

SOLAR ACCESS IMPACT ON ADJACENT PROPERTIES

APPENDIX M





Sydney Metro City & Southwest

Pitt Street South Over Station Development:

Solar Access Impact Analysis Report

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1.0 Purpose of this report

1.1 Background

This report supports a concept State Significant Development Application (concept SSD Application) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The concept SSD Application is made in accordance with Section 4.22 of the EP&A Act.

Sydney Metro is seeking to secure concept approval for a building envelope above the southern portal of Pitt Street Station, otherwise known as the over station development (OSD). The concept SSD Application seeks consent for a building envelope, maximum building height, land use options, pedestrian and vehicular access, circulation arrangements and associated car parking as well as the strategies and design parameters for the future detailed design of development.

Sydney Metro proposes to procure the construction of the OSD as part of an integrated station development package, which would result in the combined delivery of the station, OSD and public domain improvements. The station and public domain elements form part of a separate planning approval for Critical State Significant Infrastructure (CSSI) approved by DPE on 9 January 2017.

As the development is associated with railway infrastructure and is for residential or commercial premises with a Capital Investment Value of more than \$30 million, the project is a State Significant Development (SSD) pursuant to Schedule 1, Clause 19(2)(a) of the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). The full extent of the proposed development can also be considered to be SSD by virtue of Clause 8(2) of the SRD SEPP.

This report has been prepared to specifically respond to the Secretary's Environmental Assessment Requirements (SEARs) issued for the concept SSD Application for Pitt Street South on 30th November 2017 which state that the Environmental Impact Statement (EIS) is to address the following requirements:

Amenity- Solar Access Impact on Adjacent Properties

1.2 Overview of the Sydney Metro in its context

The New South Wales (NSW) Government is implementing *Sydney's Rail Future*, a plan to transform and modernise Sydney's rail network so that it can grow with the city's population and meet the needs of customers in the future. Sydney Metro is a new standalone rail network identified in *Sydney's Rail Future*.

Sydney Metro is Australia's biggest public transport project, consisting of Sydney Metro Northwest, which is due for completion in 2019 and Sydney Metro City & Southwest, which is due for completion in 2024.

Sydney Metro West is expected to be operational in the late 2020s (refer to **Figure 1**).



Figure 1: Sydney Metro alignment map

Sydney Metro City & Southwest includes the construction and operation of a new metro rail line from Chatswood, under Sydney Harbour through Sydney’s Central Business District (CBD) to Sydenham and on to Bankstown through the conversion of the existing line to metro standards.

The project also involves the delivery of seven new metro stations, including at Pitt Street. Once completed, Sydney Metro will have capacity for 30 trains an hour (one every two minutes) through the CBD in each direction - a level of service never seen before in Sydney.

On 9 January 2017, the Minister for Planning approved the Sydney Metro City & Southwest - Chatswood to Sydenham application lodged as a Critical State Significant Infrastructure project (reference SSI 15_7400), hereafter referred to as the CSSI Approval.

The CSSI Approval includes all physical work required to construct the CSSI, including the demolition of existing buildings and structures on each site. Importantly, the CSSI Approval also includes provision for the construction of below and above-ground structures and other components of the future integrated station development (including building infrastructure and space for future lift cores, plant rooms, access, parking and building services, as relevant to each site). The rationale for this delivery approach, as identified within the CSSI Application, is to enable the integrated station development to be more efficiently built and appropriately integrated into the metro station structure.

The EIS for the Chatswood to Sydenham component of the Sydney Metro City & Southwest project identified that the OSD would be subject to a separate assessment process.

Since the CSSI Approval was issued, Sydney Metro has lodged four modification applications to amend the CSSI Approval as outlined below:

- Modification 1- Victoria Cross and Artarmon Substation which involves relocation of the Victoria Cross northern services building from 194-196A Miller Street to 50 McLaren Street together with inclusion of a new station entrance at this location referred to as Victoria Cross North. 52 McLaren Street would also be used to support construction of these works. The modification also involves the relocation of the substation at Artarmon from Butchers Lane to 98 – 104 Reserve Road. This modification application was approved on 18 October 2017.
- Modification 2- Central Walk which involves additional works at Central Railway Station including construction of a new eastern concourse, a new eastern entry, and upgrades to suburban platforms. This modification application was approved on 21 December 2017.
- Modification 3 - Martin Place Station which involves changes to the Sydney Metro Martin Place Station to align with the Unsolicited Proposal by Macquarie Group Limited (Macquarie) for the development of the station precinct. The proposed modification involves a larger reconfigured station layout, provision of a new unpaid concourse link and retention of the existing MLC pedestrian link and works to connect into the Sydney Metro Martin Place Station. This modification application was approved on 22 March 2018.
- Modification 4 - Sydenham Station and Sydney Metro Trains Facility South which incorporated Sydenham Station and precinct works, the Sydney Metro Trains Facility South, works to Sydney Water's Sydenham Pit and Drainage Pumping Station and ancillary infrastructure and track and signalling works into the approved project. This modification application was approved on 13 December 2017.

Given the modifications, the CSSI Approval is now approved to operate to Sydenham Station and also includes the upgrade of Sydenham Station.

The remainder of the City & Southwest project (Sydenham to Bankstown) proposes the conversion of the existing heavy rail line and the upgrade of the existing railway stations along this alignment to metro standards. This portion of the project, referred to as the Sydenham to Bankstown Upgrade, is the subject of a separate CSSI Application (No. SSI 17_8256) for which an Environmental Impact Statement was exhibited between September and November 2017 and a Response to Submissions and Preferred Infrastructure Report was submitted to the NSW Department of Planning & Environment (DPE) in June 2018 for further exhibition and assessment.

1.3 Planning relationship between Pitt Street Station and the OSD

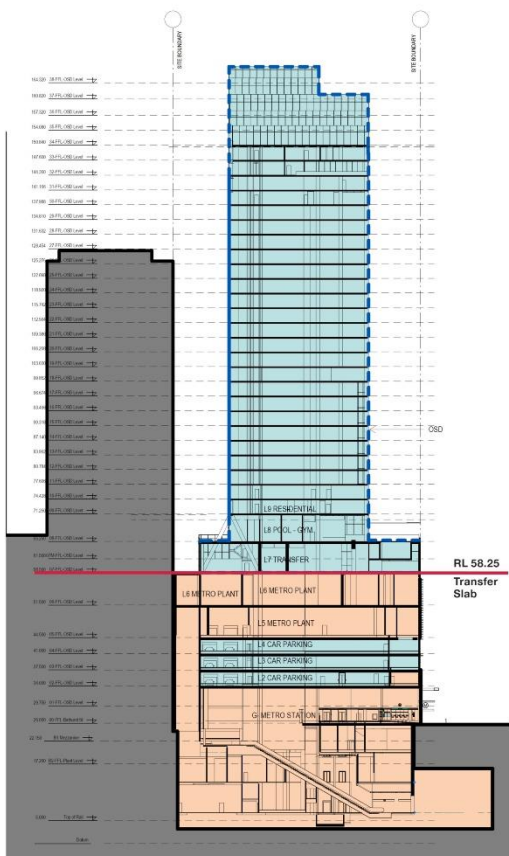
While the southern portal of Pitt Street Station and the OSD will form an integrated station development, the planning pathways under the *Environmental Planning and Assessment Act 1979* involve separate approval for each component of the development. In this regard, the approved station works (CSSI Approval) are subject to the provisions of Part 5.1 of the EP&A Act (now referred to as Division 5.2) and the OSD component is subject to the provisions of Part 4 of the EP&A Act.

For clarity, the approved station works under the CSSI Approval included the construction of below and above ground structures necessary for delivering the station and also enabling construction of the integrated OSD. This included but is not limited to:

- demolition of existing development

- excavation
- station structure including concourse and platforms
- lobbies
- retail spaces within the station building
- public domain improvements
- station portal link (between the northern and southern portals of Pitt Street Station)
- access arrangements including vertical transport such as escalators and lifts
- structural and service elements and the relevant space provisioning necessary for constructing OSD, such as columns and beams, space for lift cores, plant rooms, access, parking, retail and building services.

The vertical extent of the approved station works above ground level is defined by the 'transfer slab' level (which for Pitt Street South is defined by RL 58.25), above which would sit the OSD. This delineation is illustrated in **Figure 2**: below.



Section North-South - CSSI Podium Approval below RL 58.25

Figure 2: Delineation between station and OSD

The CSSI Approval also establishes the general concept for the ground plane of Pitt Street Station including access strategies for commuters and pedestrians. In this regard, pedestrian access to the station would be from Bathurst Street and the OSD lobby would be accessed from Pitt Street.

Since the issue of the CSSI Approval, Sydney Metro has undertaken sufficient design work to determine the space planning and general layout for the station and identification of those spaces

within the station area that would be available for the OSD. In addition, design work has been undertaken to determine the technical requirements for the structural integration of the OSD with the station. This level of design work has informed the concept proposal for the OSD. It is noted that ongoing design development of the works to be delivered under the CSSI Approval would continue with a view to developing an Interchange Access Plan (IAP) and Station Design Precinct Plan (SDPP) for Pitt Street Station to satisfy Conditions E92 and E101 of the CSSI Approval.

The public domain improvement works around the site would be delivered as part of the CSSI Approval.

1.4 The Site

The Pitt Street South OSD site is located near the corner of Pitt Street and Bathurst Street, comprising four individual allotments but excluding the Edinburgh Castle Hotel, above the southern portal of the future Pitt Street Station. The context of the site is demonstrated at **Figure 3** below.

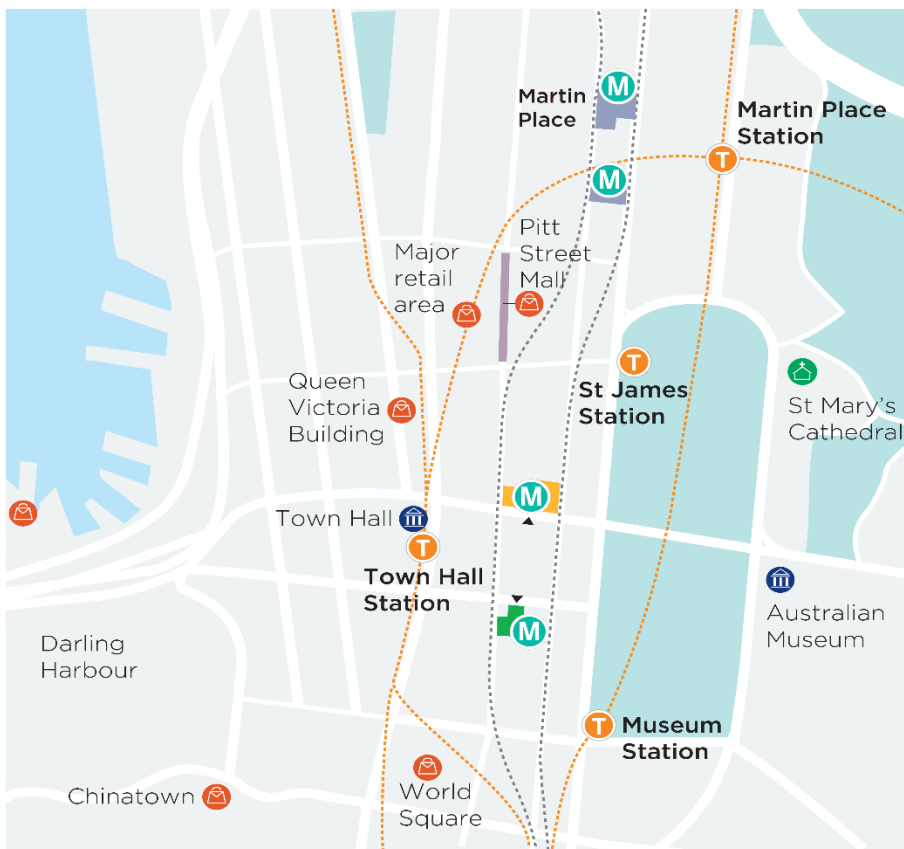


Figure 3: Pitt Street Station location plan

The site is located in the City of Sydney Local Government Area. The site (refer to **Figure 4** below) is irregular in shape, has a total area of approximately 1,708 square metres and has street frontages of approximately 32 metres to Pitt Street and 24 metres to Bathurst Street.

The Pitt Street South site comprises a number of individual properties which front Bathurst Street and Pitt Street. Specifically, the site comprises the following:

- 125-129 Bathurst Street, Sydney (Lot 1 in DP60293)
- 131-135 Bathurst Street, Sydney (Lot 1 in DP59101)
- 296-300 Pitt Street, Sydney (Lot 1 in DP436359)

- 302 Pitt Street, Sydney (Lot 1 in DP62668)

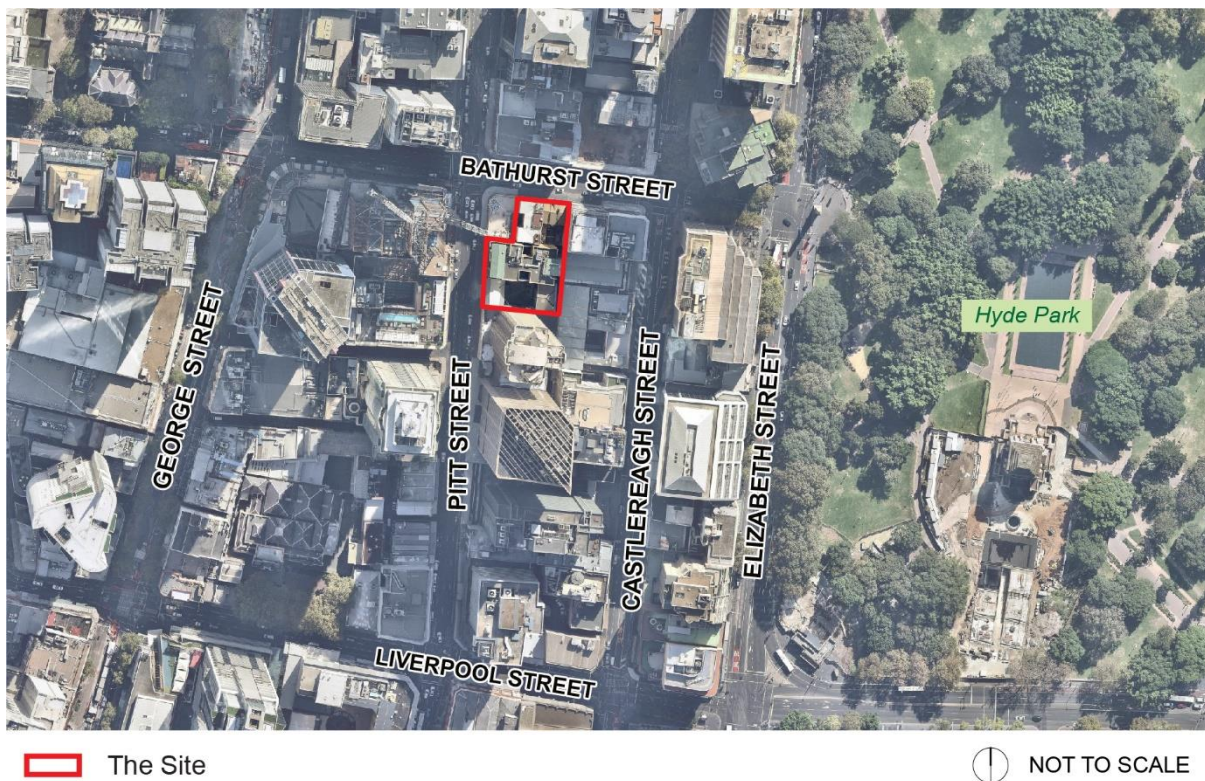


Figure 4: Aerial photo of Pitt Street South

1.5 Overview of the proposed development

This concept SSD Application comprises the first stage of the Pitt Street South OSD project. It will be followed by a detailed SSD Application for the design and construction of the OSD to be lodged by the successful contractor who is awarded the contract to deliver the integrated station development.

This concept SSD Application seeks approval for the planning and development framework and strategies to inform the future detailed design of the OSD. It specifically seeks approval for the following:

- a building envelope
- a maximum envelope height of Relative Level (RL 171.6) which equates to approximately 35 storeys, including the podium height of RL 71 which equates to approximately 8 storeys above ground
- use for the OSD component of the development for uses, subject to further detailed applications, which could include:
 - residential accommodation; or
 - commercial premises
 - use of the conceptual OSD space provisioning within the footprint of the CSSI Approval (both above and below ground), including the OSD lobby areas, podium car parking, storage facilities, services and back-of-house facilities
- car parking for a maximum of 34 spaces located across three levels of the podium

- loading, vehicular and pedestrian access arrangements from Pitt Street
- strategies for utilities and service provision
- strategies for the management of stormwater and drainage
- a strategy for the achievement of ecologically sustainable development
- indicative future signage
- a strategy for public art
- a design excellence framework
- the future subdivision of parts of the OSD footprint (if required)

As this concept SSD Application is a staged development pursuant to section 4.22 of the EP&A Act, future approval would be sought for detailed design and construction of the OSD. Concept indicative designs showing potential residential and commercial building form outcomes at the site, have been provided as part of this concept SSD Application at Appendix E and Appendix F, respectively.

Pitt Street Station is to be a key station on the future Sydney Metro network, providing access to the Sydney CBD. The proposal combines the metro station with an OSD component. The OSD would assist in strengthening the role of Central Sydney as the key centre of business in Australia and would contribute to the diversity, amenity and sustainability of the CBD.

It is noted that Pitt Street Station northern portal OSD is subject to a separate application, and does not form part of this concept SSD Application.

