

Appendix C - LETTER FROM URBIS



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SYDNEY NSW 2000**

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18 August 2017

The General Manager
City of Ryde
1 Pope Street,
Ryde NSW 2112
Sent via email: SBailey@ryde.nsw.gov.au

Attention: Sandra Bailey, Major Development Assessments

Dear Sandra,

DA2016/0395 – 25-27 EPPING ROAD, MACQUARIE PARK

1. INTRODUCTION

We write in response to the Sydney North Planning Panel's (SNPP) decision to defer the determination of the development application, to provide the additional information to City of Ryde (Council) to verify the overshadowing of proposed communal open space and solar access to units/balconies of proposed residential units and clarify the FSR calculations.

We provide the following information requested by the SNPP, along with a summary and background information to the DA:

- Expert Option SEPP 65 Amenity – Solar access Greenland Lachlan's Line Apartments, 13 August 2017 prepared by Steve King; and (**Attachment A**)
- SEPP 65/ADG Solar Access Plans, prepared by Turner Studio (**Attachment B**)
- Gross Floor Area Plans, prepared by Turner Studio (**Attachment C**)
- Amended Key Plan Level 01 DA02.101 Rev. K, and Section DA08.003 Rev. K prepared by Turner Studio (**Attachment D**)

2. REASONS FOR DEFERRAL

On the 9 August 2017, the SNPP deferred the determination of the DA, providing the following reasons for deferral

The Panel is not satisfied that the documentation submitted to Council clearly demonstrates the impact of overshadowing of communal open space and solar access to units/balconies. It therefore defers its decision requesting further information.

The applicant is to appoint an independent consultant to review solar access to communal open space, balconies and apartments, consistent with ADG principles, for the combined sites. The Panel seeks this information not only for mid-winter but also for the equinox. The selection of the independent consultant is to be agreed by the Council.

The Panel is aware that full compliance may not be achievable at the proposed density. However, the application needs to demonstrate more accurately the degree of compliance, identify the areas of non-compliance and whether any amendments can improve compliance.

Further, the Panel requests plans showing both sites, which demonstrate the areas included as floor space for FSR calculation.

The Panel requests the Council provide a supplementary report assessing the additional information.

3. SOLAR ACCESS TO APARTMENTS AND OVERSHADOWING OF COMMUNAL OPEN SPACE

The Council agreed with the Applicant's engagement of Steve King to provide expert opinion to peer review solar access to apartments and overshadowing of communal open space, in response to the request for additional information SNPP. A copy of Steve King's report is provided at **Attachment A**.

3.1. SOLAR ACCESS TO APARTMENTS

Steve King has undertaken an assessment of compliance against the objective 4A-1 of the Apartment Design Guide (ADG):

Objective 4A-1

To optimise the number of apartments receiving sunlight to habitable rooms, primary windows and private open space

Design Criteria

Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas.

A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid winter.

The methodology adopted by Steve King was to refer to a 3D model provided by the architects, and independently verify the geolocation and direction of North by reference to the site survey, and cadastral information. Computer generated projections of the 3D model, known as "Views from the Sun", taken at half hourly intervals, have been provided in his report.

A view of the sun shows all sunlit surfaces at a given time and date. Steve King states that *"It therefore allows a very precise count of sunlight hours on any glazing, with little or no requirement for secondary calculation or interpolation"*.

The report provides the views from the sun diagrams with a schedule of all apartments for each building, in each Lots 104 and 105, and the overall performance for the development application, for the combined sites is reported as requested by the Panel.

Steve King states that:

The ADG Design criteria recommend that a minimum of 70% of apartments should achieve complying periods of direct sun. In my experience, this level of compliance is rarely achievable by developments of this scale and density, requiring the exercise of discretion by the determining authority.

In order to provide the necessary information for that discretion to be exercised, I normally advocate that at the very least, consideration be given to the inclusion of all effective sun on June 21. Confidence to do so requires an analysis based on a 3D digital model large enough to confidently identify effective direct sun available before and after the 9am to 3pm period.

In taking this approach, we note that Steve King has had regard to the determination in *Botany Development Pty Ltd v Council of the City of Botany Bay LEC 10360 of 2013*, that makes clear that:

- Due regard can be taken of all sunlight available; and
- Allowance should be made for the difficulties imposed by external overshadowing of the site.

The predicted solar access of apartments provided in Table 1 of the report includes the reporting of solar access between the nominated hours in the ADG, as well as the 'effective sun' before 9am and after 3pm at 21 June, as follows:

Table 1: Summary of solar access

			Some POS treated as wintergardens	
Total number of units	879		879	
Units which achieve 2 hours or more sunlight to both glazing and POS 9am - 3pm June 21	413	47.0%	460	52.3%
'Extended hours': Additional units which achieve 2 hours or more sunlight to both glazing and POS 8am - 4pm June 21	81		85	
Proportion that could be deemed to comply on the basis of 2 hours sun to Living and POS	494	56.2%	545	62.0%
Including Bedrooms: Additional apartments if sun to Bedrooms included*	55		55	
<i>Proportion that could be deemed to comply on the basis of 2 hours sun to Living, Bedrooms and POS</i>	<i>549</i>	<i>62.5%</i>	<i>600</i>	<i>68.3%</i>
(Units with some sun, but less than 2 hours to any space 8am-4pm June 21)**	(101)		(55)	
Total units with no sun to any part of the apartment on June 21 between 8am and 4pm	229	26.1%	224	25.5%

Table 1: Summary of solar access

Notes:

* To further examine the perception of available sun at mid-winter, I have counted the approximate number of apartments where a combination of sun to bedrooms and living areas exceeds two hours. This count does not appear as a separate column in the attached detailed compliance table, but its impact is included in Table 1, with a distinguishing background tone.

** Remaining units with some sun, but less than 2 hours.

Solar Access Diagrams – Floor Plans prepared by Turner Studio are provided at **Attachment B**, which provides the graphic representation of Steve King's assessment of the performance of the development at 21 June (midwinter).

Steve King also includes full half hourly views from the sun for 21 March/September (equinox).

Wintergardens are proposed for some of the units to provide improved amenity for residents. The solar access performance assessed by Steve King has taken these wintergarden spaces into consideration, on the basis that these spaces receive the minimum amount of solar access at the assessed times. The comparison of the development with and without wintergardens is provided to demonstrate the effect of including the wintergardens in the development have on the solar access performance.

At the request of the SNPP, consideration has been given to whether amendments can be made to improve compliance. In concluding on the matter of solar access to apartment's, Steve King makes some observations about the density, heights and floor planning for the proposed development:

In a development of this scale, necessarily employing relatively large double loaded floor plates, and paying regard to external and internal overshadowing, this proposition has to be considered highly likely.

In fact, in my considered opinion, the designers have actually employed ingenious apartment layouts to maximise the distribution of apartments on the 'sunny sides' of the tall apartment blocks, while minimising the number on the side permanently shadowed in winter".

The vision of the North Ryde Station Precinct provided at section 2.1 of the DCP is to:

The vision for the Precinct is for a "Transit Oriented Development" which has direct access to North Ryde Station on the Epping to Chatswood Rail Link, and which is connected, accessible, permeable and has a high base population density. The Precinct's development will encourage greater activity around the railway station through the inclusion of suitable land uses to encourage greater use of the public transport network.

Radical changes to the proposed building forms, and heights of buildings, and/or provision of single loaded buildings may achieve compliance with the design criteria for solar access to apartments. However, given a maximum height of buildings standard applies, these types of changes to the built form would likely result in a substantial reduction in density of dwellings, This outcome is contrary to the vision of the North Ryde Station Precinct as a high density residential community within a walkable catchment of the North Ryde Train Station.

3.2. OVERSHADOWING OF COMMUNAL OPEN SPACE

ADG gives effect to SEPP65 for assessing solar access to communal open space:

Objective 3D-1

An adequate area of communal open space is provided to enhance residential amenity and to provide opportunities for landscaping

Communal open space has a minimum area equal to 25% of the site (see figure 3D.3)

Developments achieve a minimum of 50% direct sunlight to the principal usable part of the communal open space for a minimum of 2 hours between 9 am and 3 pm on 21 June (mid winter).

Steve King has undertaken an assessment of the overshadowing of open space, including communal open space, publicly accessible communal open space and public open space. The assessment of the three (3) types of open space recognises the multiple open spaces available for residents in the Lachlan's Line development.

Overshadowing of the communal open spaces being the large landscaped courtyards between Blocks L1, L2 and L3, have been assessed on June 21, with solar access being observed at the following times:

- *Begins with a narrow wedge in area A1 at approximately 10 AM,*
- *Reaches its maximum extent at around 11:30 AM when approximately 15% of the combined area A1 and A2 is sunlit, and*
- *Declines to negligible wedges shortly after 1:30 PM.*

Of the two areas, Steve King observes that courtyard A1 receives the more usable areas and durations of winter sun.

Steve King makes the following observations in relation to winter overshadowing of these courtyards:

- *Mutual overshadowing between Blocks L1, L2 and L3. This would only be improved by a reduction in the height of those buildings, or an increase in the width of the courtyards. My understanding is that neither of those constraints are able to be varied if the desired density is to be achieved within the masterplanned allocation of building volumes.*
- *Overshadowing by Blocks J and K (situated on Lot 105). This impact could only be significantly reduced by increasing the gap between the two buildings. Again, my understanding is that there is very little latitude to vary those building extents.*

The following sections of this letter provide an overview of the planning controls and approvals, which Steve King has been advised are the pre-determined density and heights of buildings, which have influenced the performance of solar access to apartments and communal open spaces.

Steve King has also considered overshadowing of the two proposed publicly accessible private open space areas, and his observations on compliance are that taken together solar access to those two spaces could be characterised as complying with the ADG numerical criteria:

- *The Plaza is entirely in the sun from first thing in the morning, reducing to approximately 50% by 10:30 AM, and almost completely overshadowed by 11am. No appreciable part of the Plaza is sunlit again later on June 21; and*
- *The portion of space between Blocks J and K is at least 50% sunlit from approximately 9:30 AM to 12:30 PM.*

Steve King also considers the solar access to the public park to the north of Lot 105, noting that it is unaffected by overshadowing from the subject development between 9 AM and 3 PM on June 21, although is affected by overshadowing from the prospective future developments to the north-east. His report states, that:

This partial overshadowing of the public park in winter can be observed to effectively finish shortly after 12:30 PM, with the park fully in the sun until after 3 PM.

If the park is to be considered as a key part of satisfying the amenity performance objectives for open space relating to the subject development, it may be safely characterised as complying with the quantitative Design criterion of the ADG.

Steve King's analysis of overshadowing of communal, publicly accessible communal and public open spaces have identified that the open spaces will be overshadowed by buildings on the subject site and in the immediate context. The communal courtyards on Lot 104 in particular do not meet the minimum 3 hours of solar access between 9am and 3pm during midwinter under the ADG.

Overshadowing must be assessed in the context of the reasonable development expectations of the proposal and the pre-determined site layout and subdivision pattern, as recognised in *Roseth SC in Parsonage v Kur-ring-gai [2004] NSWLEC 347*. Across the site and Lachlan's Line precinct different open spaces areas will provide sunlit passive and active recreational opportunities for residents. Residents will have a variety of open space choices for their recreational needs.

Steve King concludes that:

In my considered opinion, Council and the Panel may safely exercise its discretion in relation to the achieved level of solar access.

4. PLANNING CONTROLS AND APPROVALS

4.1. INTRODUCTION

This section of our letter provides an overview of the planning controls that informed the preparation of the DA including the land uses, heights (scale) and FSR (density) of development.

4.2. NORTH RYDE STATION URBAN ACTIVATION PRECINCT

The subject site is located within the North Ryde Station Precinct, which was identified as an Urban Activation Precinct (UAP) in October 2012 and subsequently rezoned for high-density residential mixed use development and public open spaces in September 2013.

The UAP aims to deliver a significant increase in dwellings, jobs and services centred on the North Ryde Train Station. Specifically, the UAP will comprise more than 2.4 hectares of parks and open space, 3,000 new dwellings and 1,500 jobs within a 10 minute walk from the train station, a community facility and transport upgrades.

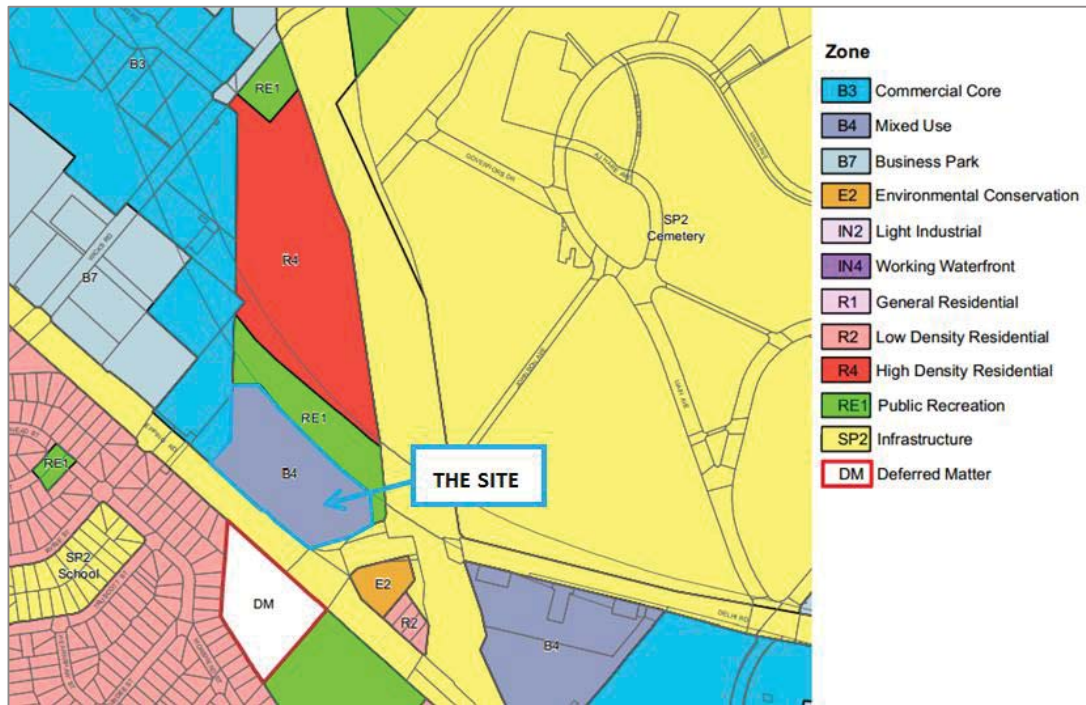
4.3. RYDE LOCAL ENVIRONMENTAL PLAN 2014

The *Ryde Local Environment Plan 2014* (RLEP) was amended following the gazettal of the *State Environmental Planning Policy Amendment (North Ryde Station Precinct) 2013* on 23 September 2013. An assessment of the proposal against the relevant provisions of RLEP is provided below.

4.3.1. Land Use zoning and permissibility

The site is zoned B4 Mixed Use under the RLEP as shown in **Figure 1**.

Figure 1 – Zoning Map (RLEP)



The objectives of the B4 Mixed Use zone are:

- *To provide a mixture of compatible land uses.*
- *To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling.*
- *To ensure employment and educational activities within the Macquarie University campus are integrated with other businesses and activities.*
- *To promote strong links between Macquarie University and research institutions and businesses within the Macquarie Park corridor.*

The proposed development is consistent with the objectives of the B4 Mixed Use zone. Specifically, the proposal will provide a mixture of compatible land uses in an accessible location, so as to maximise public transport patronage.

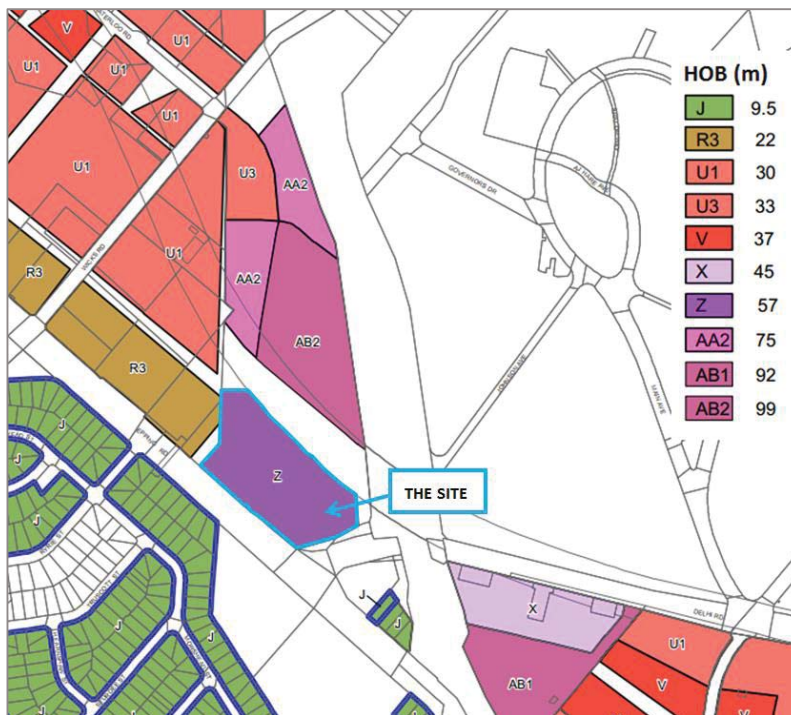
4.3.2. Height of Building

The Height of Building Map specifies a maximum height of 57 metres as shown in Figure 2. Clause 4.3 (Height of buildings) of the RLEP also includes objectives for the site as follows:

- To ensure that street frontages of development are in proportion with and in keeping with the character of nearby development,
- To minimise overshadowing and to ensure that development is generally compatible with or improves the appearance of the area,
- To encourage a consolidation pattern and sustainable integrated land use and transport development around key public transport infrastructure,
- To minimise the impact of development on the amenity of surrounding properties,
- To emphasise road frontages along road corridors.

The proposed development generally complies with the maximum 57 metre height of buildings development standard under the RLEP.

Figure 2 – Height of Building Map (RLEP)



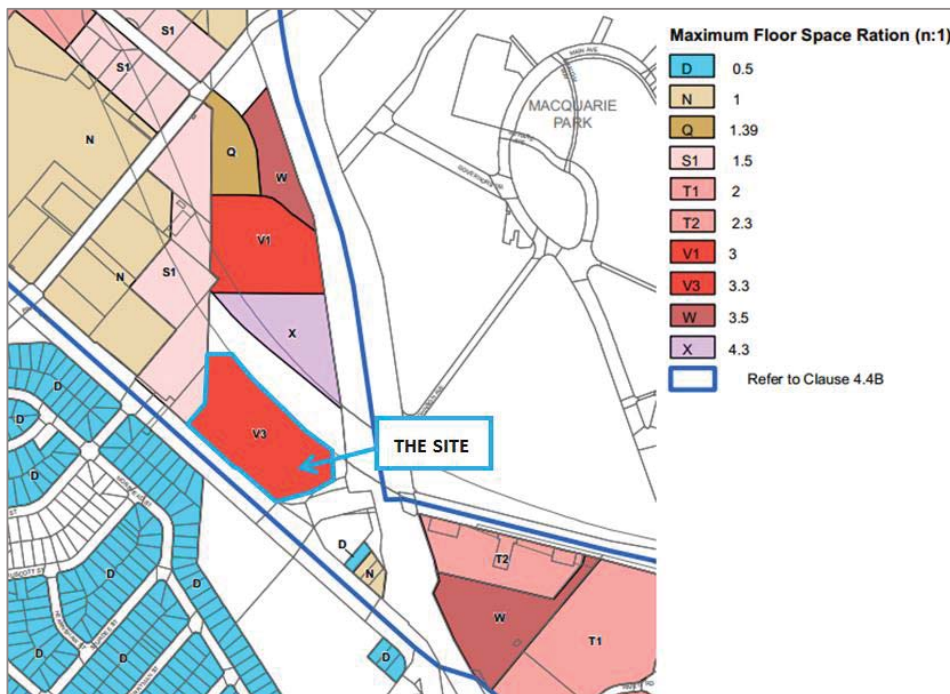
4.3.3. Floor Space Ratio

The Floor Space Ratio Map specifies a maximum FSR of 3.3:1 as identified in Figure 3 below. The objectives for FSR are specified under Clause 4.4 of the RLEP as follows:

- To provide effective control over the bulk of future development,

- To allow appropriate levels of development for specific areas,
- In relation to land identified as a Centre on the Centres Map—to consolidate development and encourage sustainable development patterns around key public transport infrastructure.

Figure 3 – Floor Space Ratio Map (RLEP)



The maximum permitted FSR identified on the FSR Map for Lots 104 and 105 is indicated as 3.3:1 FSR for the v3 FSR band. However, given Consent SSD_5093 was approved under Section 83D(2) of the *Environmental Planning and Assessment Act 1979* (EP& A Act 1979), a consent authority must determine subsequent DA submitted under Section 83B(3)(a) of the EP& A Act 1979 consistently with the approved staged consent. The proposed development complies with the maximum permitted gross floor area for Lots 104 and 105, under the Development Consent SSD_5093. Refer to Section 6.

The maximum permitted height of buildings and FSR for land to the north of Lot 105 are 99 metres and 4.3:1 FSR. Indicative building envelopes has been considered for this land to the north of the subject site by Steve King to determine the solar access performance for proposed apartments and communal open spaces on the subject site.

4.4. NORTH RYDE STATION PRECINCT DCP 2013

The North Ryde Station Precinct Development Control Plan 2013 (NRSP DCP) established detailed objectives and controls for development within the NRSP and support the relevant provisions of the

RLEP 2010. NRSP DCP expresses the vision for the precinct as a transit oriented development, including the following principles:

- *Provides mixed use development within 800 metres of North Ryde Station which provides a rapid and frequent transit service.*
- *Provides increased residential density around North Ryde Station, supported by appropriate community facilities.*
- *Integrates North Ryde Station with retail, commercial, recreational and community uses, therefore stimulating activity around the station.*

The proposed development is consistent with the vision for the North Ryde Station Precinct. The mix of retail, residential and community uses proposed will have direct access to North Ryde Station. The development of the site consistent with the maximum permitted density will encourage greater activity around the North Ryde Station and maximise patronage of the public transport network.

4.5. STATE SIGNIFICANT DEVELOPMENT APPLICATION (SSD_5093)

A State Significant Development Application (SSD_5093) for the staged development under Section 83B of the EP&A Act 1979, of the North Ryde Station Precinct - M2 Site was approved by the Delegate of the Minister for Planning in March 2015. The approval comprises a concept approval for:

- Subdivision of the site into 12 development lots, 5 public open space lots and 2 public road lots.
- Allocation of a maximum gross floor area to each of the development lots (total of 238,919m² across the site plus an additional 2,500m² to Lot 104 for a community facility); and
- Infrastructure, civil works and landscaping.

As well as Stage 1 development works in the following phases:

- Phase 1 - Site preparation works including demolition, remediation and rehabilitation, bulk earth works;
- Phase 2A – super-lot subdivision to create 4 public roads and a future public road lot; five public reserve lots; three future development lots and two super-lots;
- Phase 2B -Civil and public domain works including road and intersection construction; open space establishment and embellishment, pedestrian pathways and cycle-ways, drainage, public domain works and services infrastructure
- Phase 3 - subdivision to create 8 development lots; and
- Phase 4 - Construction of a pedestrian bridge over Delhi Road.

