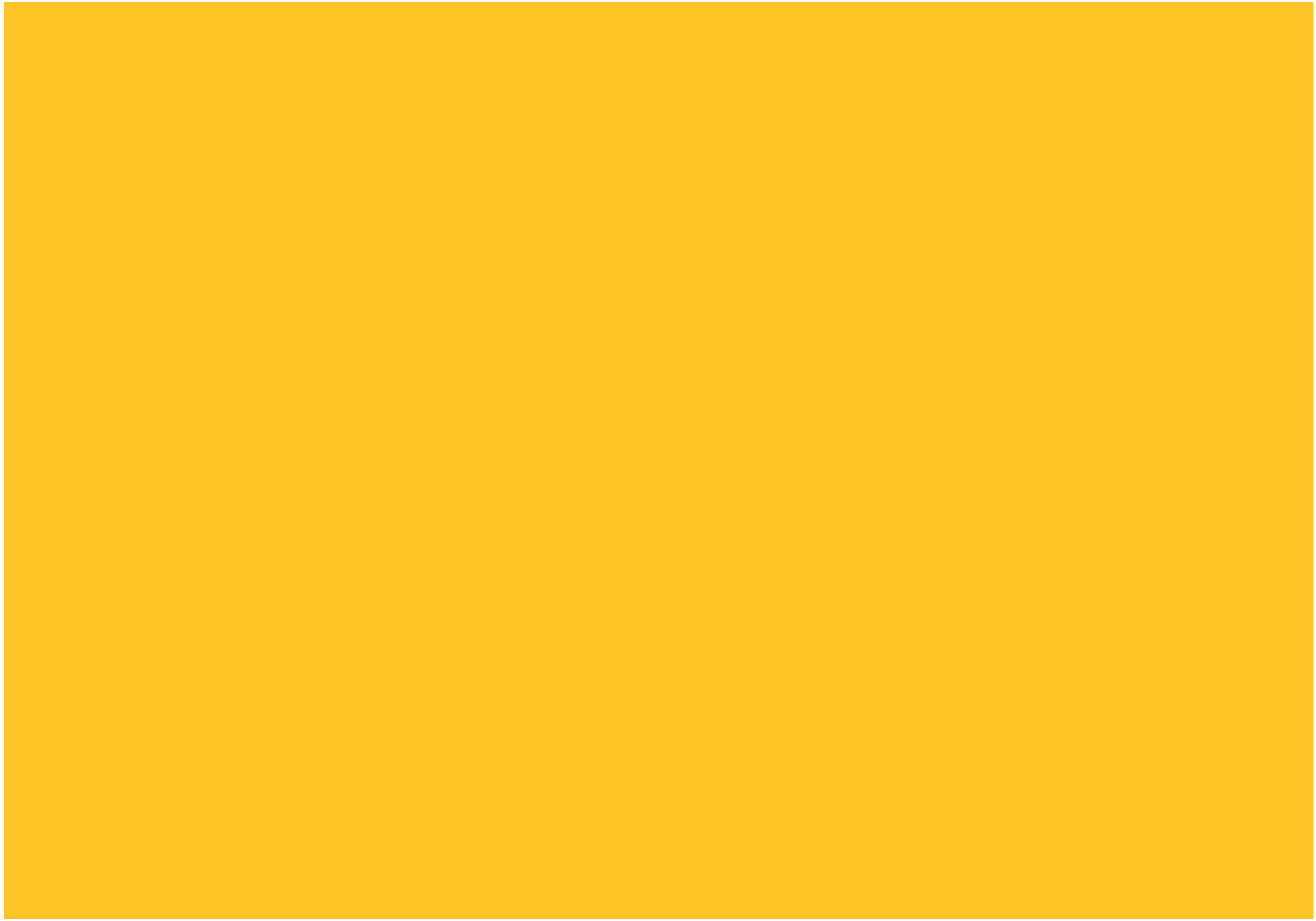
Since downstands and smoke control are provided, the building will evacuate on a phased basis. This is advantageous since

- the impact of false alarms is limited
- the size of stair pressurisation plant is reduced

Plant and car park spaces will evacuate as one zone.

-  **evacuate signal**
- fire floor; floor above and below
-  **warning signal**
- remaining floors





Appendix D

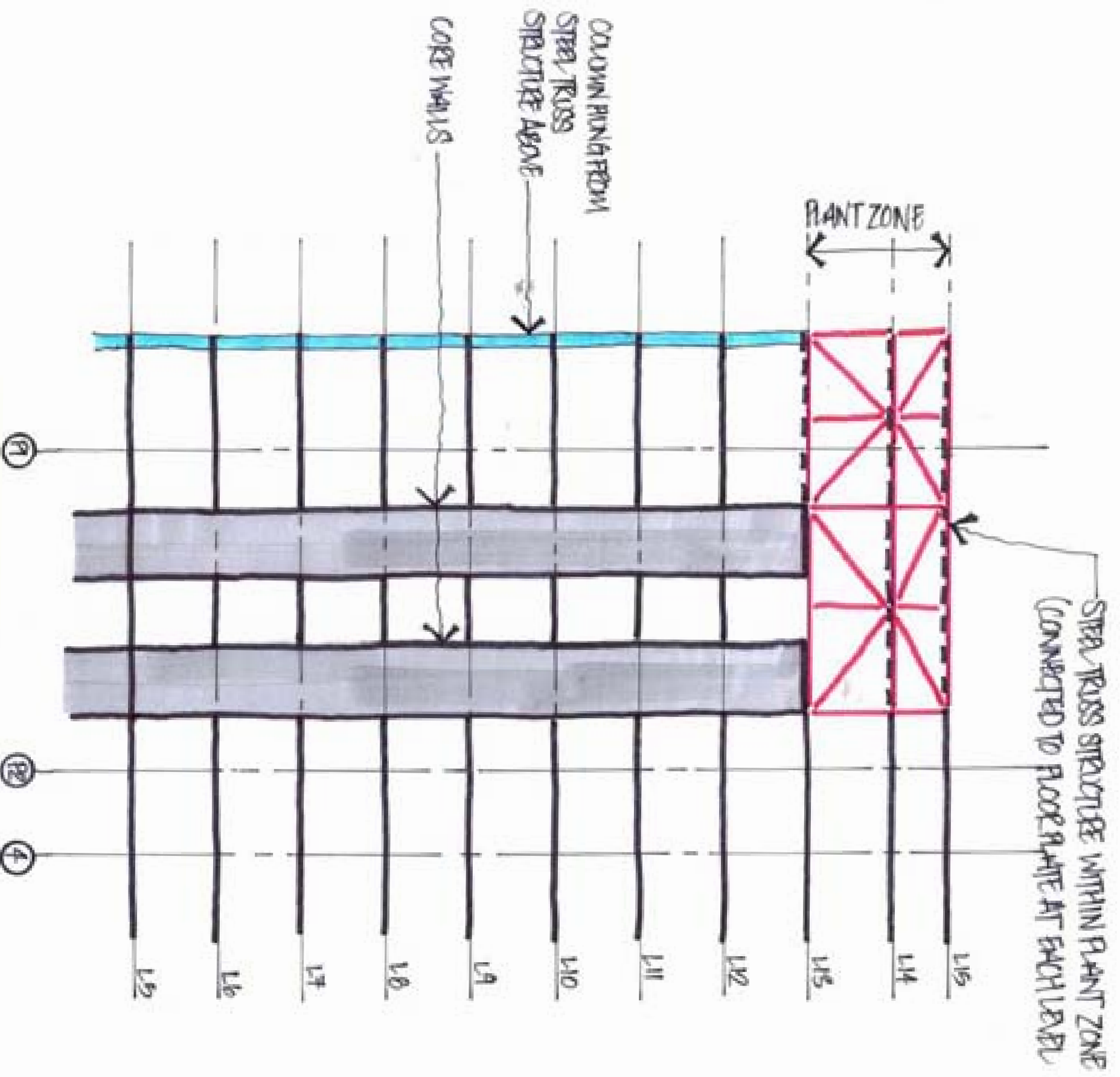
Structure

[illegible]

SCALE 1 : 100

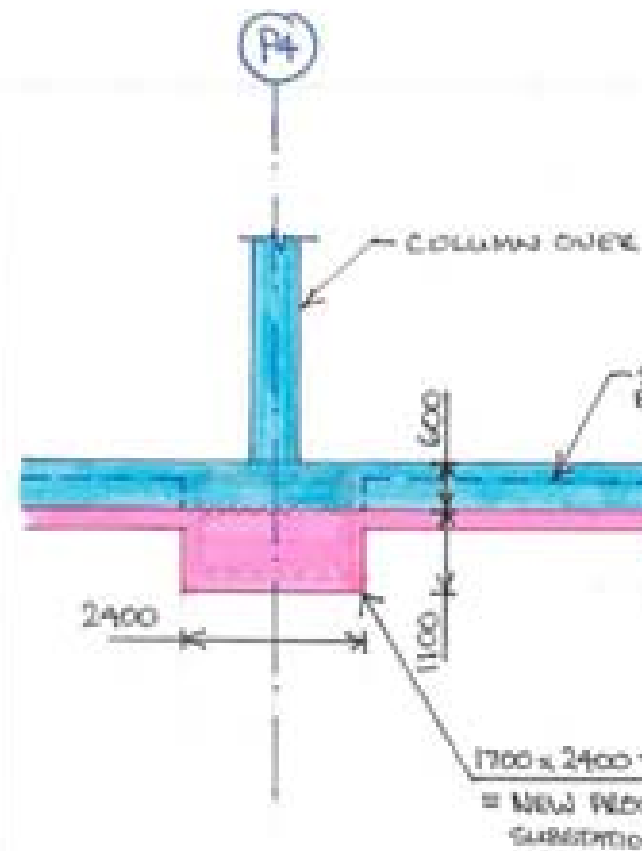
SCALE 1 : 50

CLIENT	PROJECT	DRAFT STATUS			SHEET SIZE
	BELMORE PARK COMMERCIAL		DRAFT COPY		
	430-450 PITT STREET, SYDNEY NSW 2000	DRAFTSMAN MPK	PROJECT MANAGER AS	SCALE 1:100, 50 @ A0	A0
TITLE		PROJECT REF No.		DRAWING No.	REVISION
TYPICAL LEVEL PLAN		9478		SK01	A