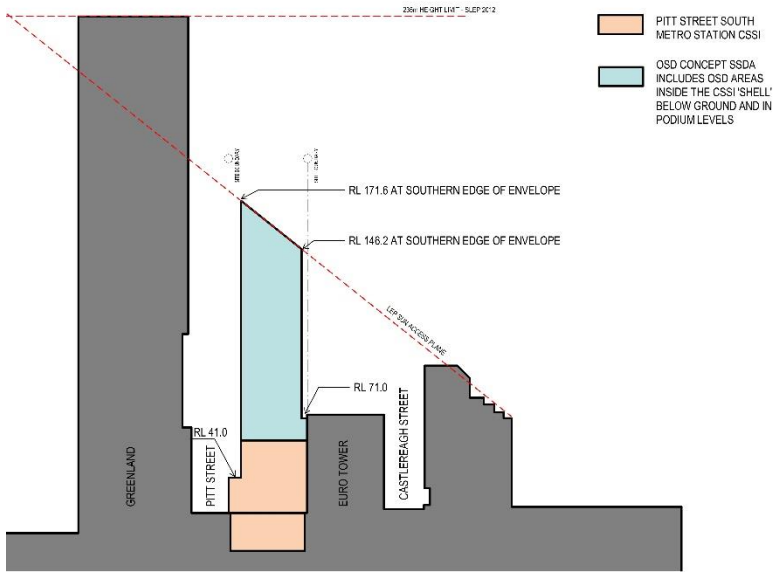


Figure 5: Pitt Street South OSD envelope, including OSD components (Blue) and station box (Orange)

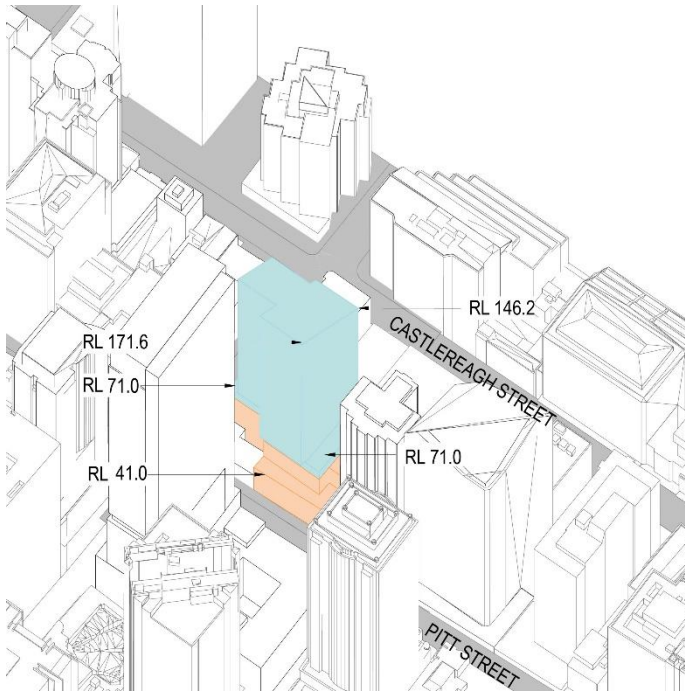


Figure 6: Pitt Street South OSD axonometric diagram, as seen from the south-west

1.6 Staging and framework for managing environmental impacts

Sydney Metro proposes to procure the delivery of the Pitt Street South integrated station development in one single package, which would entail the following works:

- station structure
- station fit-out, including mechanical and electrical
- OSD structure
- OSD fit-out, including mechanical and electrical.

Separate delivery packages are also proposed by Sydney Metro to deliver the excavation of the station boxes/shafts ahead of the integrated station development delivery package, and line-wide systems (e.g. track, power, ventilation) and operational readiness works prior to the Sydney Metro City & Southwest metro system being able to operate.

Three possible staging scenarios have been identified for delivery of the integrated station development:

1. Scenario 1 – the station and OSD are constructed concurrently by constructing the transfer slab first and then building in both directions. Both the station and OSD would be completed in 2024.
2. Scenario 2 – the station is constructed first and ready for operation in 2024. OSD construction may still be incomplete or soon ready to commence after station construction is completed. This means that some or all OSD construction is likely to still be underway upon opening of the station in 2024.
3. Scenario 3 – the station is constructed first and ready for operation in 2024. The OSD is built at a later stage, with timing yet to be determined. This creates two distinct construction periods for the station and OSD.

Scenario 1 represents Sydney Metro's preferred option as it would provide for completion of the full integrated station development and therefore the optimum public benefit at the site at the earliest date possible (i.e. on or near 2024 when the station is operational). However, given the delivery of the OSD could be influenced by property market forces, Scenarios 2 or 3 could also occur, where there is a lag between completion of the station component of the integrated station development (station open and operational), and a subsequent development.

The final staging for the delivery of the OSD would be resolved as part of the detailed SSD Application(s).

For the purposes of providing a high level assessment of the potential environmental impacts associated with construction, the following have been considered:

- Impacts directly associated with the OSD, the subject of this SSD Application
- Cumulative impacts of the construction of the OSD at the same time as the station works (subject of the CSSI Approval)

Given the integration of the delivery of the Sydney Metro City & Southwest metro station with an OSD development, Sydney Metro proposes the framework detailed in Figure 7 to manage the design and environmental impacts, consistent with the framework adopted for the CSSI Approval.

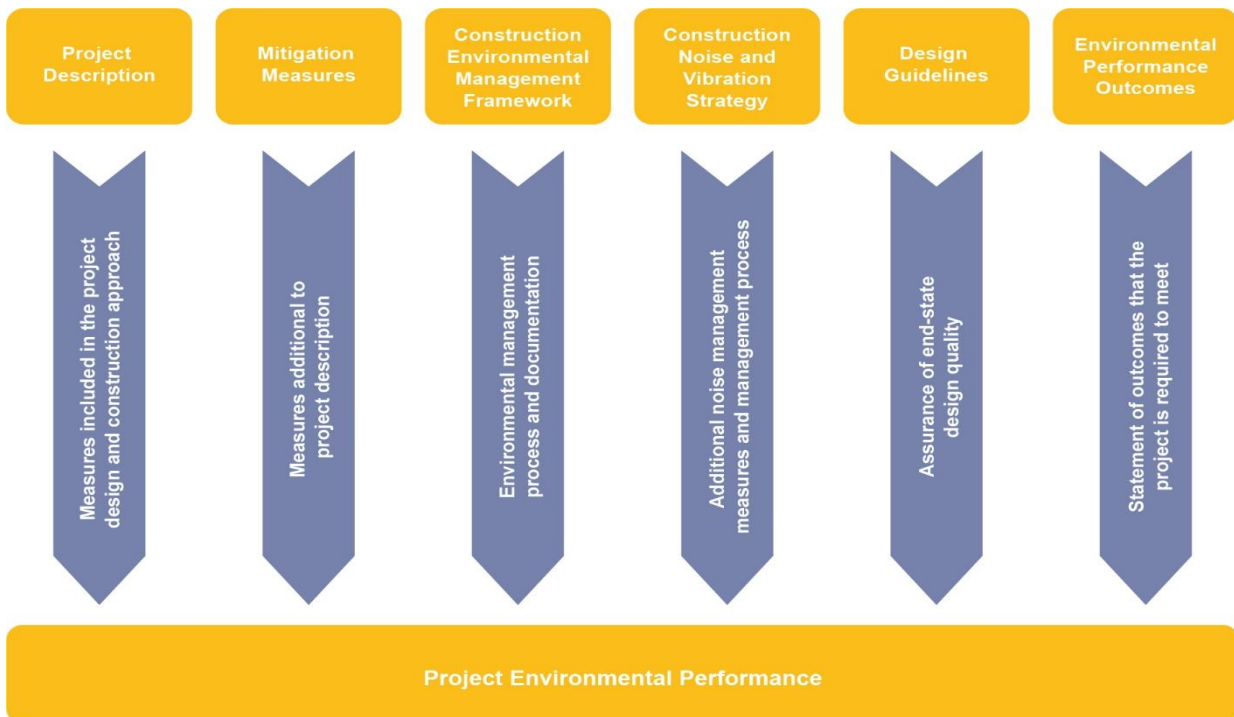


Figure 7: Project approach to environmental mitigation and management

Figure 7: Project approach to environmental mitigation and management

Sydney Metro proposes to implement a similar environmental management framework where the integrated delivery of the CSSI station works and the OSD occur concurrently. This would ensure a consistent approach to management of design interface and construction-related issues.

Sydney Metro proposes this environmental management framework would apply to the OSD until completion of the station and public domain components of the integrated station development delivery contract (i.e. those works under the CSSI Approval). Should the OSD be constructed beyond the practical completion and opening of the station, standard practices for managing construction related environmental impacts would apply in accordance with the relevant guidelines and Conditions of Approval for the detailed SSD Application(s).

2.0 Preliminaries: Overshadowing impacts

2.1 I provide this report as an expert opinion, relating to potential overshadowing impacts on neighboring residential dwellings by the proposed development at 125 - 129 and 131 - 135 Bathurst Street and 296 - 300 and 302 Pitt Street Sydney.

The design I examine is a detailed 'proof-of-concept'. This proposed envelope is based on planning, urban design and building design considerations, as well as the amenity parameters that are the subject of this report. Where relevant, I comment on those additional considerations.

2.2 My qualifications and experience are included at 3.0 Credentials.

2.3 The documentation on which I rely is set out in 4.0 Documents.

2.4 Overshadowing. I have undertaken an independent analysis of overshadowing impacts on identified nearby residential buildings:

Century Tower Princeton Apartments

The *Greenland Centre* under construction will contain residential uses, but is located due east of the subject site in a manner which is not adversely affected. Other buildings in the vicinity, which may receive some additional shadowing by the proposed building envelope, are identified as being commercial, retail or hotel uses, and do not enjoy the protection of a control for overshadowing.

3.0 Documents

4.1 I base my report on

- SEARs - Pitt Street South (Final) 30 November 2017.pdf
- Plans etc Century Tower dated 1/9/97 scanned as
 - 1994_0286-11.pdf
 - 1994_0286-01.pdf
 - 1994_0286-02.pdf
 - 1994_0286-03.pdf
 - 1994_0286-04.pdf
 - 1994_0286-05.pdf
 - 1994_0286-06.pdf
 - 1994_0286-07.pdf
 - 1994_0286-08.pdf
 - 1994_0286-09.pdf
 - 1994_0286-10.pdf
 - 10-35.JPG
 - 36-41.JPG
 - 36-41.PNG
 - 42-47.JPG
 - L48.JPG
- Plans, etc Princeton Apartments dated 10/10/94 scanned as
 - 22(Levels 26 and 27-41 Floor Plans 3).pdf
 - 9(Levels 9 and 10-25 Floor Plans).pdf
- Digital 3D models in .skp file format.

4.2 I have visited the site.

4.0 Overshadowing Analysis

5.1 Methodology

5.1.1 My analysis of overshadowing has been carried out by use of a 3D digital model in the *Trimble SketchUp* software package. This model analysis is effectively identical to that normally undertaken for solar access compliance of a proposed multi-residential building under the Apartment Design Guide.

5.1.2 The model was prepared by the architects. The existing and proposed building models are inserted into a context of surrounding buildings derived from the so-called 'city model', approved plans obtained from the Council, and survey data supplemented by plans from marketing material.

I particularly note that the resulting composite model includes the Greenland Centre at Bathurst Street, presently under construction.

5.1.3 I have undertaken a summary check of the topographical and building dimensions of the 3D digital model by reference to figured dimensions from the plans and sections. I cannot independently warrant other model dimensions, but I feel confident to rely on the general accuracy of the modelling.

5.1.4 I have independently geolocated the model, and verified the direction of True North by online reference to the cadastral grid north.

5.1.5 My detailed analysis relies primarily on projections known as 'View from the Sun'. A view from the sun is an aerial perspective from a very large distance, that shows all sunlit surfaces at a given time and date. It therefore allows a very precise count of sunlight hours on any glazing or horizontal surface, with little or no requirement for secondary calculations or interpolation. The technique is illustrated in *Figure 8*.

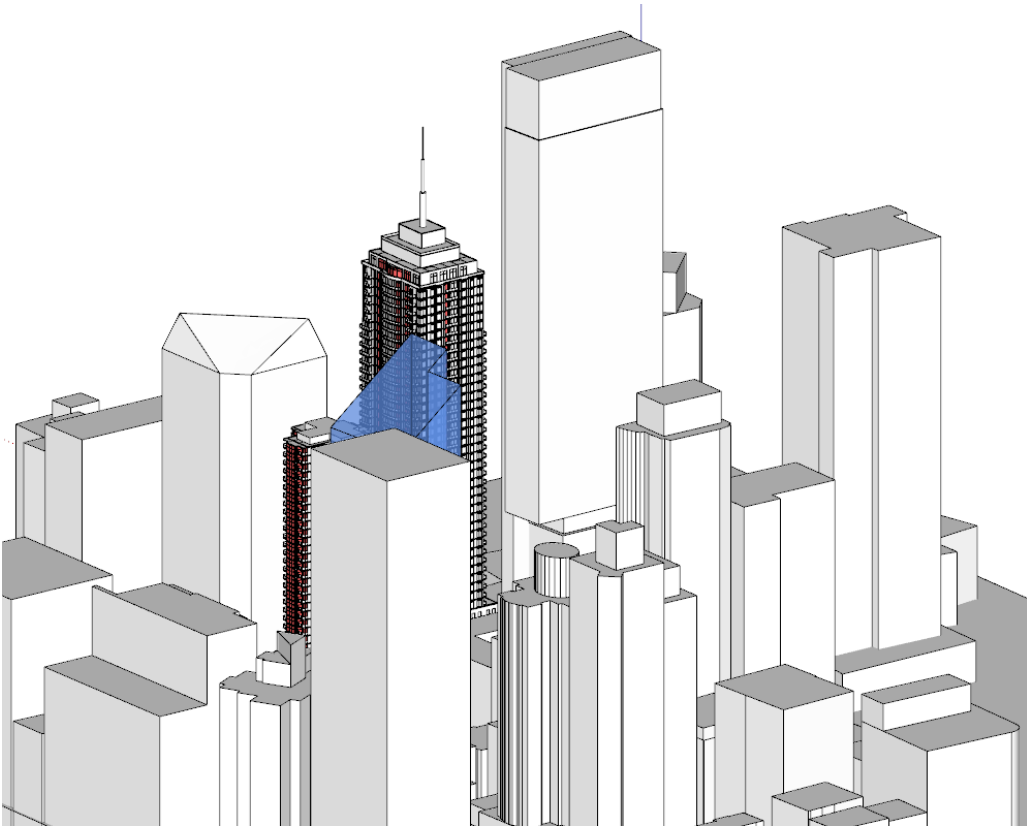


Figure 8: View from the sun 9 AM June 21
The subject building is shown in semi-transparent blue. Note that the model incorporates all relevant surrounding developments.

Views from the sun do not show any shadows. Shadows are those areas exactly coinciding with objects in the foreground. This has the advantage that it allows any shadow to be precisely identified with the object, or in this case the part of any building which causes it. The technique is illustrated in Figure 8.

To facilitate the comparison of existing and prospective conditions, the proposed building envelope is rendered in the model as semitransparent.

In ATTACHMENT B, I provide the complete tables of half-hourly views from the sun on June 21. A selection from those views is annotated to identify and comment on overshadowing impact, as discussed in *5.0 OVERSHADOWING IMPACT COMPLIANCE*.

5.0 Overshadowing Impact Compliance

6.1 Potentially affected properties

My understanding is that commercial occupancies do not enjoy the protection of any control for overshadowing. The relevant overshadowing impacts are those to residential properties on surrounding sites. The views from the sun readily identify the residential buildings which are potentially impacted by June 21 shadows attributable to the subject proposal.

- *Century Tower*
- *Princeton Apartments*

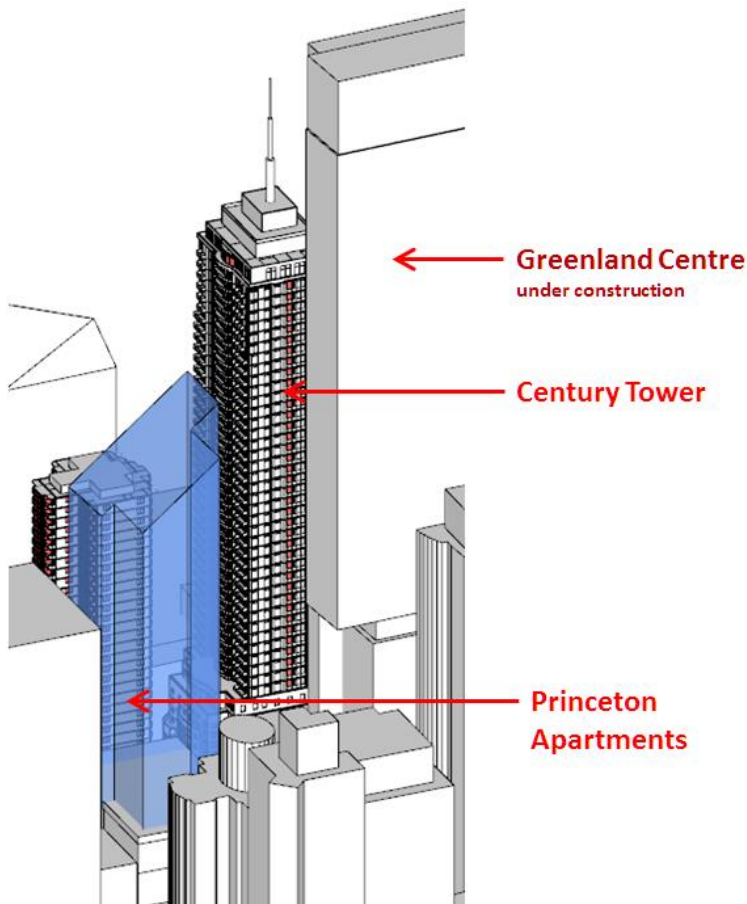


Figure 9: View from the sun at 10 AM

6.2 Characterisation of overshadowing impact and compliance

6.2.1 Given the impacted properties are residential flat buildings (RFB), not single dwellings, I consider the most pertinent control to be SEPP65, and therefore any relevant ADG *Design criterion* or *Design guidance*. Accordingly, I am guided by:

Objective 3B-2
Overshadowing of neighbouring properties is minimised during mid winter
Design guidance
<ul style="list-style-type: none">• Living areas, private open space and communal open space

Objective 3B-2

should receive solar access in accordance with sections 3D Communal and public open space and 4A Solar and daylight access

- Solar access to living rooms, balconies and private open spaces of neighbours should be considered
- **Where an adjoining property does not currently receive the required hours of solar access, the proposed building ensures solar access to neighbouring properties is not reduced by more than 20%**
- If the proposal will significantly reduce the solar access of neighbours, building separation should be increased beyond minimums contained in section 3F Visual privacy
- Overshadowing should be minimised to the south or downhill by increased upper level setbacks

I interpret the *Design guidance* as implicitly assuring equity between the treatment of the proposed new and existing 'properties', by applying to the affected RFB in each case as a whole.

To implement the *Design guidance* in relation to the impacted buildings, it is necessary to re-analyze the building as a whole, in order to determine the overall existing 'notional compliance' with the ADG, for comparison to the projected 'notional compliance'.