Condition A8 limits the maximum GFA for future developments on the site to be consistent with the Concept Proposal, as follows:

MAXIMUM GROSS FLOOR AREA (GFA)

A8. The maximum GFA for future developments on the site shall be consistent with the Concept Proposal for each development allotment as detailed below:

Development Lot	Maximum GFA
Lot 104:	49,384m ² +2,500m ² community GFA
Lot 105:	24,136m ²
Lot 107:	4,332m ²
Lot 201:	42,949m ²
Lot 202:	25,626m ²
Lot 203:	28,468m ²
Lot 204:	15,764m ²
Lot 205:	29,210m ²
Lot 206:	5,413m ²
Lot 207:	6883m ²
Lot 208:	6,754m ²

Condition A2 to A5 of Consent SSD_5093 provides the terms of the consent reference to Urban Design and Landscape Drawings. GFA Allocation Plan DA1-003 H is included in the list of drawings referenced in the consent.

The proposed distribution of GFA was developed from Master Planning work prepared by Bates Smart Architects. The approved GFA Allocation Plan was prepared, having regard to the following urban design principles:

- Alignment of the Spine Road linking Epping Road and Wicks Road.
- Providing open space at the northern and central parts of the site consistent with the RLEP and NRSP DCP.
- Providing a linear Park that links the Central Park with the Northern Bushland Park with a width of 16 metres that provides a large number of buildings along its length with a park frontage, and defines a pedestrian and cycle route through the site to the station. The linear park forms part of an integrated water sensitive urban design strategy for the site.
- A Retail Street is located on axis with the proposed pedestrian bridge. It divides the land between the Central Park and Epping Road into a wide land parcel towards Epping Road and a narrower parcel (Lot 105 and Lot 106) for cafes and neighbourhood retail with dual frontage to the park. The wide parcel (Lot 104) can accommodate large retail tenancies such as a supermarket and showrooms.
- A new street is to be extended into the neighbouring site to provide a legible network of neighbourhood streets.
- Mews driveways separate the site into development parcels with a width of approximately 65m. These driveways are paved and landscaped spaces that are to provide an address and drop off for the individual buildings as well as visitor parking and access to basement car parking.
- Development blocks of varying sizes and configurations are proposed. A number of blocks have potential for further subdivision. A flexible staging strategy is accommodated to address market demands both in overall block sizes and the ability to stage larger blocks.

- h) Built form that will achieve a high standard of amenity for building occupants through consistency with the design quality principles of SEPP 65.

The master planning work that informed the proposed GFA allocation was prepared having regard to the built form considerations described and illustrated, as follows:

The proposal seeks to utilise the floor space permitted under the RLEP and the SSD_5093 Consent to provide a residential density to increase patronage to the North Ryde Train Station.

The arrangement of buildings has been influenced by site layout for new roads, open spaces and development lots. The proposed arrangement of buildings appropriately balances this objective with providing good residential amenity, having regard to solar access, views and outlook and access to open space with the site layout, density and building scale on the site and immediate context.

5. OPEN SPACE

5.1. INTRODUCTION

This section of the letter provides a description of the open spaces proposed, including communal open space, publicly accessible communal open spaces and public open space. It describes the amenity available to occupants, and the choices available to residents of a variety of open spaces distributed on the sites and the wider Lachlan's Line development.

5.2. RESIDENTIAL COMMUNAL OPEN SPACE

Two large residential courtyards to the Lot 104 development will provide outdoor recreation opportunities (**Figure 4**).

Each of the courtyards are situated over a basement podium with a 1.0m set down in the slab level. Coupled with mounding and raised soil volumes, adequate soil depth will provide for mature tree plantings to establish.

The courtyards have been designed to provide a range of spaces for residents with opportunities to relax or enjoy passive recreation. Smaller spaces framed by raised planter beds and seating elements provide more intimate interactions. Open lawn areas will provide for passive recreation.

Figure 4 – Lot 104 Level 1 courtyards landscape plan , Aspect Studios

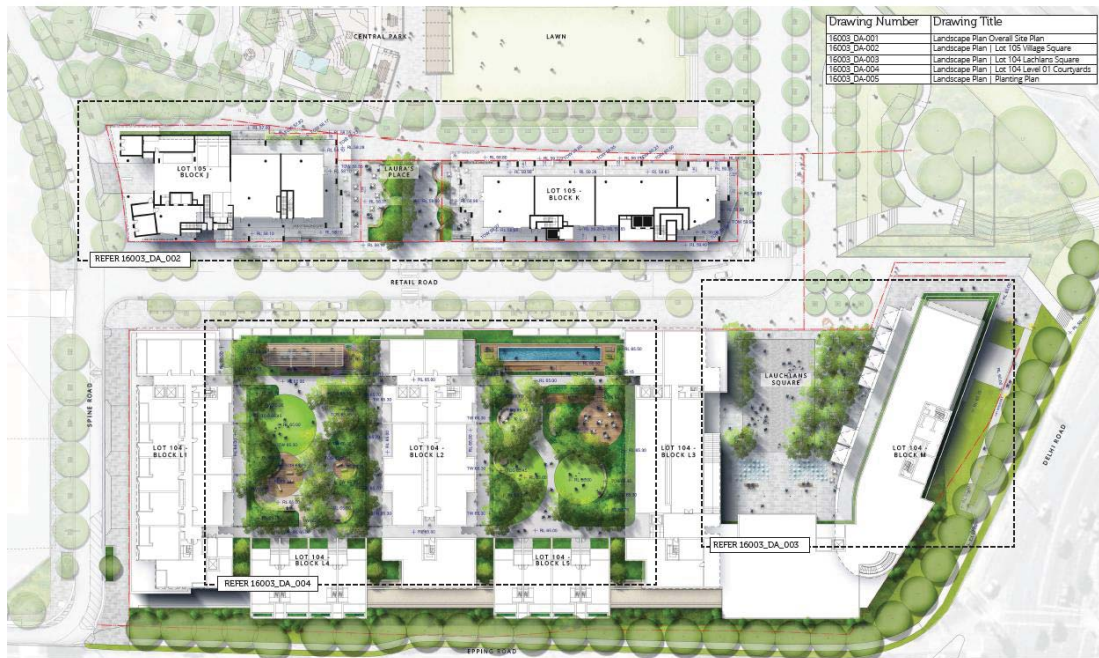


5.3. PUBLICLY ACCESSIBLE OPEN SPACE

Figure 5 illustrates a composite landscape plan for the proposed development, showing the following publicly accessible open space on the site and adjoining public park:

- Lachlan's Square
- Laura's Place
- Central Park

Figure 5 – Proposed Composite Landscape Plan for Lots 104 and 105, Aspect Studios



5.3.1. Lachlan's Square

The proposed design for Lachlan's Square aims to create a new civic heart for visitors and residents to the Lachlan's Line development. The design for Lachlan's Square makes reference to the following design principles:

- Legible pedestrian circulation
- Outdoor dining area (3m wide)
- Active frontages to all parameters to provide passive surveillance
- Dimensions that allow for a range of functional layouts

Lachlan's Square will be a vibrant public square with active frontages, outdoor dining and pedestrian access to the community centre and retail.

5.3.2. Laura's Place

The public domain areas for Lot 105 include 'Laura's Place' and the retail edges fronting onto Central Park, as well as Retail Street.

Laura's Place provides a high quality, verdant pedestrian link from the Central Park across Retail Street through robust public domain materials including granite, timber and concrete. Clear view-lines framed by greenery will make Laura's Place a desirable through pedestrian link, drawing people into the park, or to the surrounding shops.

5.3.3. Central Park

Central Park is a public open space, which is located to the north of Lot 105, providing passive and active recreational opportunities for the local community. The area of this park is approximately 5,540m².

6. GROSS FLOOR AREA

6.1. SUMMARY

This section of the report provides a numerical summary of the proposed gross floor area (GFA) for the development. GFA Plans have been submitted at **Attachment C**, calculated in accordance with the following definition of GFA under the RLEP:

gross floor area means the sum of the floor area of each floor of a building measured from the internal face of external walls, or from the internal face of walls separating the building from any other building, measured at a height of 1.4 metres above the floor, and includes:

- (a) the area of a mezzanine, and
- (b) habitable rooms in a basement or an attic, and
- (c) any shop, auditorium, cinema, and the like, in a basement or attic,

but excludes:

- (d) any area for common vertical circulation, such as lifts and stairs, and
- (e) any basement:
 - (i) storage, and
 - (ii) vehicular access, loading areas, garbage and services, and
- (f) plant rooms, lift towers and other areas used exclusively for mechanical services or ducting, and
- (g) car parking to meet any requirements of the consent authority (including access to that car parking), and
- (h) any space used for the loading or unloading of goods (including access to it), and
- (i) terraces and balconies with outer walls less than 1.4 metres high, and
- (j) voids above a floor at the level of a storey or storey above.

In preparing the GFA Plans, Turner Studio identified a discrepancy with the DA plans and the GFA calculation provided for the DA for the Lot 104 development. The discrepancy relates to the entry to

the retail centre from Lachlan's Square. The entry space provides public circulation and access between the public domain and the retail tenancies.

There is some ambiguity as to the location of the external enclosing wall in this area due to the way this space is designed as an extension of the public domain into the retail entrance. An amendment to the ground floor plan is proposed to remove any ambiguity about the location of the external enclosing wall on this frontage to Lachlan's Square.

The proposed design changes to the Lot 104 development are described, as follows:

- Removal of the external enclosing wall and doors from Lachlan's Square; and
- Removal of the walls to the retail space beneath the stairs on the north-western side of Lachlan's Square. This space will be maintained for market type retail use such as kiosks to retain the activation of the north western edge of Lachlan's Square, as requested by Council.

This will serve as an extension of the Lachlan's Square public domain with the same pavement materials, providing pedestrian access for the public via vertical circulation (lift and travelators) between car parking levels and Lachlan's Square.

Figure 6 illustrates an extract from the Ground Floor Plan lodged with the DA.

Figure 7 illustrates the amended design proposal.

Figure 6 – Retail entrance from Lachlan's Square (source: Key Plan Ground Level DA02.100 Revision H).

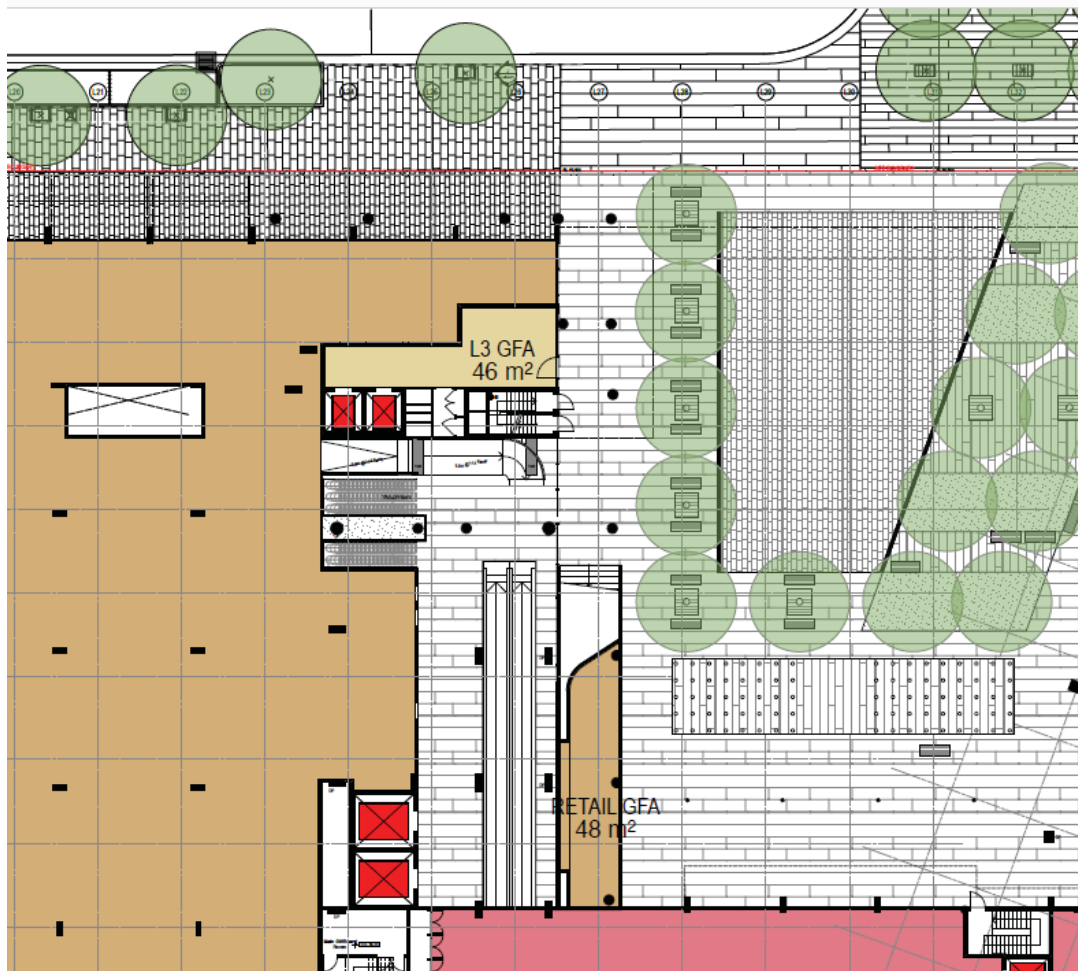


Figure 7 – Amendment to the retail entrance from Lachlan's Square (Source: Key Plan Ground Level DA02.100 Rev K)



Attachment D provides an amended Key Plan for the Ground Floor Level.

Table 2 provides the GFA for each building and land use in the proposal for Lot 104.

Table 2 – Lot 104 GFA

Building	GFA (M2)		
	Residential	Retail	Community
L1	9316	912	
L2	10,549	3482	
L3	9956	540	
L4	564		
L5	564		
M	13,235	266	2500
Total	44,184	5200	2500

Table 3 provides the GFA for each building and land use in the proposal for Lot 105.

Table 3– Lot 105 GFA

Building	GFA (M2)		
	Residential	Retail	Community
J	12,700	268	-
K	10,670	498	-
Total	23,370	766	-

Table 4 provides the GFA for each building and land use in the proposal for Lot 105.

Table 4 – GFA summary

Use	Lot 104	Lot 105
Retail	5200m2	766m2
Residential	44,184m2	23,370m2
Community	2500m2	
Total	51,884m2	24,136m2



The plans requested by the SNPP show areas included in the gross floor area calculation reflect the design adjustment of the entry to the retail centre and demonstrate consistency with the maximum permitted gross floor area for Lots 104 and 105, under Consent SSD_5093.

If you have any questions please don't hesitate to contact me on (02) 8233 9953.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Murray Donaldson". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Murray Donaldson
Director

Encl.

Attachment A: Expert Option SEPP 65 Amenity – Solar access Greenland Lachlan's Line Apartments, 13 August 2017 prepared by Steve King

Attachment B: SEPP 65/ADG Solar Access Plans, prepared by Turner Studio

Attachment C: Gross Floor Area calculations, prepared by Turner Studio

Attachment D: Key Plan Ground Level DA02.100 Rev K and Section DA08.003 Rev. K prepared by Turner Studio

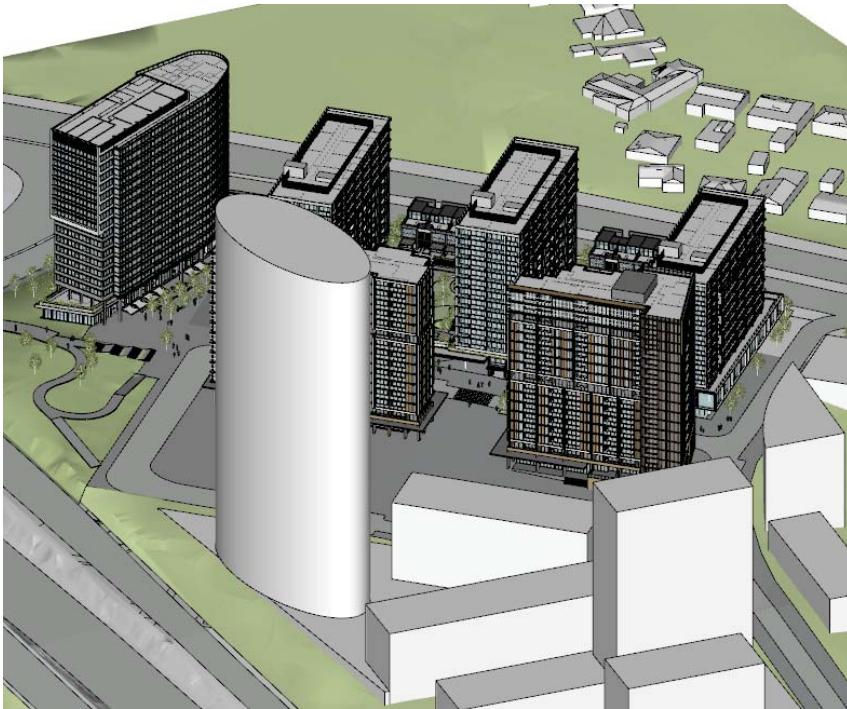


**ATTACHMENT A: EXPERT OPTION SEPP 65 AMENITY – SOLAR ACCESS GREENLAND
LACHLAN'S LINE APARTMENTS, 13 AUGUST 2017 PREPARED BY STEVE KING**

Summary Expert Opinion

SEPP65 AMENITY

SOLAR ACCESS



Greenland Lachlan's Line Apartments

14 August 2017

Signed,

A handwritten signature in black ink that reads "Steve King". The signature is stylized with a large, looped "S" and a cursive "King".

Steve King

STEVE KING

CONSULTANT

Appropriate design and alternative technologies for environmental control in buildings

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1.1 This report is a summary peer review of **solar access / overshadowing** compliance of the submitted DA scheme for Lot 104 and Lot 105, which form part of the masterplanned development known as Lachlan's Line, North Ryde.

1.2 I address myself to relevant issues raised in the RECORD OF DEFERRAL: SYDNEY NORTH PLANNING PANEL, of Wednesday, 9 August 2017.

REASONS FOR DEFERRAL

The Panel is not satisfied that the documentation submitted to Council clearly demonstrates the impact of overshadowing of communal open space and solar access to units/balconies. It therefore defers its decision requesting further information.

The applicant is to appoint an independent consultant to review solar access to communal open space, balconies and apartments, consistent with ADG principles, for the combined sites. The Panel seeks this information not only for mid-winter but also for the equinox. The selection of the independent consultant is to be agreed by the Council.

The Panel is aware that full compliance may not be achievable at the proposed density. However, the application needs to demonstrate more accurately the degree of compliance, identify the areas of non-compliance and whether any amendments can improve compliance.

1.3 My qualifications and experience are summarized in A.0 APPENDIX: CREDENTIALS.

1.4 The documents referred to in this report are detailed in 2.0 DOCUMENTS.

1.5 **Solar access to units/balconies**

For this summary report, I have undertaken my usual method of analysis, using a full 3D digital model of the combined Lots 104/105.

The Apartment Design Guide requires compliance with reference to winter solar access on June 21. For that date I supply half hourly views from the sun, and a full detailed compliance table.

The Panel makes the appropriate assumption that that 'full compliance may not be achievable at the proposed density'. I strongly infer that the request for a second full analysis for the Equinox is a reflection of the Panel's assumption that durations of solar access are demonstrably more favourable at that time.

I therefore employ a second full set of half hourly views from the sun for September/March 21. But for reasons I more fully explain, in my considered opinion a second full takeoff of solar access to glazing and private open space for the equinox is not justified.

1.6 **Impact of overshadowing of communal open space**

A preliminary inspection of the June 21 views from the sun makes clear that both *areas and durations* of direct sun to some areas of communal open space fall so far short of numerical measures suggested in the ADG *Design guidance*, as to make detailed calculations of marginal utility.

Therefore, in comparing the views from the sun on June 21 and September/March 21, I provide instead a detailed qualitative commentary on the significantly increased solar access at the equinox— particularly to communal open space between the buildings. In my view, the Panel can form an adequate informed assessment, if it wishes to exercise its discretion on the basis of that commentary.

2.0 DOCUMENTS AND INFORMATION ---

2.1 I note the relative difficulty I had assembling a fully consistent set of architectural documents for the two sites, apparently due to difficult coordination between two major architectural consultancies involved in the preparation of the DA.

For brevity, I declare that I am satisfied I have been able to refer to the correct plans prepared by Bates Smart and Turner architects, provided to me by the applicant.

I have also been provided by Turner Architects with a detailed 3D digital model (originally prepared by BatesSmart), as well as annotations of the plans to clarify unit numbering.,

2.2 I have previously visited the site.

3.0 SOLAR ACCESS FOR APARTMENTS

3.1 Relevant solar access standards

3.1.1 Apartment Design Guide

The *Apartment Design Guide (ADG)* gives effect to SEPP65 for assessing solar access and other amenity provisions and gives the following quantified recommendations:

<i>Objective 4A-1</i>	
To optimise the number of apartments receiving sunlight to habitable rooms, primary windows and private open space	
<i>Design criteria</i>	
1.	Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas
2.	A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid winter
3.	A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid winter

3.1.2 Local controls

I note that under the amended SEPP65, requirements of a development control plan (DCP) will have no effect if they relate to certain objectives, design criteria and design guidance set out in the Apartment Design Guide. These are:

- visual privacy;
- **solar and daylight access;**
- common circulation and spaces;
- apartment size and layout;
- ceiling heights;
- private open space and balconies;
- natural ventilation; and
- storage.

In quantifying the compliance for solar access for this application, I rely on the ADG.

3.2 Predicted solar access: methodology

3.2.1 3D digital model

For detailed analysis of overshadowing and solar access I refer to a fully 3D digital model provided by the architects.

I independently verified the geolocation and the direction of North by reference to the survey and to cadastral information. But I rely on the architects' model dimensions being consistent with the orthographic architectural drawings.

I note that the model shows such of the surrounding development – both existing and proposed – as may make a material impact on overshadowing of the subject sites.

3.2.2 Views from the sun

Because of the complexity of determining and *demonstrating* in detail the quantification of solar access to glazing of various orientations — and taking into account the considerable self-shading and other potential obstructions — I prepare computer generated projections known as ‘*View from the Sun*’, taken at half hourly intervals.

A view from the sun shows all sunlit surfaces at a given time and date. It therefore allows a very precise count of sunlight hours on any glazing, with little or no requirement for secondary calculations or interpolation. Figure 1 illustrates the technique. *Note that a ‘view from the sun’ by definition does not show any shadows.*



Figure 1: View from the sun, 12pm June 21
The model shows the overshadowing impact of buildings remote from the site

I note in particular the potential serious overshadowing impact of the tall oval-shaped building envelope designated in the master plan to the north-east of the subject site.

3.3 Characterisation of solar access compliance

3.3.1 Sun patches on glazing

For the purpose of calculating the compliance with the control, I examine sun patches on the relevant glazing line of each apartment. Because of its key importance in the determination of what is ‘effective sunlight’ for characterisation of compliance, for both glazing and private open space, I refer specifically to the relevant *L+EC Planning Principle (The Benevolent Society v Waverley Council [2010] NSWLEC 1082)* in that:

- I ignore very large angles of incidence to the glazing surface, and unusably small areas of sunlit glazing.
- I quantify as complying all sun patches of ‘reasonable size’, which I generally take to be a minimum of approximately 1m².

3.3.2 Duration of sun access

I have characterised as complying when sun access is over two hours of partially and fully sunlit glazing between 9am and 3pm mid-winter. The ADG adopts this standard throughout the metropolitan area, without any further test for high density.

3.3.3 Timing of acceptable sun access

Due to some self-shading by privacy walls, mutual shading between the buildings, and significant external overshadowing by the very large proposed future building to the north-east of the subject site, some otherwise favourably oriented apartments will receive less than two hours of winter sun to their living area glazing between 9am and 3pm on June 21.