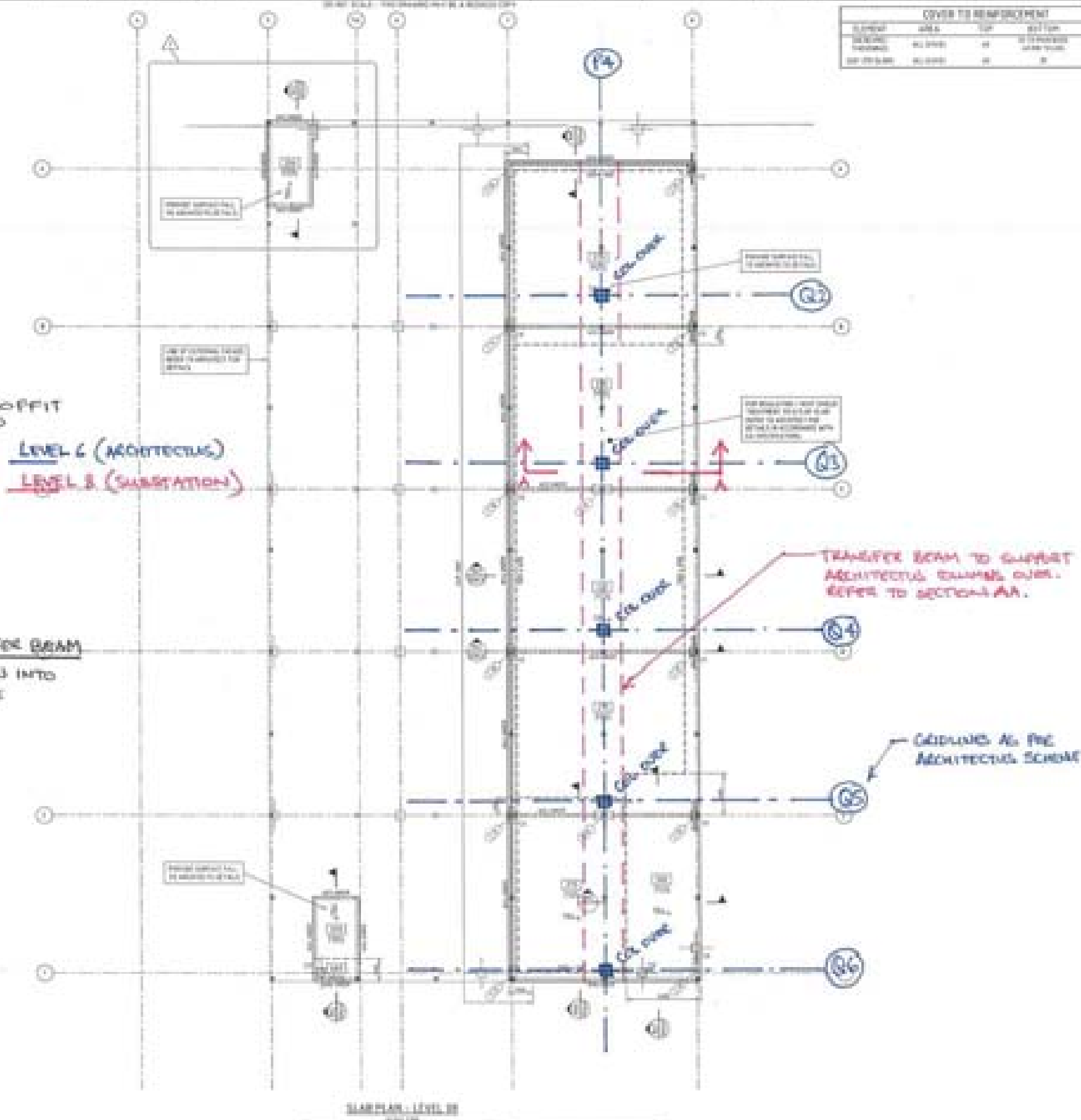


ELEVATION ON GRID OF MAINING COLUMN SUPPORT STRUCTURE (LOOKING NORTH)

L4D/SF/22.09.11



SECTION AA



NAME _____ LEVEL _____

100 From 1990 to 1995, the number of people who were employed in the health care industry in the United States increased by approximately 10 percent. The number of people who were employed in the health care industry in the United States in 1995 was approximately 10 million. The number of people who were employed in the health care industry in the United States in 1990 was approximately 9 million.

Keywords: adolescents; self-esteem; social support; coping strategies

 Korn Ferry Group LINCOLN & SYMON
Commercial Engineers

Question	Answer
1. What is the purpose of the study?	To determine the effect of the new drug on the old drug.
2. What is the hypothesis?	The new drug is more effective than the old drug.
3. What is the independent variable?	The type of drug (new vs. old).
4. What is the dependent variable?	The effectiveness of the drug.

Energy Australia

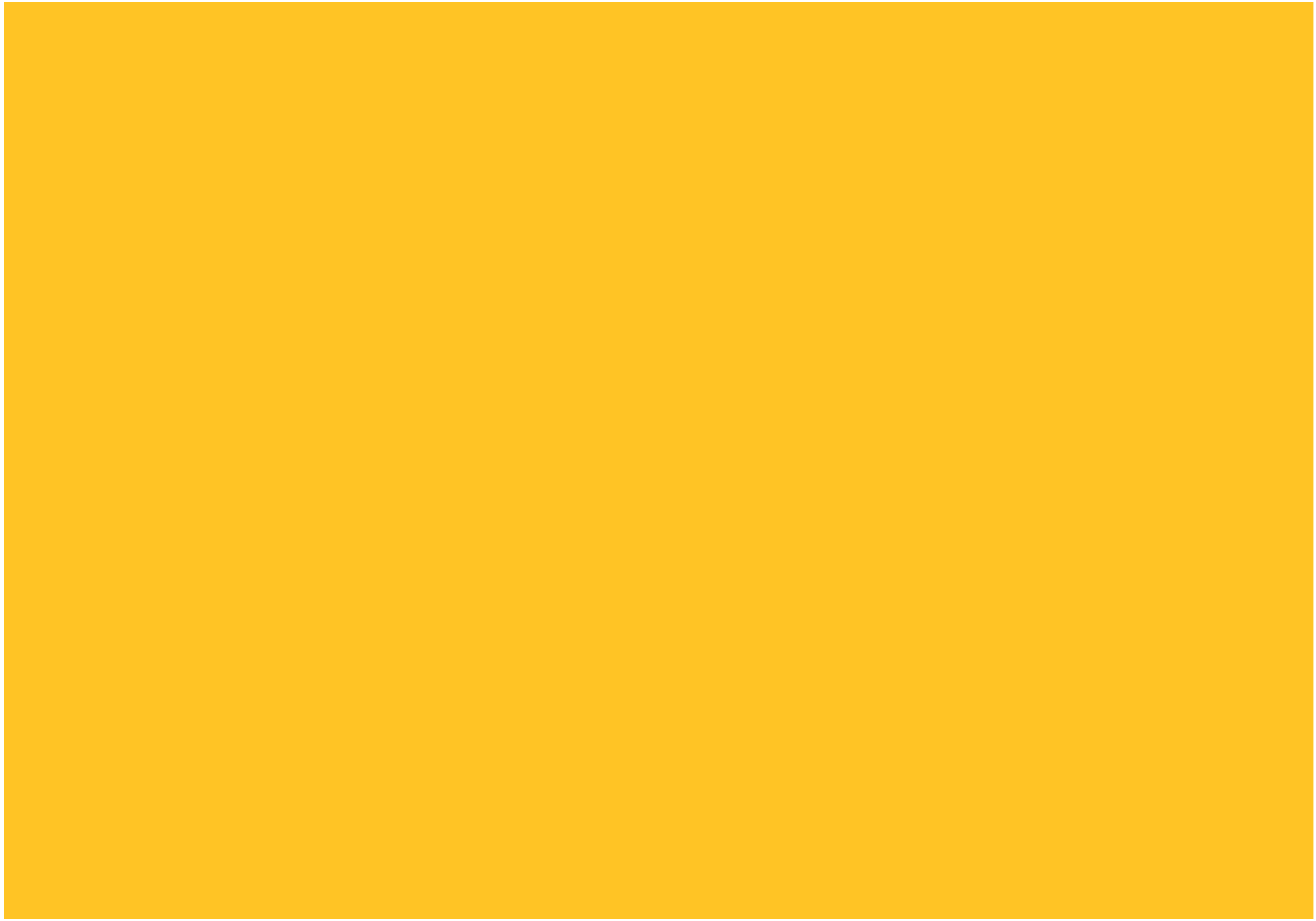
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 2. **Title:** [Title]
 3. **Journal:** [Journal]
 4. **Volume:** [Volume]
 5. **Issue:** [Issue]
 6. **Page:** [Page]

FOR CONSTRUCTION

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201645



Appendix E

ESD



Consultant Advice

From: Chris Nunn

Date: 6 Aug. 12

File No: S300011003IG-121\ca120806s0002

Pages: 14

Project: Belmore Park - Green Star pathway

No: G-001[1.0]

Attention	Company	Email
To: James Henshaw	Norman Disney & Young	j.henshaw@ndy.com
cc: Campbell Williams	Norman Disney & Young	c.williams@ndy.com
Eliot Reeves	Norman Disney & Young	e.reeves@ndy.com
Ron Green	Norman Disney & Young	r.green@ndy.com

Green Star 5 Star Office Design v3 and NABERS Office Energy 4.5 Star Pathway

EXECUTIVE SUMMARY

Green Star: A Green Star scorecard has been developed to identify a pathway to a Green Star 5 Star Office Design Rating (at Appendix A). In order to achieve a Green Star 5 Star rating, the minimum number of points required is 60. It is normal practice for a buffer of up to 10% (e.g. a score of 66) to be targeted. Additional points beyond those indicated in the scorecard will need to be targeted to provide a safety buffer above the 5 star threshold, but the selection of these additional credits must be done in consultation with the client and design team, preferably at a Green Star focused design team meeting to be held early enough in the concept design phase to enable substantial changes to be made to the design if required.