Views from the sun from the digital model identify on a half hourly basis the likely:

- Present durations of direct sun for individual apartments in impacted developments;
- Projected future durations of direct sun for individual apartments.

6.3 Predicted overshadowing impact

In order to make an accurate assessment of the overshadowing impact for each of the two identified buildings, a full analysis was carried out to record the present nominal solar access compliance of the whole building, and to identify those apartments which were likely to lose their complying status.

The change in percentage of dwellings complying for solar access was then computed. The reduction in solar access compliance due to the overshadowing impact of the proposal is calculated as a proportion of the total number of apartments.

6.3.1 Century Tower

Table 1 summarises the present and projected solar access status for Century Tower.

Table 1: Summary of solar access compliance for Century Tower

	Existing	Proposed
Total Units	296	296
Complying 2 hrs 9am-3pm	22	21
%	7.4%	7.1%
Reduction in units complying		1
Change		0.3%
'No sun' 9am to 3pm	89	89
%	30.1%	30.1%

ATTACHMENT C reports the full table of direct sun access for all individual apartments in Century Tower, and highlights the periods of loss of sun exposure for individual apartments due to the overshadowing.

It is immediately apparent that the overshadowing impact from the proposal is relatively small. The simple explanation is that the overshadowing impact on Century Tower is dominated by the Greenland Centre under construction immediately to its north, and in the later afternoon by existing buildings to the north-west.

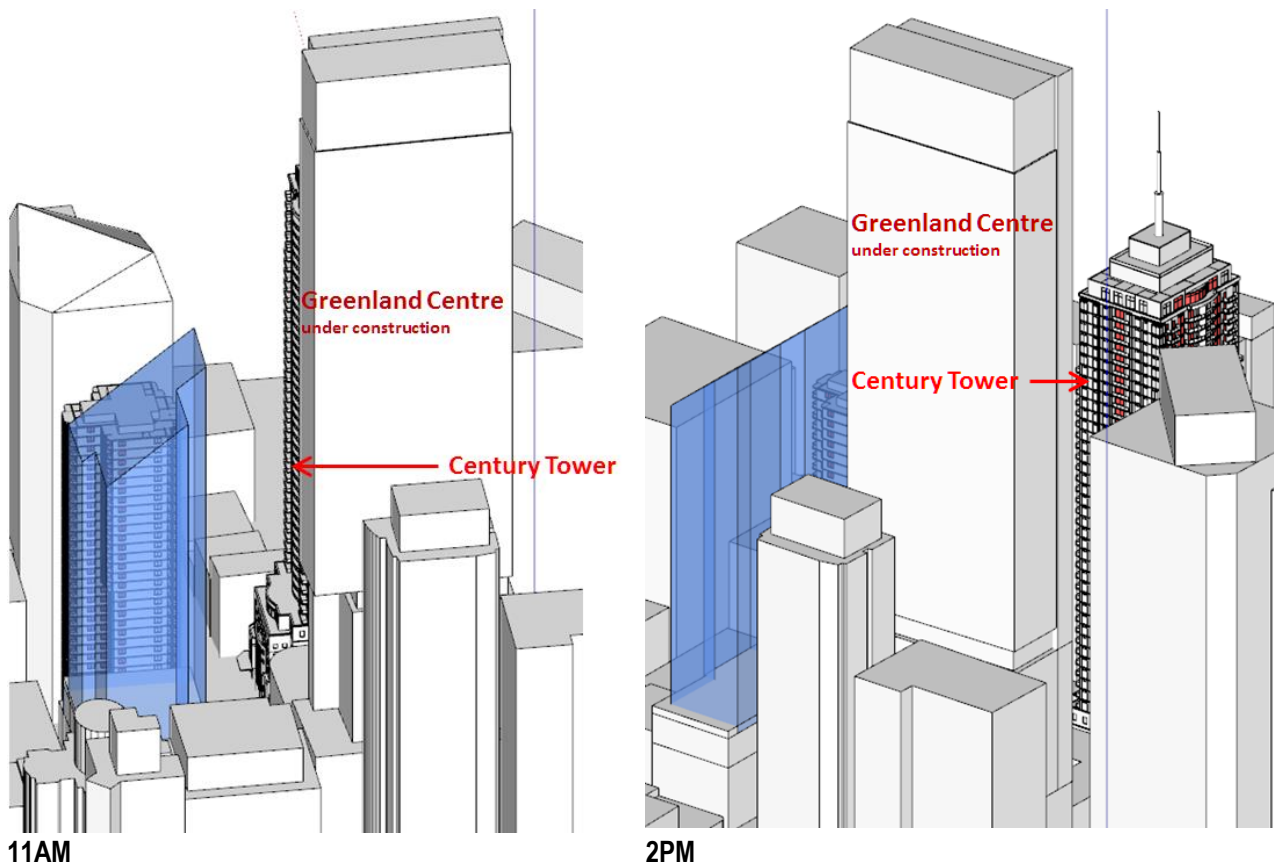


Figure 10: Views from the sun at 11 AM and 2 PM June 21 Showing overshadowing of Century Tower

6.3.2 Princeton Apartments

This building is situated immediately to the south of the proposal site, and can be expected to be most impacted by any additional shadows. As for Century Tower, I undertook the detailed quantification of the present and projected solar access status of individual apartments. Table 2 summarises the present and projected solar access status for Princeton Apartments.

ATTACHMENT C reports the full table of direct sun access for all individual apartments in Princeton Apartments, and highlights the periods of loss of sun exposure for individual apartments due to the overshadowing.

Table 2: Summary of solar access compliance for Princeton Apartments

	Existing	As proposed
Total Units	116	116
Complying 2 hrs 9am-3pm	62	5
%	53.4%	4.3%
Reduction in units complying		57
Change		49.1%
'No sun' 9am-3pm	17	17
%	14.7%	14.7%

6.3.2.1 SENSITIVITY TO THE EAST AND WEST SETBACKS

In a previous study of a proposal for a taller building on the subject site, I was instructed to test the impact of the development on Princeton Apartments, taking into consideration complying east and west setbacks, being an 8m setback to Pitt Street along the western boundary, and 6m setback along the eastern boundary.

For that version of the analysis of the taller scheme, I was supplied with an alternative model amended to incorporate the setback changes, and some consequent adjustments to the podium levels. These differences in the models of the taller scheme can be best seen in the 11 o'clock view from the sun in **Figure 11**.

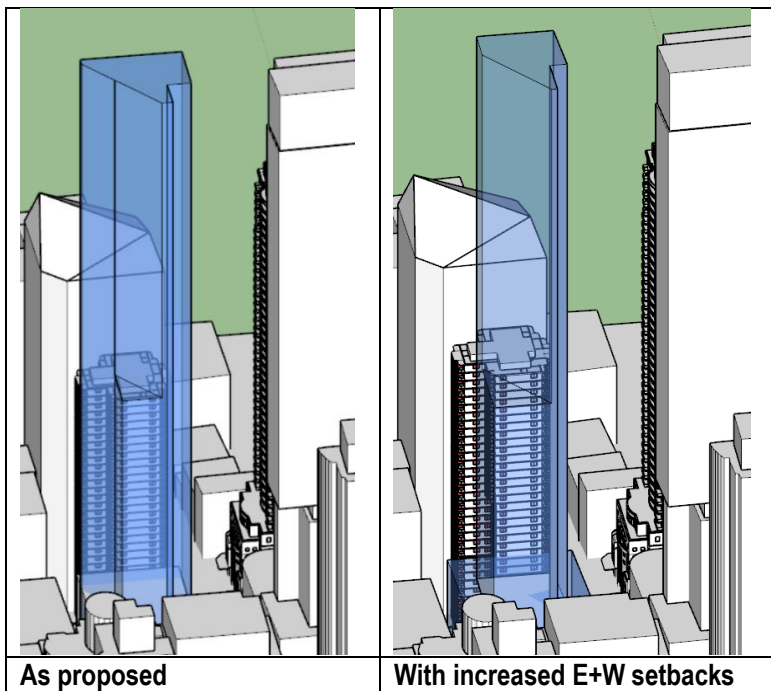


Figure 11: View from the sun at 11 AM comparing proposed building envelope and increased setbacks
Taken from the earlier analysis of a taller scheme

Inspection of the earlier analysis views from the sun suggests:

- Slightly longer exposure of the east facing units, which should translate into a favourable difference, if marginal, in overall overshadowing impact;
- The greater western setback is unlikely to yield a comparable benefit, because from the relevant sun angles the critical edge of the shadow is in fact cast by the northern sharp edge of the building envelope. The overshadowing impact of the proposal is effectively insensitive to an increase in the size of the western setback.

These earlier observations remain valid for the 36 storey scheme currently proposed.

6.0 Conclusions

I have examined the likely overshadowing impact of the proposal on the immediately surrounding residential buildings identified from the detailed 3D digital model.

Because of its specific relevance to residential flat buildings, I consider it relevant to test overshadowing impact against the *Design guidance* from Objective 3B – 2 of the ADG. I identify two buildings to which such analysis may be relevant. Taking them in turn:

7.1 Century Tower

A very low proportion of the apartments in this building presently retain a complying 2 hours of direct sun to living areas between 9 AM and 3 PM on June 21. This is consistent with:

- the design of the building, using a symmetrical floor layout with no particular orientation sensitivity;
- extensive overshadowing by the Greenland Centre building under construction to the north.

The additional overshadowing impact of the proposal results in one additional apartment losing this notionally complying solar access.

Based on those numbers, to my mind the overshadowing impact on the Century Tower apartments generally complies with the ADG Design guidance.

7.2 Princeton Apartments

62 out of 116 (53.4%) of the apartments in this building presently retain a complying 2 hours of direct sun to living areas between 9 AM and 3 PM on June 21. This is consistent with the existing low rise development of the site of the subject proposal, directly to the north of Princeton Apartments.

The overshadowing impact of the proposal reduces this proportion to 5 out of 116 apartments (4.3%), which clearly cannot be said to simply conform with the ADG Design guidance.

I observe that the ADG is a guideline document, not a statutory standard, and is to be applied with discrimination. In contextualising the apparently large overshadowing impact on the Princeton Apartments, I pay regard to the following considerations:

- The proposed building envelope is a relatively slim tower form.
- The overshadowing impact on Princeton Apartments is effectively insensitive to the height of the proposal.
- I have carried out a previous study for the subject site, which shows that overshadowing impact on the Princeton Apartments is only marginally sensitive to the size of the setback on the eastern boundary, and insensitive to the setback on the western boundary.
- In my experience, a large increase of the proportion of apartments failing to meet the relatively stringent '2 hours standard' can be considered usual and expected in such a dense high rise environment.
- Specifically, in my considered opinion, any development consistent with the planning controls on the site will not be able to limit overall solar access compliance impact to the

ADG *Design guidance* recommended maximum 20 percent reduction. The impact on the Princeton Apartments is to a significant degree the outcome of the non-complying building being built on the boundary.

- I am especially mindful that if the proposed building envelope is realised, the solar access retained for Princeton Apartments is almost exactly comparable with the outcome for Century Tower consequent to the impact of the recently approved Greenland Centre.

In my considered opinion, in a closely built-up city centre environment, the overshadowing impact of the proposal has to be treated as to be expected and reasonable.

ATTACHMENT A: CREDENTIALS

I 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, and until its disestablishment in November 2006, I was the Associate Director, Centre for Sustainable Built Environments (SOLARCH), 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.

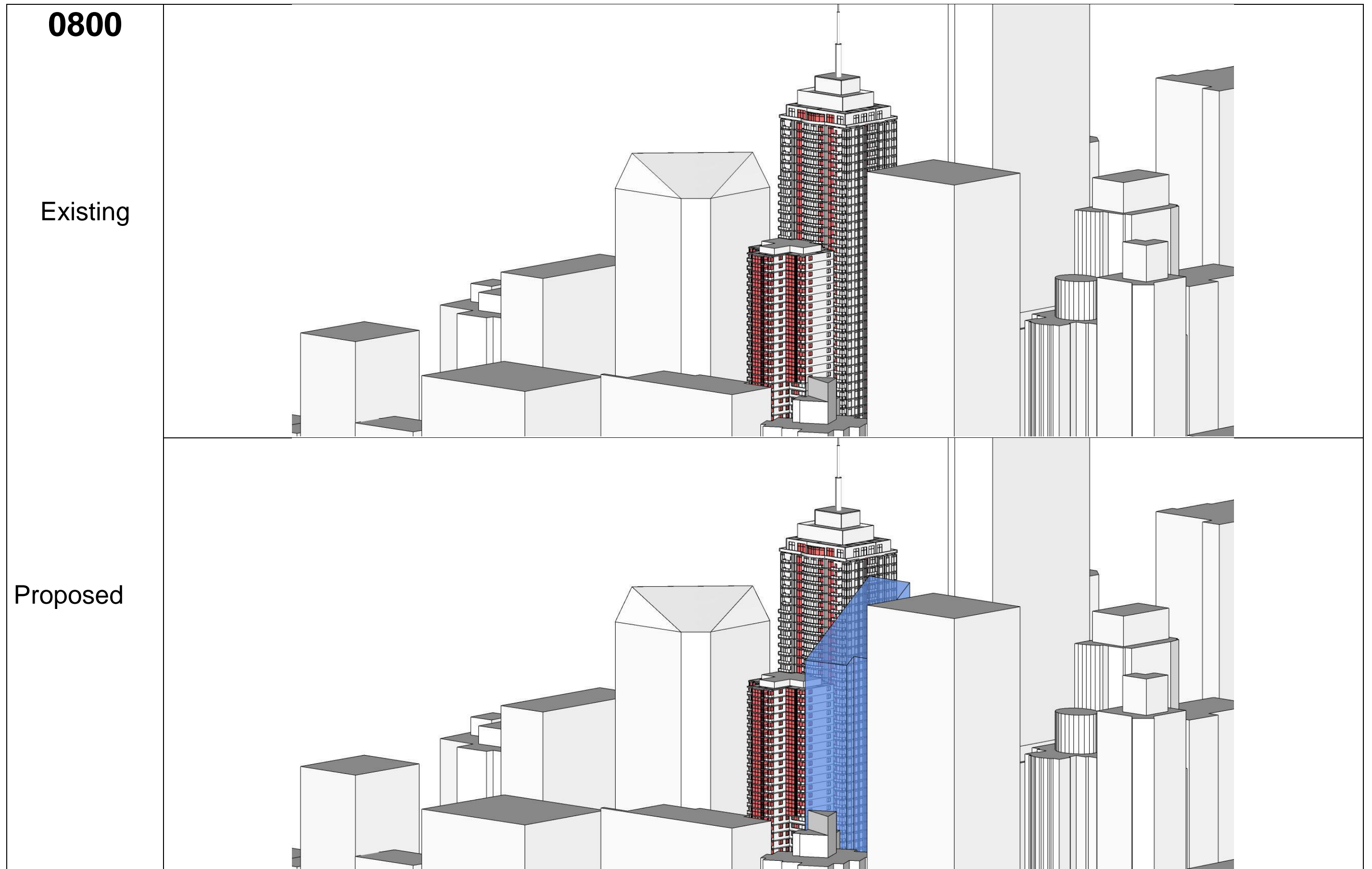
SOLARCH/UNISEARCH were the contractors to SEDA NSW for the setting up and administration of the House Energy Rating Management Body (HMB), which accredits assessors under the Nationwide House Energy Rating Scheme (NatHERS), NSW. I was the technical supervisor of the HMB, with a broad overview of the 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.

Through UNISEARCH, NEERG Seminars and Linarch Design, 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, including 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 1971-2014, and now maintain a specialist consultancy practice advising on passive environmental performance and sustainability in buildings. I regularly assist the Land and Environment Court as an expert witness in related matters.

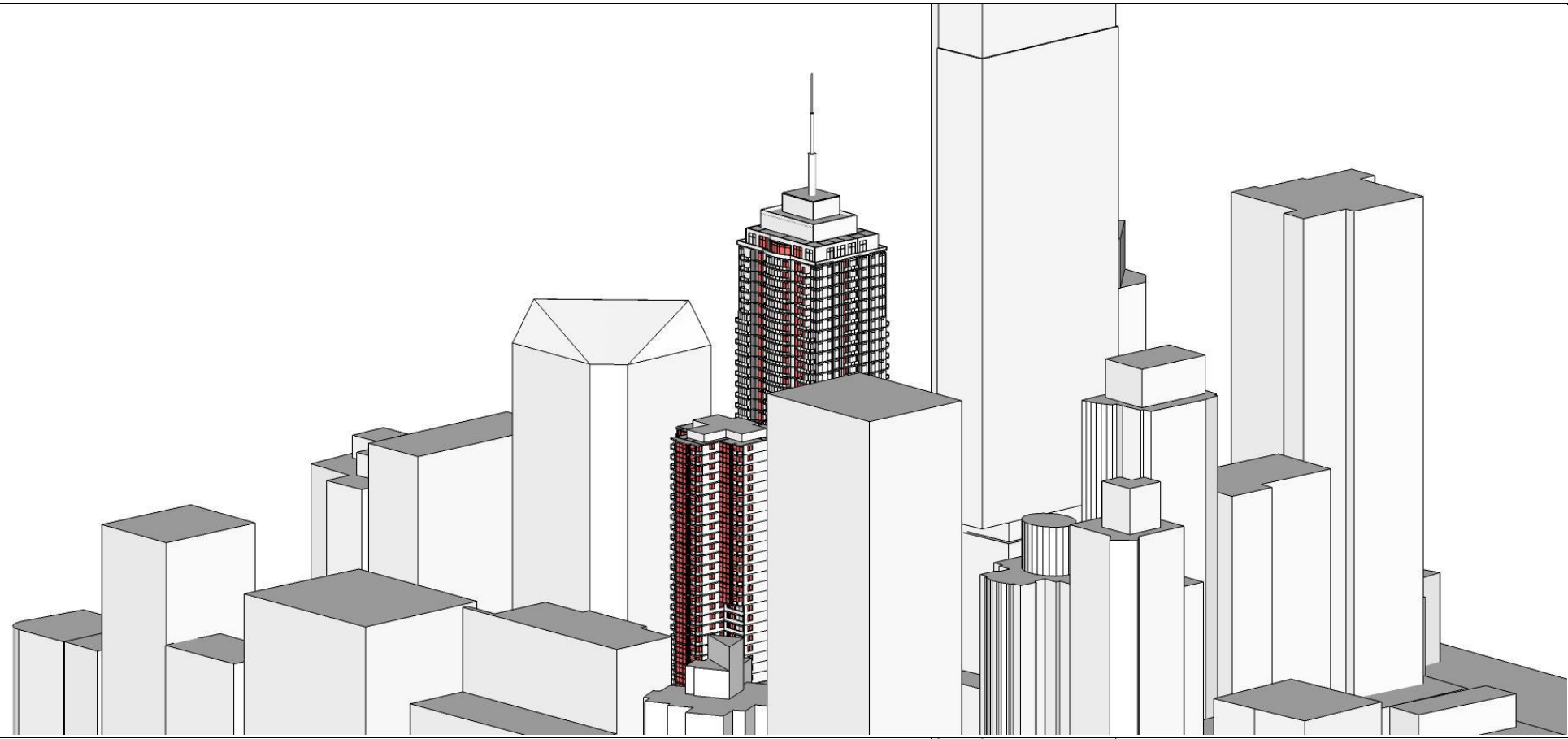
ATTACHMENT B: VIEWS FROM THE SUN

The table below reproduces for reference the detailed 'views from the sun' on a half hourly basis, comparing the building envelope as proposed, and with increased east and west setbacks.