However, by modelling a large enough context for the site, it can be demonstrated where such apartments will receive additional effective direct winter sun either earlier than 9am or later than 3pm respectively.

Explanation:

The 9am and 3pm limits are a legacy from early controls for single dwellings in Arcadian suburban settings where the desired mature tree canopied character was assumed to limit the likely ongoing availability of winter sun beyond those times. In my considered opinion, to apply those limits without reference to the availability of earlier and later sun is inappropriate, and this opinion has consistently had the support of the Land and Environment Court.

In relation to this interpretation of the RFDC performance objectives, I refer specifically to the judgment by Brown C. in the matter of *Botany Development Pty Ltd v Botany Council LEC 10360 of 2013*, at paras. 79 through 87. While the judgement refers to the RFDC, the principles on which it is based continue to be applicable to the application of the ADG.

I have therefore examined and quantified solar access from 8am and until 4pm. I note that in general, for the relevant east and west glazing, these earlier and later periods of winter sun are actually the most effective, because the sun penetrates more deeply into the apartment.

3.3.4 Private open space

For a threshold of POS solar access, I take guidance from the relevant *L+EC Planning Principle*, which makes clear that for small verandas and courtyards the plane on which the sun is to be examined may be, for instance, a table, and that any arbitrary proportion of area is also likely to be misleading. In brief, I take as my minimum threshold a sufficient area for an adult to enjoy sun seated outdoors.

Overall, private open spaces of individual dwellings in this development are as well or better exposed to winter sun compared to living area glazing.

3.3.5 Wintergardens

For a significant number of apartments, the development application designates wintergarden style private open space.

Wintergardens are a proven and accepted strategy for maximising the effective winter sun available to apartments. However, to realise the amenity and energy efficiency potential, the wintergarden glazing needs detailed design to meet the following objectives:

- *Well-controlled air exchange* to optimise the performance of the wintergarden as an *attached sunspace in winter*. In practical terms, an attached sunspace is a more effective passive solar gain strategy than 'direct gain';
- Designed for maximum opening to encourage (and possibly enhance) *summer ventilation*.

Where those requirements are both met, the relevant glazing line for winter solar access compliance is generally agreed to be the 'outer', facade glazing.

My analysis provides a comparison between solar access compliance assuming the presence or absence of properly designed wintergardens for the relevant apartments. I do this to show the determining authority how the inclusion of wintergardens affects the solar access performance of the individual units, and overall.

3.3.6 Sun to bedrooms

Extended periods of sun available to bedrooms contribute significantly to the amenity of any apartment that may have an otherwise unfavourably oriented or overshadowed living area. This characterisation is consistent with the interpretation of *the BenSoc Principle* (and its predecessor *Parsonage Principle*) as previously accepted by the Land and Environment Court, and by various Councils.

In the first instance, I do not rely on periods of sun to bedrooms to characterise apartments as complying with the ADG Design criterion. But for completeness, the detailed table of solar access of individual units is annotated to identify where this consideration may be relevant to a more subjective understanding of the actual solar access amenity of specific dwellings.

3.4 Predicted solar access of apartments

3.4.1 Table 2 in Appendix C reports in detail the schedule of achieved mid-winter (June 21) solar access for each apartment. Table 1 below summarises the projected solar access for the living area glazing of the residential dwelling units.

I record solar access achieved before 9am and after 3pm. I then pay regard to extended periods for the characterisation of solar access only where the relevant sun is both likely to be unobstructed in the future, and is 'effective sun' as intended by *The Benevolent Society v Waverley*. This characterisation has been previously accepted by Councils, and to date has been supported by the L+EC.

			Some POS treated as wintergardens	
Total number of units	879		879	
Units which achieve 2 hours or more sunlight to both glazing and POS 9am - 3pm June 21	413	47.0%	460	52.3%
'Extended hours': Additional units which achieve 2 hours or more sunlight to both glazing and POS 8am - 4pm June 21	81		85	
Proportion that could be deemed to comply on the basis of 2 hours sun to Living and POS	494	56.2%	545	62.0%
Including Bedrooms: Additional apartments if sun to Bedrooms included*	55		55	
Proportion that could be deemed to comply on the basis of 2 hours sun to Living, Bedrooms and POS	549	62.5%	600	68.3%
(Units with some sun, but less than 2 hours to any space 8am-4pm June 21)**	(101)		(55)	
Total units with no sun to any part of the apartment on June 21 between 8am and 4pm	229	26.1%	224	25.5%

Table 1: Summary of solar access

Notes:

* To further examine the perception of available sun at mid-winter, I have counted the approximate number of apartments where a combination of sun to bedrooms and living areas exceeds two hours. This count does not appear as a separate column in the attached detailed compliance table, but its impact is included in Table 1, with a distinguishing background tone.

** Remaining units with some sun, but less than 2 hours.

3.4.2 The overall compliance figures I obtain are lower than those reported in the DA. Scrutiny of my detailed compliance table of individual apartments suggests the following causes of that discrepancy:

ANALYSIS PERFORMED ON A 'SURFACE MODEL'.

This is where solar access is counted if the façade of an apartment receives direct sun, to glazing **or** private open space. It is common in the industry, especially in the Stage 1 DAs or equivalent master planning studies.

This technique does not provide the information prescribed by the relevant ADG *Design criterion*. Analyses based on this simplistic approach almost invariably deliver as an exaggerated expectation of overall compliance, which subsequent Stage 2 DAs then have extreme trouble delivering.

FAILURE TO FULLY ACCOUNT FOR MUTUAL OVERSHADOWING.

This happens where preliminary analysis is typically carried out by the use of two-dimensional azimuth templates. The appropriately oriented apartments are identified on typical floor plates, and extrapolated for the building as a whole – with no appropriate check on nominally complying apartments lost because of mutual overshadowing within the subject development.

FAILURE TO ACCOUNT FOR ACTUAL OR LIKELY EXTERNAL OVERSHADOWING.

In the context of the subject application this appears to apply to the prospective overshadowing by the oval-shaped tower suggested by the masterplan to occupy a site to the north-east of Lot 105.

DISREGARD OF TOO SMALL SUN PATCH SIZE ON GLAZING

This is where the duration of solar access is counted from 'first kiss' of sun to last sliver. This approach yields a significant apparent increase in the proportion of complying apartments, but contravenes the intent of the control, and the explicit wording of the relevant LEC Planning Principle as it defines minimum acceptable sun patch size.

3.4.3 The ADG *Design criteria* recommend that a minimum of 70% of apartments should achieve complying periods of direct sun. In my experience, this level of compliance is rarely achievable by developments of this scale and density, requiring the exercise of discretion by the determining authority.

In order to provide the necessary information for that discretion to be exercised, I normally advocate that at the very least, consideration be given to the inclusion of all effective sun on June 21. Confidence to do so requires an analysis based on a 3D digital model large enough to confidently identify effective direct sun available before and after the 9am to 3pm period.

To properly consider the inclusion of 81 (85) apartments in the subject development which benefit from a period of sun before 9am and after 3pm, one has to be mindful of:

- The interpretation by the Land and Environment Court where the controls are applied to a site with constraints on the achievable solar access;
- The reasonable expectation of compliance achieved for that proportion of apartments which have access to sun, after allowing for the overshadowing impact of existing and prospective surrounding developments.

As I have previously indicated, the most applicable matter in which this issue was given due consideration is by Brown, C. in *Botany Development Pty Ltd v Council of the City of Botany Bay LEC 10360 of 2013*. The relevant parts of Commissioner Brown's determination read:

86 I do not accept that the RFDC should be read as a development standard or a requirement that must be complied with. In the second dot point, the Rules of Thumb contemplate variations to the requirements. Also, the definition in the RFDC for Rules of Thumb supports the application of a flexible approach where it states:

rules of thumb recommend minimum standards as a guide for local decision making. Minimum standards may vary depending on local context issues and/or if development applicants are able to demonstrate that they have addressed the better design practice guidelines and achieved the stated objectives.

87 In this case, I am satisfied that the minimum 70% standard can be varied given the relatively small variation (10 units out of 158 units excluding any benefit from the deletion of 4 units), the sunlight available between 8 am and 4 pm, the orientation of the site and the design that seeks to maximise solar access to the northern face of the building.

In brief, the detailed determination in *Botany Development Pty Ltd v Council of the City of Botany Bay* makes clear that:

- Due regard can be taken of all the sunlight available;
- Allowance should be made for the difficulties imposed by external overshadowing of the site.

3.4.3 The overall number of units with no sun on June 21, even if allowance is made for extended hours of available sun, comes to 228 (26.1%), and is in excess of the maximum 15% suggested by the ADG.

In a development of this scale, necessarily employing relatively large double loaded floor plates, and paying regard to external and internal overshadowing, this proportion has to be considered highly likely.

In fact, in my considered opinion, the designers have actually employed ingenious apartment layouts to maximise the distribution of apartments on the 'sunny sides' of the tall apartment blocks, while minimising the number on the side permanently shaded in winter.

4.0 SOLAR ACCESS FOR COMMUNAL OPEN SPACE

4.1 Relevant solar access standards

4.1.1 Apartment Design Guide

The *Apartment Design Guide (ADG)* gives effect to SEPP65 for assessing solar access and other amenity provisions and gives the following quantified recommendations:

<i>Objective 3D-1</i>

An adequate area of communal open space is provided to enhance residential amenity and to provide opportunities for landscaping	
<i>Design criteria</i>	
1.	Communal open space has a minimum area equal to 25% of the site (see figure 3D.3)
2.	Developments achieve a minimum of 50% direct sunlight to the principal usable part of the communal open space for a minimum of 2 hours between 9 am and 3 pm on 21 June (mid winter)

4.1.2 Local controls

Local controls are generally consistent with the above provisions of the ADG. Compliance with the ADG design criteria would normally be considered to also satisfy the local controls.

4.1.3 The master plan

Lots 104 and 105 fall within the masterplanned precinct known as Laughlan's Line. The masterplan is the most important determinant of the ability to deliver compliance with the above design criteria. The masterplan:

- Designates prescriptive relationships between conventionally defined communal open space and *publicly accessible* communal open space.
- By defining the relevant surveyed individual sites, pre-determines the massing and spacing of the building blocks.
- Designates FSR realisation envelopes on other sites which constitute the masterplanned precinct. These envelopes may be treated as likely reflected in future building forms, with relatively little variation, at least from the point of view of the overshadowing impact.

4.2 Discussion

Preliminary to any attempted quantification, I briefly note the major opportunities and constraints relating to solar access for communal open space.

Refer to Figures 2 & 3. Both figures illustrate solar access or overshadowing of open space in the subject development at 10:30am June 21. Figure 2 is a view from the sun; Figure 3 is a conventional shadowed plan.

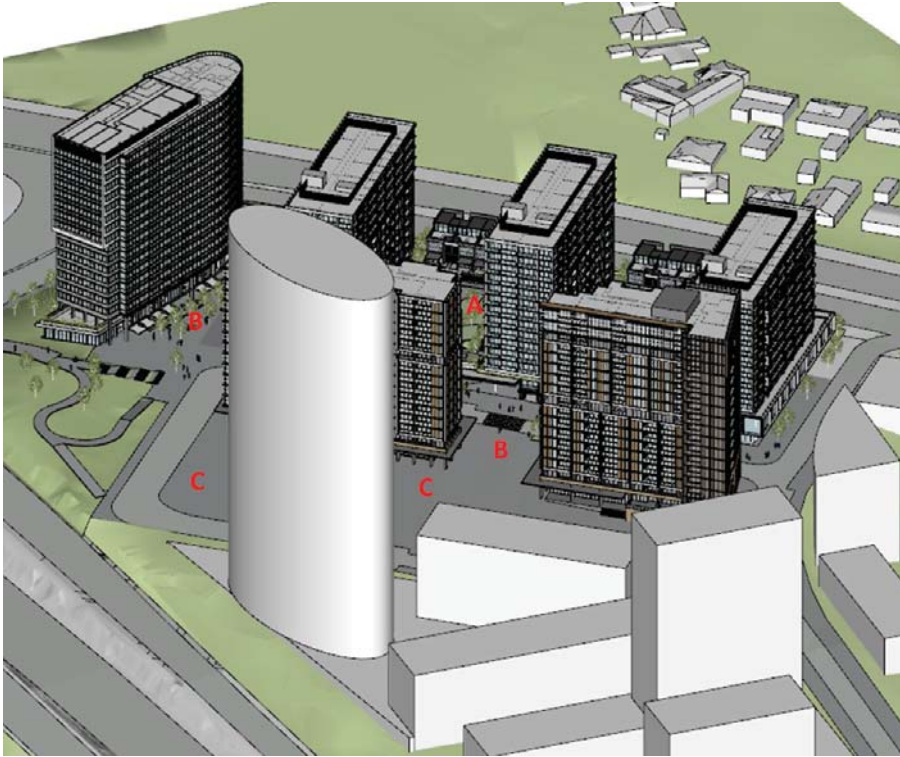


Figure 2: View from the sun, 10:30am June 21

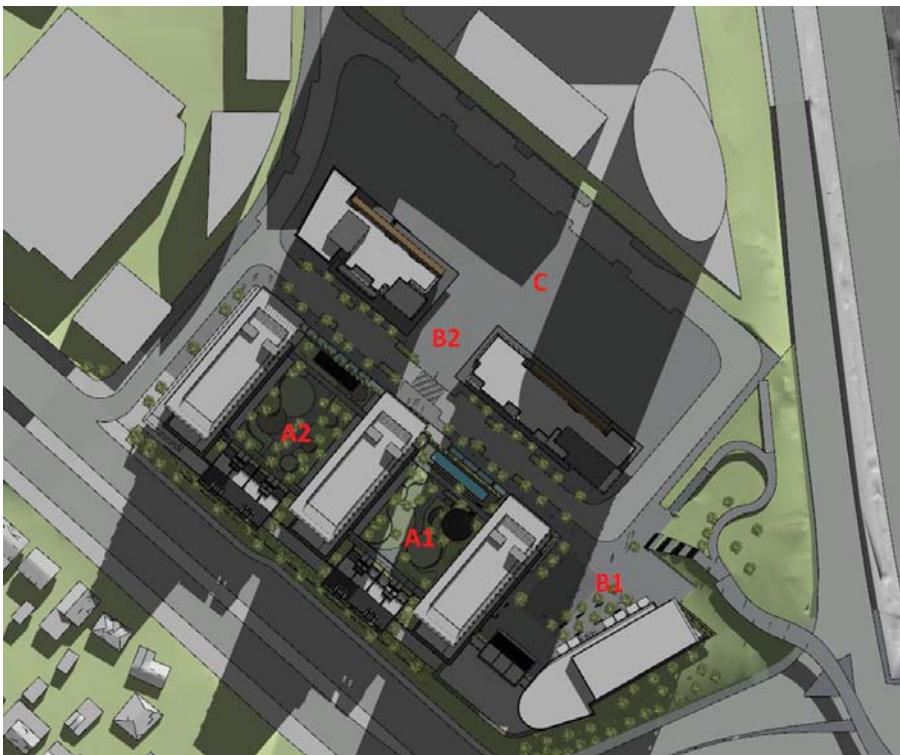


Figure 3: Plan view at 10:30am June 21

I annotate both views to identify:

- A** Conventional communal open space, potentially securable.
- B** Publicly accessible communal open space.
- C** Public open space. For the present purpose, I ignore the minor landscaped component of the public road that separates Lots 104 & 105.

Note that my labelling and categorisation are not intended to address *Design criterion 1*, relating to mandated minimum areas of communal open space, but are adopted simply for easier reference in this discussion of solar access.

4.2.1 Solar access to conventional communal open space

For my purposes, this description applies primarily to the large landscaped courtyards between Blocks L1, L2 and L3, designated on my diagrams as areas A1 and A2.

WINTER SOLAR ACCESS

Winter solar access to these areas on June 21

- begins with a narrow wedge in area A1 at approximately 10 AM,
- reaches its maximum extent at around 11:30 AM when approximately 15% of the combined area A1 and A2 is sunlit, and
- declines to negligible wedges shortly after 1:30 PM.

Of the two areas, courtyard A1 receives the more usable areas and durations of winter sun.

Reference to the views from the sun for a June 21 makes clear that the winter overshadowing of these courtyards is due to:

- Mutual overshadowing between Blocks L1, L2 and L3. *This would only be improved by a reduction in the height of those buildings, or an increase in the width of the courtyards.* My understanding is that neither of those constraints are able to be varied if the desired density is to be achieved within the masterplanned allocation of building volumes.
- Overshadowing by Blocks J and K (situated on Lot 105). This impact could only be significantly reduced by increasing the gap between the two buildings. Again, my understanding is that there is very little latitude to vary those building extents.

EQUINOX SOLAR ACCESS

Reference to the views from the sun for the Equinox shows that useful proportions of the combined areas of courtyards A1 and A2 are sunlit from before 9 AM till after 1 PM, with over 50% definitely receiving some between 9:30 AM and 12:30 PM.

The limiting factor at the Equinox is mutual overshadowing by Blocks L1, L2 and L3.

4.2.2 Solar access to publicly accessible communal open space

Again only for my purposes, this description applies primarily to the large trapezoidal shaped 'plaza' between Blocks L3 and M, and the wide gap between Blocks J & K. These areas are labelled on my diagrams as 'B'.

WINTER SOLAR ACCESS

Notwithstanding the significant external overshadowing by the proposed oval-shaped tower to the north-east, by Block K on Lot 105, and later in the afternoon by Block L3, the publicly accessible private open space areas – taken together – could be characterised as complying with the ADG numerical criteria:

- The Plaza is entirely in the sun from first thing in the morning, reducing to approximately 50% by 10:30 AM, and almost completely overshadowed by 11 AM. No appreciable part of the Plaza is sunlit again later on June 21.
- The portion of space between Blocks J and K is at least 50% sunlit from approximately 9:30 AM to 12:30 PM.

EQUINOX SOLAR ACCESS

Reference to the views from the sun for the Equinox shows that – somewhat counter-intuitively – the total sunlit area of these two portions of space is slightly reduced compared to winter, albeit of slightly longer duration, with complete overshadowing by 1:30 PM.

The limiting overshadowing of the Plaza at the Equinox is from Block L3, and of the gap between Blocks J and K, by Block K.

4.2.3 Solar access to public open space

This description applies primarily to the dedicated public park to the north-northeast of Lot 105. For my purposes I ignore the minor landscaped areas created as part of the public street which divides Lots 104 and 105.

WINTER SOLAR ACCESS

Because of its location, the designated public park is unaffected by overshadowing from the subject development between 9 AM and 3 PM on June 21.

However, it is significantly affected by overshadowing from the prospective future developments to the north-east, especially the oval-shaped tower building. This partial overshadowing of the public park in winter can be observed to effectively finish shortly after 12:30 PM, with the park fully in the sun until after 3 PM.

If the park is to be considered as a key part of satisfying the amenity performance objectives for open space relating to the subject development, it may be safely characterised as complying with the quantitative *Design criterion* of the ADG.

EQUINOX SOLAR ACCESS

Because of the higher sun angles, the morning overshadowing of the park by the oval shaped tower is somewhat reduced in total area, but otherwise the durations and pattern of solar access for the park is recognisably similar to that in winter.

5.0 CONCLUSIONS

The ADG *Design criteria* recommend a minimum of 70% of apartments should have the amenity of two hours winter sun. But the ADG explicitly acknowledges that this compliance may be difficult to achieve on some sites.

My most recent experiences of very large masterplanned projects, and in particular this analysis of the subject development proposal, leads me to suggest that the ADG does not fully anticipate the degree of constraint which results from limitations imposed by multistage master plans, rather than from intrinsic site factors.

While unacceptable analysis technique may have contributed to an exaggerated reporting of the level of compliance achieved, in my considered opinion, the same cannot be said of the broad design skill applied to maximise the number of apartments which benefit from the available solar access opportunity.

In my considered opinion, Council and the Panel may safely exercise its discretion in relation to the achieved level of solar access.

A.0 APPENDIX: CREDENTIALS

I have taught architectural design, thermal comfort and building services at the Universities of Sydney, Canberra and New South Wales since 1971. From 1992, I was a Research Project Leader in SOLARCH, the National Solar Architecture Research Unit at the University of NSW. Until its disestablishment in November 2006, I was the Associate Director, Centre for Sustainable Built Environments, UNSW.

My research and consultancy includes work in solar access, energy simulation and assessment for houses and multi-dwelling developments, building assessments under the NSW SEDA Energy Smart Buildings program, appropriate design and alternative technologies for museums and other cultural institutions, and asthma and domestic building design. I am the principal author of *SITE PLANNING IN AUSTRALIA: Strategies for energy efficient residential planning*, funded by the then Department of Primary Industry and Energy, and published by AGPS, and of the RAIA Environment Design Guides on the same topic. Through UNISEARCH, NEERG Seminars and Linarch P/L, I conduct training in solar access and overshadowing assessment for Local Councils. I have delivered professional development courses on topics relating to energy efficient design both in Australia and internationally.

SOLARCH/UNISEARCH were the contractors to SEDA NSW for the setting up and administration of the House Energy Rating Management Body (HMB), which accredits assessors under the Nationwide House Energy Rating Scheme (NatHERS), NSW. I was the technical supervisor of the HMB, with a broad overview of the dwelling thermal performance assessments carried out in NSW over five years. I have been a member of the NSW BRAC Energy Subcommittee, and also a member of the AGO Technical Advisory Committee on the implementation of AccuRate, the new mandated software tool under NatHERS. I undertook the Expert Review for the NSW Department of Planning, of the comparison of NatHERS and DIY methods of compliance for Thermal Comfort under BASIX, and was subsequently a member of a three person expert panel advising on the implementation of AccuRate in BASIX.

I have delivered the key papers in the general area of assessment of ventilation and solar access performance and compliance, for NEERG Seminars, cited by Commissioners of the LEC. Senior Commissioner Moore cited my assistance in reframing of the Planning Principle related to solar access (formerly known as the Parsonage Principle) in *The Benevolent Society v Waverley Council [2010] NSWLEC 1082*.

I practiced as a Registered Architect from 1971 to 2014, and maintain a specialist consultancy practice in Sydney and Canberra. I regularly assist the Land and Environment Court as an expert witness in related matters.