NABERS: there is a risk of taking design decisions at the concept design stage, without the benefit of an energy model to provide an indication of the potential NABERS rating. Recommend developing an energy model to determine what measures are required to safeguard the targeted NABERS Energy rating of minimum 4.5 Star, aspiring 5 Star.

PCA Grade: The PCA A grade commercial office requirements that relate to sustainability have been summarised (included at Table 1 below).

Recommendations: Sustainability issues to be considered during the concept design phase:

- Terrace areas could incorporate an extensive green roof or planter box areas featuring native plants that do not require irrigation to improve Green Star ecology credits.
- Enclose the central atrium with glazed internal partitions at the edge of office spaces adjoining the atrium to facilitate natural ventilation of this space, for substantial energy savings.
- The location of the core on the glazed north facade creates an opportunity to incorporate a 'solar chimney' ventilation stack driven by a trombe wall space between the glazing and the core. The solar chimney could be used in summer as a return air path to help draw air off the floor plate, back up to the roof top plant. In winter, the solar chimney could be used to temper incoming air, providing free heating.
- Consider reducing the glazed area and incorporating vertical shading elements on the upper floors of the west facade to reduce heat gains and glare from hot afternoon western sun.



- The building fabric will need to perform very well in terms of glazing properties, insulation values, air-tightness and external shading effectiveness to achieve the targeted Green Star energy points and NABERS rating.
 - The full height glazing on the North facade should be high performance double glazing. Double glazing should be considered for all windows.
 - On the north facade, consider reducing the glazed area by extending the spandrel panel up to 500mm to 900mm above the floor height.
- Consider inclusion of a greywater recycling system (in addition to rainwater harvesting) to improve Green Star water section score. The PCA A Grade criteria requires 50% of Green Star water credits. This will require a greywater reuse system to provide water for cooling tower demand.
- Identify a suitably sized waste storage area for recyclables collection in the basement.
- Green Star IEQ section will require CFD modelling, and daylight modelling.
- Carry out preliminary analysis on daylight (IEQ-4) and views (IEQ-8) to determine if these points can be achieved.
- Consider if a dedicated tenant exhaust riser is required (IEQ-16)
- Consider reducing general lighting levels, supplemented by task lighting (ENE-3, IEQ-7)
- Investigate district energy system options under the City Of Sydney trigeneration master plan.
- Carry out a renewable energy feasibility study (Ene-1 & Ene-5), to consider photovoltaic solar panels, ground source heat pumps in the foundation piles (aka energy piles), solar thermal hot water, and a thermal store for peak energy demand reduction.
- Consider increasing area for bicycle parking, and identify a location for change rooms, showers and lockers.
- Evaluate feasibility of a high percentage of cement substitutes (Mat-5) and options to achieve design for disassembly (Mat-9) and dematerialisation (Mat-10).



BACKGROUND

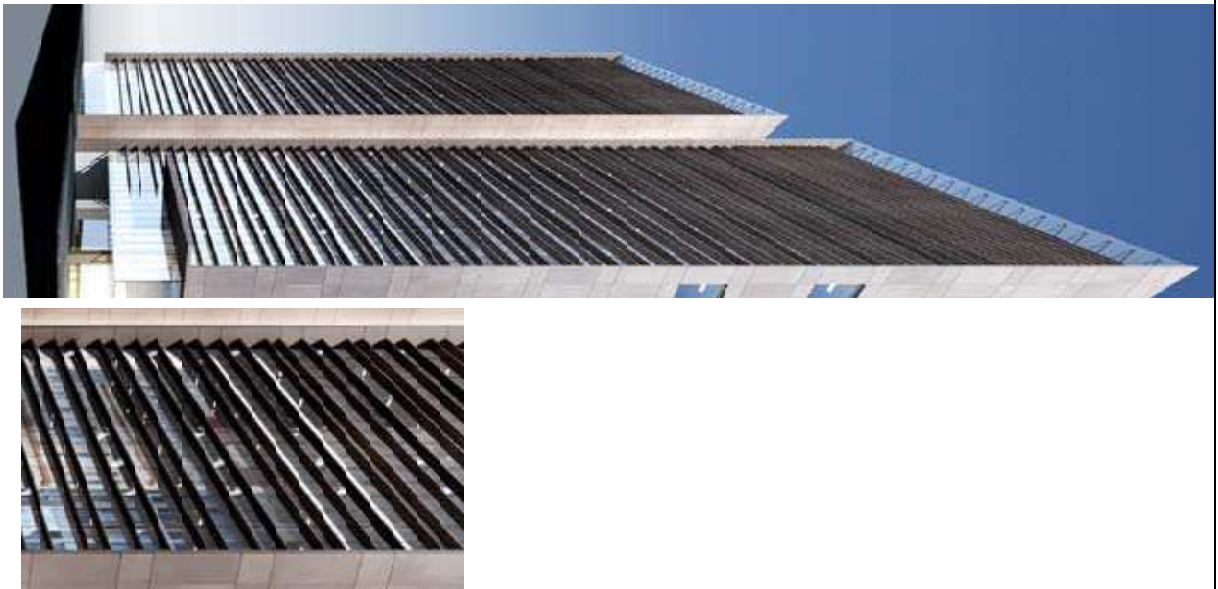
Investa propose to build a 15-storey office building above an Ausgrid sub-station (part 4-, part 5-storey) at 430-450 Pitt Street adjacent to Belmore Park, in down town Sydney. There will be 12 floors of PCA A grade commercial office space, with a Class 5 GFA of 21,000m2 and a NLA of 18,500 m².

There is a requirement to achieve a Green Star 5 Star Office Design rating, and NABERS Office Energy (Base Building) 4.5 Star rating as a minimum, with an aspiration to NABERS 5 Star.

The building will be mechanically ventilated with a low temp VAV with centralised plant.

The following sections are observations based on the Belmore Park Office Building Design Report dated October 2011 by architectus.

North Face

	The north facade is full height glazing with extensive fixed horizontal shading louvers (copper coloured zinc louver blades). The core is located on the north facade, which will usefully block heat gains northern sun for about half of the north facade. The full height glazing on the North facade should be high performance double glazing. Consider reducing the glazed area by extending the spandrel panel up to 500mm to 900mm above the floor height.
	Solar chimney: The location of the core on the glazed north facade creates an opportunity to incorporate a 'solar chimney' ventilation stack driven by a trombe wall space between the glazing and the core. This would involve creating an air gap (approx 200mm) between the glazed (unshaded) facade and the core on the north facade. The north sun would heat the air trapped within the glass 'chimney', and this air then rises, drawing warm air out of the building floor plates. This solar chimney stack effect could be used to help expel hot air from the building while pulling in cooler air from below. The solar chimney could be used in summer as a return air path to help draw air off the floor plate, back up to the roof top plant. In winter, the solar chimney could be used to temper incoming air, providing free heating.

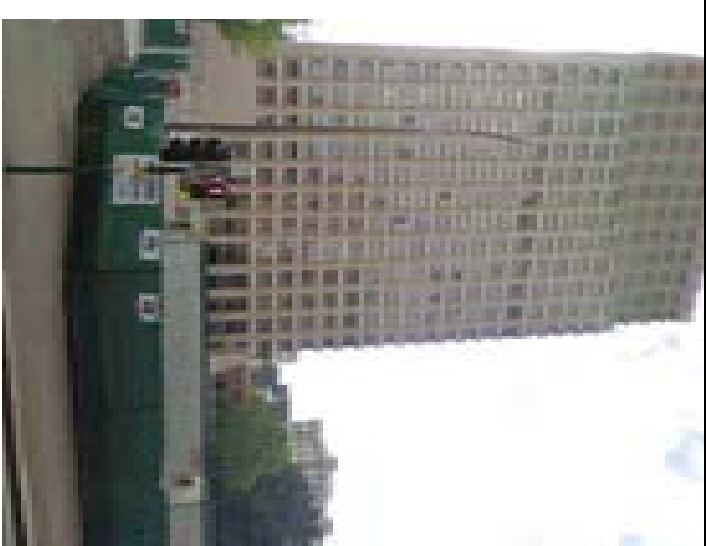


	The images to the left show a solar chimney at Lancaster university in the UK (Ref: http://www.levolux.com/L_case_studies/lancaster_university.htm) and the Building Research Establishment's Building 16 in the UK (Ref: http://projects.bre.co.uk/envbuild/index.html).
	There are high rise residential towers to the north which will provide shading to the north facade.
	The 4 storey chamberlain hotel to the North, Pitt Street, and the set back of the Metro Hotel mean there is a corridor to the north that will admit direct sunlight onto the north facade.