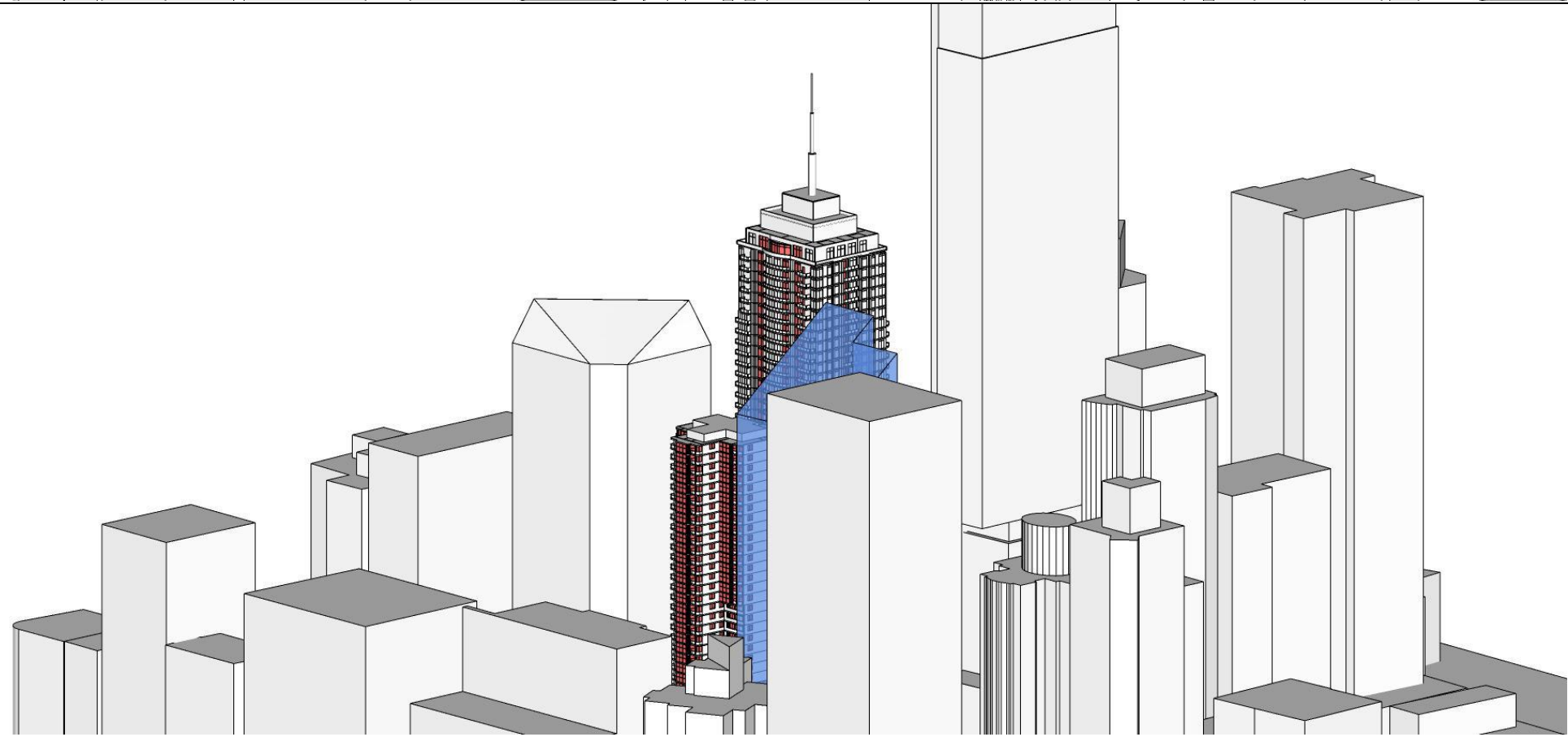


0830

Existing

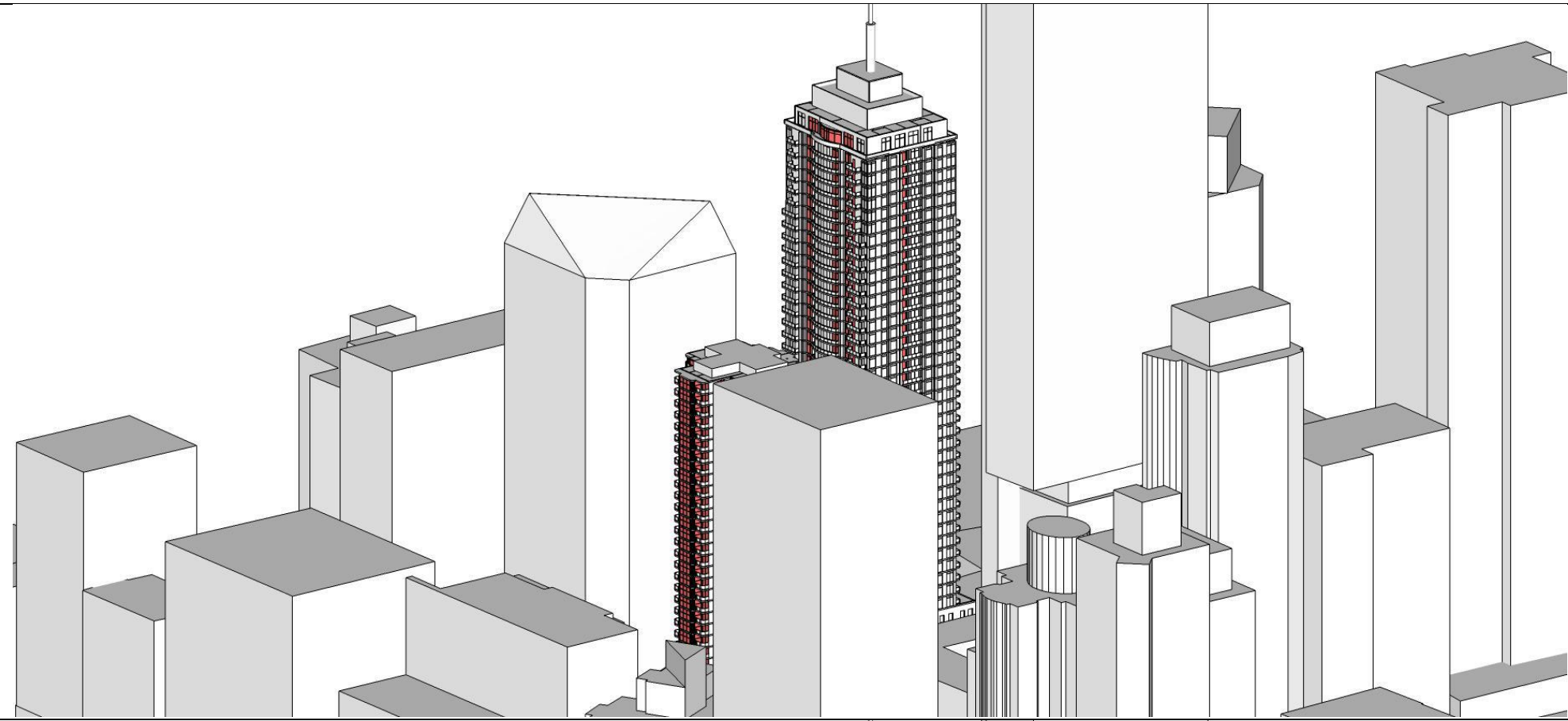


Proposed

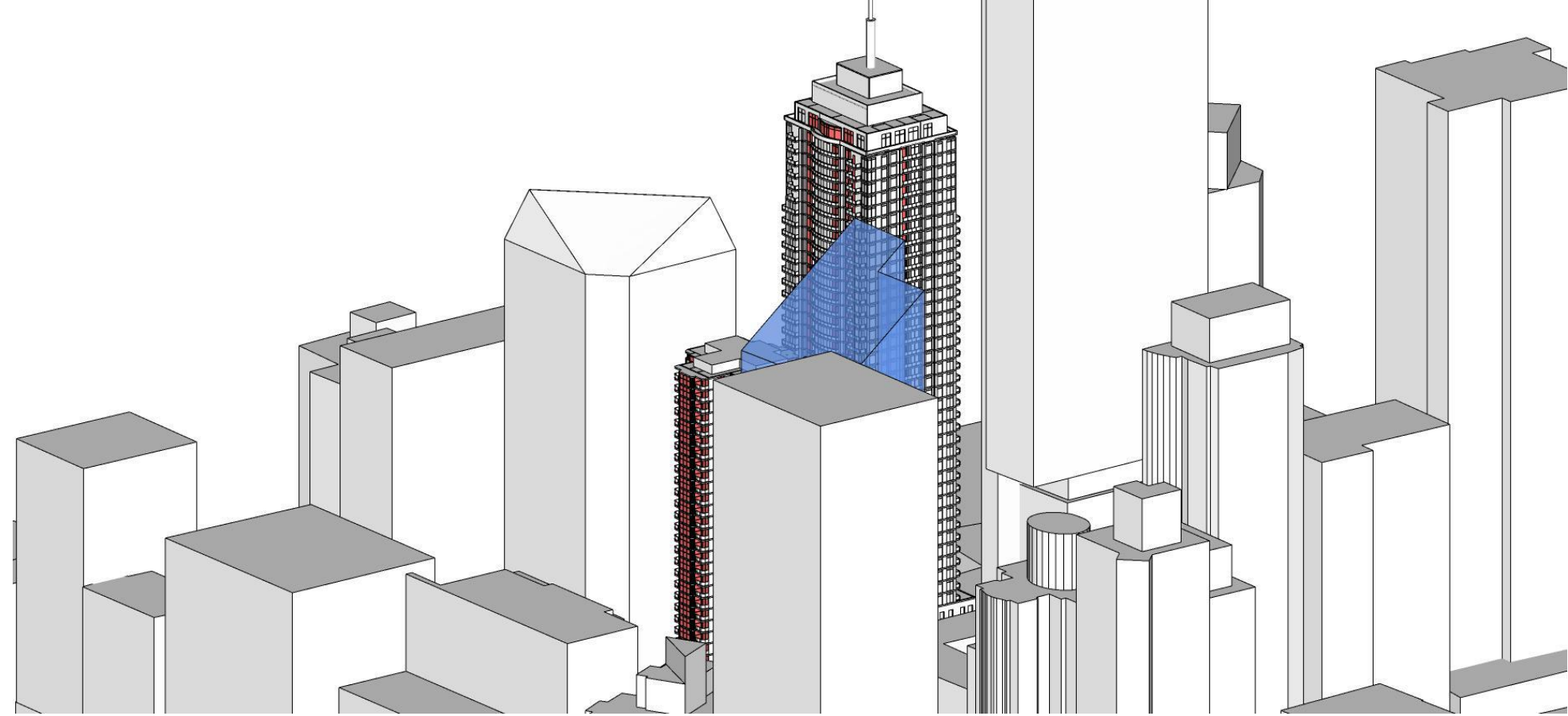


0900

Existing

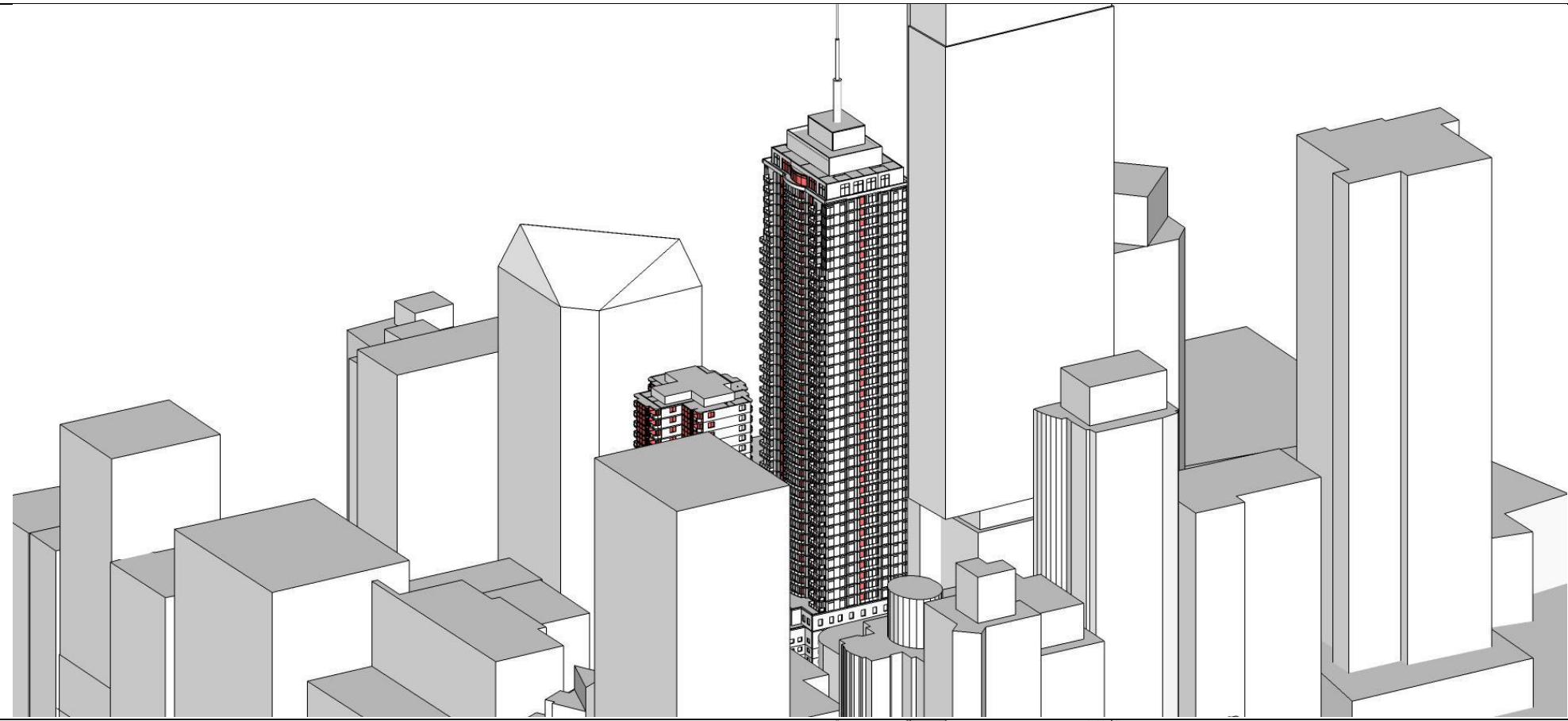


Proposed

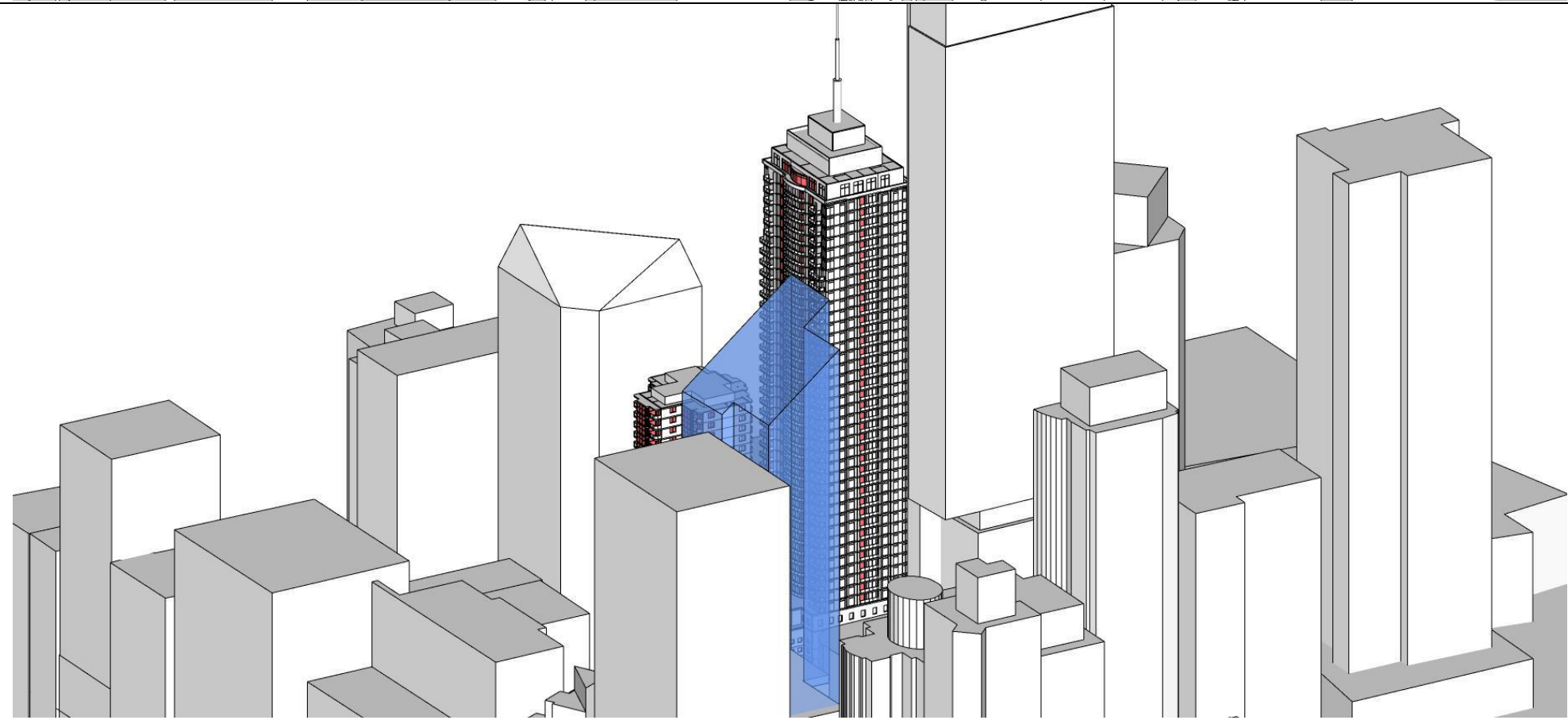


0930

Existing