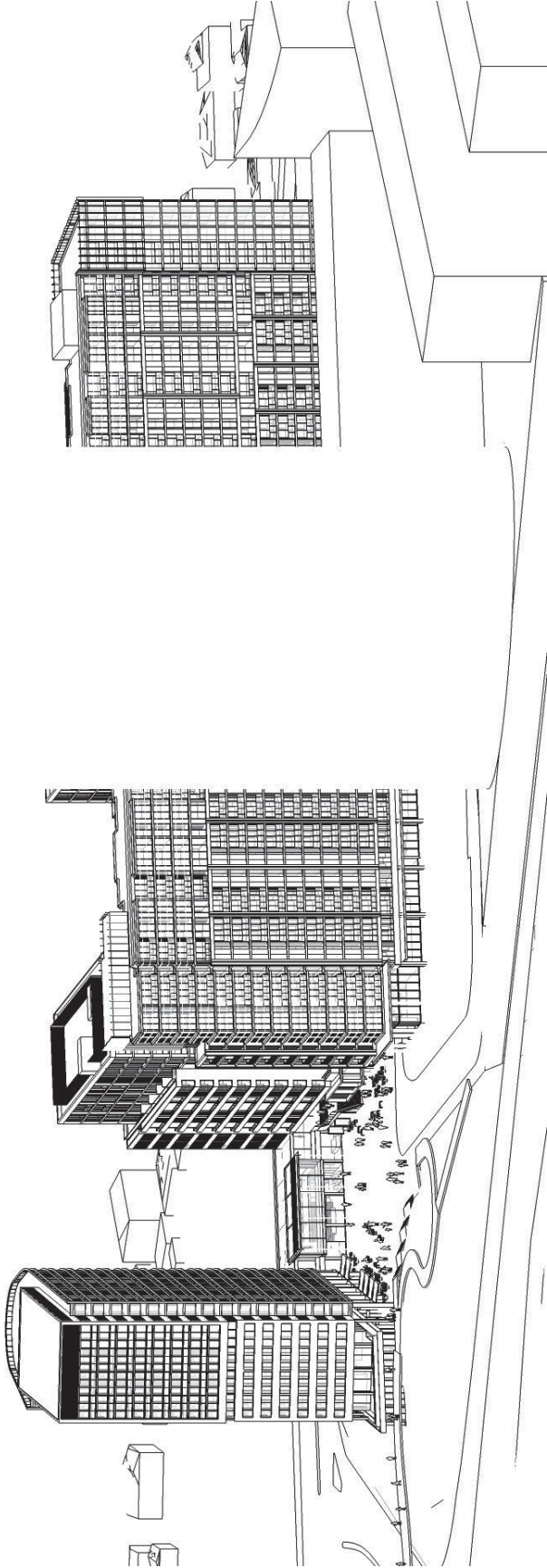


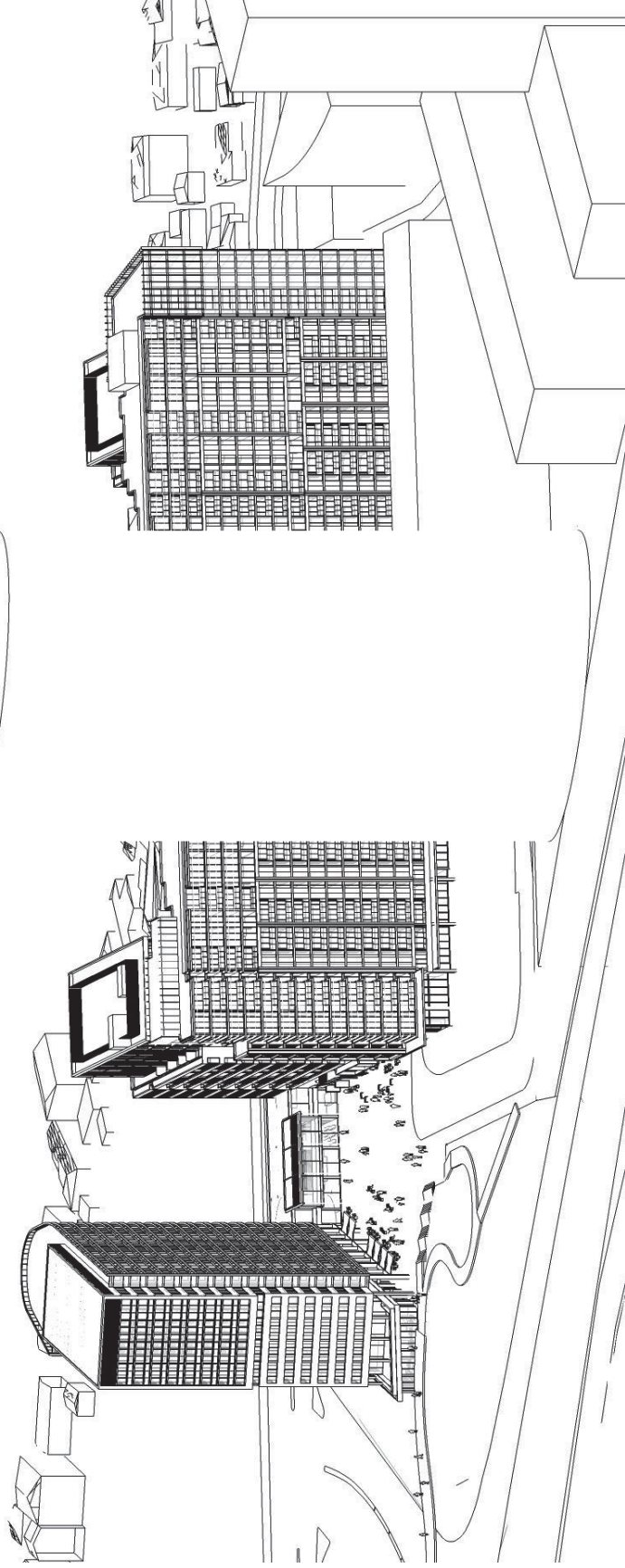
Steve King

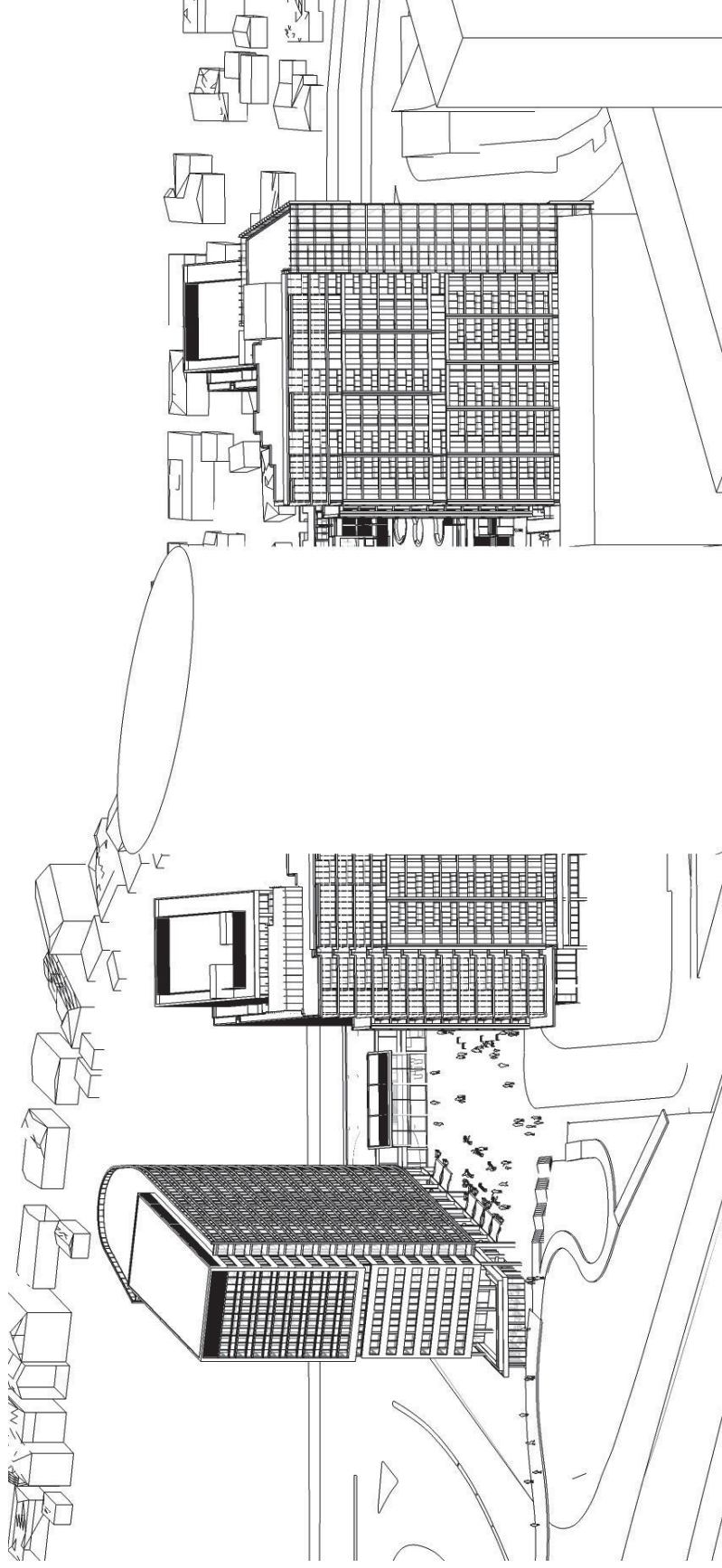
B.1 APPENDIX: VIEWS FROM THE SUN JUNE21

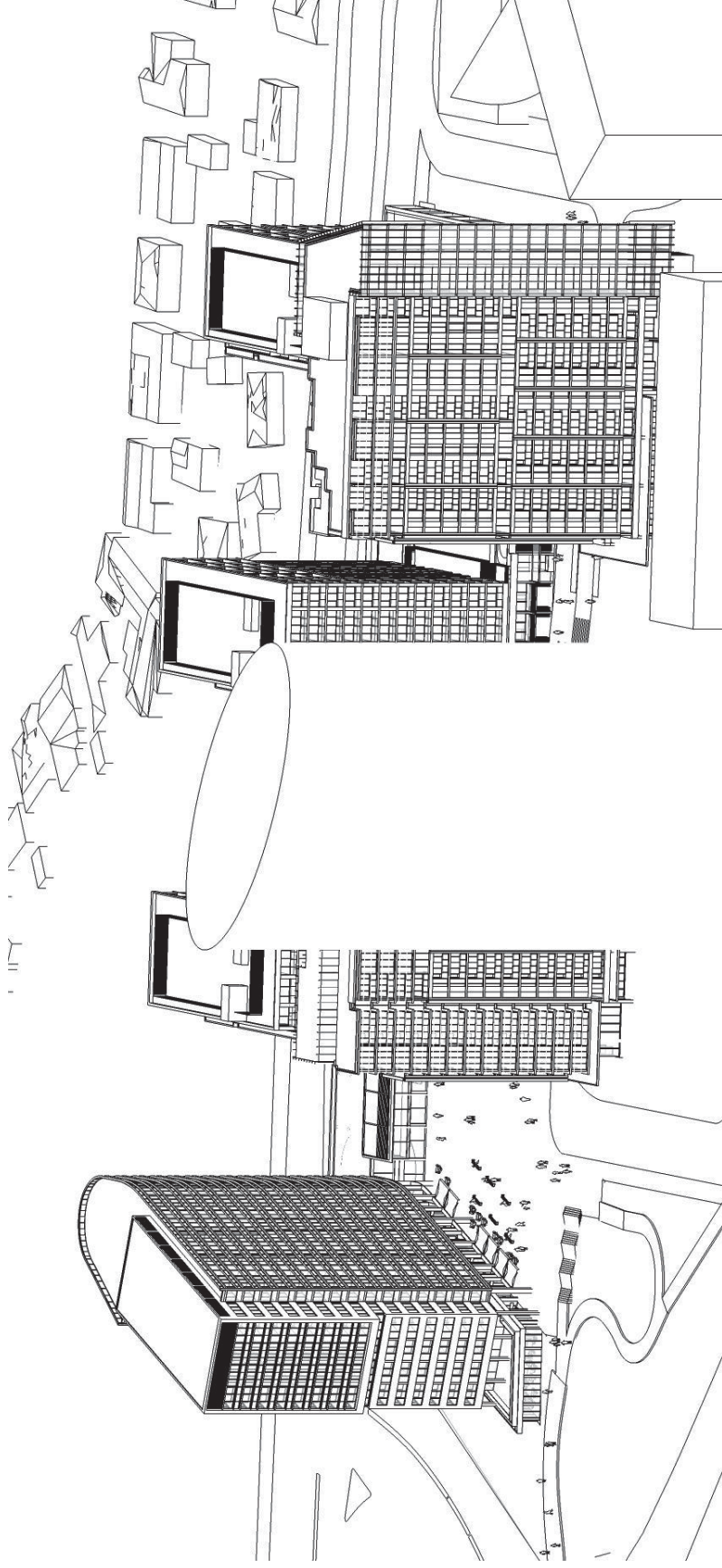
The Table below reproduces for reference the detailed 'views from the sun' on a half hourly basis.

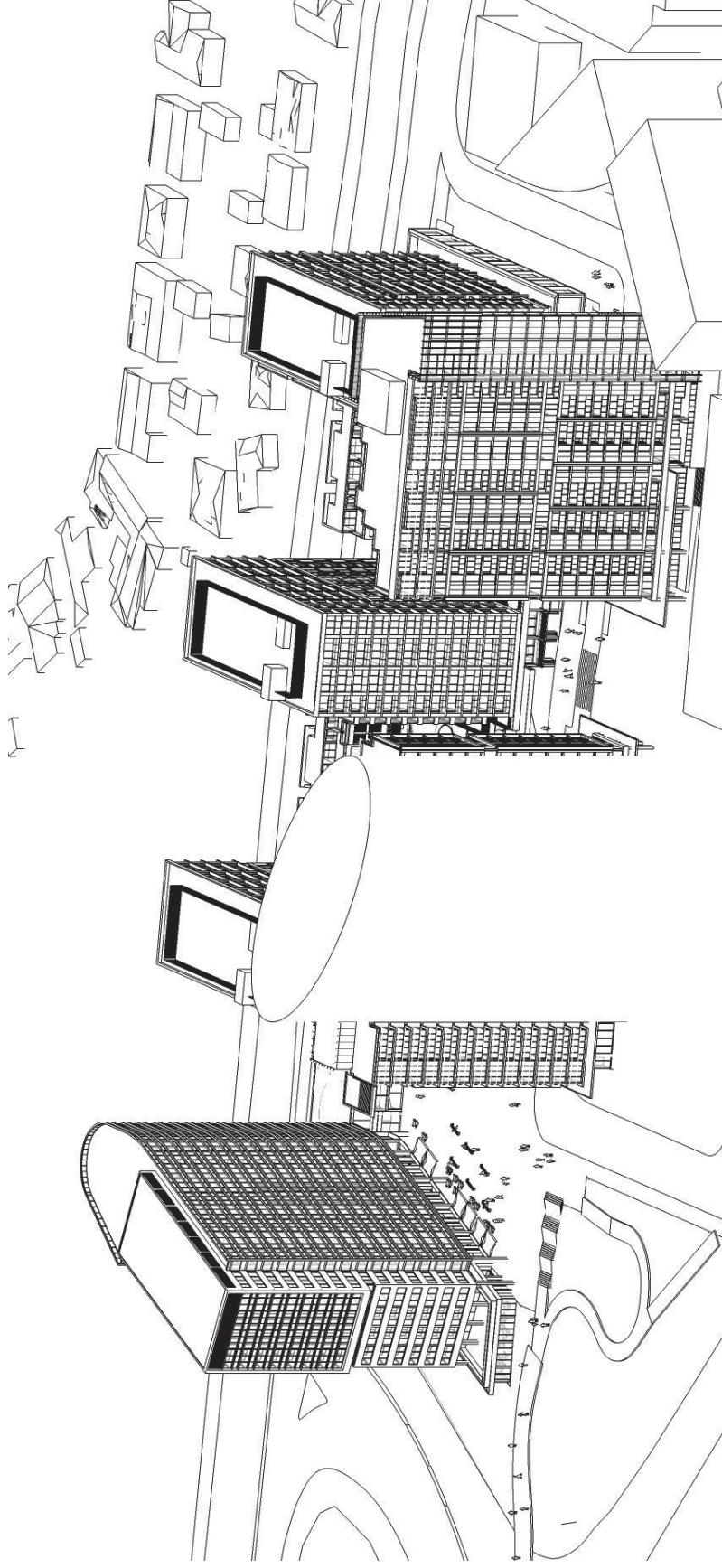
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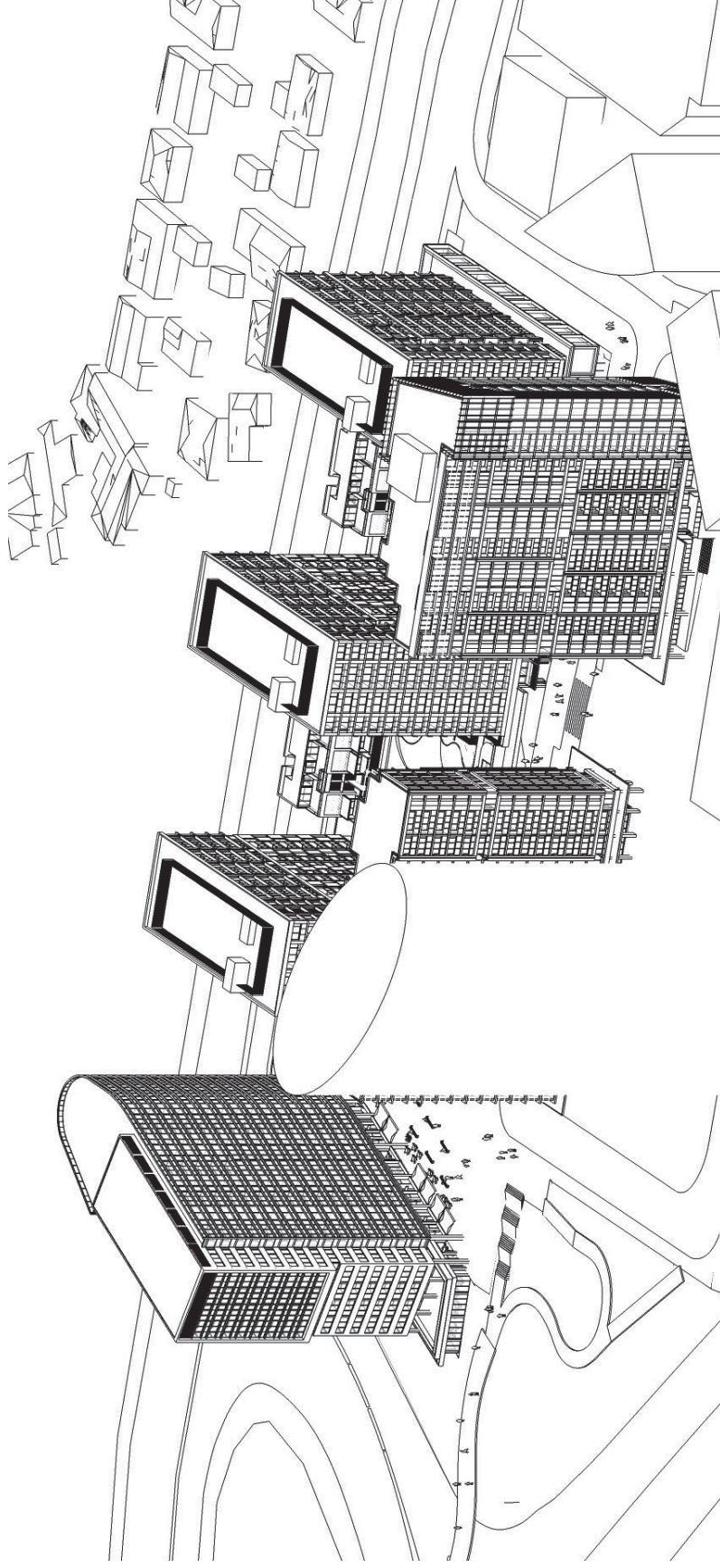