West & East face

	Copper-coloured zinc cladding is proposed for the walls on the east and western facades. Windows are full height, but recessed, which will provide some shading benefit. The window to wall ratio on the Western facade provides protection against the western sun. Consider vertical shading elements on the upper floors of the west facade to reduce heat gains and glare from hot afternoon western sun.
--	--



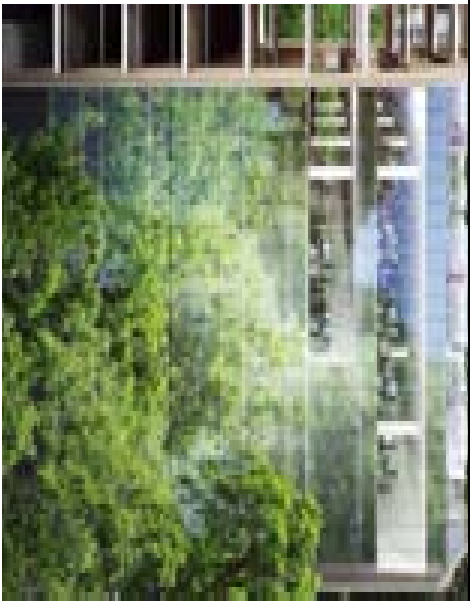
	The lower part of the western facade will be shaded from Western Sun to some extent by the adjacent heritage building at 441 Pitt St.
	The eastern facade will be shaded from morning sun by the high-rise tower to the east of the site

South Facade

	The south facade is a fully glazed facade, which features a 32 degree tapering plane on the upper levels that creates outdoor terrace spaces, with opportunities for landscaping. The plane is angled to maintain winter sun to Belmore Park. This roof top arrangement is reminiscent of the ACROS building in Fukuoka, Japan, shown below. It presents a significant opportunity to incorporate usable green space adjacent to the upper office levels, which could improve occupant amenity and score well in the Green Star Ecology section.
  	Opened in 1995 the ACROS Fukuoka building in Tenjin, Fukuoka City, Japan. http://www.acros.or.jp/english/ . Ref Google Maps: Link The tapering terrace roof for the proposed new building at 430-450 Pitt Street represents an opportunity to

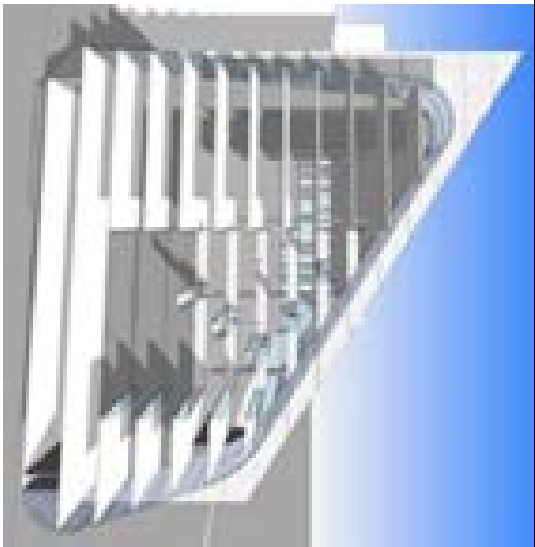


incorporate a substantial green roof, more extensive than the potted plants shown in the Architectus concept design report.



For the area of the South Facade adjacent to the sub-station, spandrel panels and cladding will be mirrored glazing.

Atrium



The Atrium is intended to provide natural light into the central floor plates. It could also operate as a ventilation pathway as part of a mixed mode natural ventilation strategy.
Enclose atrium to separate conditioned office floor plate from naturally ventilated atrium.

PCA A GRADE COMMERCIAL OFFICE

Sustainability criteria that form part of the PCA Office Quality Grade are listed in Table 1 below, with proposed and suggested design responses at 430-450 Pitt Street listed in the right hand column.

Table 1: PCA Grade Criteria that relate to sustainability

PCA A Grade Criteria		Proposed design response at 430-450 Pitt Street	
A1- Green Star Office Design v3 4 Star minimum		5 Star targeted	
A2 - NABERS Office Energy Commitment Agreement to achieve 4.5 Star		4.5 Star minimum targeted Aspiration to achieve 5 Star	
A3 – Water. Achieve 50% of GS Water credits			Wat-1 Water calculator. Target 2/5 points. Rainwater harvesting for toilet and urinal flushing, irrigation, cooling tower and fire system test water. This will require WELS 4 Star dual flush toilets (3 L half / 4.5 L full flush), WELS 5 Star urinals (Sensor activated, 1 L per flush), WELS 6 Star Taps (4 L/m mixer tap; or 3 L/m Sensor tap), and WELS 3 Star Showers (max 9l/min flow rate). Plus rainwater harvesting and storage tank. Assuming no grey water reuse and no black water treatment. Wat-2 Water meters. Target 1/1 point. Wat-3 Landscape Irrigation. Target 1/1 point. Requires rainwater to be used for



PCA A Grade Criteria		Proposed design response at 430-450 Pitt Street
		landscape irrigation and/ or drought tolerant planting (aka 'xeriscape garden'). Wat-4 Heat rejection water. Green Star scorecard currently shows 0/4 however, Target 2/4 points to satisfy the PCA criteria of 50% of water credits. Two points for reducing potable water consumption of water-based heat rejection systems by 50%. Use rainwater for cooling tower water. Wat-5 Fire system water consumption. Target 0/1 point. Total equals 6/12 points (50%)
A4 – Waste. Achieve 2 GS Mat-1 points		Mat - 1 Recycling Waste Storage requires a dedicated storage area for the separation and collection of office recyclables that is adequately sized in accordance with 'Sizing the Waste Storage Area' table (Table Mat-1.1) – which for buildings between 10,000 and 20,000m2 requires 0.25% of GFA. Estimated area required is approximately 50m2. Must be located on the same level as the loading dock, and be within 20m of the exit used for recycling pick-up; or 20m of the lift core serving all floors; or 3m of the shortest route connecting the lift core serving all floors and the exit used for recycling pick-up.
A5 – IEQ. Achieve 50% of GS IEQ points		IEQ - 1 Ventilation Rates – Target 1/3 points. For Mech Vent & mixed mode spaces, one point requires a 50% improvement on outside air rate required by AS1668.2-1991 for 95% of the NLA IEQ - 2 Air Change Effectiveness – Target 1/2 points. CFD modelling required to demonstrate that Air Change Effectiveness (ACE) is >0.95 for at least 95% of the NLA. Use swirl diffusers to improve air flow distribution. IEQ - 3 Carbon Dioxide Monitoring and Control – Target 1/1 point. CO2 monitoring and control system with a minimum of one CO2 sensor at all return points on each floor to facilitate continuous monitoring and adjustment of outside air ventilation rates to each level. IEQ - 4 Daylight – Target 1/3 points. achieve over 2.0% Daylight Factor for over 30% of NLA. Daylight modelling required to confirm. IEQ- 5 Daylight Glare Control – target 1/1 point. Fixed external shading and Blinds. Fixed shading devices shade the working plane 1.5m in from the centre of the glazing from direct sun at desk height (720mm AFFL) for 80% of standard working hours, and blinds are fitted on all glazing and atriums as a base building provision. IEQ - 6 High Frequency Ballasts – target 1/1 point. High frequency ballasts for fluorescent luminaries. IEQ - 7 Electric Lighting Levels – target 1/1 point. Office lighting design to have maximum maintained illuminance level of 400 Lux for 95% of the Class 5 Commercial Office NLA at 720mm AFFL. Recommend designing for 320 Lux at desk height with 220 lux general lighting and 100 Lux from supplementary task lighting. IEQ - 8 External Views – target 1/2 points. Over 60% of the NLA must have a direct line of sight to the outdoors or into an adequately sized and day-lit atrium. Can only count areas within 8m of the perimeter or atrium. IEQ - 9 Thermal Comfort – target 1/2 points. Requires Predicted Mean Vote (PMV) levels between -1 and +1 for 98% of the year. Requires a thermal comfort