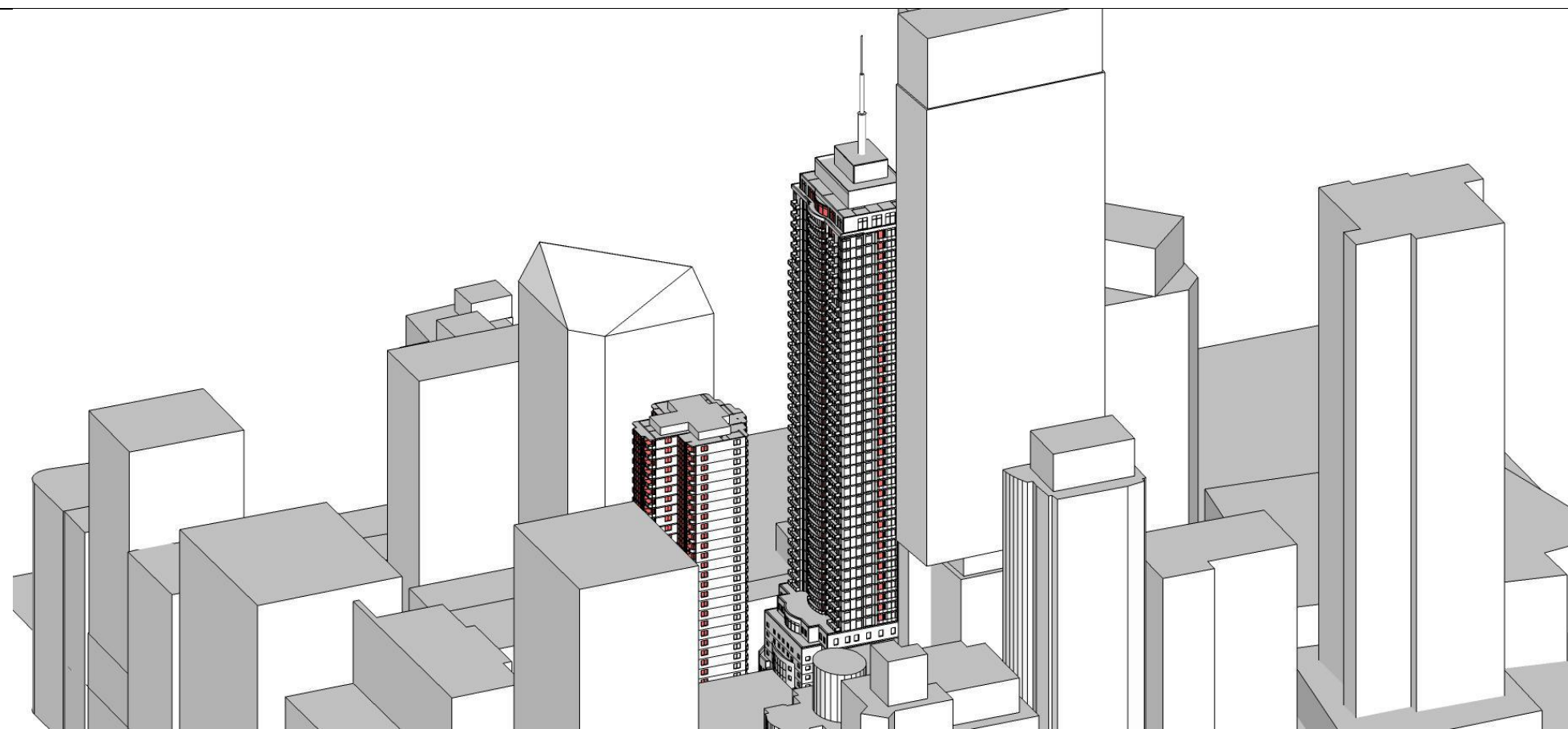


Proposed

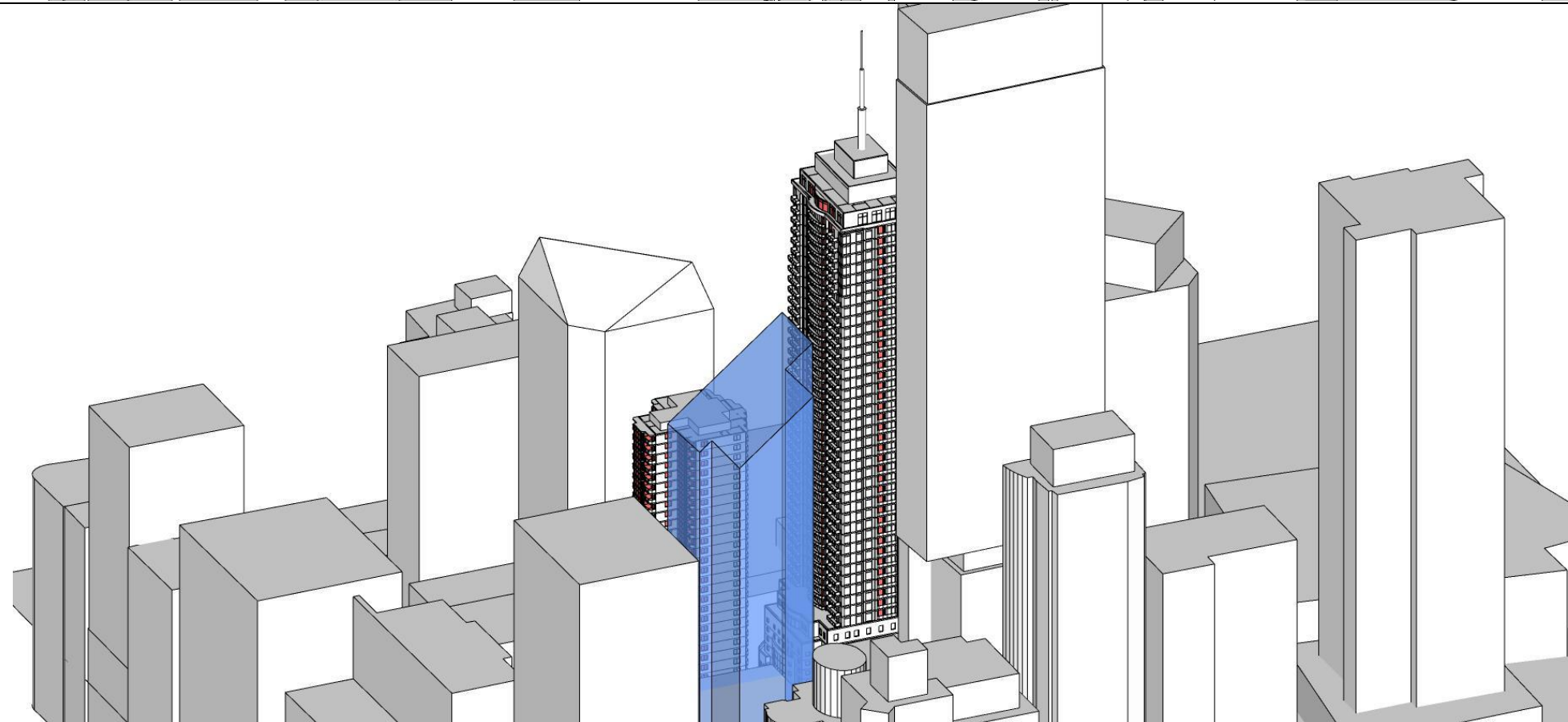


1000

Existing

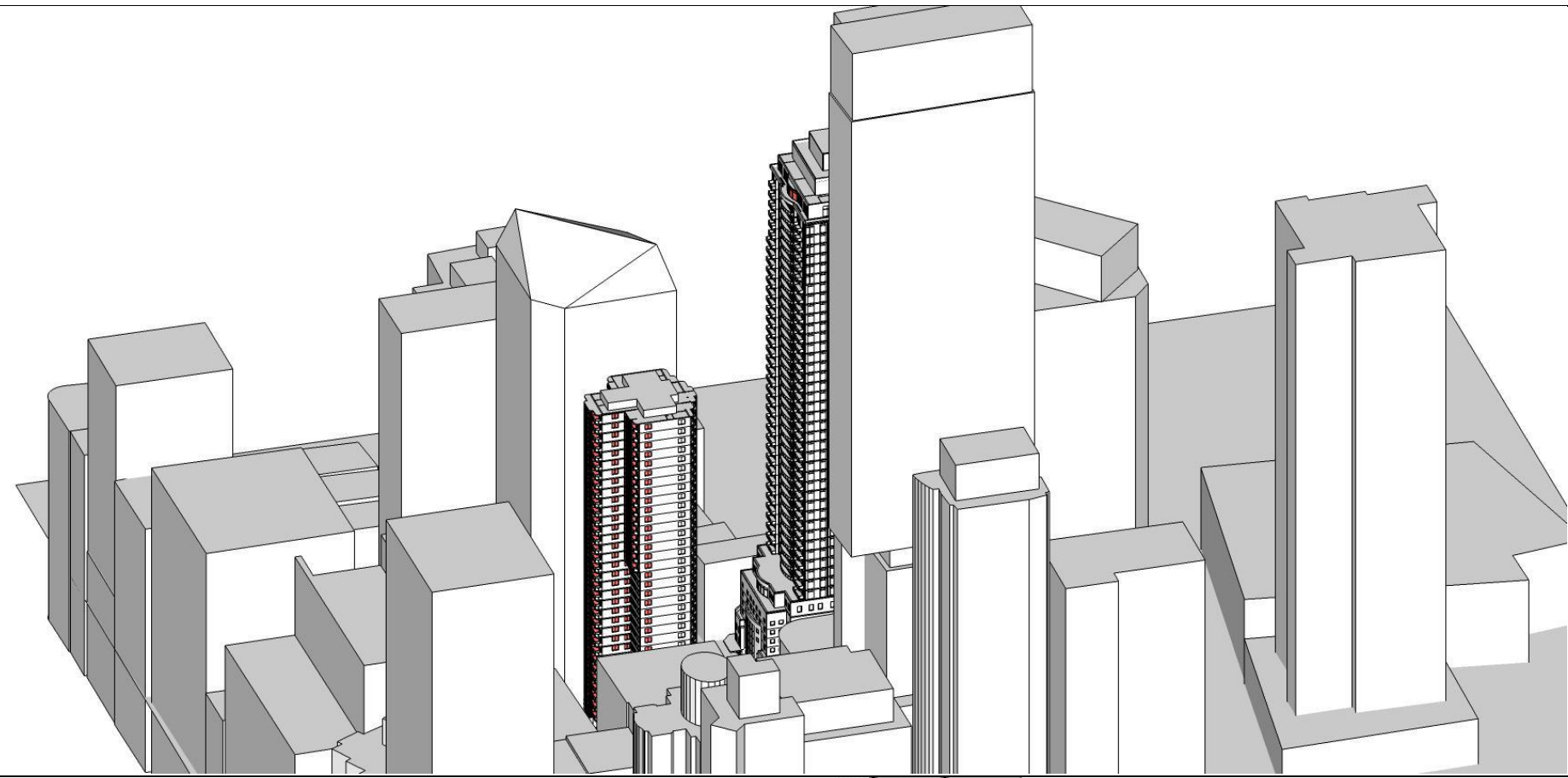


Proposed

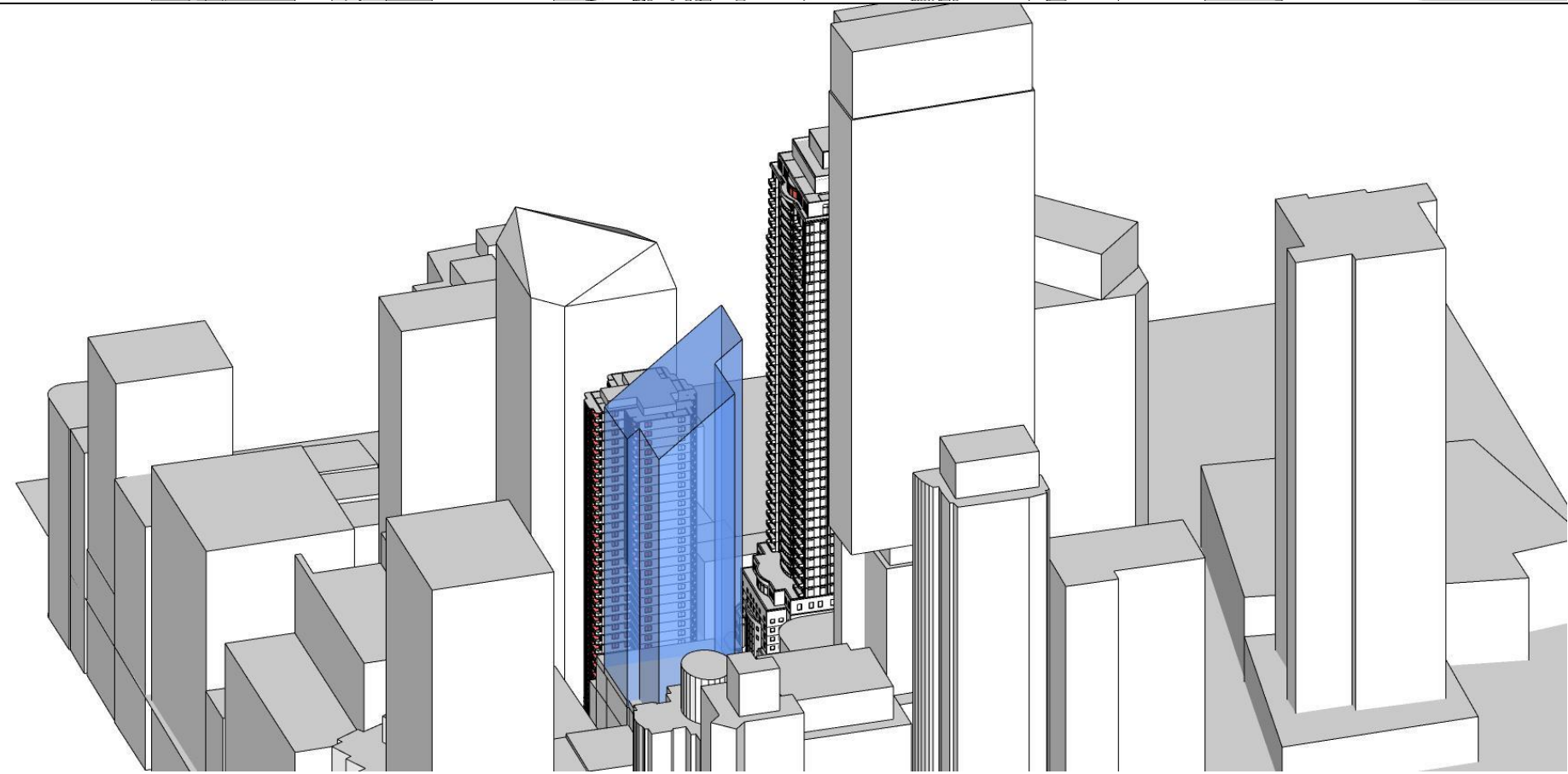


1030

Existing

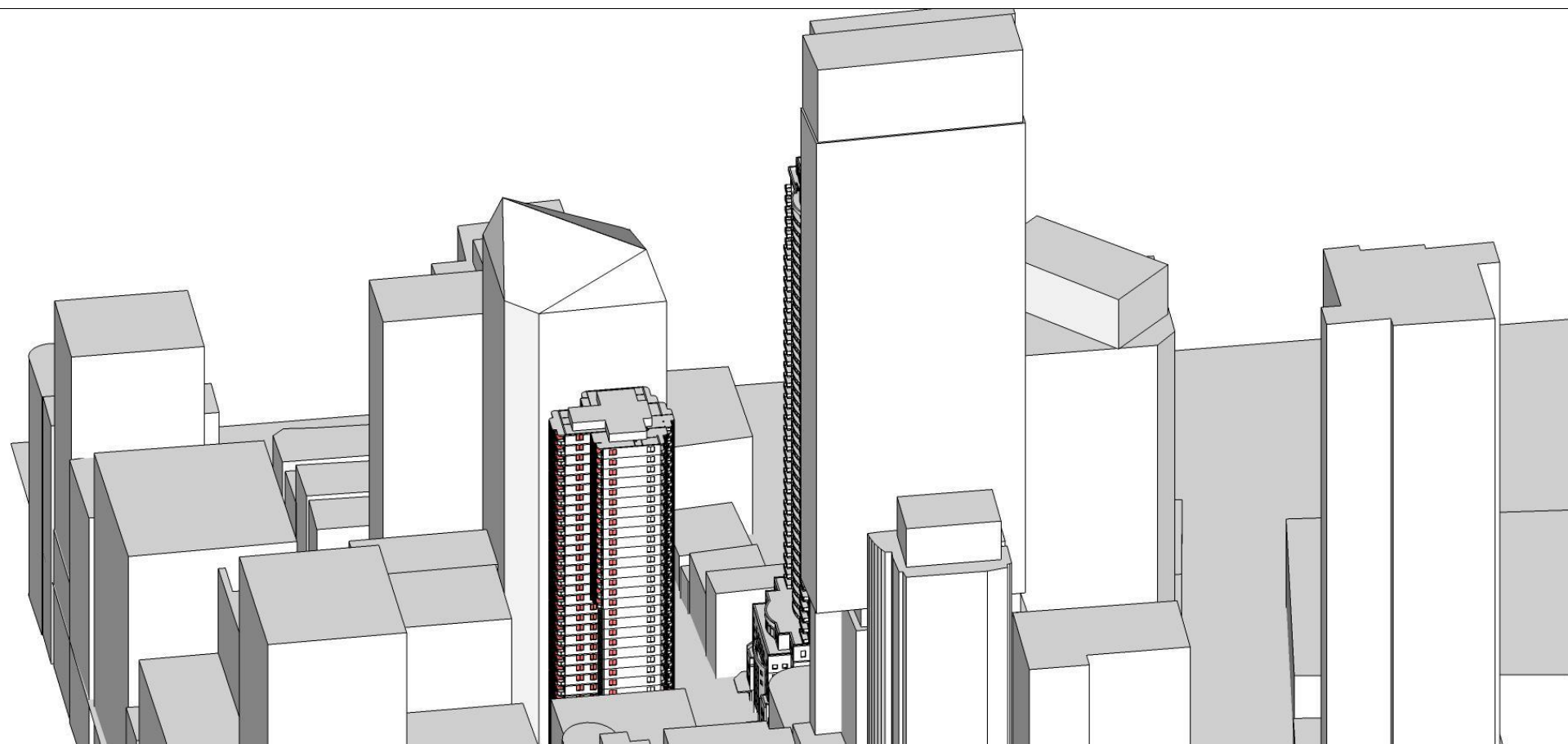


Proposed