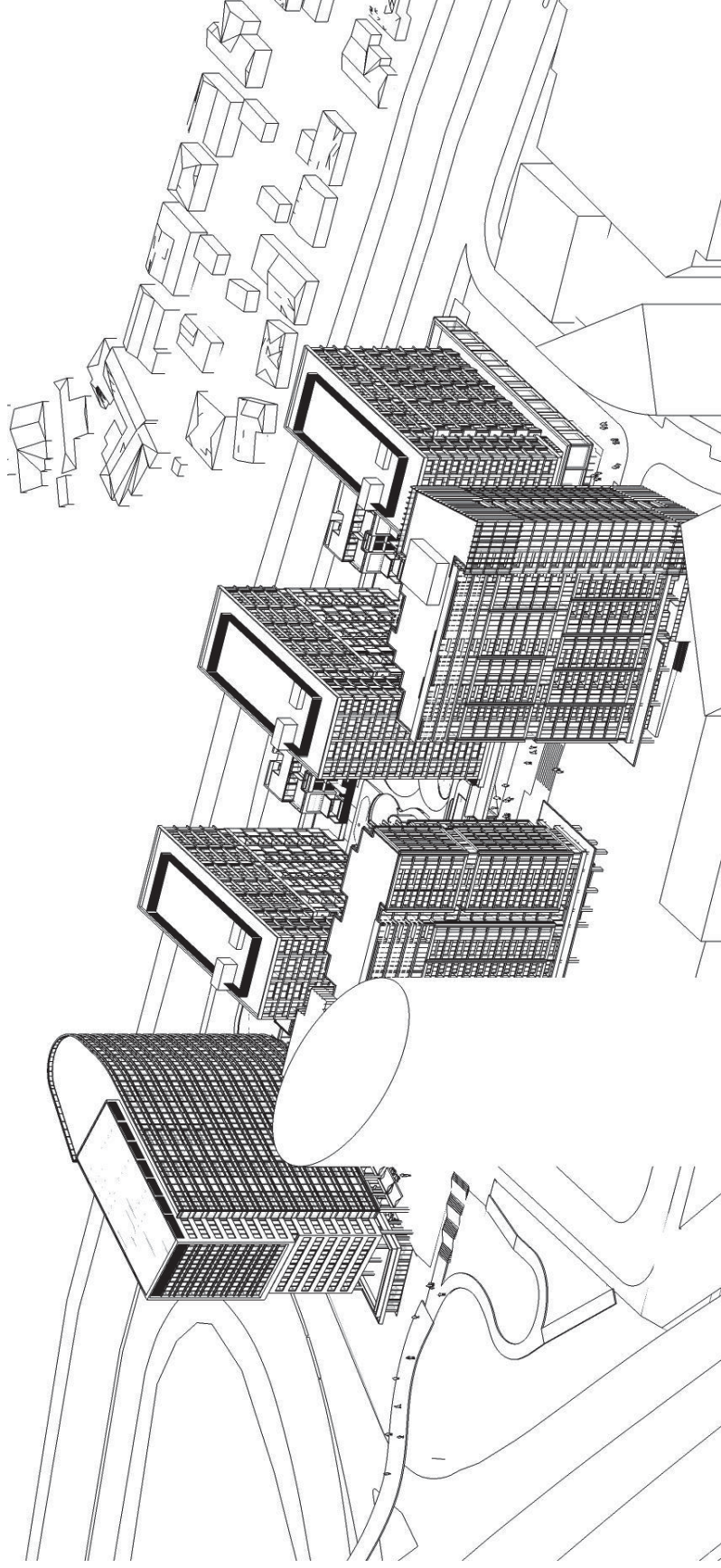


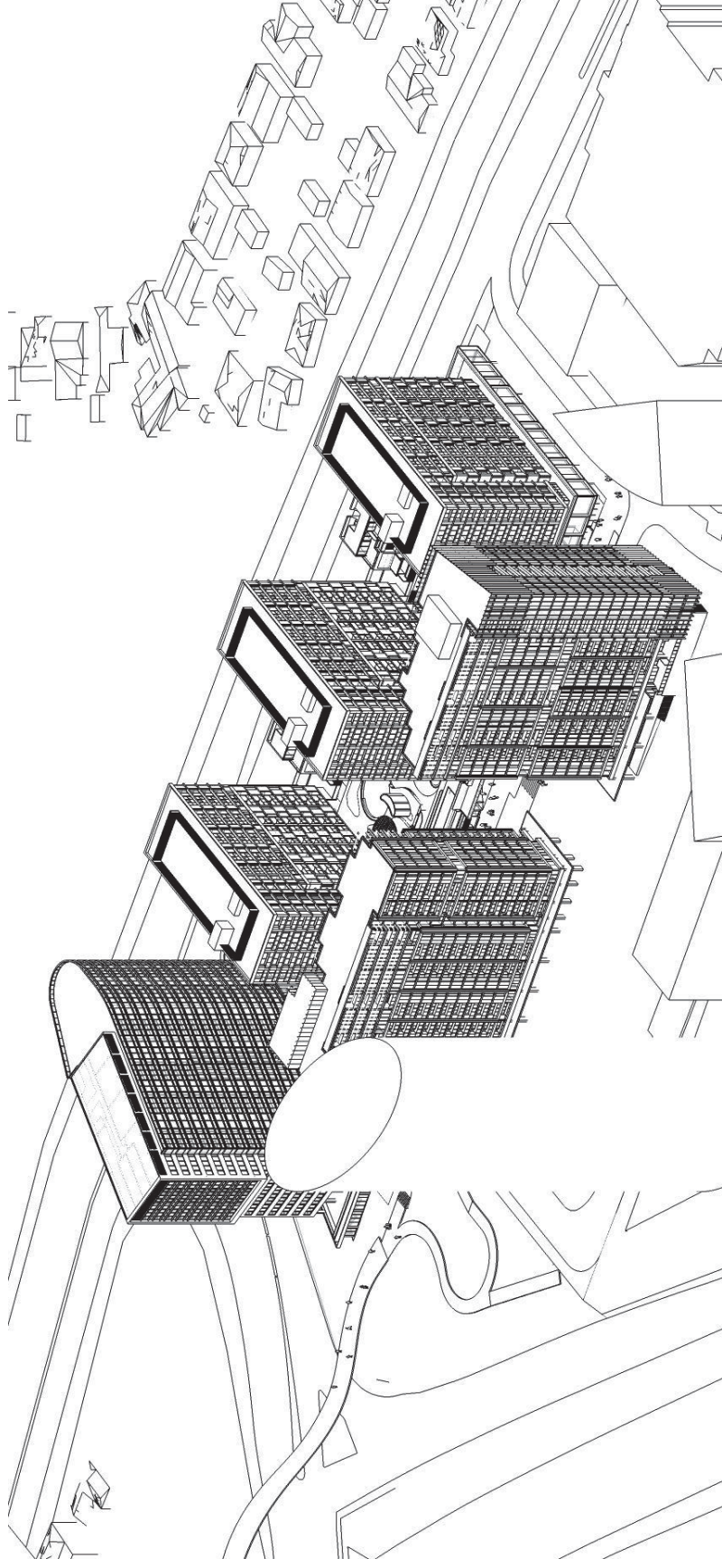


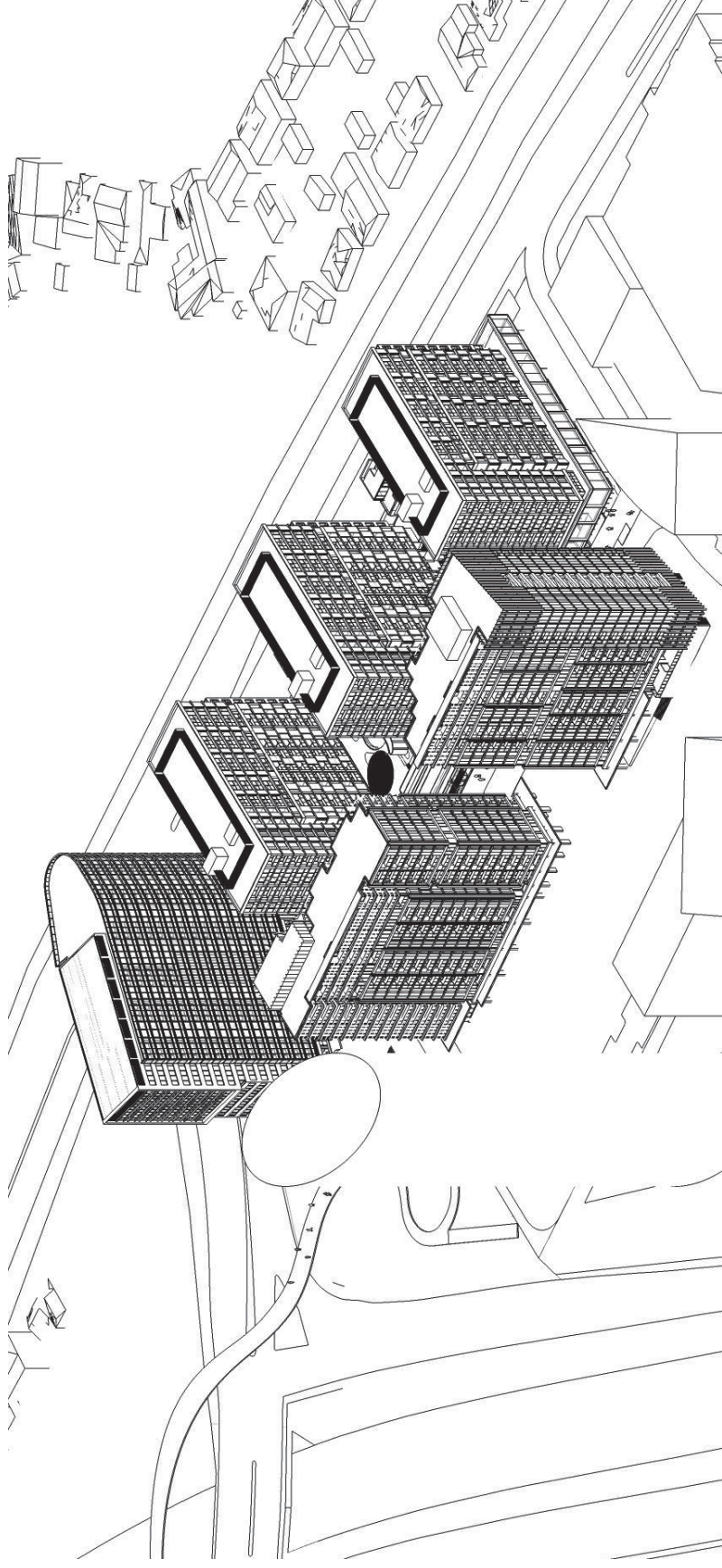


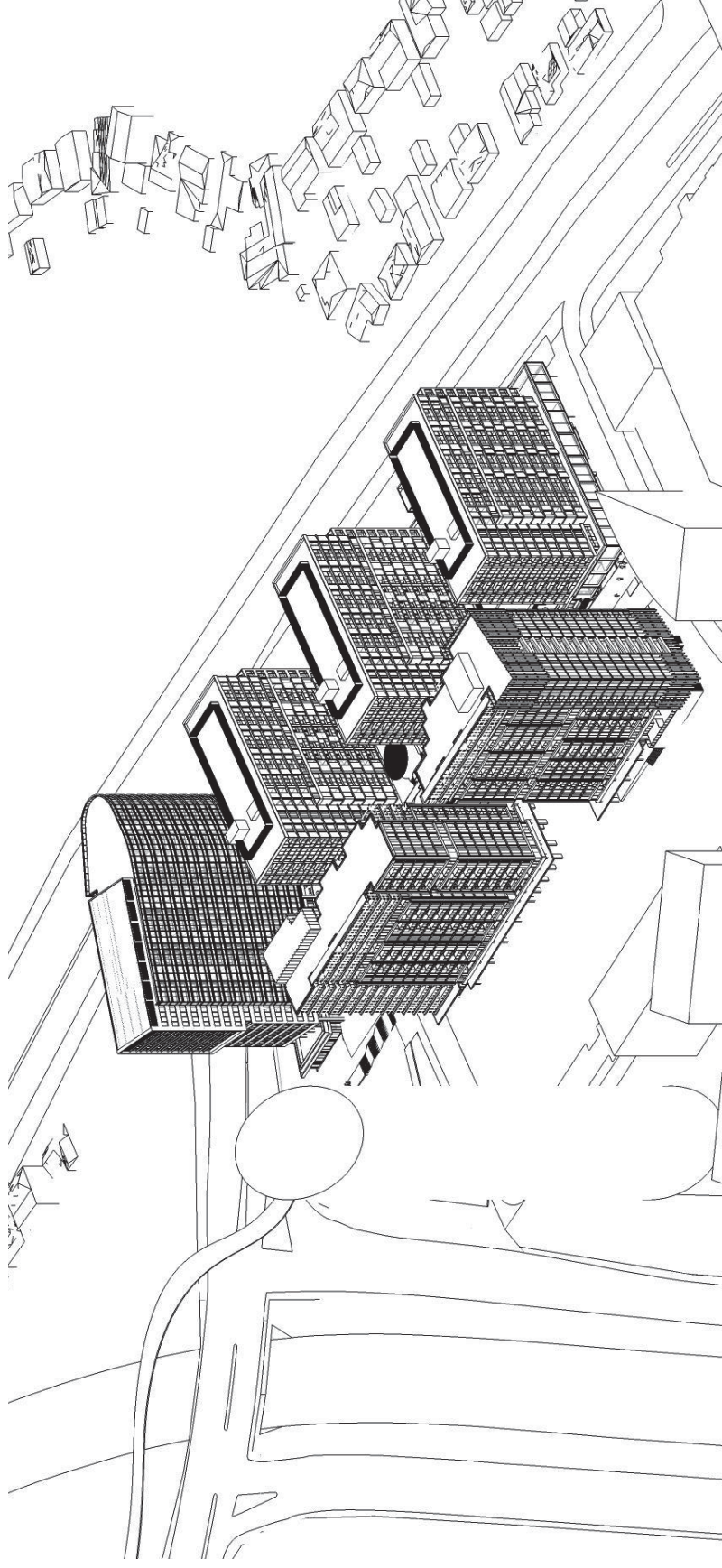


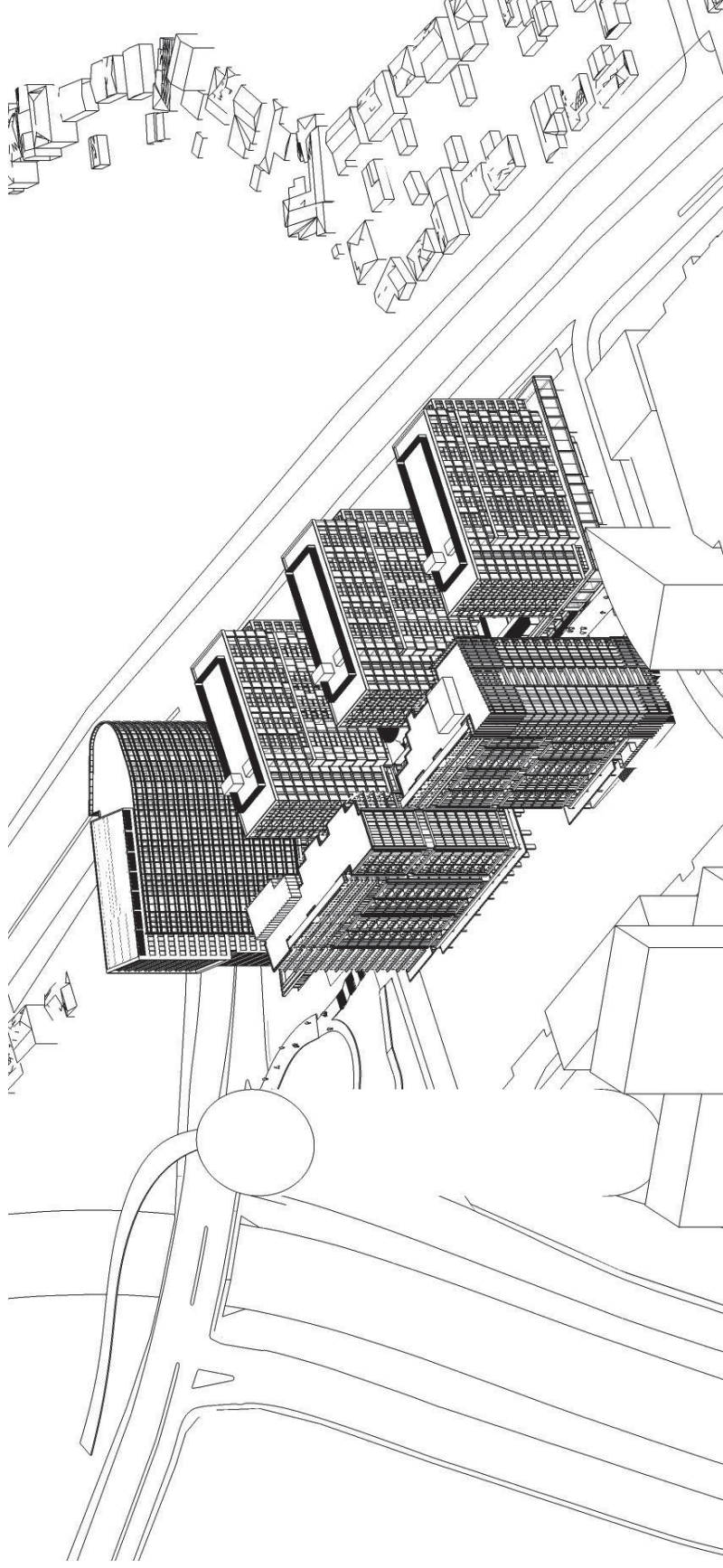


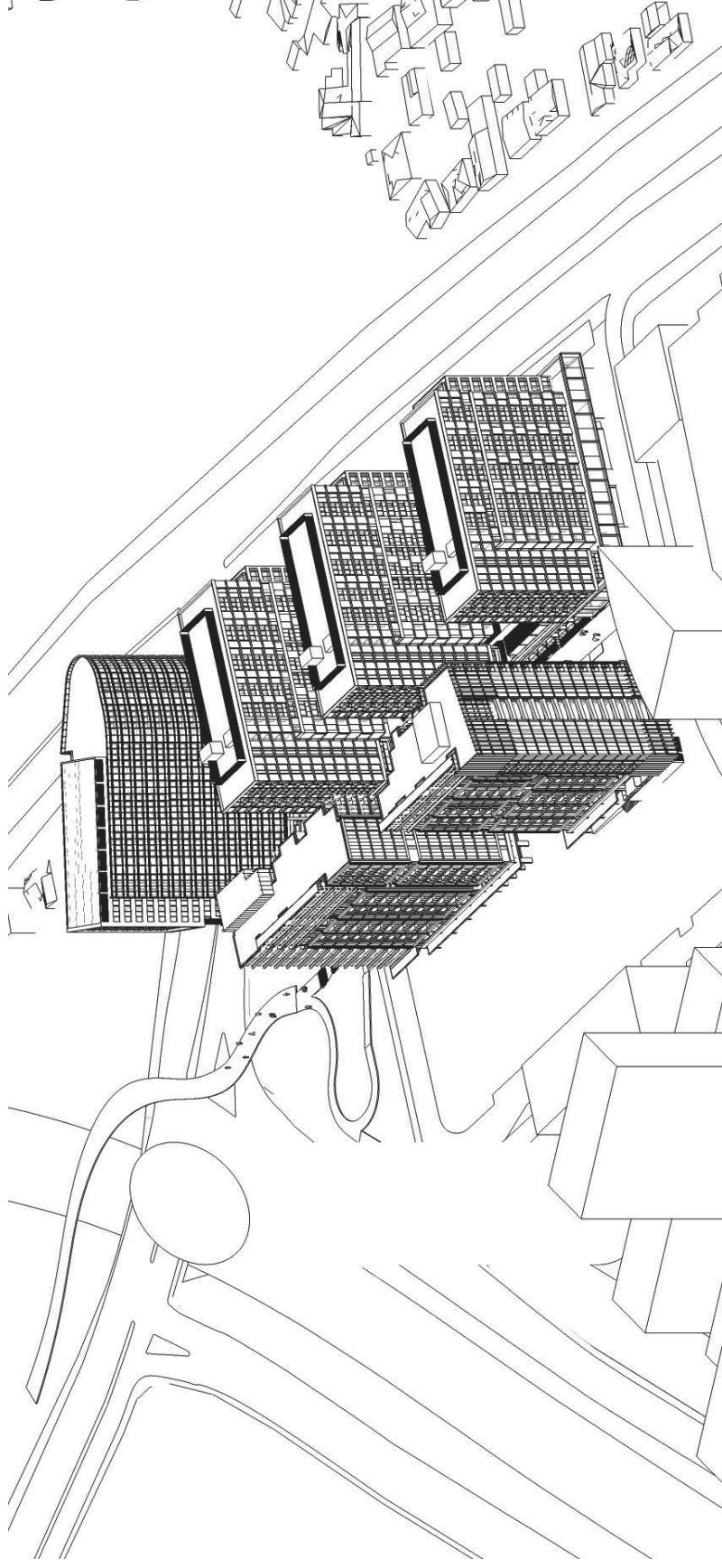


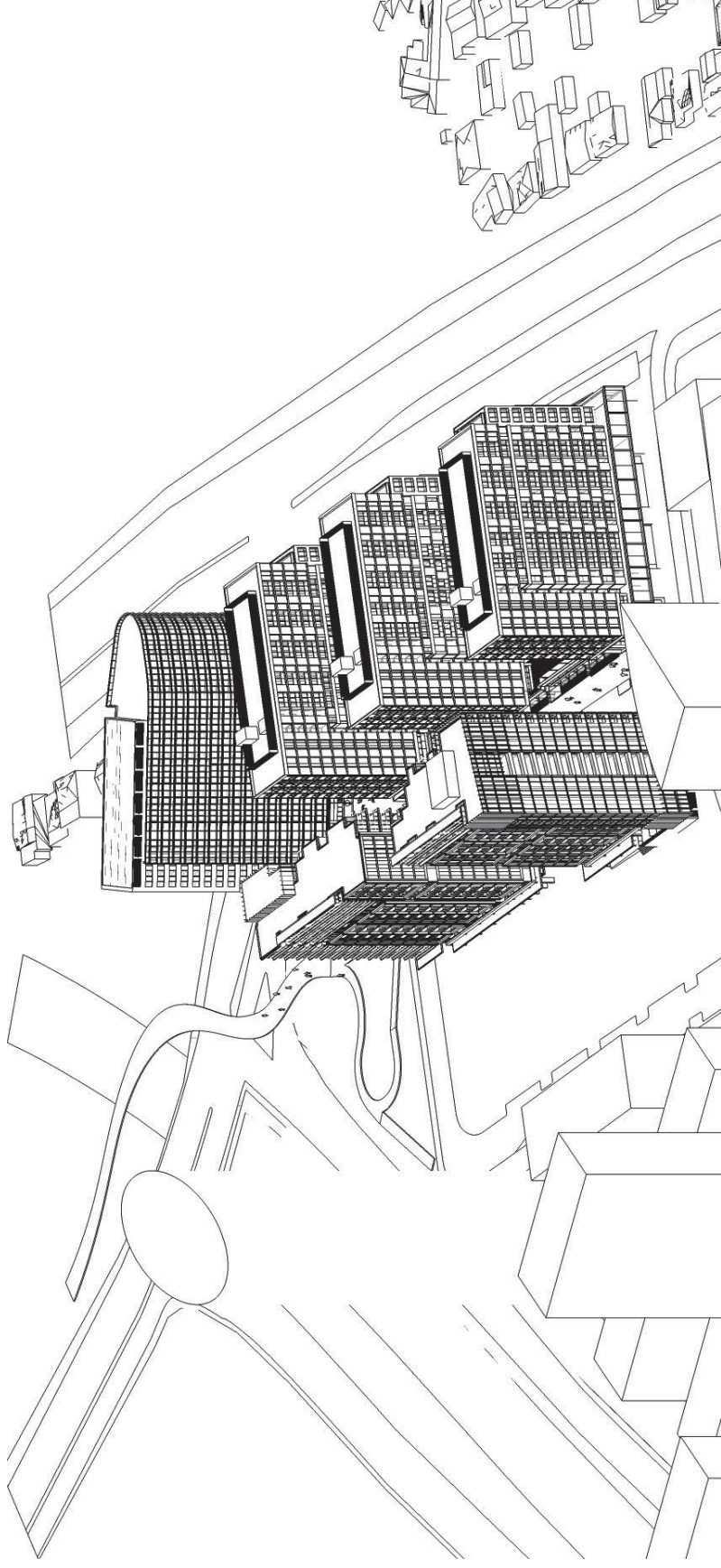


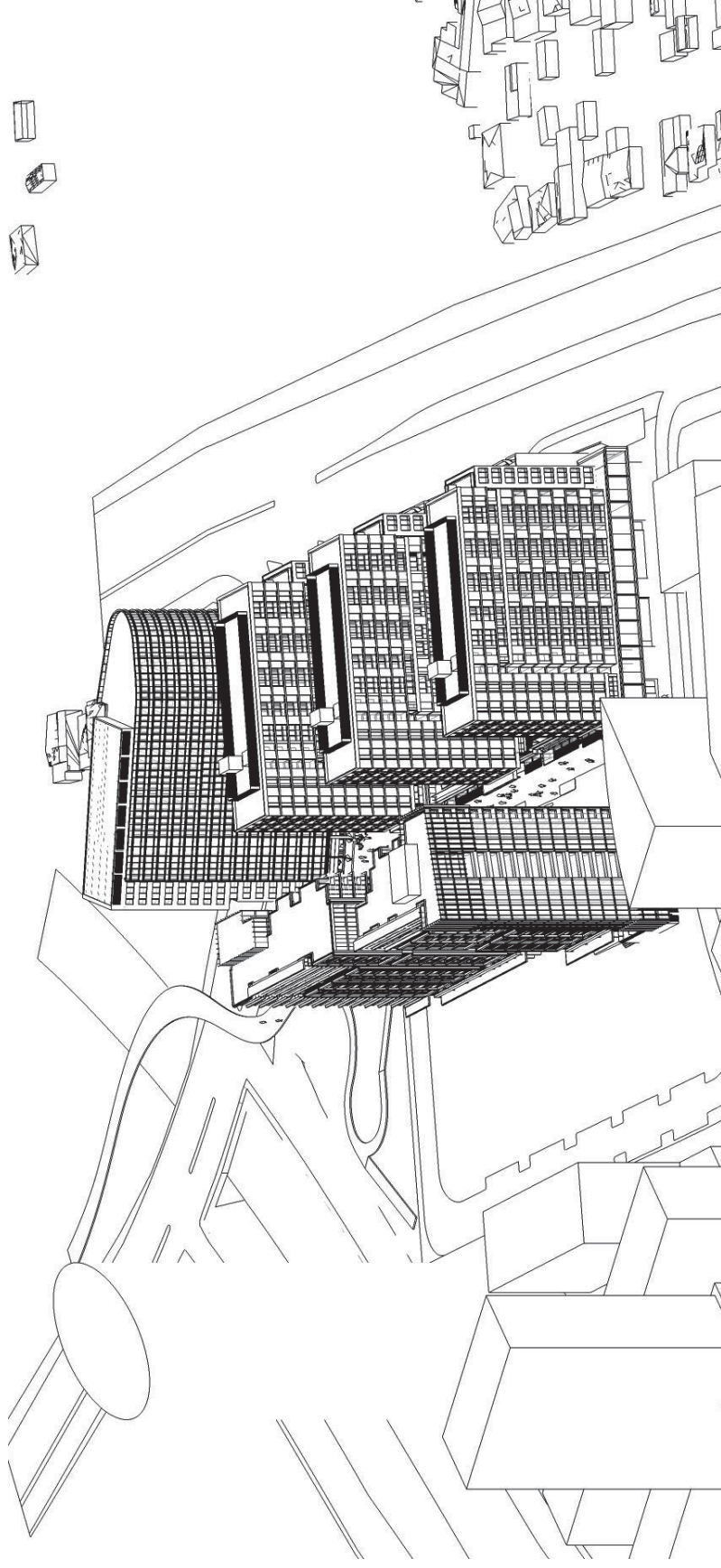


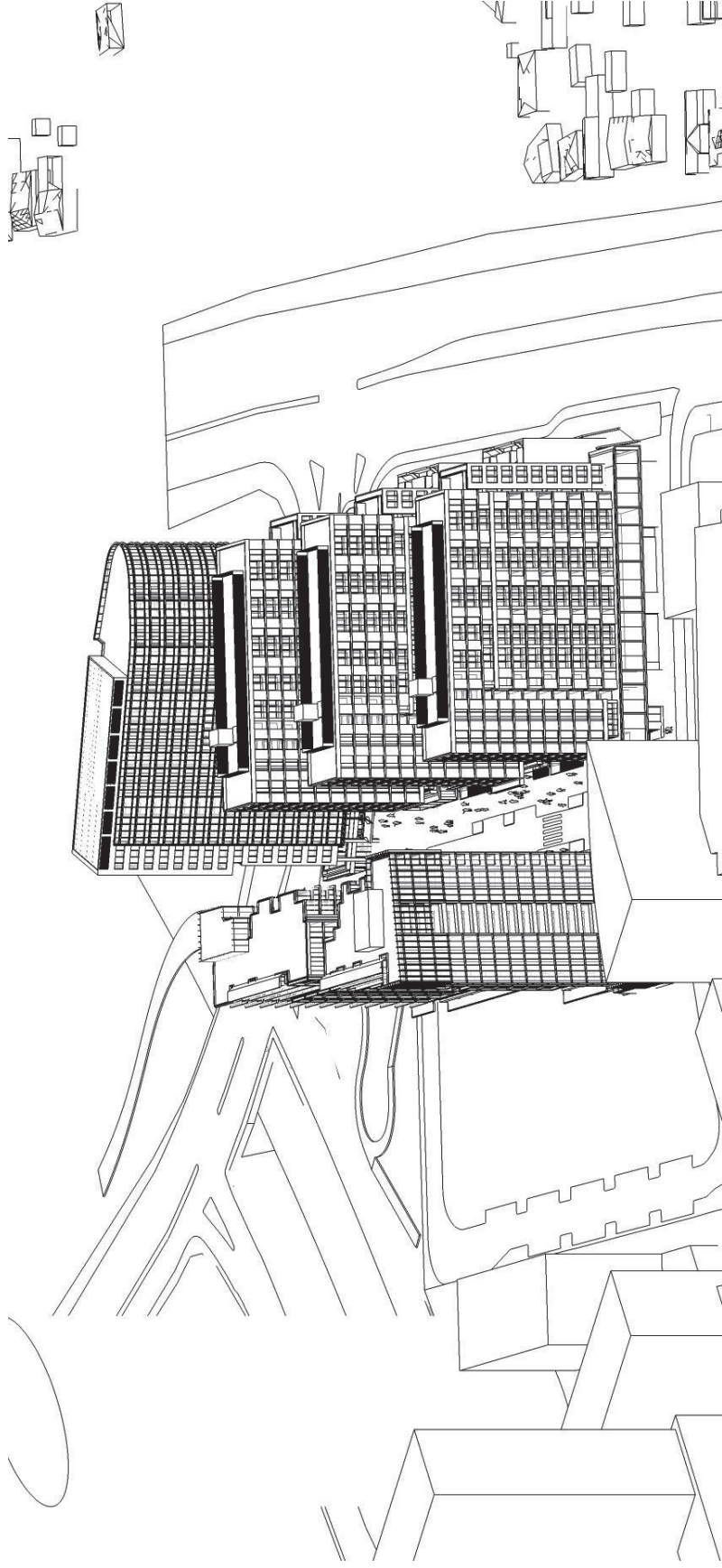