PCA A Grade Criteria		Proposed design response at 430-450 Pitt Street
		model. Alternatively, the Deemed to Satisfy requirements can be targeted for 1 point, but they require double glazing on 90% of all fenestration (and 100% on N, E & W facades).
		IEQ - 10 Individual Comfort Control – target 0/2 points. One point requires individual user control of air supply rates, air temperature, or mean radiant temperature to each workspace, for each 15m ² or part thereof (including enclosed spaces), for 60% of NLA (2 points for 90% of NLA).
		IEQ - 11 Hazardous Materials – 1 point available if site is contaminated and remediated. TBA. Requires a hazardous material survey; and if asbestos, lead or PCBs are found, they have been remediated. If no haz mat, credit is NA. Assuming NA at this stage, pending outcome of contamination report.
		IEQ - 12 Internal Noise Levels – target 2/2 points. Ambient internal noise levels for Building Services Design not to exceed 40dBAeq, and base building office space not to exceed 40dBAeq for 95% of NLA.
		IEQ - 13 Volatile Organic Compounds – target 3/3 points. Low/zero VOC Paints, Carpets and Flooring, Adhesives and Sealants.
		IEQ - 14 Formaldehyde Minimisation – target 1/1 point. Low/no formaldehyde composite wood products.
		IEQ - 15 Mould Prevention – target 0/1 point. Requires active humidity control in mech vent system to ensure no more than 60% relative humidity in the space and no more than 80% relative humidity in the supply ductwork.
		IEQ - 16 Tenant Exhaust Riser – target 0/1 point. Requires a dedicated tenant's exhaust riser.
C1 – AC. Max zone size of 85m ² perimeter, 120m ² core		NDY design to incorporate requirement that HVAC zoning has a maximum zone size of 85m ² for perimeter zones and 120m ² for core zones.
F3 – Lighting. Less than 2.5 W/m ² per 100 Lux F4 – Lighting control zones less than 150m ²		GS Ene-3 - If office lighting is designed to 320 lux, then the lighting power density needs to be less than 8W/m ² . This is achievable with high-efficiency T5 fluorescent tubes in open plan office areas, and LEDs in other areas (e.g. circulation space, lift lobbies etc – where halogen spot lights might otherwise be specified). GS Ene-4 - Lighting design to be based on control zones of less than 150m ² .
F5 – Full BMCS		Full BMCS with remote monitoring capability to be incorporated.
H2 – Life cycle maintenance plan covering at least first 10 years		Life cycle maintenance plan covering at least first 10 years to be developed.
H3 – Energy and water sub-metering		Energy sub-metering for all substantive energy uses to meet Green Star Ene-2 requirements. Water sub-metering to comply with Green Star Wat-2 requirements covering all major water uses including: bathrooms, showers, rainwater supply and any cooling towers, humidifiers, washing systems.
J1 – Water storage for at least 2 hours operation		Hydraulic design to incorporate water storage tanks with sufficient capacity to meet building demand for at least 2 hours operation.
J3 – Non potable water		Hydraulic design to incorporate rainwater harvesting.



PCA A Grade Criteria		Proposed design response at 430-450 Pitt Street																												
system																														
M2 – Bicycle storage and L3 Change Rooms and Showers - sufficient to achieve at least 1 GS TRA-3 point		Bicycle storage proposed in the basement levels Basement 03 – two areas equivalent to approx 3 parking bays (dwg A111), Basement 02 – two areas equivalent to approx 2 parking bays (dwg A112), Basement 01 – one area equivalent to approx 3 parking bays (dwg A113). Green Star Tra-3 requires bicycle racks for 5% of building staff, based on one person per 15m² (for 1 point). Using the NLA of 18,500m2, and 1 person per 15m2, then the building population is assumed to be 1234 people, with 5% being 62 spaces. Assuming standard Sheffield style bike racks, with two bicycles per rack, then 31 racks are required. Architect to confirm exact areas available for bicycle parking, and the anticipated number of bicycle racks to be provided. Is the area provided sufficient for 62 bicycle racks? GS Tra-3 also requires Change Rooms and Showers and Lockers to be provided for cyclists. 1 locker per space. 1 shower is required for every 10 bicycle parking spaces. • 62 bicycle parking spaces (31 double sided racks) • Changing facilities adjacent to showers • 7 Showers (can these be accommodated in the basement adjacent to the bicycle racks?) • 62 Lockers (must be immediately adjacent to showers inside the changing area) • 25 visitor parking spaces (13 double sided racks – near the main building entrance) <table><tr><td>Class 5 NLA</td><td>18,500 m²</td></tr><tr><td># of person per 15m²</td><td>1,234 person</td></tr></table> <table><tr><th colspan="2">Tenant Bicycle Storage</th><th>1 point</th><th>2 points</th></tr><tr><td colspan="2">Total tenant bicycle spaces required</td><td>62 spaces</td><td>124 spaces</td></tr><tr><td colspan="2">Total secure lockers required</td><td>62 lockers</td><td>124 lockers</td></tr><tr><td colspan="2">Total accessible showers required</td><td>7 showers</td><td>13 showers</td></tr><tr><td colspan="2">Visitor Bicycle Storage*</td><td>1 additional point</td><td>1 additional point</td></tr><tr><td colspan="2">Total visitor bicycle spaces required</td><td>25 spaces</td><td>25 spaces</td></tr></table> * Visitors bike spaces have to be provided in an accessible location, signposted and close to, or adjacent to, a major public entrance to the building.	Class 5 NLA	18,500 m ²	# of person per 15m ²	1,234 person	Tenant Bicycle Storage		1 point	2 points	Total tenant bicycle spaces required		62 spaces	124 spaces	Total secure lockers required		62 lockers	124 lockers	Total accessible showers required		7 showers	13 showers	Visitor Bicycle Storage*		1 additional point	1 additional point	Total visitor bicycle spaces required		25 spaces	25 spaces
Class 5 NLA	18,500 m ²																													
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Tenant Bicycle Storage		1 point	2 points																											
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Visitor Bicycle Storage*		1 additional point	1 additional point																											
Total visitor bicycle spaces required		25 spaces	25 spaces																											

GREEN STAR 5 STAR PATHWAY

A draft Green Star scorecard showing a pathway to 5 Stars is attached as an appendix to this advice note. Items highlighted yellow require further discussion with the design team and client decision making.

General comments regarding Green Star are that:

- **GS 5 Star target:** In order to achieve a Green Star 5 Star rating, the minimum number of points required is 60. It is normal practice for a buffer of up to 10% (e.g. a score of 66) to be targeted to ensure that if during the course of the design development, certain credits become unfeasible, e.g. based on cost grounds, or if the GBCA reject the design team's evidence after the Round 2 submission, there are still enough points to



achieve the desired rating. The scorecard attached includes only 65 base points, plus 1 innovation point. Additional points will need to be targeted to provide a safety buffer above the 5 star threshold, but the selection of these additional credits must be done in consultation with the client and design team, preferably at a Green Star focused design team meeting to be held early enough in the concept design phase to enable substantial changes to be made to the design if required.

- **Management:** the scorecard assumes 100% of management credits are achieved. This requires early action to involve a Green Star accredited professional in design team meetings, and the appointment of an independent commissioning agent, among other things.
- **Indoor Air Quality (IEQ):** The IEQ section is worth 20% of the total available credits. Each point is worth 0.74. The scorecard targets 69% of the available IEQ points.
- **Energy:** The Energy section is worth 25% of the total available credits. Each point is worth 1.04. Ene-1 accounts for 20 of the 29 available credits in this section. Eight out of 20 points are targeted. The building fabric will need to perform *very well* in terms of glazing properties, insulation values, air-tightness and external shading effectiveness to achieve the targeted energy points. The 8 points targeted for Ene-1 are at the limit of what can be achieved without the addition of renewable energy systems or a thermal energy store or some other significant low energy design feature. In order to provide a buffer to safeguard the Green Star 5 star target, it is recommended that a feasibility study of renewable energy options is produced, which is likely to consider Photovoltaic solar panels, ground source heat pumps in the foundation piles (aka energy piles), solar thermal hot water and a thermal store for peak energy demand reduction. The impact of a trombe wall adjacent to the core on the north facade on the ventilation system effectiveness should also be considered as part of the mechanical design. Separating the atrium space from the conditioned offices should be considered to enable the atrium to be naturally ventilated and largely unconditioned, while the office space can be mechanically ventilated and conditioned.
- **Transport:** The Transport section is worth 8% of the total available credits. Each point is worth 0.74. 91% of the transport credits are targeted. The area in the basement reserved for bicycle parking appears to be large enough for one Tra-3 point for bicycle parking, however, there does not appear to be any allowance in the basement for showers and change rooms adjacent to the bicycle parking. This is required to achieve this Green Star point. Consider increasing the bicycle parking provision to obtain all three Tra-3 points.
- **Water:** The Water section is worth 12% of the total available credits. Each point is worth 0.92. Only 33% of the water credits are targeted. To improve the water section score, a greywater recycling system should be considered, to improve Wat-1 which relates to potable water consumption and Wat-4 which requires recycled water for the cooling towers.
- **Materials:** The materials section is worth 14% of the total available credits. Each point is worth 0.61. 93% of the materials credits are targeted. This includes several credits which require further discussion with the design team and client decisions, including: Mat-4 integrated fit out; Mat-5 Concrete which requires cement substitutes; Mat-9 design for disassembly; Mat-10 dematerialisation.
- **Land use and ecology (LUE):** The LUE section is worth 6% of the total available credits. Each point is worth 0.75. Only 50% of the LUE credits are targeted. Opportunities to improve this section score relate to the extent and intensity of the green roof on the terrace areas.
- **Emissions:** The emissions section is worth 6% of the total available credits. Each point is worth 0.43. Only 44% of the emissions credits are targeted. This includes several items for further discussion and client decisions, including: Emi-3 refrigerant leak detection and recovery; 1 of 3 points for Emi-5 which could be improved with increased green roof area; and 1 of 4 points for Emi-6 discharge to sewer, which could be improved with greywater recycling.
- **Innovation:** There are up to 5 bonus points available for innovation points. The scorecard assumes 1 point is achieved, either for an innovative design feature, or exceeding green star benchmarks.

NABERS OFFICE (BASE BUILDING) ENERGY 4.5 / 5 STAR RATING

To achieve a NABERS 4.5 star rating will require excellent building fabric performance plus low energy services. To achieve a 5 Star rating will probably require the addition of renewable energy systems.



The conventional approach to low-energy building design is to first consider passive design measures, then ensure the services strategy is as efficient as possible, and finally to consider renewable energy generation options.