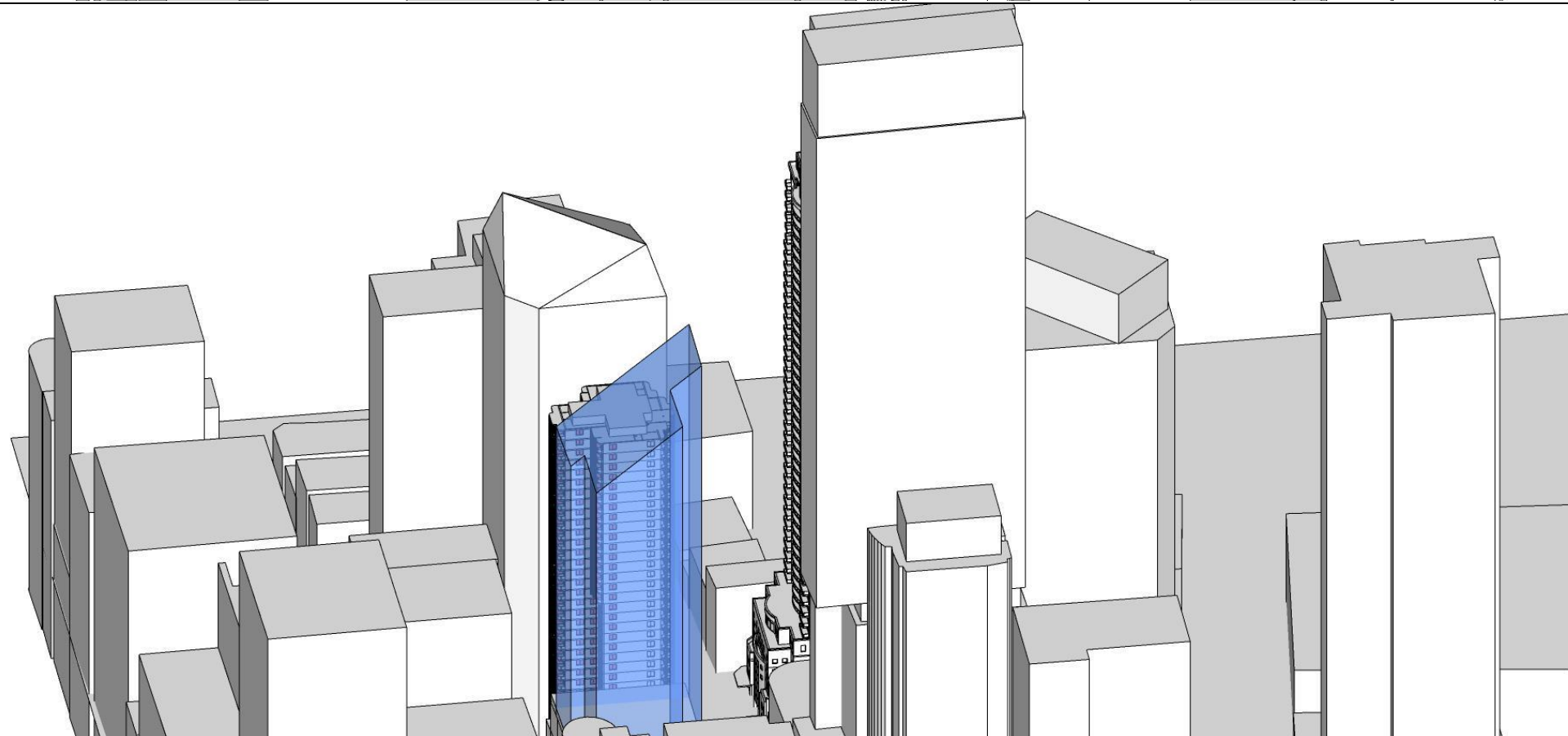


1100

Existing

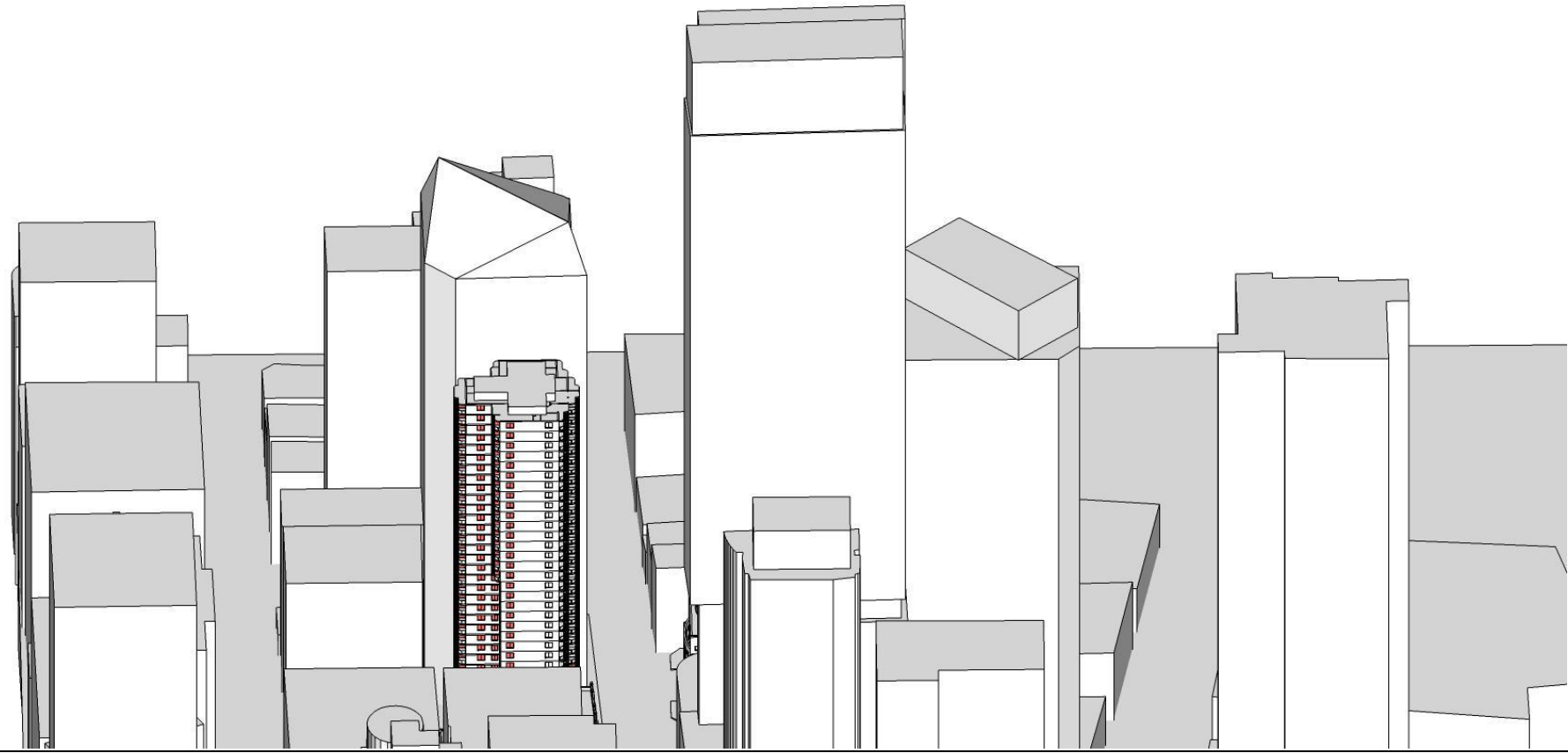


Proposed

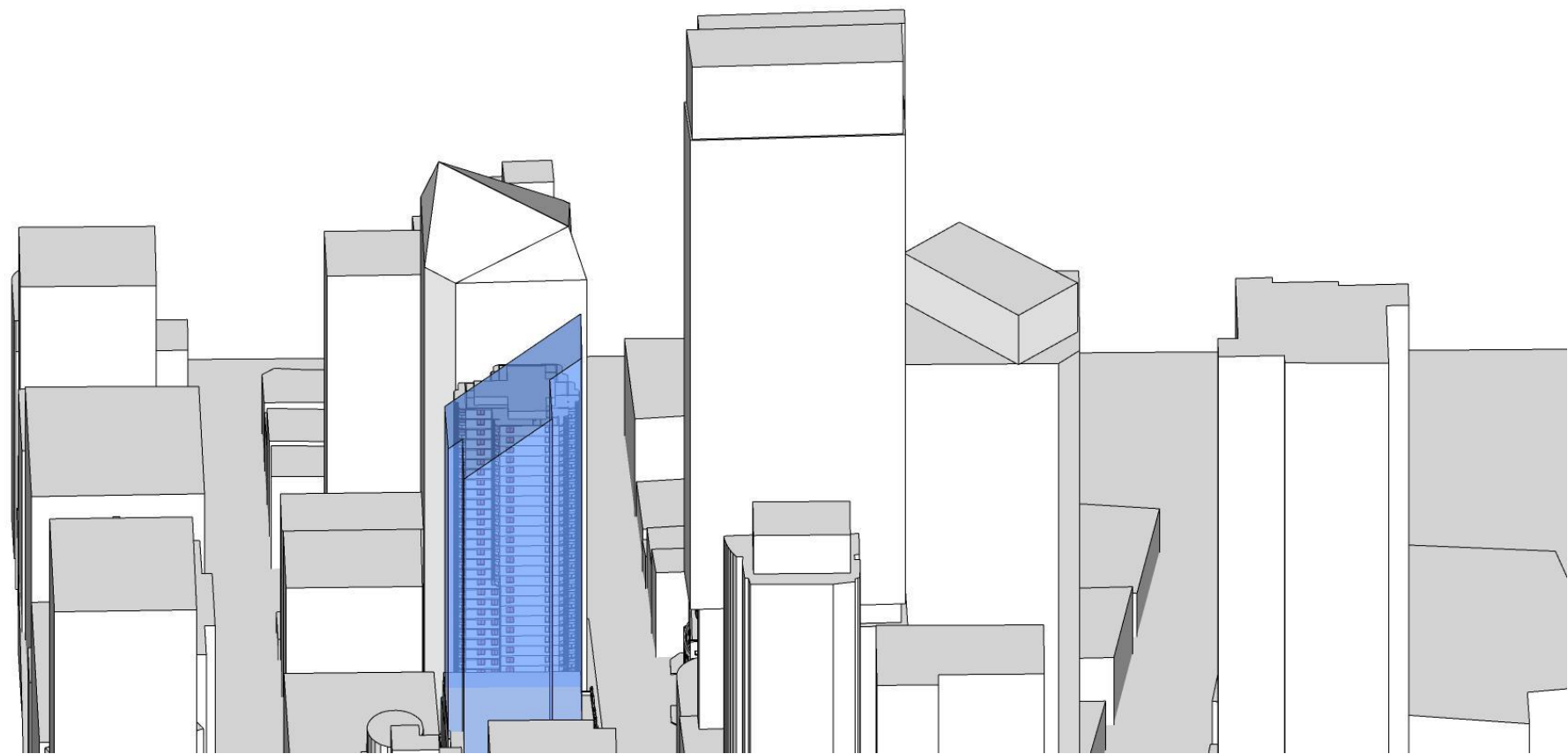


1130

Existing

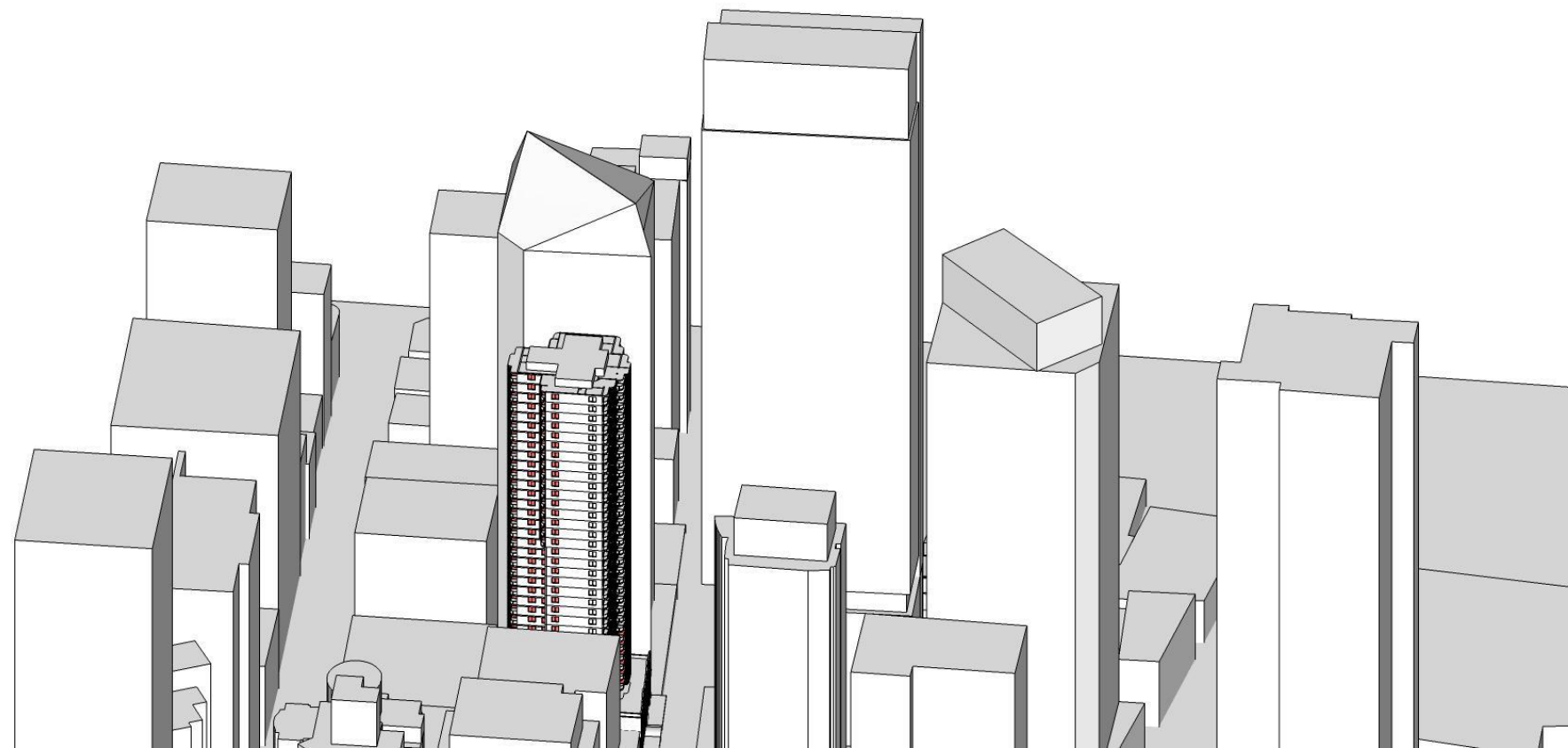


Proposed

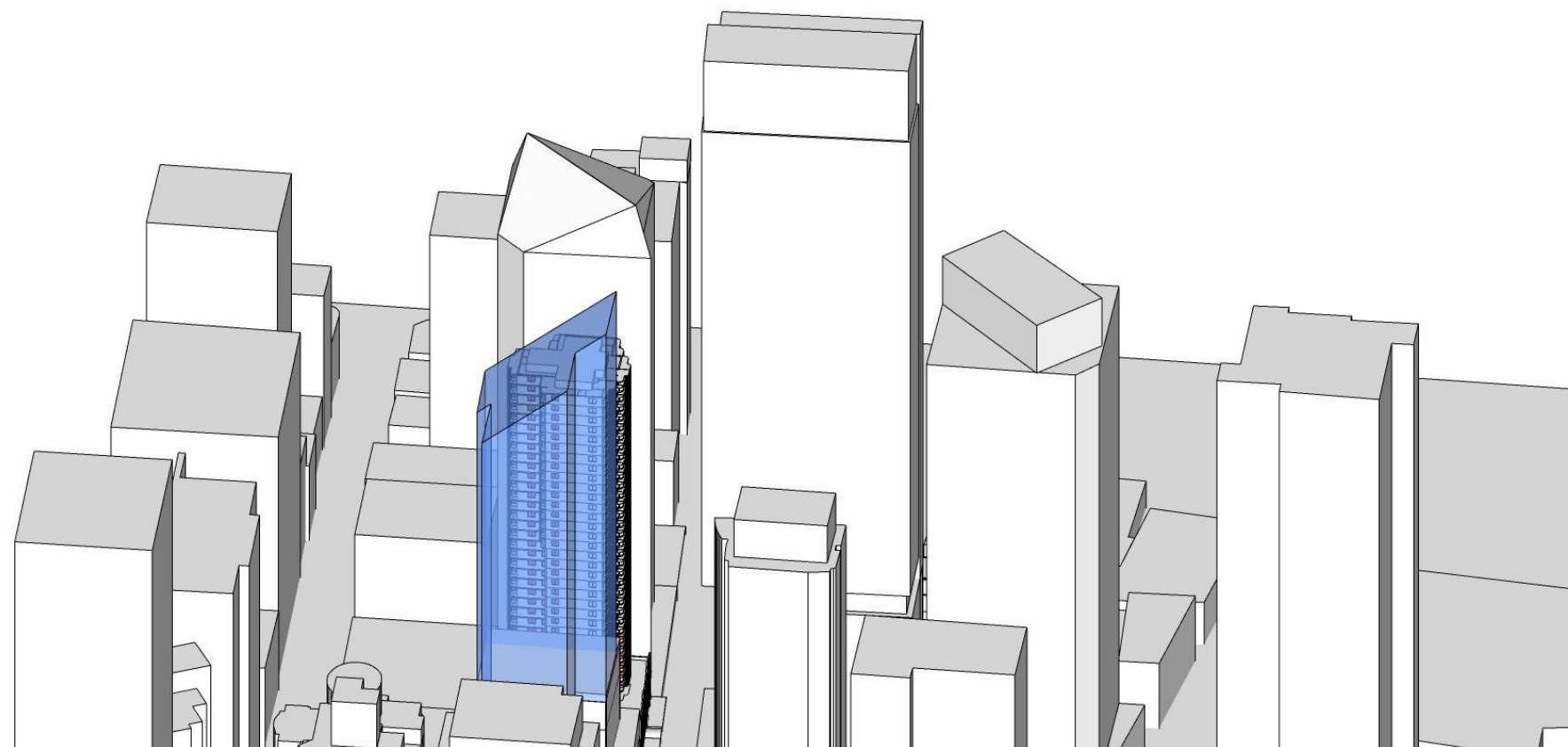


1200

Existing