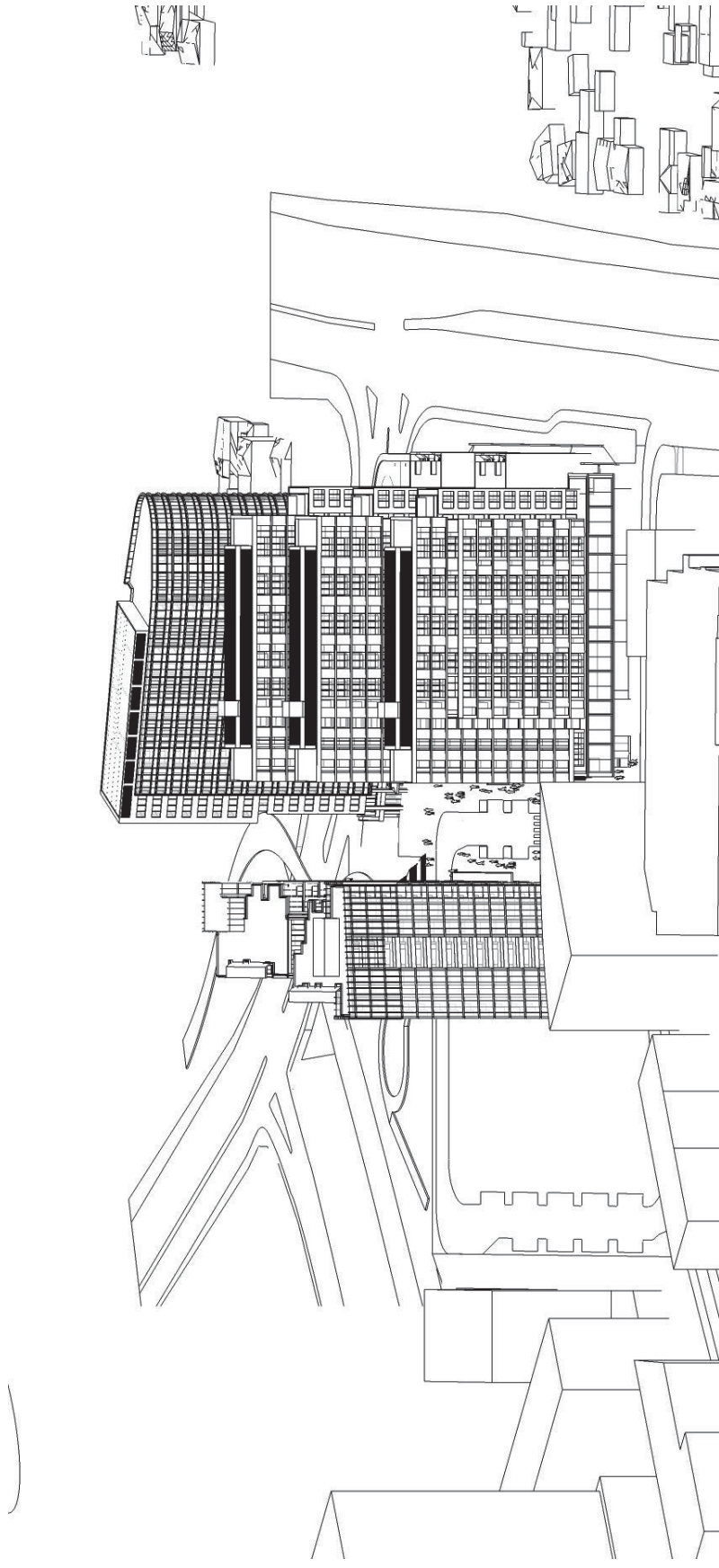


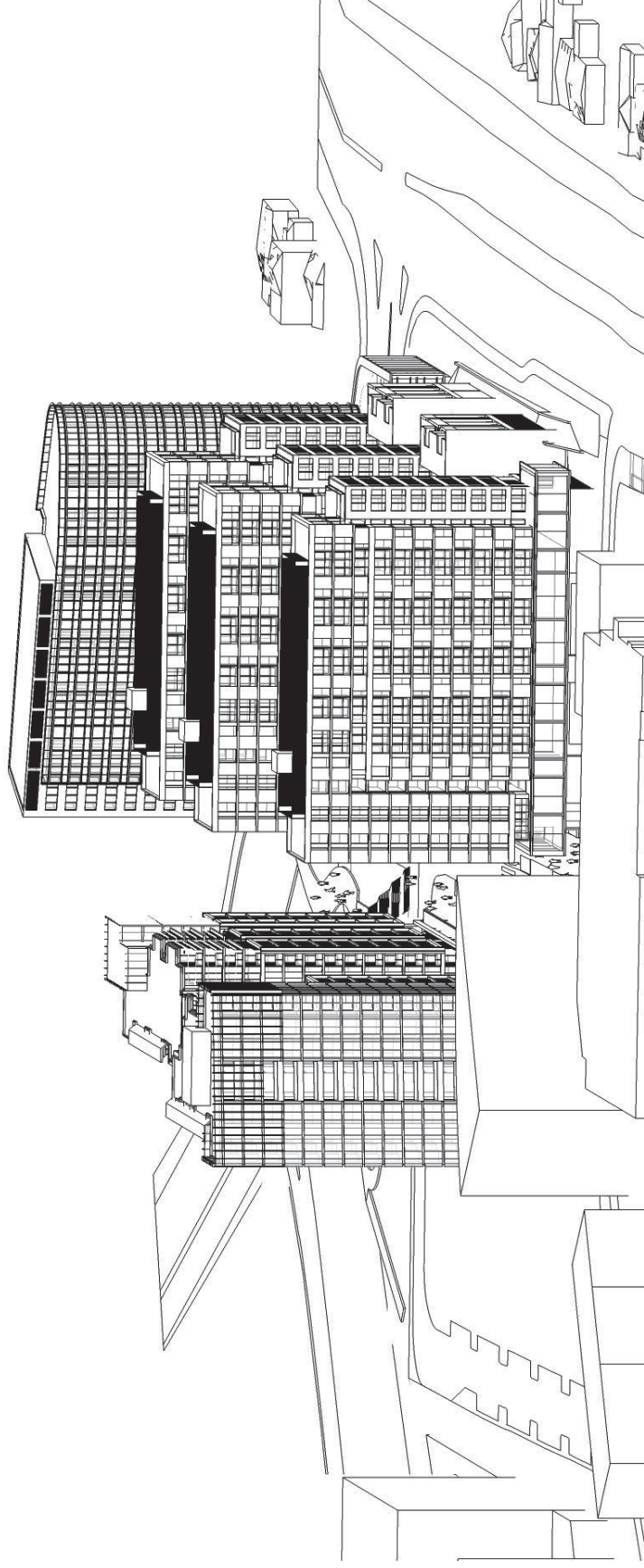








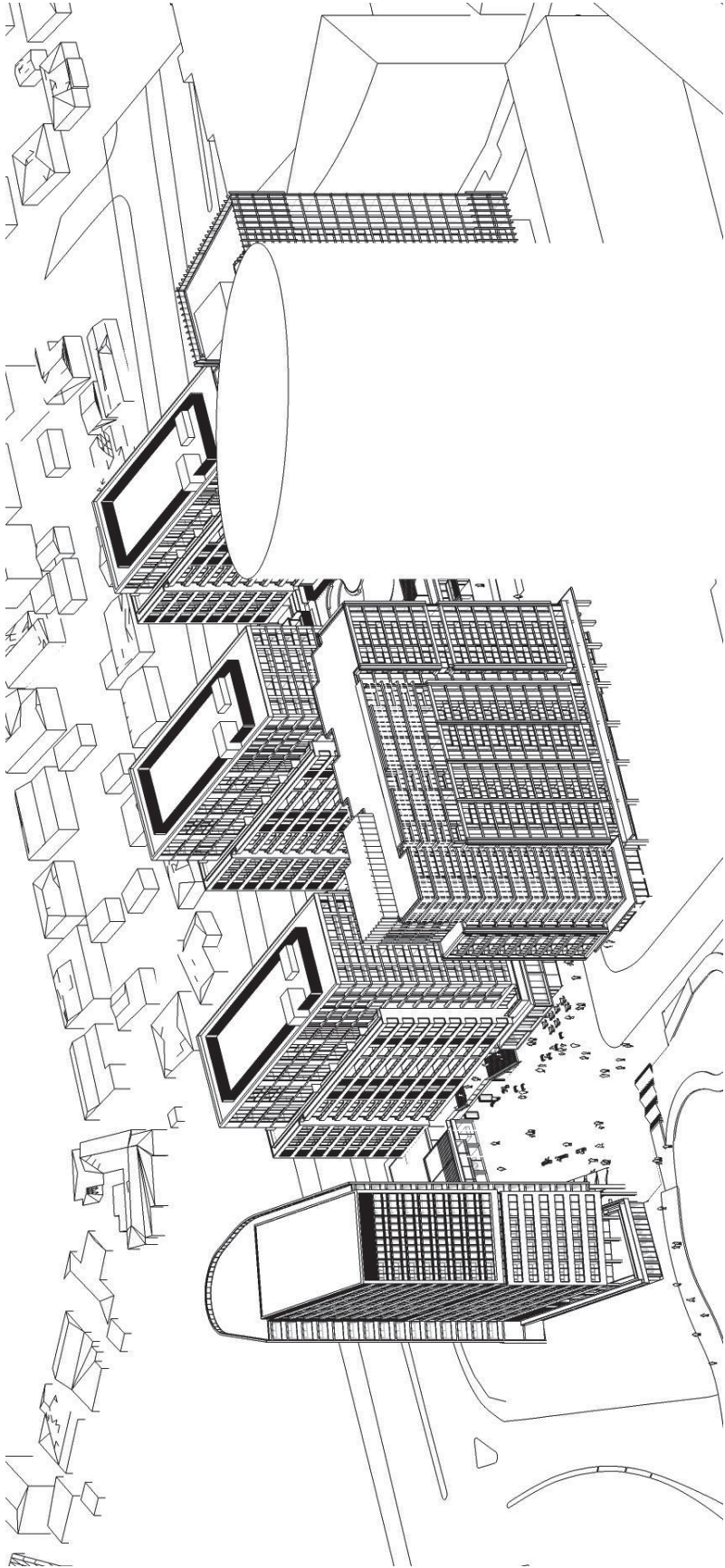


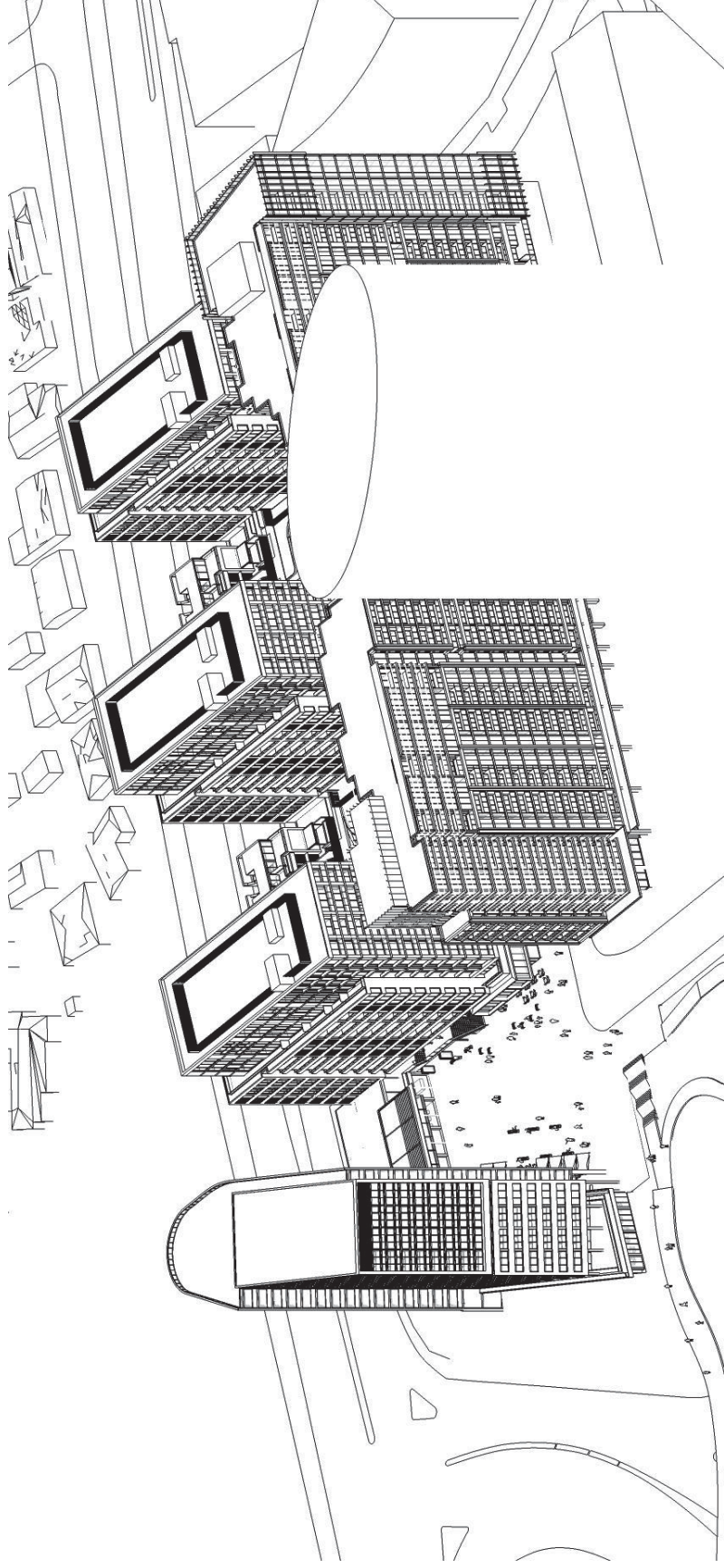


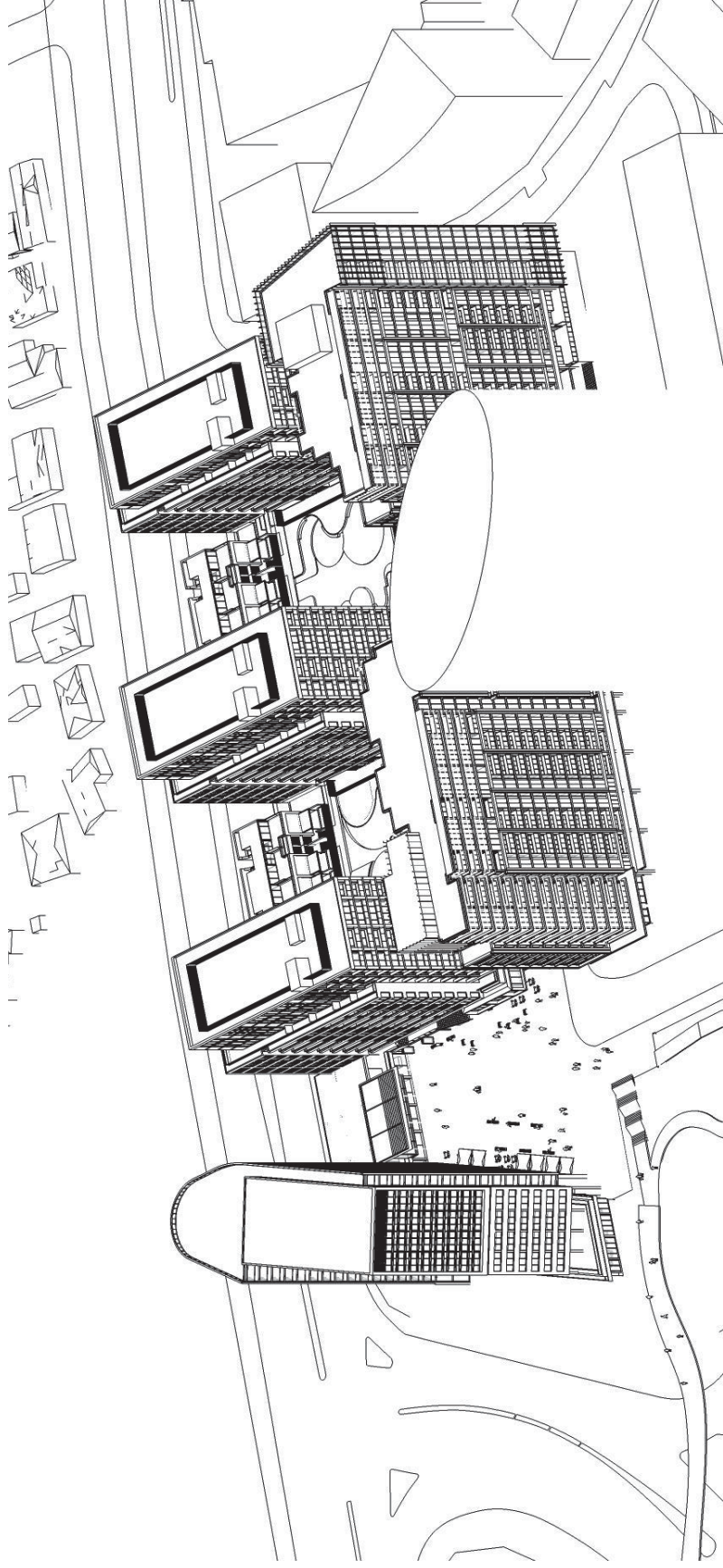
B.2 APPENDIX: VIEWS FROM THE SUN SEP/MARCH 21

The Table below reproduces for reference the detailed 'views from the sun' on a half hourly basis.