Passive design measures to be considered include:

- o Use of exposed thermal mass inside for temperature control
 - o Excellent u-values – high performance glazing and good thermal insulation
 - o Air-tightness to avoid leakage of conditioned air
 - o Careful management of solar gains
 - Window to wall ratios
 - External shading (including mesh shading, especially on north and west facades)
 - Controlled solar gains in winter
 - o Narrow floor plates in office areas and classrooms to facilitate reliance on natural light and natural ventilation (limit to 6-8m deep from external facade, and 3-4m from internal atria).
 - o Maximise natural ventilation (e.g. in the lobby and atrium)
 - o Consider air tempering options, such as using Earth Ducts on the fresh air intake to provide passively conditioned fresh air for displacement ventilation.
 - o Stack effect in central atrium space with fan assisted central extract
 - o Trombe wall on north facade to help drive return air flows, and/or temper incoming air in winter.
 - o Cross ventilation from automated openable perimeter windows within the central atrium (mechanical ventilation to only operate when sensors confirm windows are closed).
 - o Provide a diverse range of tempered and conditioned spaces to suit the use. Adopt wider thermal comfort requirements in less intensive spaces such as atrium and circulation spaces, which will act as a thermal buffer between outside and more controlled environments in the office space. Distinguish 'steady zones' conditioned spaces (offices) from 'buffer zones' which are semi-conditioned (atrium).
- Efficient services and appliances
- o Evaluate feasibility of night cooling and exposed thermal mass
 - o Outside air economy cycle
 - o Consider a thermal store for GS Ene-5 Peak energy demand reduction.

Energy efficient appliances (e.g. PCs, fridges)

Lighting

- o Day-lit working spaces.
- o Efficient electric lighting with high frequency ballasts, photocell controls and presence detectors, banked lighting zones to allow auto dimming in areas well lit by natural daylight.
- o Light fixture placement designed to ensure low lighting power density.

Low carbon energy

- o Ground source heat pumps (GHSP - subject to suitable ground conditions)
- o Photovoltaics - could also provide shading if integrated with glazing on suitable north facades.
- o Solar thermal hot water heating

The table below indicates the type of characteristics that are typically associated with different NABERS energy ratings.

Building Properties	3.5 stars	4.5 stars	5.5 stars
Facade	Fully glazed all orientations	Glazing + spandrel panels to improve window to wall ratio	Orientation-sensitive window to wall ratio
Glazing	Single glazed Tinted	Single glazed Tinted	Double glazed / double skin Tinted
External shading	No external shading	Fixed External Shading	Fixed / active external shading
HVAC	Constant volume or variable air volume ventilation (VAV) system	VAV or Low temperature VAV	Low temperature VAV or Passive chilled beams
Maintenance	Hasn't been re-commissioned or tuned	Well tuned and re-commissioned	Fully retro-commissioned and upgraded to current standards
Lighting	T8 fluorescents 15 to 20 W/m ² Zoning by floor	T5 fluorescents 10 to 15 W/m ² Zoned lighting controls	T5 fluorescents + LEDs 5 to 10 W/m ² Core and perimeter zoned lighting (max 100m ²) with presence detection and photocell controls
Renewables	None	May have some on-site renewables: e.g. solar thermal – but not required	Renewable energy system e.g. solar thermal + PV or tri-generation

District energy & absorption chiller

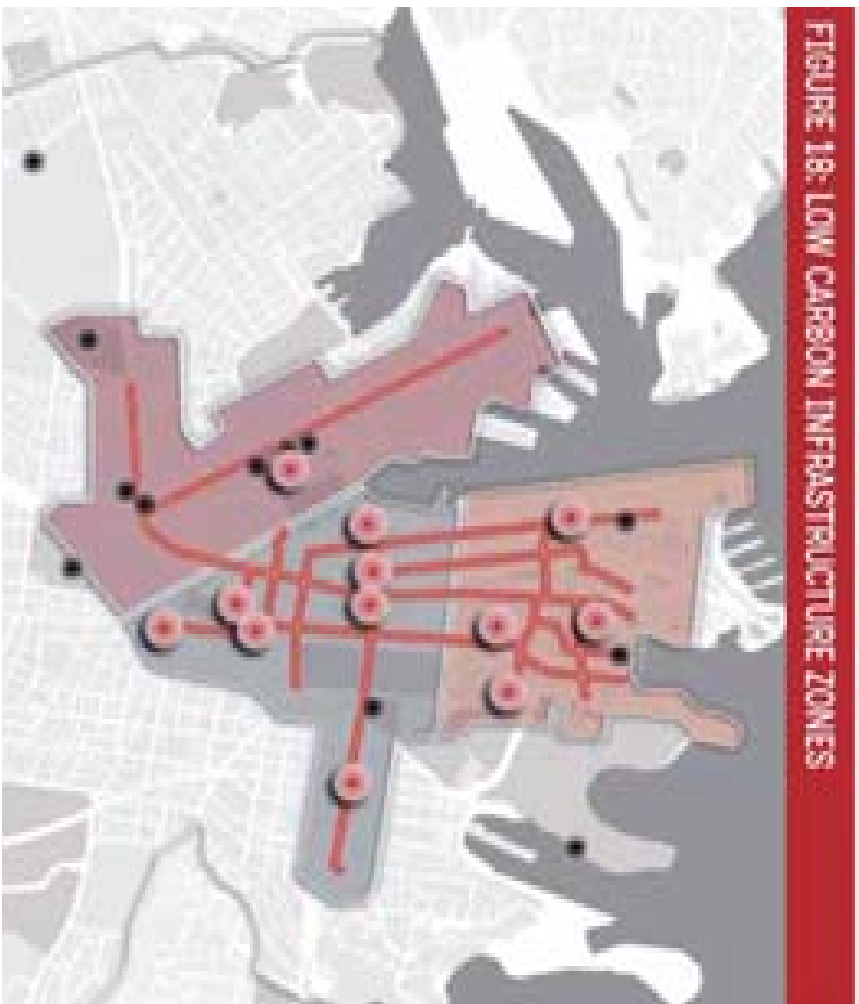
On 18 June 2012, the City of Sydney tabled its trigeneration master plan. The City of Sydney is proposing to develop a trigeneration district heat network in the Sydney CBD, with one of the zones covering the CBD south, which includes the site at 430-450 Pitt Street. This presents an opportunity to tap into the hot water that will be piped through the district heat network, and use an absorption chiller to convert the district heat into cooling for the building. This warrants further investigation, and consultation with the City of Sydney regarding timescales.

Based on the maps to the left, from the City of Sydney trigeneration master plan that the zone highlighted grey



Based on the maps to the left and below, from the City of Sydney trigeneration master plan, it appears that the zone highlighted grey and labelled CBDS, for CBD South zone, contains a number of proposed trigeneration facilities that will be connected to a network that will run past the Belmore Park site.

CBD SOUTH LOW CARBON INFRASTRUCTURE ZONES	2010	2015	2020	2025	2030
CONNECTED FLOOR AREA—m ²	0	694,000	2,852,000	5,373,000	7,200,000
GAS CONSUMPTION – TJ/YR	0	815	2,445	4,891	6,114
LOW-CARBON ELECTRICITY GENERATION—GWH/YR	0	96	287	573	717
DISPLACED ELECTRICAL THERMAL LOAD—GWH/YR	0	17	67	123	159
INSTALLED GENERATION—MWe	0	6	22	35	50
CBDs 1	0	6	22	35	50
CBDs 2	0	5	10	20	20
CBDs 3	0	0	0	20	30
CBDs 4	0	6	10	10	10
CBDs 5	0	0	10	20	20
SUBTOTAL	0	17	52	105	130