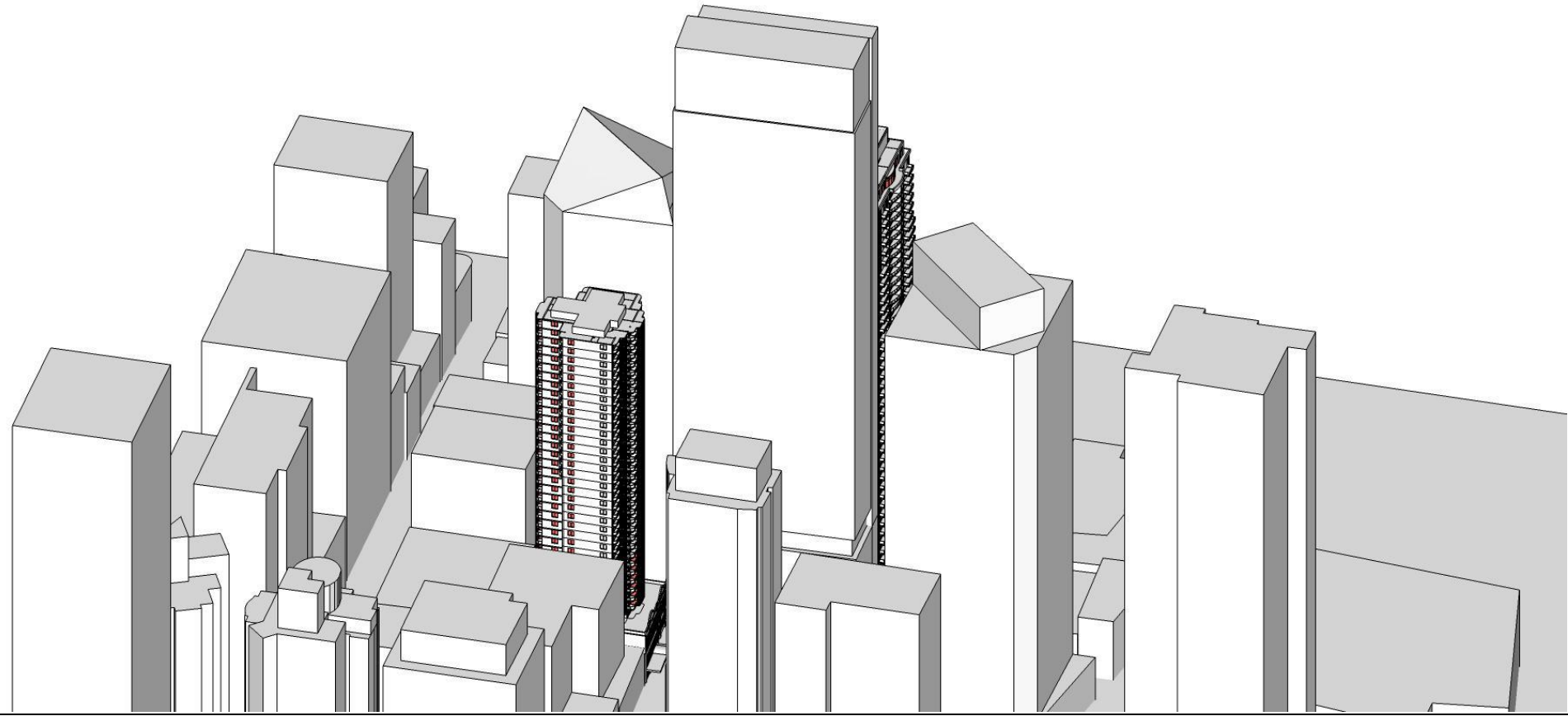


Proposed

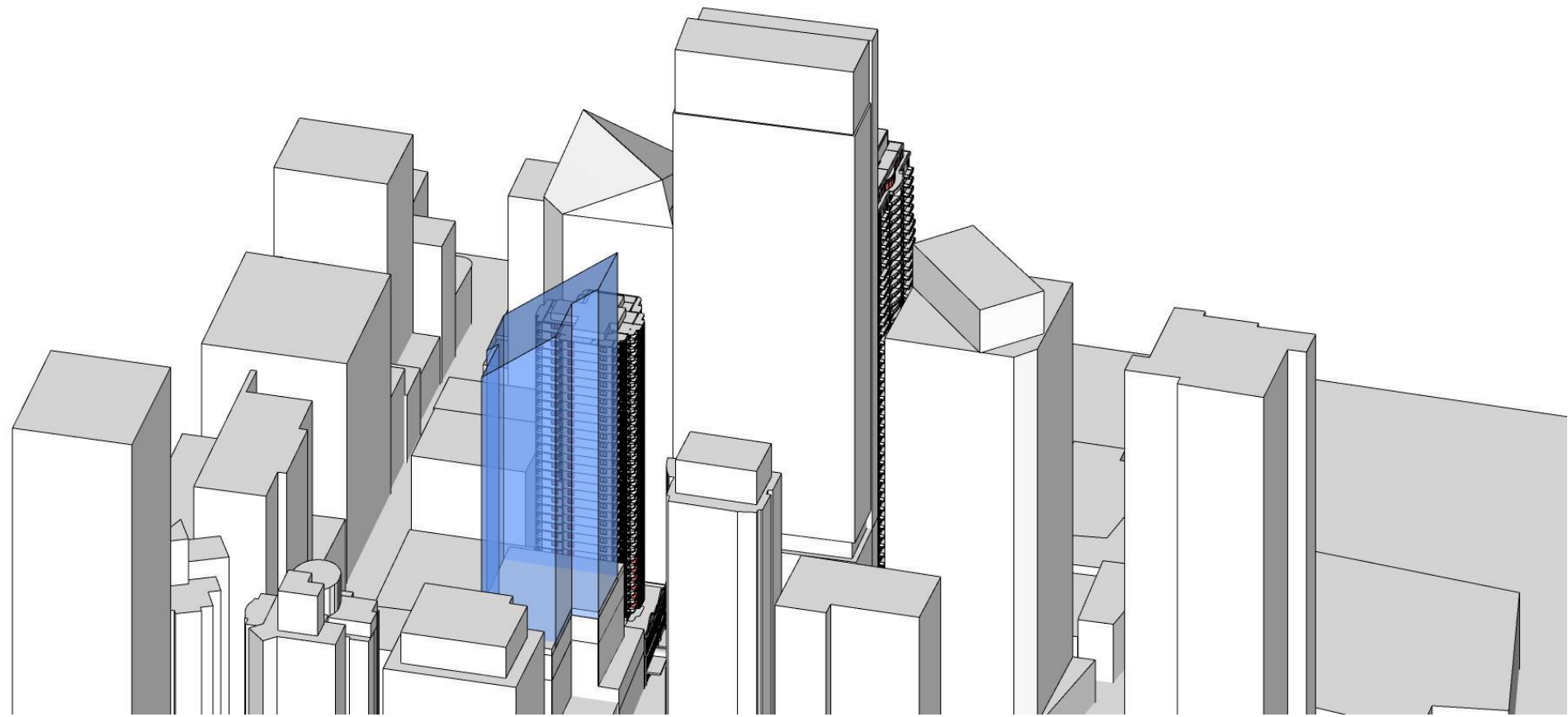


1230

Existing

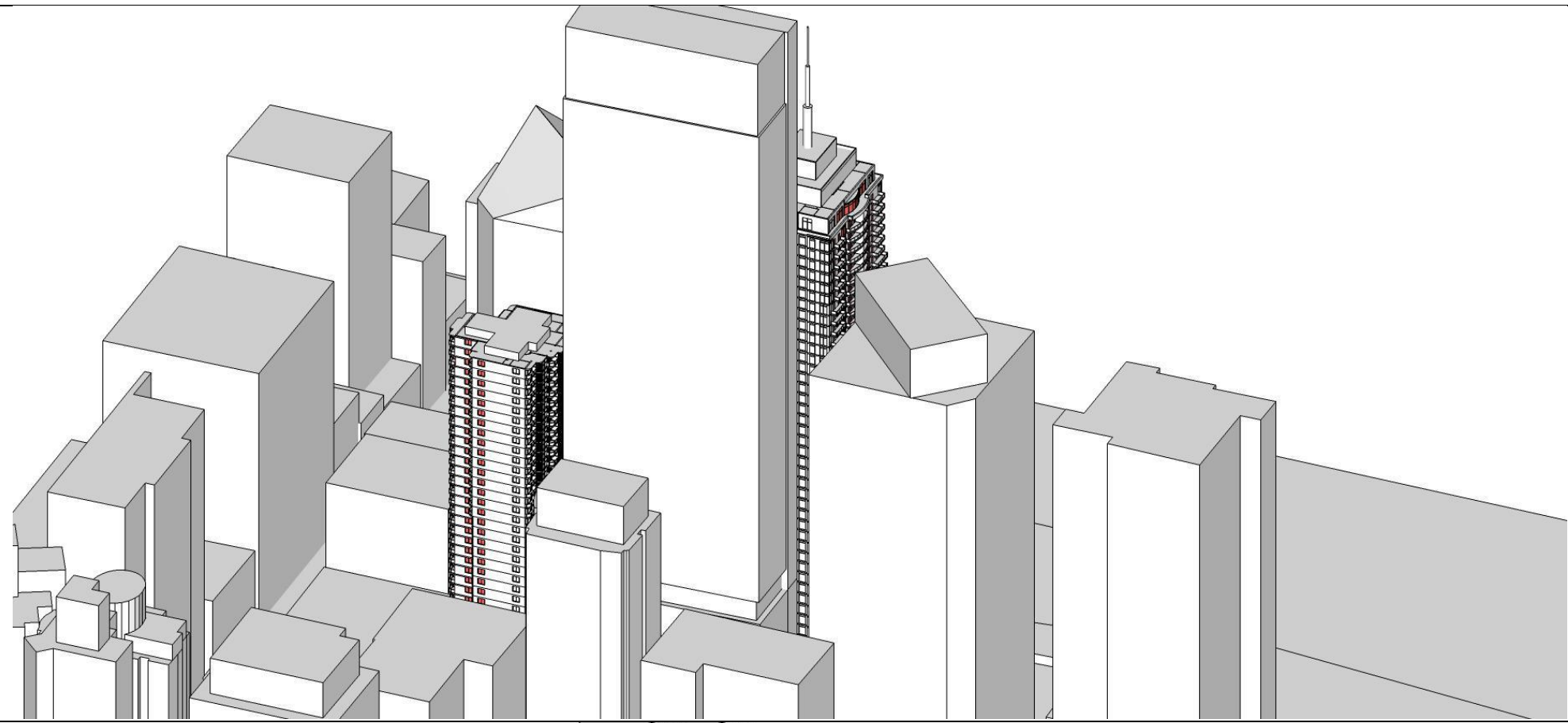


Proposed

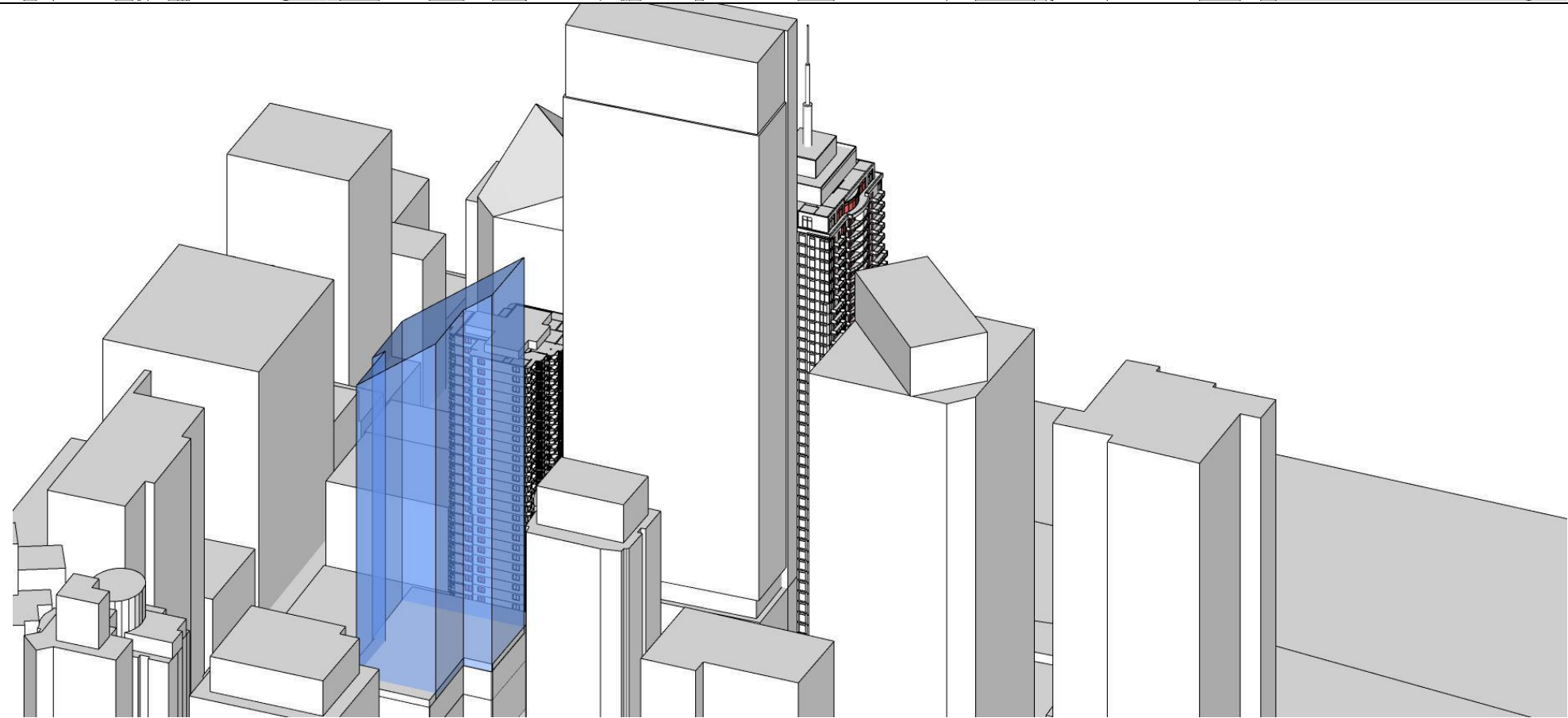


1300

Existing

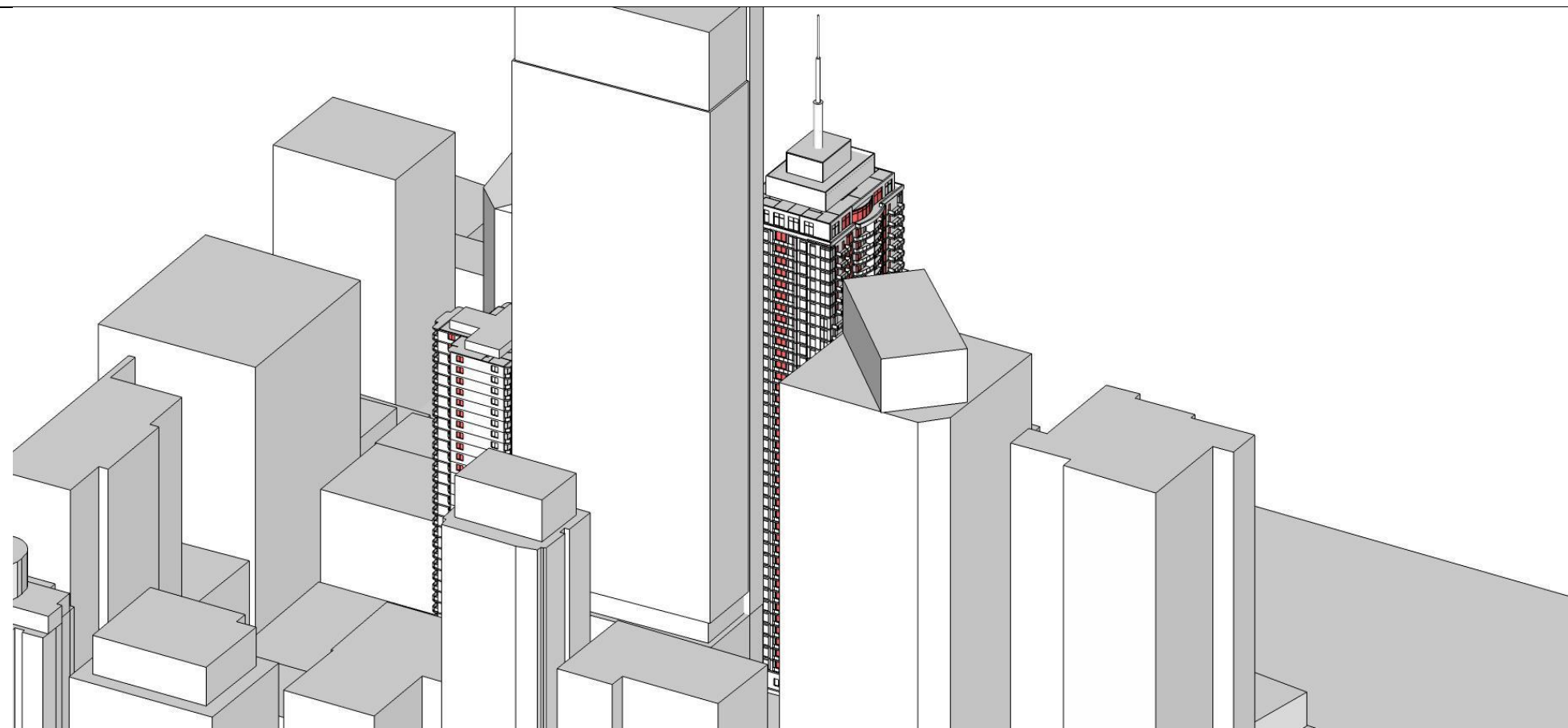


Proposed