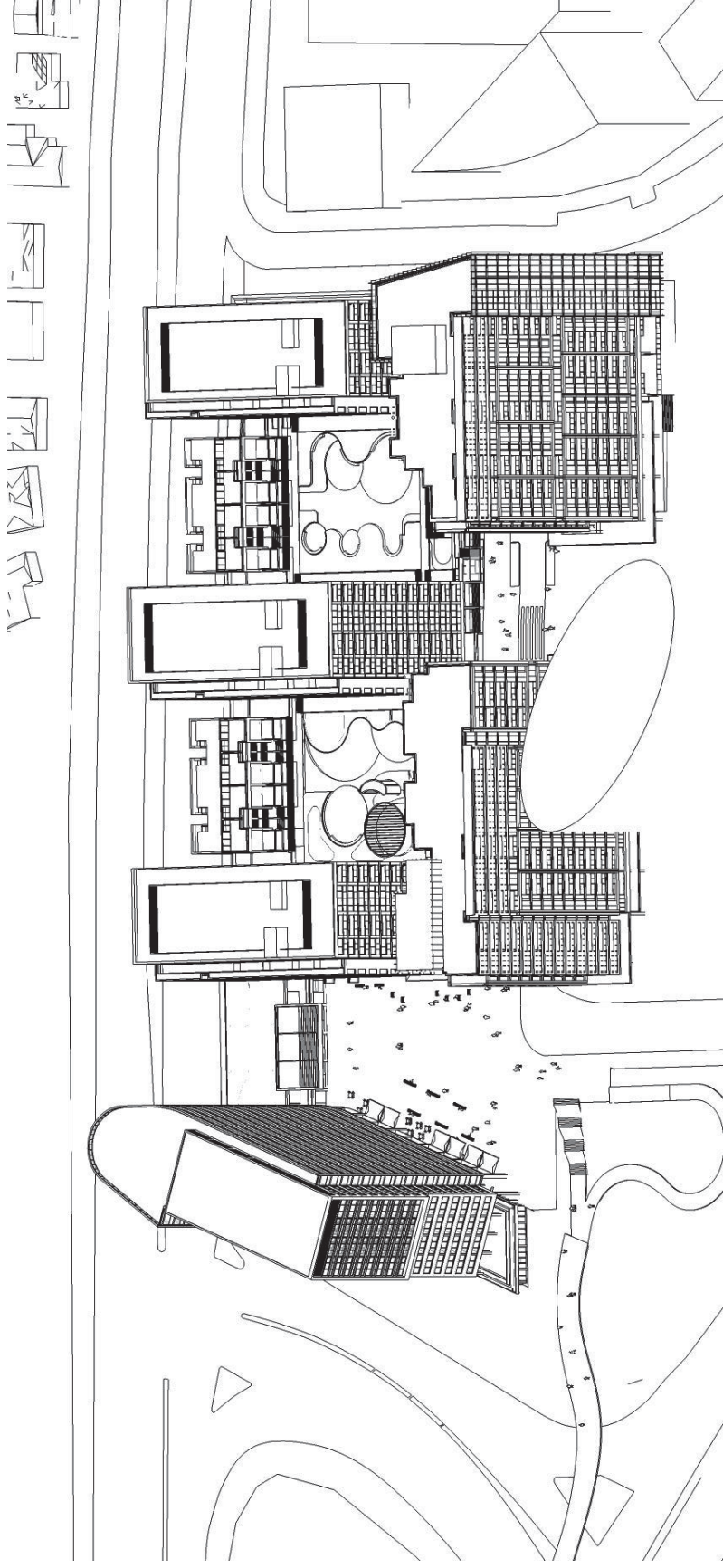
0800

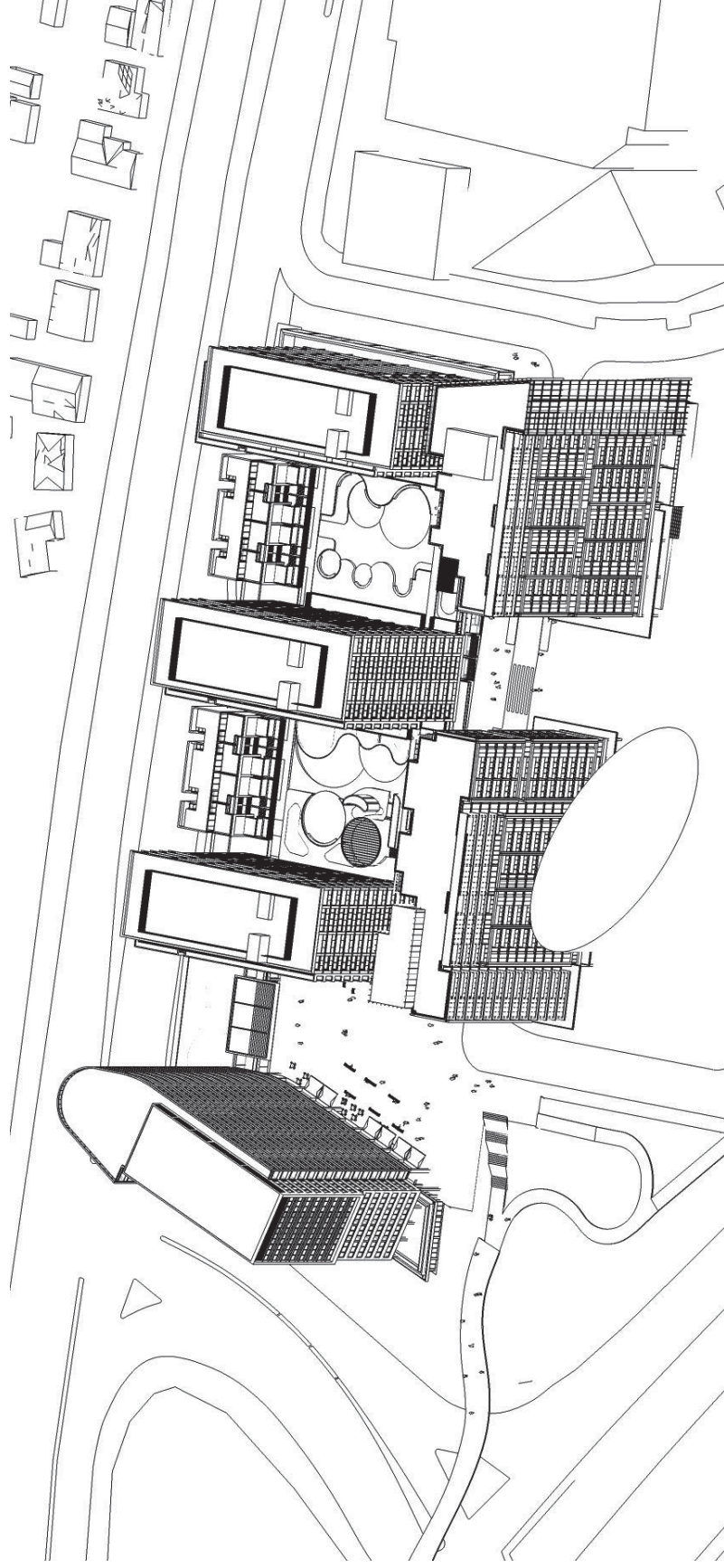


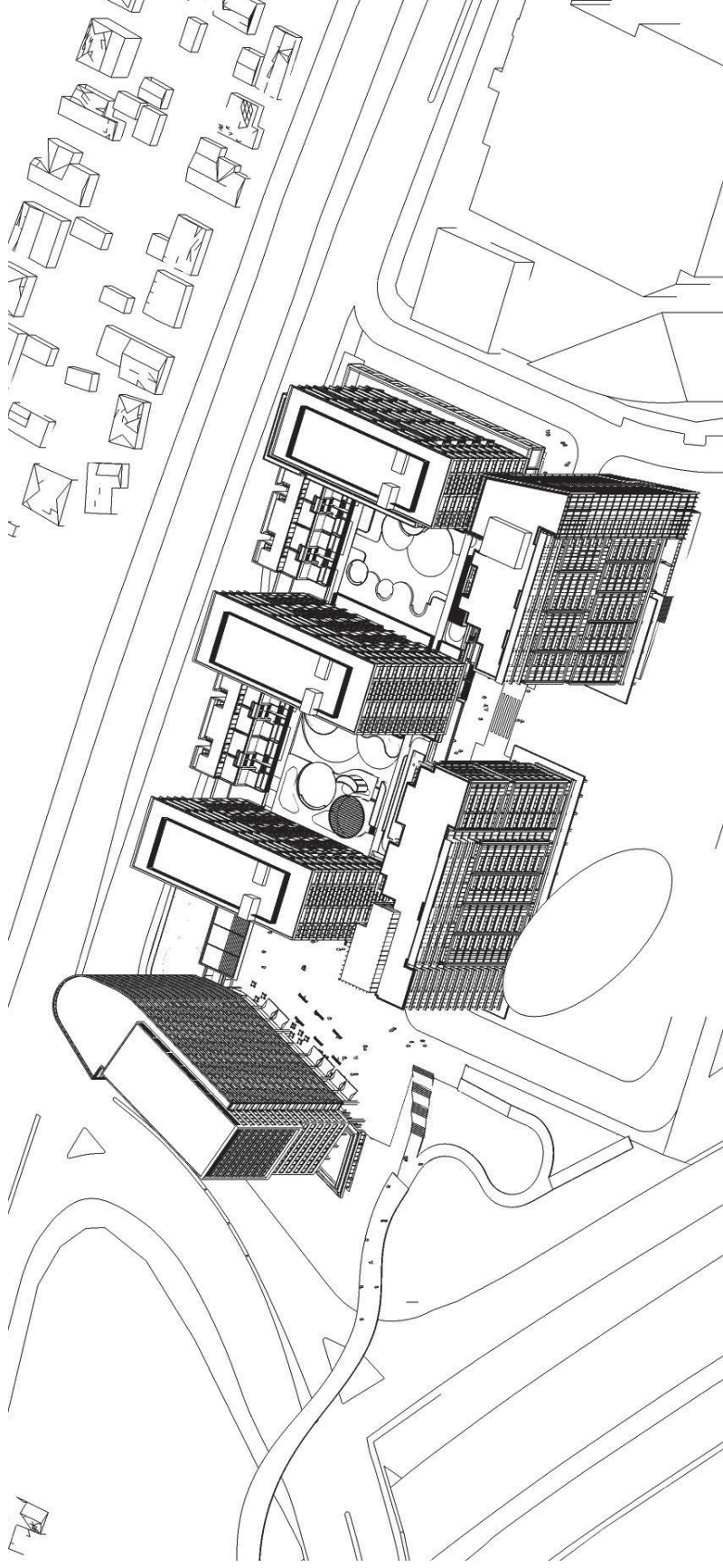


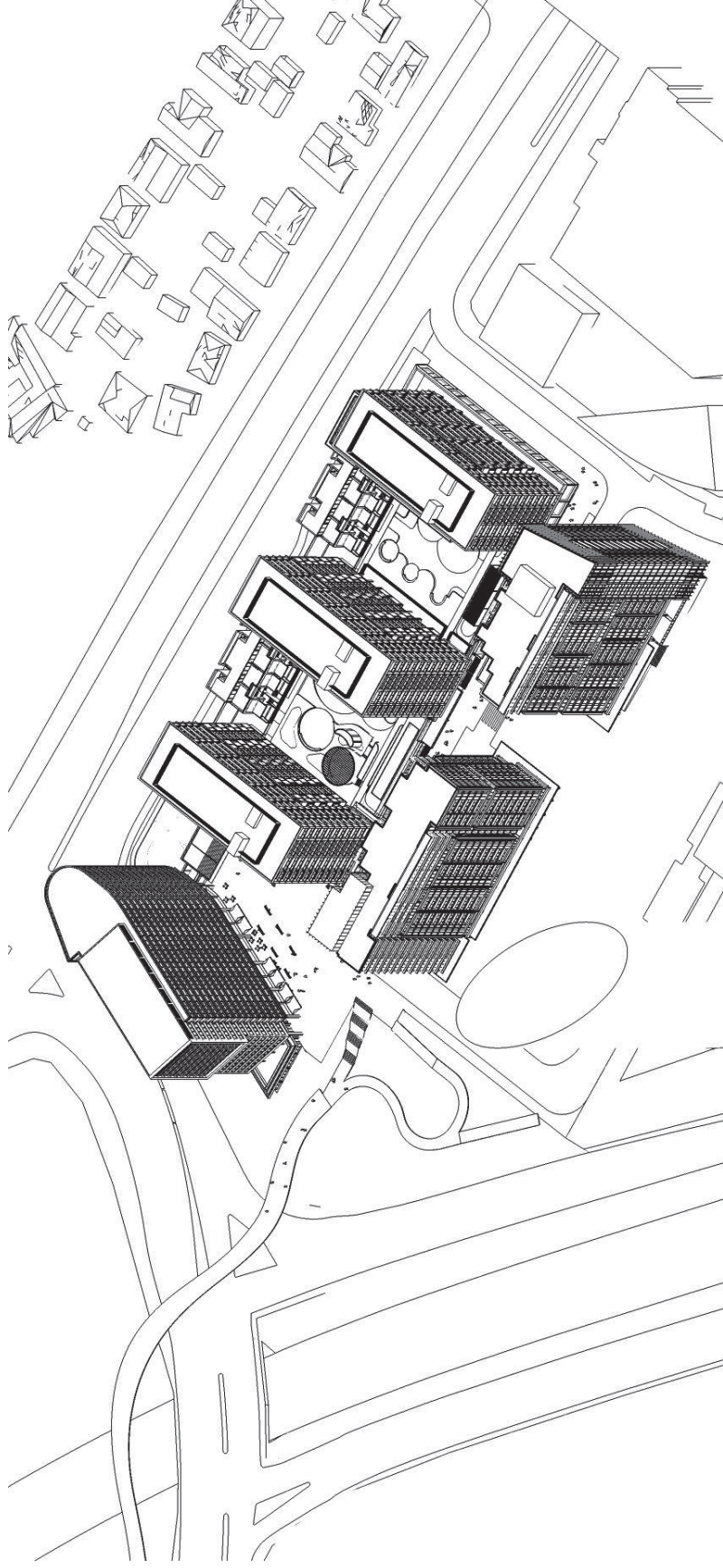


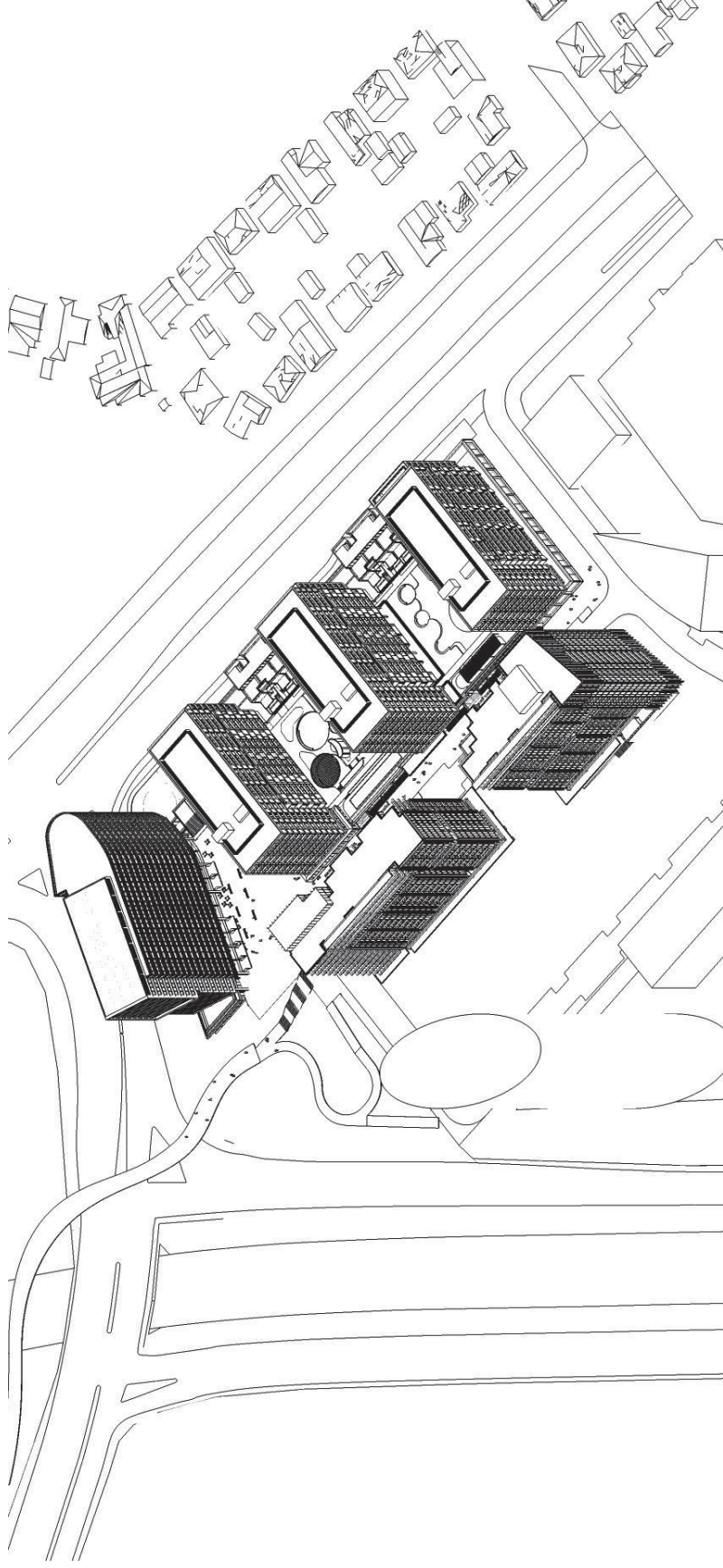


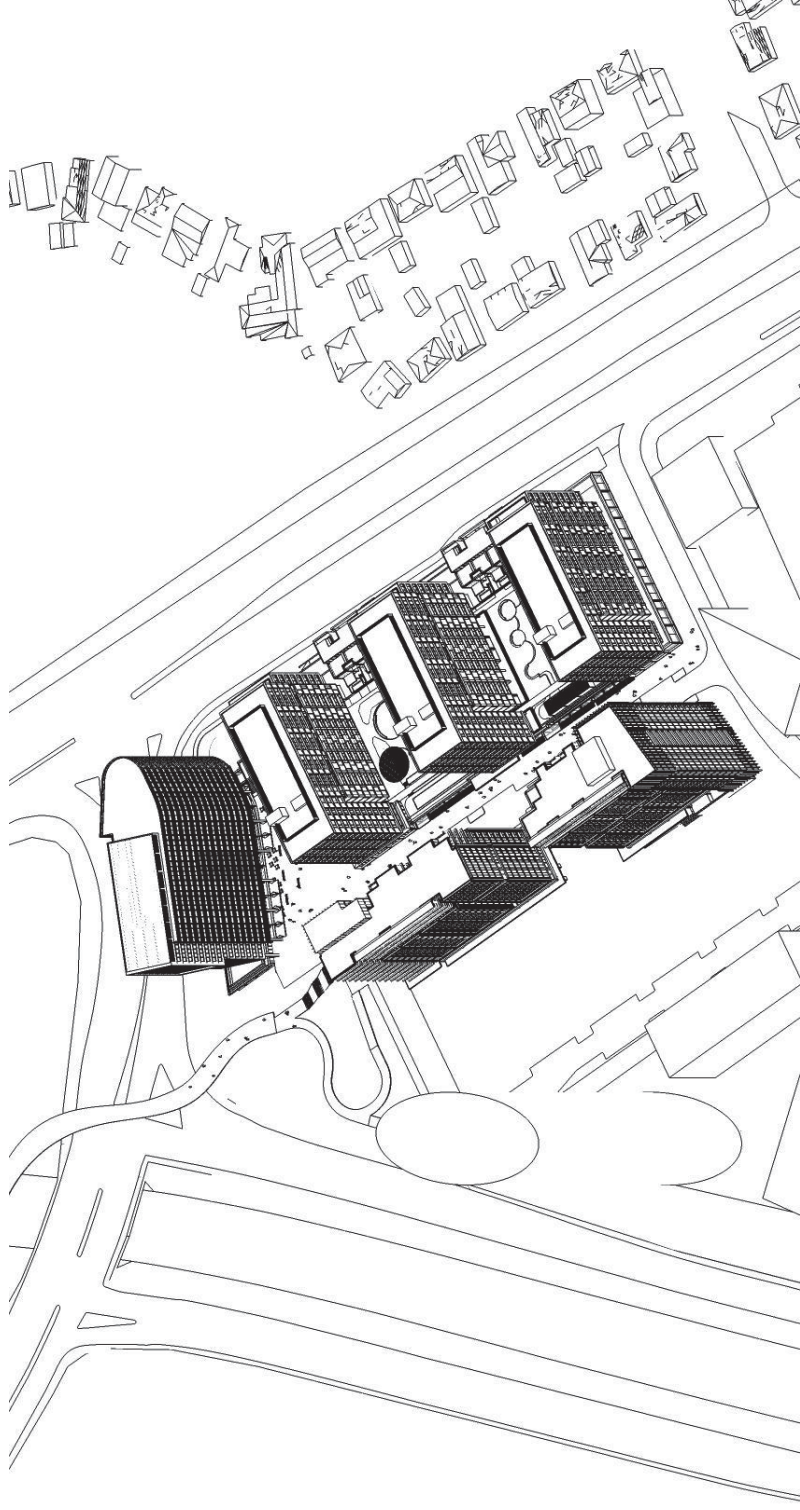


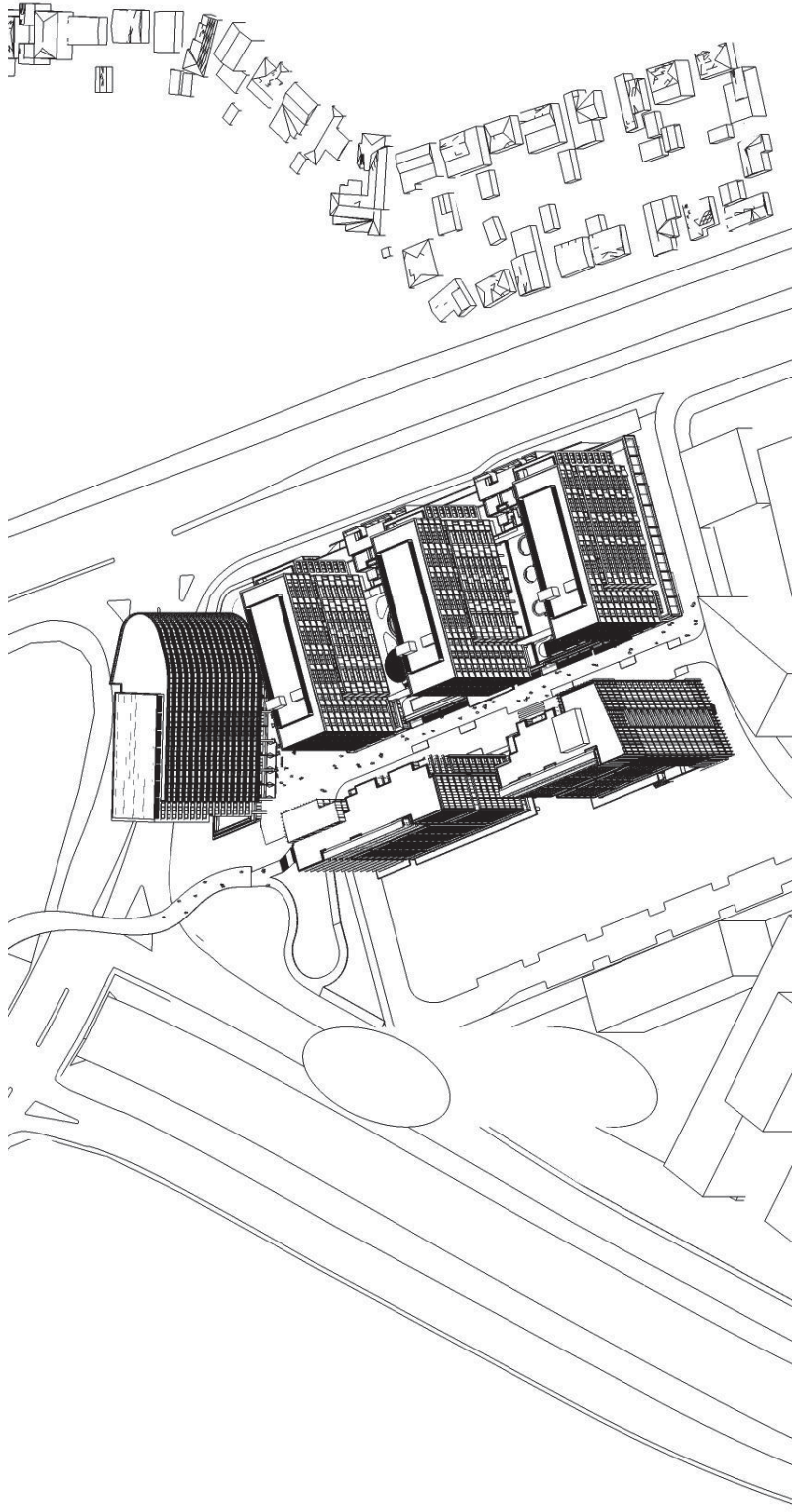


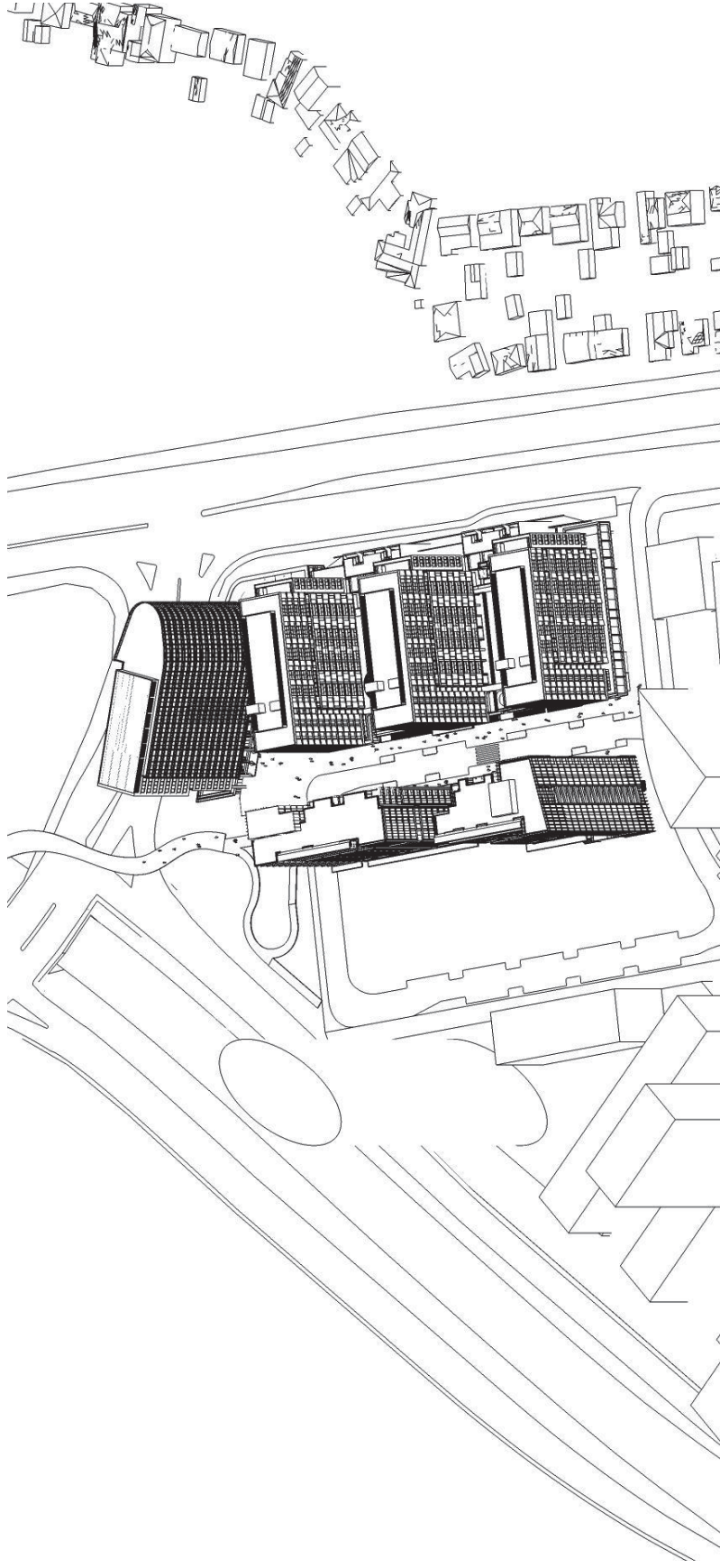


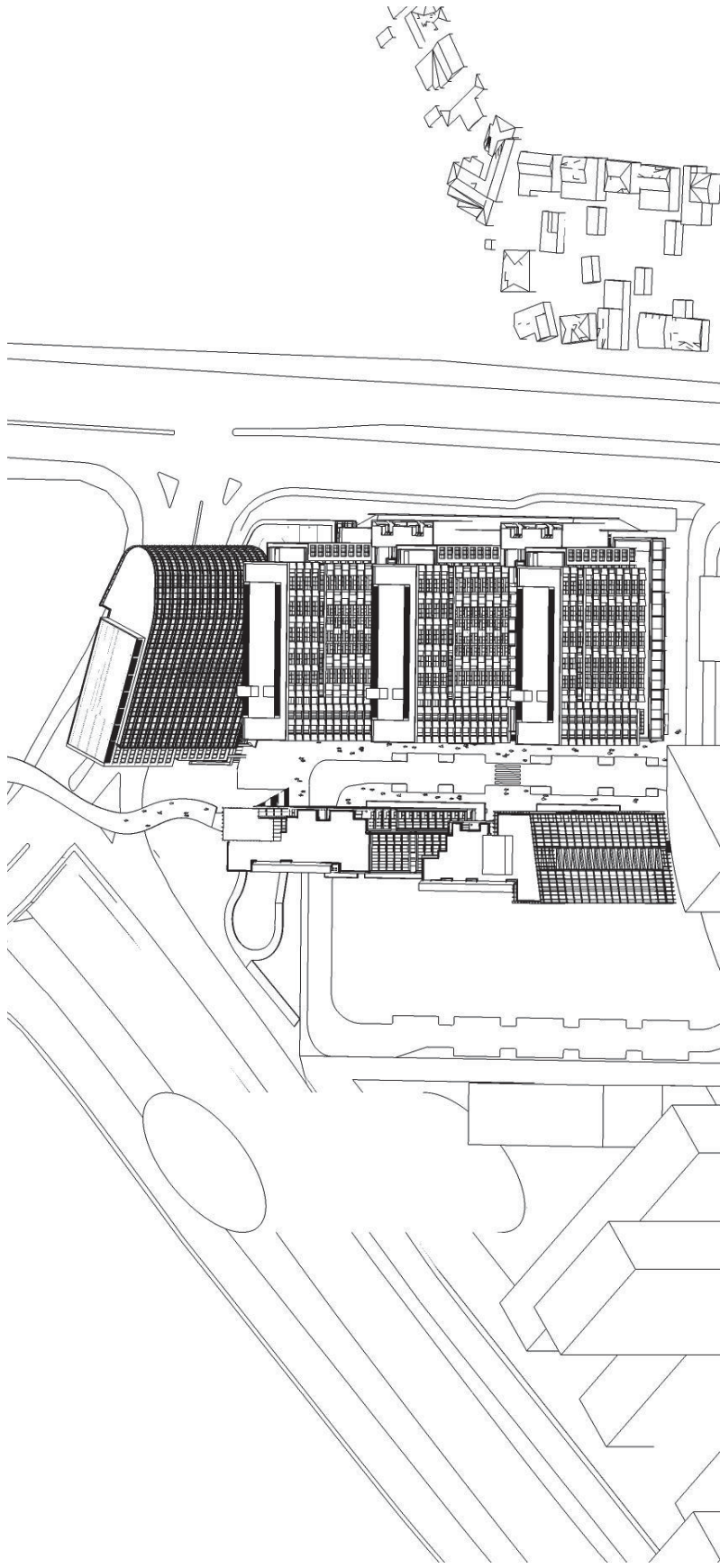


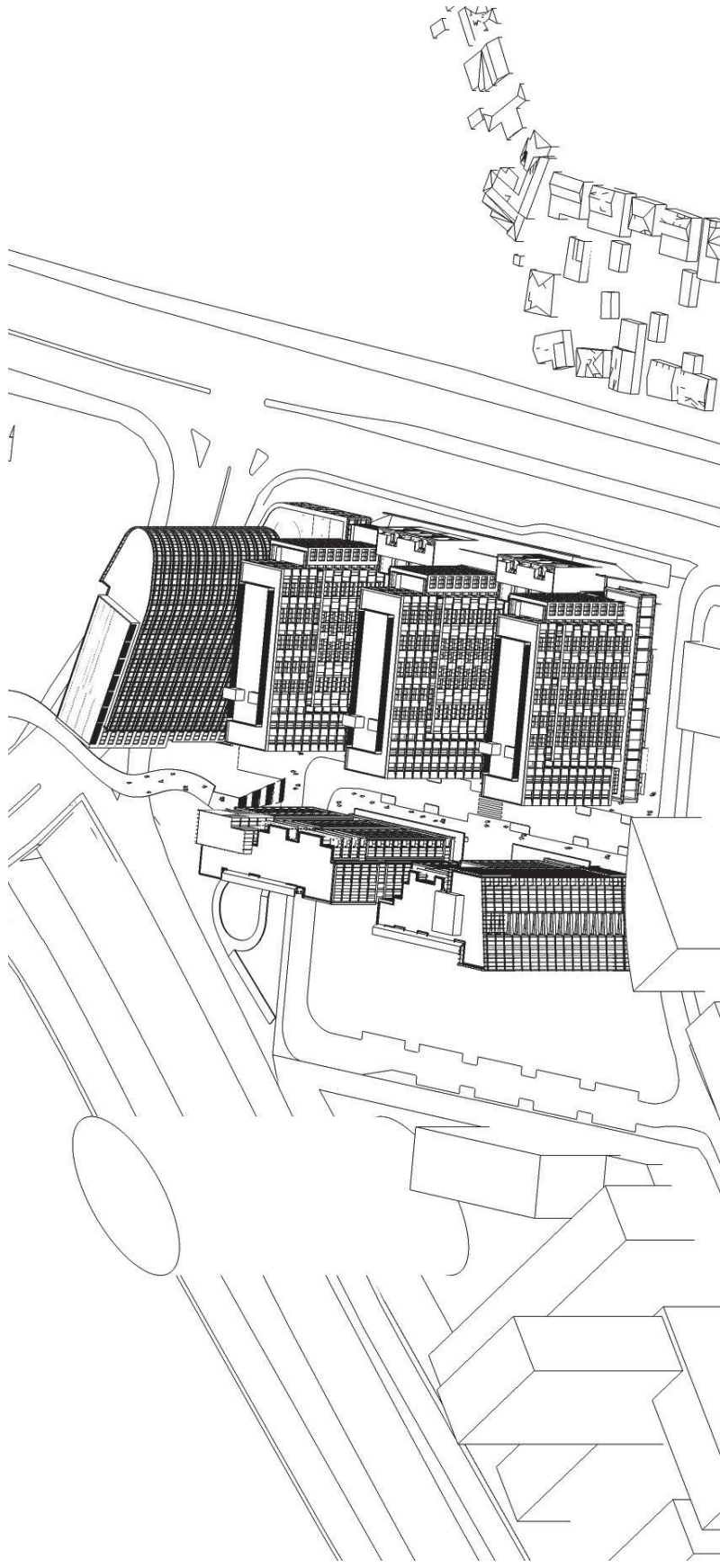


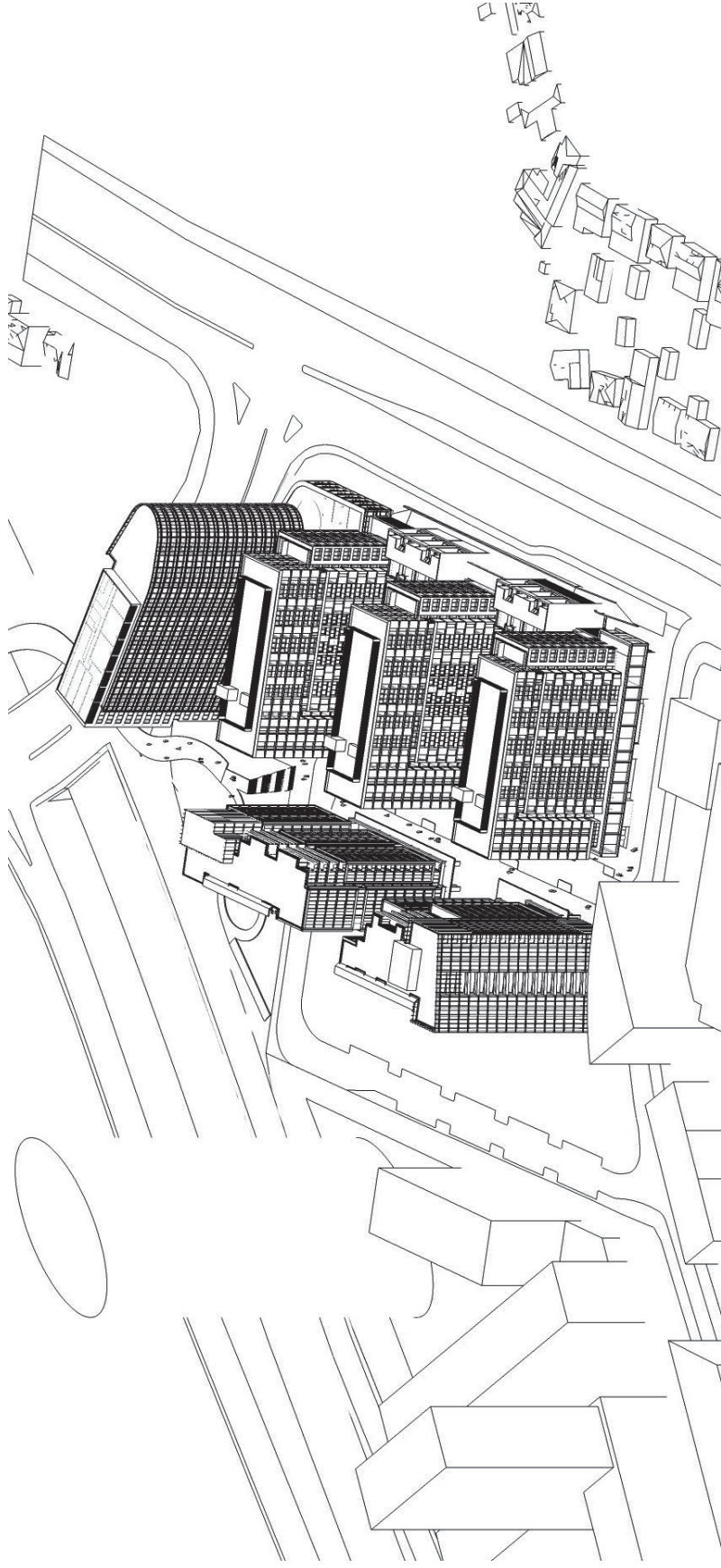


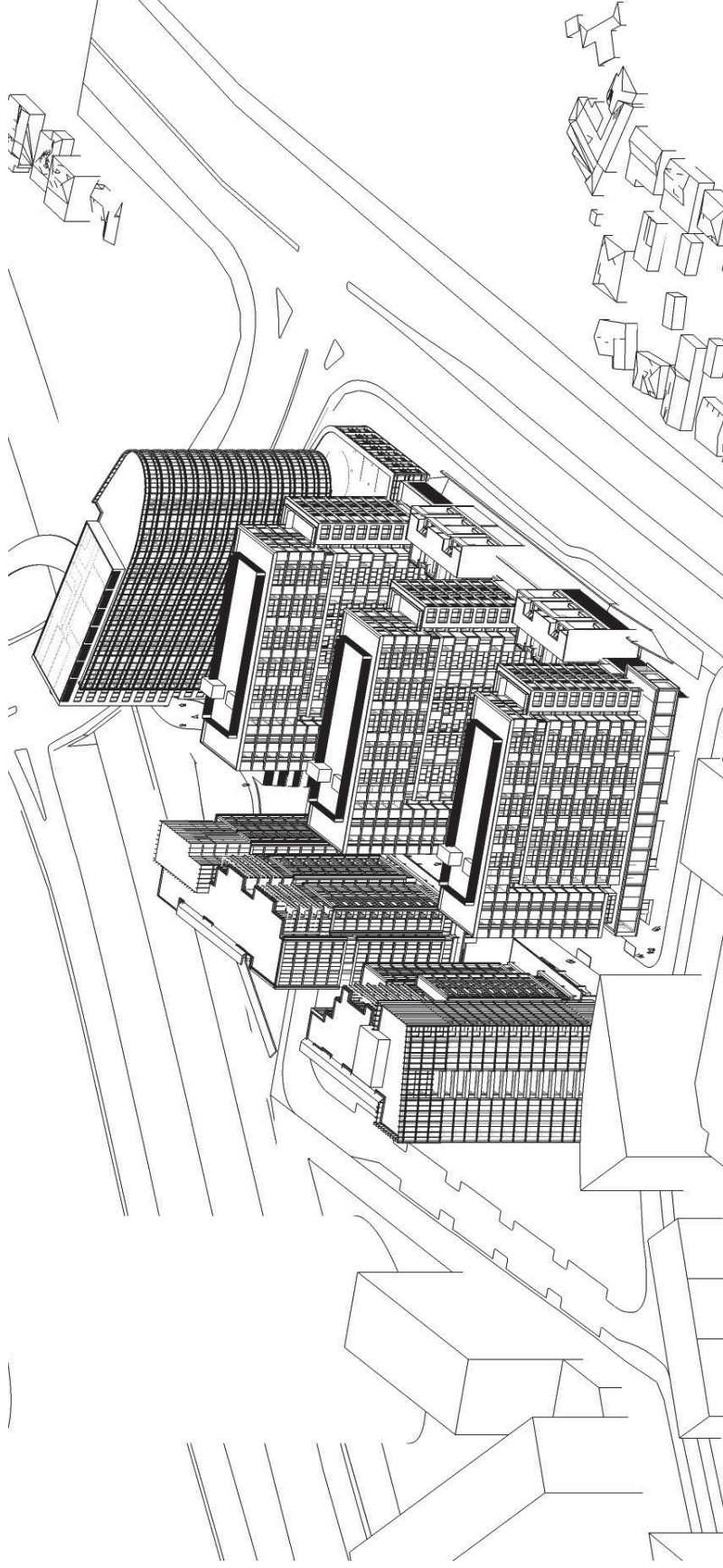


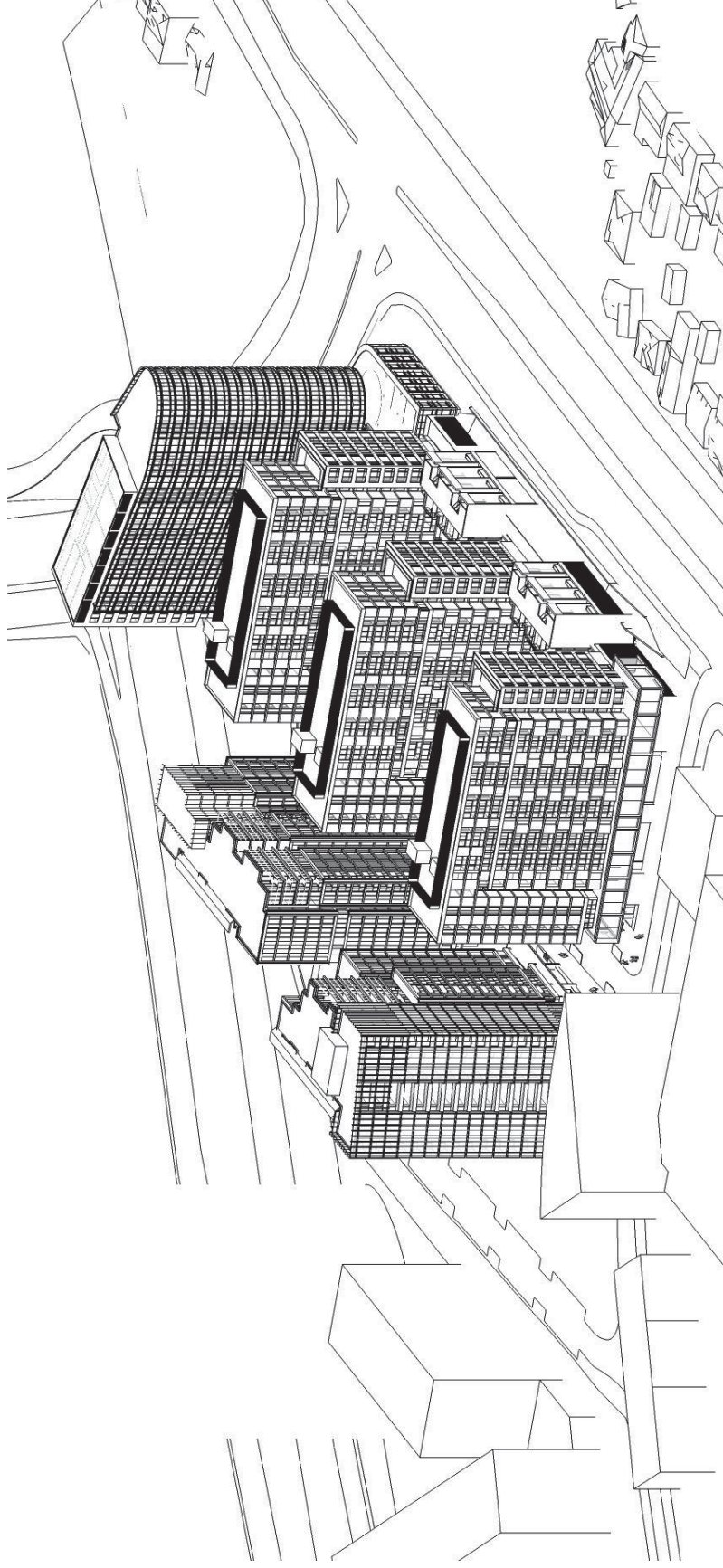












C.0 APPENDIX: DETAILED COMPLIANCE TABLE

The following table sets out in detail the solar access and ventilation status of each apartment.

KEY	
1	Direct sun to Living
B	Direct sun to Bedroom(s) only

LOT 104 BUILDING L1

Level	Solar access																Solar compliance						Private Open Space 9.3	Private Open Space 8.4	Notes	
	UNIT	8	830	9	920	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (3 hrs 8-4)	>2 hrs 9-3	>2 hrs 8-4 WG				>2 hrs 8-4
LEVEL 1	L1.201	0	0	0	0	W	W	W	W	W	W	1	1	1	1	1	1	1		YES					YES	
	L1.202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						YES	YES	
	L1.203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						YES	YES	
	L1.205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						YES	YES	
	L1.206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						YES	YES	
	L1.207	0	0	0	0	0	0	0	0	W	1	1	1	1	1	1	1	1		YES						YES
LEVEL 2	L1.208	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.209	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.210	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.211	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.212	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.301	0	0	0	B	B	1	1	1	1	1	1	1	1	1	1	1	1							YES	
LEVEL 3	L1.301	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1							YES	
	L1.302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.303	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.305	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.306	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.307	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
LEVEL 4	L1.308	0	0	0	0	0	0	0	0	W	1	1	1	1	1	1	1	1		YES						YES
	L1.309	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.310	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.311	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.312	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.313	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