NORMAN DISNEY & YOUNG



Chris Nunn
ESD Manager
c.nunn@ndy.com



APPENDIX A – GREEN STAR SCORECARD

Green Star Office v3 Design

Project Name: Belmore Park

Date of issue: 06-Aug-12

Revision: A

Categories & Specific Credits	Points Available	Option 1: ...	Design Requirement	Action required for GS submission	Responsible Organization
Management		Weighting Factor 9%			
Man-1 GSAP (New Credit)	2	2	Green Star Accredited Professional engaged at schematic design.	Hire GSAP	Building Owner
Man-2 Commissioning Clauses	1	1	ALL building services pre-commissioning, commissioning and quality monitoring to be performed in accordance with ASHRAE and CIBSE commissioning codes. Above point achieved & Design team and contractor transfer project knowledge to building owner/manager through documented Design Intent, as-built drawings, O&M Manual, Commissioning Report and training of staff	Specification Clauses Production of DIR	Design team GSAP
Man-3 Building Tuning	2	2	After handover, the services contractors undertake monthly monitoring, quarterly reviews and reporting and a full re-commissioning 12 months after handover. A member of the design team needs to be involved to review the reports.	Specification Clauses	Design team
Man-4 Independent Commissioning Agent	1	1	ICA to be engaged at schematic design. Require ICA's resume and letter of appointment.	Hire ICA	Building Owner
Man-5 Building Users' Guide	1	1	Architect and building services engineers are engaged to provide a simple Building Users' Guide (BUG) to outline: energy and environmental strategy, monitoring and targeting, building services, transport facilities, materials, waste, noise etc.	Production of BUG	GSAP
Man-6 Environmental Management	1	1	Builder required to provide a site specific EMP. Contractor has valid ISO14001 accreditation prior to and throughout the project.	Produce project specific EMP ISO 14001 certificate	Builder Builder
Man-7 Waste Management	2	2	1 pt if 60% and 2 pts if 80% of all construction and demolition waste on site is reused/recycled.	Specification Clauses	Design team
TOTAL		12	12		
CATEGORY SCORE		100%	100%		
WEIGHTED CATEGORY SCORE		9	9		
Indoor Environment Quality					
Weighting Factor 20%					
IEQ-1 Ventilation Rates	3	1	Greater outside air rate is provided over the requirements of AS1668.2-1991 as follows: 1 pt for 50%, 2 pts for 100% and 3 pts for 150% improvement.	Design HVAC equipment to handle increased vent. rates. Provide GS documentation	Mechanical Engineer
IEQ-2 Air Change Effectiveness	2	2	For at least 95% of the NLA the air change effectiveness is >0.95. CFD modelling of design required to demonstrate this.	CFD Model of air flow	GSAP
IEQ-3 Carbon Dioxide Monitoring and Control	1	1	CO2 monitoring and control system provided, with a minimum of one CO2 sensor at all return pts on each floor.	Specification Clauses, Provide GS documentation.	Mechanical Engineer
IEQ-4 Daylight	3	2	1 pt if 30%, 2 pts if 60% and 3 pts if 90% of NLA has a DF of min 2% at desk height level (720mm AFFL) under a uniform sky. The amount of daylight into the office space is affected by a number of factors including the VLT of the glass used, the distance to adjacent buildings etc.	Daylight model of NLA, Provide GS documentation.	GSAP
IEQ-5 Daylight Glare Control	1	1	Blinds/screens on all glazing & atriums to be fitted as a base building provision which eliminates 95% of all direct sun penetration, have a visual light transmittance (VLT) of <10%, and can be controlled by all occupants within each floor/area.	Specification Clauses, Drawings and Schedule, Provide GS documentation.	Architect
IEQ-6 High Frequency Ballasts	1	1	High frequency ballasts must be installed on all fluorescent fittings within the NLA.	Specification Clauses, Provide GS documentation.	Electrical Engineer
IEQ-7 Electric Lighting Levels	1	1	Office lighting design has a lighting level of ≤ 400 Lux for 95% of the NLA at 720mm AFFL.	Specification Clauses, Provide GS documentation.	Electrical Engineer
IEQ-8 External Views	2	1	1 pt if 60%, 2 pts if 80% of the NLA are within 8m from vision glazing. There must not be another building within eight meters from the glazing.	Specification Clauses, Provide GS documentation.	Architect
IEQ-9 Thermal Comfort	2	1	Mechanical and facade design can achieve a PMV between -1 and +1 for 1 pt and between -0.5 and +0.5 for 2 pts. The design of the facade and mechanical system will determine if these pts can be achieved. Thermal modelling required.	CFD Model of thermal comfort, Provide GS documentation.	GSAP
IEQ-10 Individual Comfort Control	2	0	The base building provides for individual user control of air supply rates, air temperature, or mean radiant temperature to each workspace. Pts be claimed by providing an under floor air conditioning system or ceiling level swiveled vertical air jets for 60% (1 pt) or 90% (2 pts) of NLA (mechanically air-cond spaces) or every 30m2 (1 pt) or 10m2 (2 pts) of NLA for acoustically treated & MANNESMANN.		Mechanical Engineer
IEQ-11 Hazardous Materials	NA	NA	1 pt if a comprehensive hazardous materials survey has been carried out and all hazardous materials have been appropriately removed & disposed of as per the relevant OH&S legislation. N/A for new developments or developments in which none of the above hazardous materials were found.		
IEQ-12 Internal Noise Levels	1	1	Noise from the building services does not exceed 40dB(A)Aeq within the entire base building, general office space.	Acoustic Analysis, Provide GS documentation. Acoustic Analysis, Provide GS documentation.	Acoustic Consultant Acoustic Consultant
IEQ-13 Volatile Organic Compounds	1	1	The sound level does not exceed 40dB(A)Aeq within the base building office space.	Specification Clauses, Provide GS documentation.	Design team
	1	1	95% of all painted surfaces have low TVOC content.	Specification Clauses, Provide GS documentation.	Design team
	1	1	95% of all adhesives and sealants have low TVOC content.	Specification Clauses, Provide GS documentation.	Design team
	1	1	95% of all carpets and flooring have low TVOC content.	Specification Clauses, Provide GS documentation.	Architect

Categories & Specific Credits	Points Available	Option 1: ..	Design Requirement	Action required for GS submission	Responsible Organization
IEQ-14 Formaldehyde Minimisation	1	1	All engineered wood products must have low formaldehyde emissions.	Specification Clauses, Provide GS documentation.	Architect
IEQ-15 Mould Prevention	1	1	Mechanically air-conditioned system actively controls humidity to be no more than 60% relative humidity in the space & no more than 80% relative humidity in the supply ductwork OR, the building is naturally ventilated /MANY.		
IEQ-16 Tenant Exhaust Riser	1	0	A dedicated tenant exhaust riser provides no less than 0.2 l/s/m2 for 100% of the NLA and has a capacity of 0.35 l/s/m2 for 100% of the NLA on any individual floor.	Add tenant exhaust riser, Provide GS documentation.	Mechanical Engineer
TOTAL 26 18					
CATEGORY SCORE 100% 69%					
WEIGHTED CATEGORY SCORE 20 14					

Energy					Weighting Factor 25%
Ene- Conditional Requirement	Cond	Yes	It is a conditional requirement that building's greenhouse gas emissions do not exceed 110kgCO2/m2/annum.	Energy model and report	GSAP
Ene-1 Greenhouse Gas Emissions	20	8	Up to 20 pts are awarded based on the predicted improvement in energy efficiency & greenhouse emissions above the conditional ENE requirement. For full 20 pts, the base building must be carbon neutral.	No additional documentation required	-----
Ene-2 Energy Sub-metering	1	1	All substantive energy uses (100kVA or greater) are submetered & there is an effective mechanism for monitoring energy consumption data.	Ensure sufficient sub-metering is in building.	Electrical Engineer
	1	1	1 extra point if submetering is provided separately for lighting and power for each floor or tenancy, whichever is smaller; and existence of effective mechanism for monitoring energy consumption from all energy submeters.	Provide GS documentation. Ensure sufficient sub-metering is in building.	
Ene-3 Lighting Power Density	3	2	The lighting power density of the installation for 95% of the NLA is 2.5W/m2 per 100 lux (1 pt), 2.0W/m2 per 100 lux (2 pts) or 1.5W/m2 per 100 lux (3 pts).	Design lighting system to meet requirements for targeted pts	Electrical Engineer
Ene-4 Lighting Zoning	1	1	The size of individual switched lighting zones must not exceed 100m2 and switching must be provided within the 100m2 zone and at every entry.	Design lighting system with zones < 100m2.	Electrical Engineer
	1	1	1 extra point if an individually addressable lighting system is provided for 90% of NLA.	Provide GS documentation. Addressable lighting system provided.	Electrical Engineer
Ene-5 Peak Energy Demand Reduction	2	0	Peak energy reduced by 15% or difference between peak & average demand less than 40% (1 pt), OR, Peak energy reduced by 30% or difference between peak & average demand less than 20% (2 pts) by providing cogeneration, chilled water storage etc.		
TOTAL 29 14					
CATEGORY SCORE 100% 48%					
WEIGHTED CATEGORY SCORE 25 12					

Transport					Weighting Factor 8%
Tra-1 Provision of Car Parking	2	2	1 pt if number of car parking spaces is at least 25% less than the max local planning allowances, or no more than 10% more than the min planning allowances, or 2 pts if at least 50% less than the max local planning allowances, or no more than the min planning allowance.	Comply with x% less/more than the max/min local planning allowances	Architect
Tra-2 Fuel-Efficient Transport	1	1	80% of all spaces designed for use by small cars, hybrid cars or car pooling must be preferred (closer to the entrance). Also, of the total parking spaces 10% must be allowed for small cars and 5% for mopeds and/or motorcycles.	Design sufficient small car bays (at least 10), etc and sufficient preferred spaces.	Architect
Tra-3 Cyclist Facilities	2	1	N/A if no car parking spaces provided Bike parks, lockers and change facilities are provided for 5% (1 pt) or 10% (2 pts) of building staff (1 person per 15m2). 1 locker provided per bike space and 1 shower provided for every 10 bike racks.	Provide sufficient bicycle racks and cyclist facilities.	Architect
	1	1	1 extra point if visitors spots are provided (1 per 750m2 of NLA) near the main entrance.	Provide sufficient visitor bicycle bays.	Architect
Tra-4 Commuting Mass Transport	5	5	Based on the amount of public transport to the site & results of the Green Star Mass Transport Calculator.	Provide GS documentation.	GSAP / Architect
TOTAL 11 10					
CATEGORY SCORE 100% 91%					
WEIGHTED CATEGORY SCORE 8 7					

Water					Weighting Factor 12%
Wat-1 Occupant Amenity Water	5	2	To gain more than two pts for this credit, sufficient rainwater collection and reuse is required. To gain the maximum pts, a grey water treatment plant will be required.	Design to include water efficient fittings and fixtures	Architect, Hydraulics Engineer
Wat-2 Water Meters	1	1	Water submeters are installed on all major water uses in the building.	Design to include sufficient water meters	Hydraulics Engineer
Wat-3 Landscape Irrigation	1	1	Potable water consumption for landscape irrigation is reduced by 90% OR a xeriscape garden has been installed. N/A if there is no landscaping, or landscaping represents less than 1% of the site area.	Design irrigation as sub-soil drip system or install xeriscape garden	Architect
Wat-4 Heat Rejection Water	4	0	Potable water consumption reduced by 50% (2 pts) or by 90% (4 pts). This credit relies on having collection or recycling of water on site.	Provide GS documentation.	Mechanical Engineer
Wat-5 Fire System Water Consumption	1	0	There is sufficient temporary storage for a min of 80% of the routine fire protection system test water & maintenance drain-downs, for reuse on site; and, each floor is fitted with a sprinkler system that has isolation valves or shut-off pts for floor-by-floor testing. -OR- The fire protection system does not expel water for testing.	Provide GS documentation.	Fire Engineer
TOTAL 12 4					
CATEGORY SCORE 100% 33%					
WEIGHTED CATEGORY SCORE 12 4					

Materials	Weighting Factor 14%
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Categories & Specific Credits	Points Available	Option 1: ..	Design Requirement	Action required for GS submission	Responsible Organization
Mat-1 Recycling Waste Storage	2	2	A dedicated storage area for the separation and collection of office recyclables is provided and it is adequately sized according to credit guidelines and is located in the same level as the loading dock with clearly marked, sign-posted, convenient, guaranteed access route within one of the following walking distances: 20m of the exit used for recycling pick-up; OR 20m of the lift core serving all floors; OR 3m of the shortest route connecting the lift core serving all floors & the exit used for recycling pick-up.	Drawings, Provide GS documentation	Architect
Mat-2 Building Reuse	NA	NA	1 pt for 60% or 2 pts for 90% reuse of total existing façade of building by vertical area. N/A if the site is a Greenfield site or the gross floor area (GFA) of the original building is less than 20% of the new building's GFA that replaces it.	Provide GS documentation	Architect
	NA	NA	2 pts for 30%, 3 pts for 60% or 4 pts for 90% reuse of existing major structure. N/A if the site contained no buildings at the time of purchase or the total GFA of the original building(s) is less than 20% of the GFA of the new building that replaces it.	Provide GS documentation	Architect
Mat-3 Reused Materials	1	0	At least 2% of the projects total contract value is represented by reused products and materials..	Provide GS documentation	QS
Mat-4 Shell and Core or Integrated Fit-out	2	2	1 pt if 60% or 2 pts if 90% of the NLA is done as any combination of shell and core or integrated fitout.	Provide GS documentation	Architect / Building Owner
Mat-5 Concrete (New Credit)	2	2	1 pt for 30% and 2 pts for 40% Portland Cement replacement with industrial waste products. N/A if material cost of new concrete represents less than 1% of project's contract value.	Specification Clauses, Provide GS documentation.	Structural Engineer
	1	1	1 pt if mix water for all concrete used in the project contains at least 50% captured or reclaimed water, and 25% of fine aggregates (sand) or 40% of coarse aggregate used for structural purposes is recycled (Class 1 RCA in accordance with HB155-2002). No natural aggregates are to be used in non-structural uses (e.g. building base course, sub-grade to any car parks and footpaths, backfilling to service trenches, kerb and gutter).	Specification Clauses, Provide GS documentation.	Structural Engineer
Mat-6 Steel (New Credit)	2	2	95% of all structural and reinforcing steel used in the building's structure is sourced from a responsible steel maker, and the steel complies with the requirements stated in the technical manual. N/A if material cost of structural and reinforcing steels represents less than 1% of project's total contract value, or there are no new structural or reinforcing steels used.	Specification Clauses, Provide GS documentation.	Structural Engineer
Mat-7 PVC (New Credit)	2	2	1 pt if 60% or 2 pts if 90% (by cost) of all common uses of PVC products (flooring, cable and conduit) meet the 'Best Practice Guidelines for PVC in the built environment'. N/A if cost of PVC products in common uses of PVC represents less than 0.05% of project's total contract value, or there are no PVC products present in the project.	Specification Clauses, Provide GS documentation.	Architect
Mat-8 Timber (New Credit)	1	1	1 pt if 95% (by cost) of all timber used in the building and construction works is certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification. N/A if material cost of timber represents less than 0.1% of project's total contract value.	Specification Clauses, Provide GS documentation.	Architect
Mat-9 Design for Disassembly	1	1	The façade cladding, roofing, and structural framing must be designed for disassembly. Further advice from the structural engineer is required. N/A if material cost of the structural framing, roofing, and façade cladding systems represent less than 1% of project's total contract value.	Specification Clauses, Provide GS documentation.	Architect/ Structural Engineer
Mat-10 Dematerialisation	1	1	To achieve 1 pt, a substantial reduction in material consumption must occur. Any 2 of the initiatives must be demonstrated: Structure: Within projects where at least 50% of the Gross Floor Area is framed in structural steel, and where it is demonstrated that the building's structural requirements and integrity have been achieved using 10% less steel (by mass) than in a structure with conventional steel framing, without changing the load path to other structural components. Building Efficiency: Where it is demonstrated that Building Efficiency, defined as the ratio of the total NLA over the total GFA, is at least 85%. Finishes: As-installed final design must require no finish. 95% of all base building floor material is exposed structure with no covering (e.g. exposed sealed concrete floor). Cladding: 25% of the roof cladding area has a dual function (e.g. roof garden substrate or photovoltaic shingles, serve as cladding). Piping: Waterless urinals are installed & the piping is completely disconnected.	Specification Clauses, Provide GS documentation.	Design team
TOTAL 15 14					
CATEGORY SCORE 100% 93%					
WEIGHTED CATEGORY SCORE 14 13					

Land U Land Use & Ecology			Weighting Factor 6%		
Eco- Conditional Requirement	Cond	Yes	Condition achieved if the site is a refurb or redevelopment. If not, development site must not be on prime agricultural land, old-growth forest, or within 100m of a wetland.	Provide GS documentation.	GSAP
Eco-1 Topsoil	1	1	All topsoil impacted by the construction works is separated & protected; there is no net change in the volume of topsoil on the site; and, 95% of all topsoil by volume retains its productivity.	Specification Clauses, Provide GS documentation.	Builder
Eco-2 Reuse of Land	1	1	If the project is a refurb, or if 75% of the site had been previously built on at the time of site purchase.	Provide GS documentation.	Architect
Eco-3 Reclaimed Contaminated Land	NA	NA	If the land is found to be significantly contaminated and is remediated. N/A if project is a refurb or building extension.	Provide GS documentation.	Architect
Eco-4 Change of Ecological Value	4	1	Points determined by the Green Star Change in Ecology Calculator. To claim 1 pt the ecological value of the site must not be diminished.	Specification Clauses, Provide GS documentation.	Landscape Architect
TOTAL 6 3					
CATEGORY SCORE 100% 50%					
WEIGHTED CATEGORY SCORE 6 3					

Emissions			Weighting Factor 6%		
Emi-1 Refrigerant ODP	1	1	All HVAC refrigerants must have an ODP of zero.	Specification Clauses, Provide GS documentation.	Mechanical Engineer
Emi-2 Refrigerant GWP	2	0	1 pt if 50% of the fluorocarbon refrigerant charge has been replaced with refrigerants that have a GWP100 of 10 or less. 2 pts if no refrigerants are used OR all refrigerants have GWP100 of 10 or less.	Specification Clauses, Provide GS documentation.	Mechanical Engineer

Categories & Specific Credits	Points Available	Option 1: ...	Design Requirement	Action required for GS submission	Responsible Organization
Emi-3 Refrigerant Leaks	1 1	1 1	1 pt if HVAC system is contained in a moderately air tight enclosure with ventilation in the plant room, and a leak detection system installed. N/A if project is fully naturally ventilated or is fully MANV, or if all pts in Emi-1 'Refrigerant ODP' and Emi-2 'Refrigerant GMP' are achieved. 1 extra point if project has a refrigerant recovery system with an automated pump-down system that is sized to effectively & safely capture, isolate, & store 95% of the max refrigerant charge.	Specification Clauses, Provide GS documentation. Specification Clauses, Provide GS documentation.	Mechanical Engineer Mechanical Engineer
Emi-4 Insulant ODP	1	1	All thermal insulants used in the project avoid the use of ODP substances in both manufacture and composition.	Specification Clauses, Provide GS documentation.	Design Team
Emi-5 Stormwater (New Credit)	3	1	Post-development peak 1.5 year Average Recurrence Interval (ARI) even discharge from the site does not exceed the pre-development peak 1.5 year ARI event discharge, and all stormwater discharge from site meets the Pollution Reduction targets of Table Emi-5.1 in Column A (1 pt), B (2 pts) or C (3 pts).	Specification Clauses, Provide GS documentation.	Civil/ Hydraulic Engineer
Emi-6 Discharge to Sewer	4 1	1 0	Discharge to sewer reduced by 30% (1 pt), 50% (2 pts), 70% (3 pts) or 90% (4 pts). 1 extra pt if at least 1 of the above is achieved & there is a blackwater treatment plant installed. A maintenance plan must be put in place plus a min 5 year contract to ensure the blackwater treatment system operates as intended by the design. N/A if no blackwater treatment system is installed.	Specification Clauses, Provide GS documentation. Specification Clauses, Provide GS documentation.	Hydraulic Engineer Hydraulic Engineer
Emi-7 Light Pollution	1	1	No external luminaire has an upward light output ratio that exceeds 5% and the lighting design complies with AS4282 "Control of the Obtrusive Effects of Outdoor Lighting".	Specification Clauses, Provide GS documentation.	Electrical Engineer
Emi-8 Legionella	1	0	No water-based heat rejection systems installed.	Specification Clauses, Provide GS documentation.	Mechanical Engineer
TOTAL 16 7					
CATEGORY SCORE 100% 44%					
WEIGHTED CATEGORY SCORE 6 3					
TOTAL WEIGHTED 100 65					

Innovation					
Inn-1 Innovative Strategies and Technologies	5 pts in total for Inn-1,2&3	1	Making use of the airspace above a substation, which would otherwise not be used for office space.		
Inn-2 Exceeding Green Star Benchmarks		0			
Inn-3 Environmental Design Initiatives		0			
TOTAL 5 1					
OVERALL WEIGHTED 105 66					