LEVEL 5	L1.501	0	0	0	B	B	1	1	1	1	1	1	1	1	1	1	1	1							YES	
	L1.502	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1							YES	
	L1.503	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.505	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.506	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.507	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
LEVEL 6	L1.508	0	0	0	0	0	0	0	W	1	1	1	1	1	1	1	1	1		YES						YES
	L1.509	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.510	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.511	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.512	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.513	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
LEVEL 7	L1.601	0	0	0	B	B	1	1	1	1	1	1	1	1	1	1	1	1							YES	
	L1.602	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1							YES	
	L1.603	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.605	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.606	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.607	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
LEVEL 8	L1.608	0	0	0	0	0	0	0	W	1	1	1	1	1	1	1	1	1		YES						YES
	L1.609	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.610	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.611	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.612	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.613	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
LEVEL 9	L1.701	0	0	0	B	B	1	1	1	1	1	1	1	1	1	1	1	1							YES	
	L1.702	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1							YES	
	L1.703	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.705	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
	L1.707	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							YES	
LEVEL 10	L1.708	0	0	0	0	0	0	0	0	W	1	1	1	1	1	1	1	1		YES						YES
	L1.709	0	0	0	0	0	W	W	W	1	1	1	1	1	1	1	1	1							YES	
	L1.710	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.711	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.712	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
	L1.713	0	0	0	W	W	W	W	1	1	1	1	1	1	1	1	1	1							YES	
LEVEL 11	L1.801	0	0	0	0	B	B	1	1	1	1	1	1	1	1	1	1	1							YES	

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]



**ATTACHMENT B: SEPP 65/ADG SOLAR ACCESS PLANS, PREPARED BY TURNER
STUDIO**