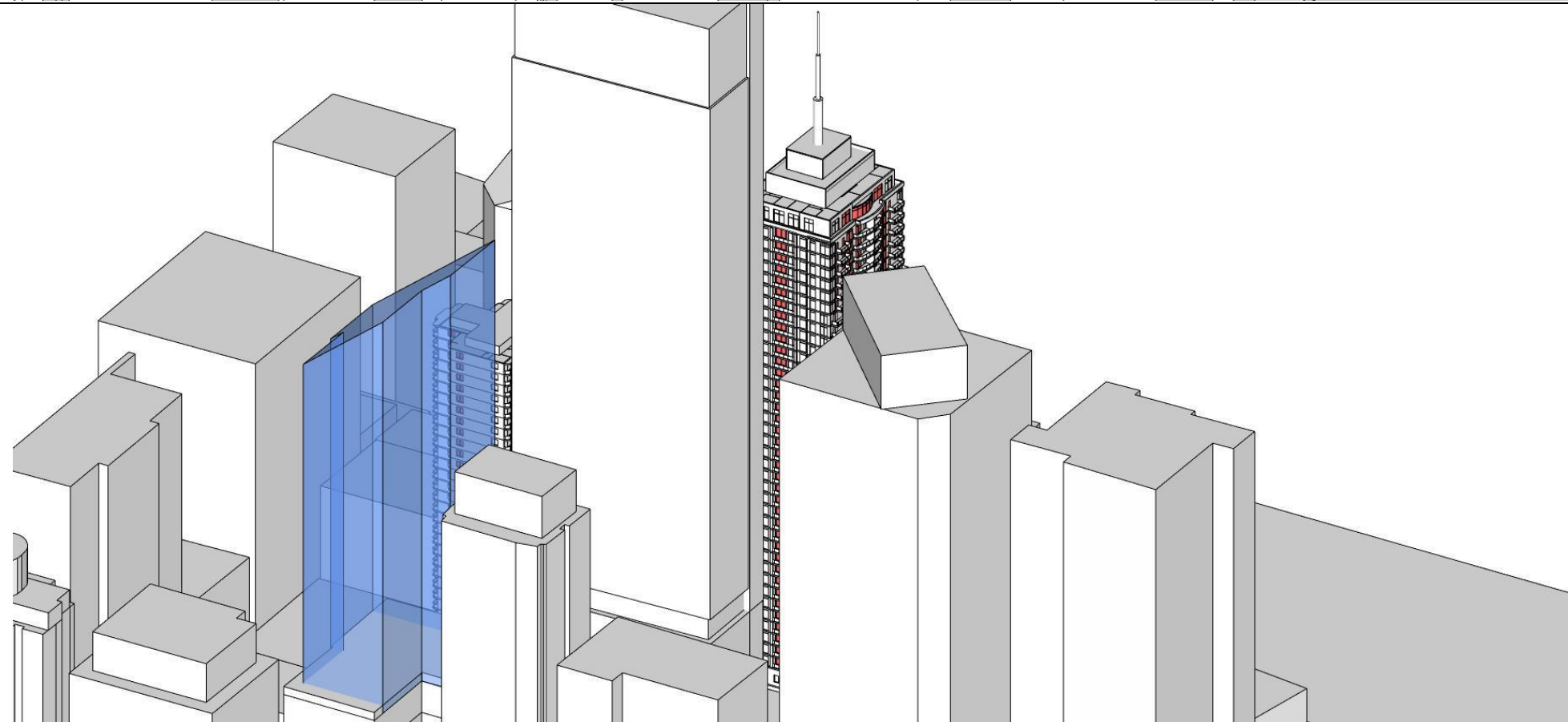


1330

Existing

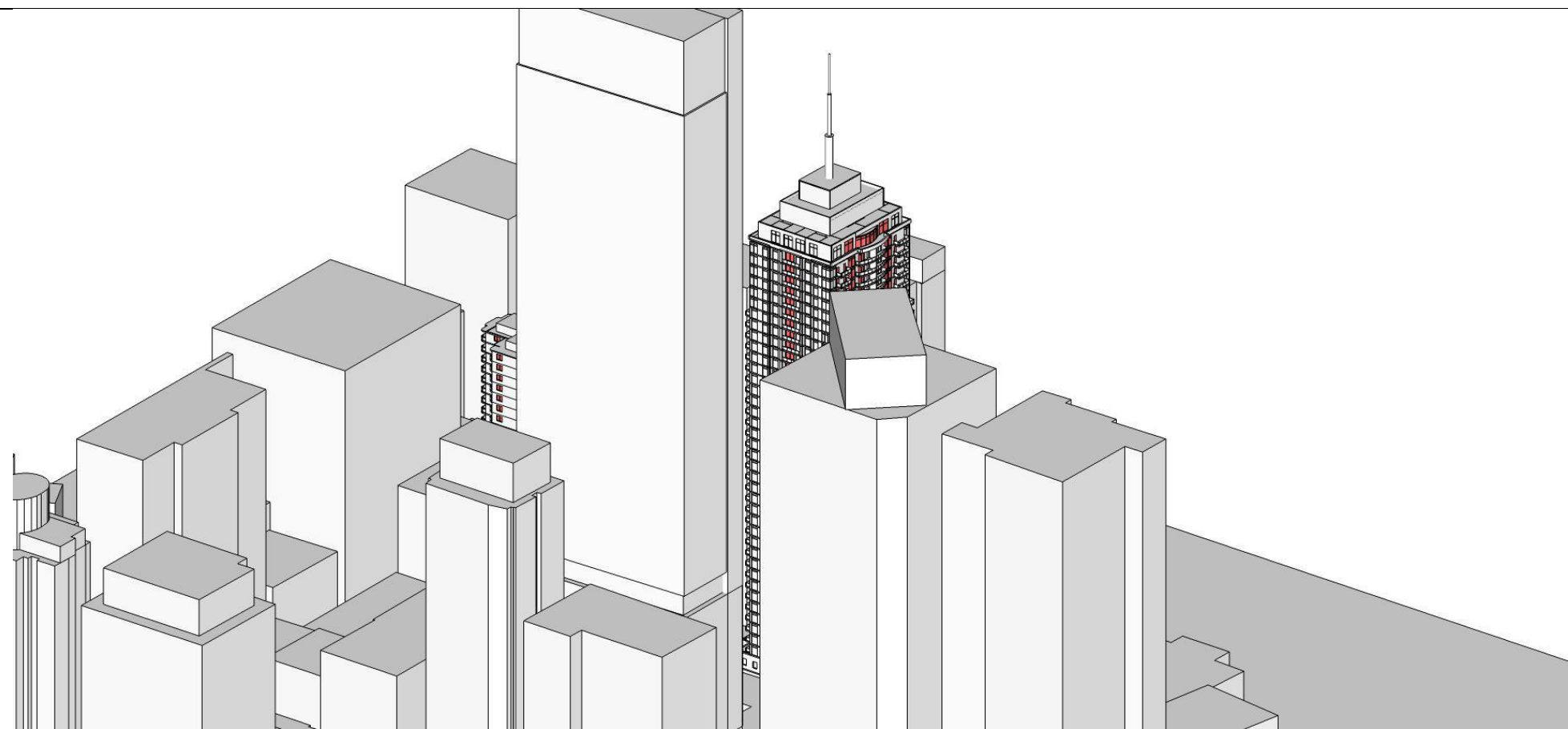


Proposed

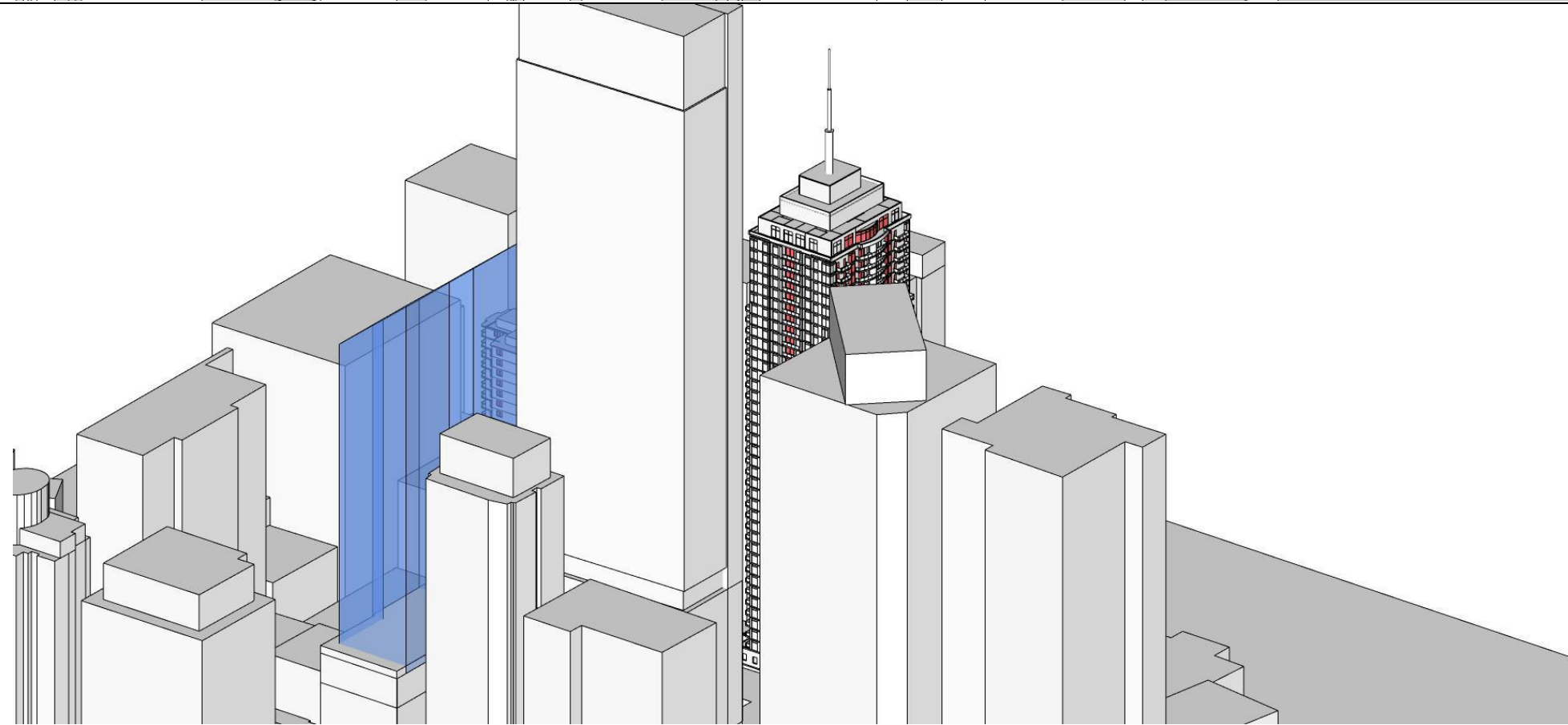


1400

Existing

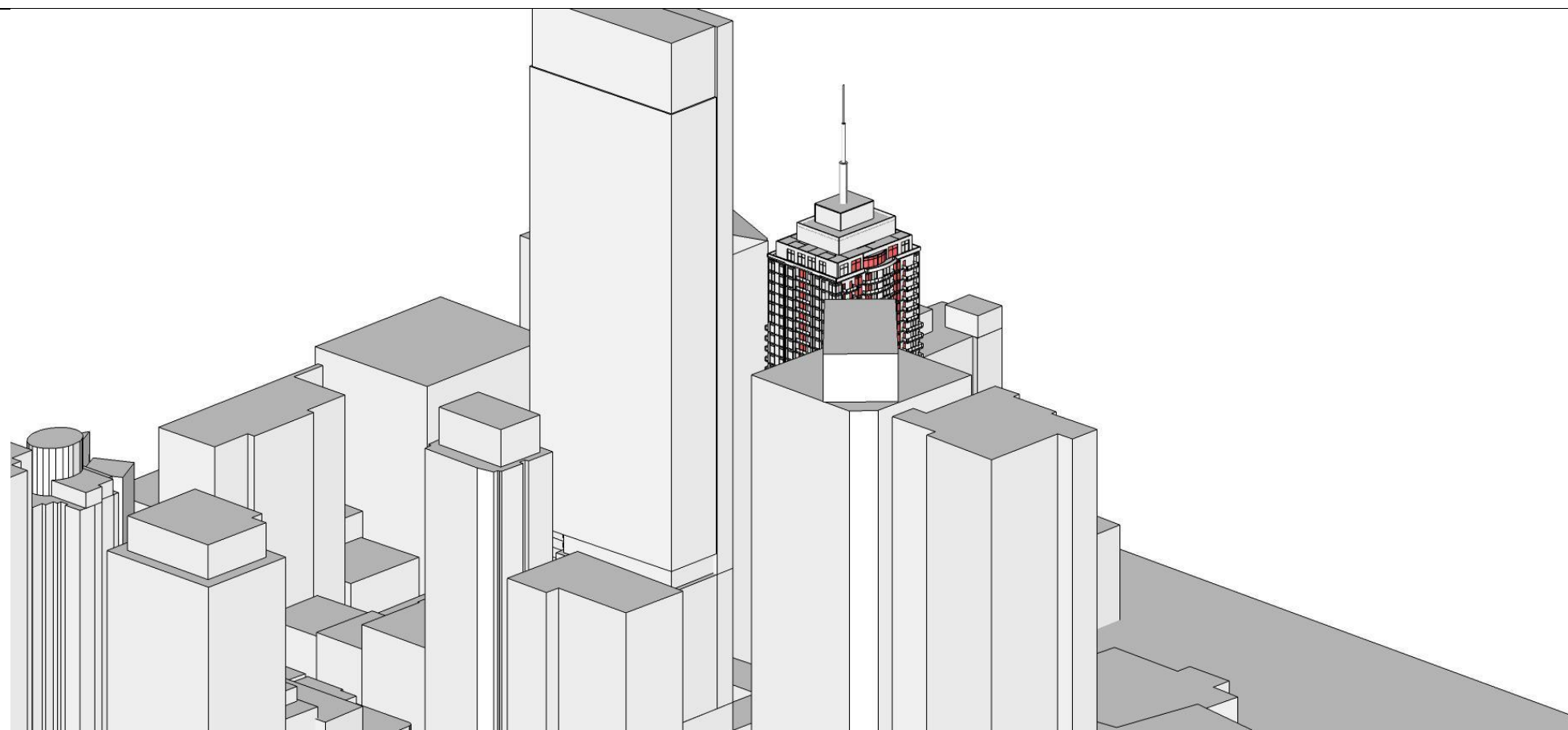


Proposed

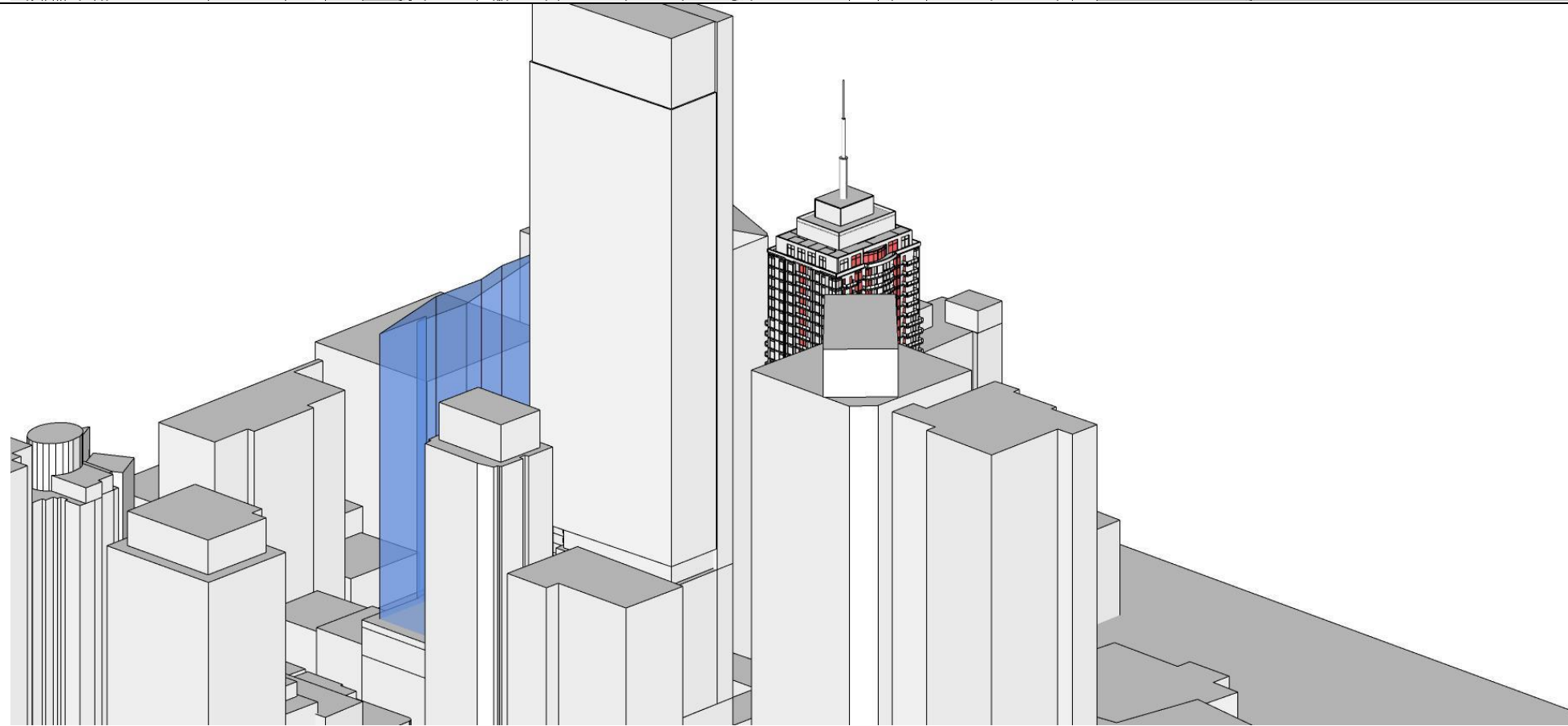


1430

Existing

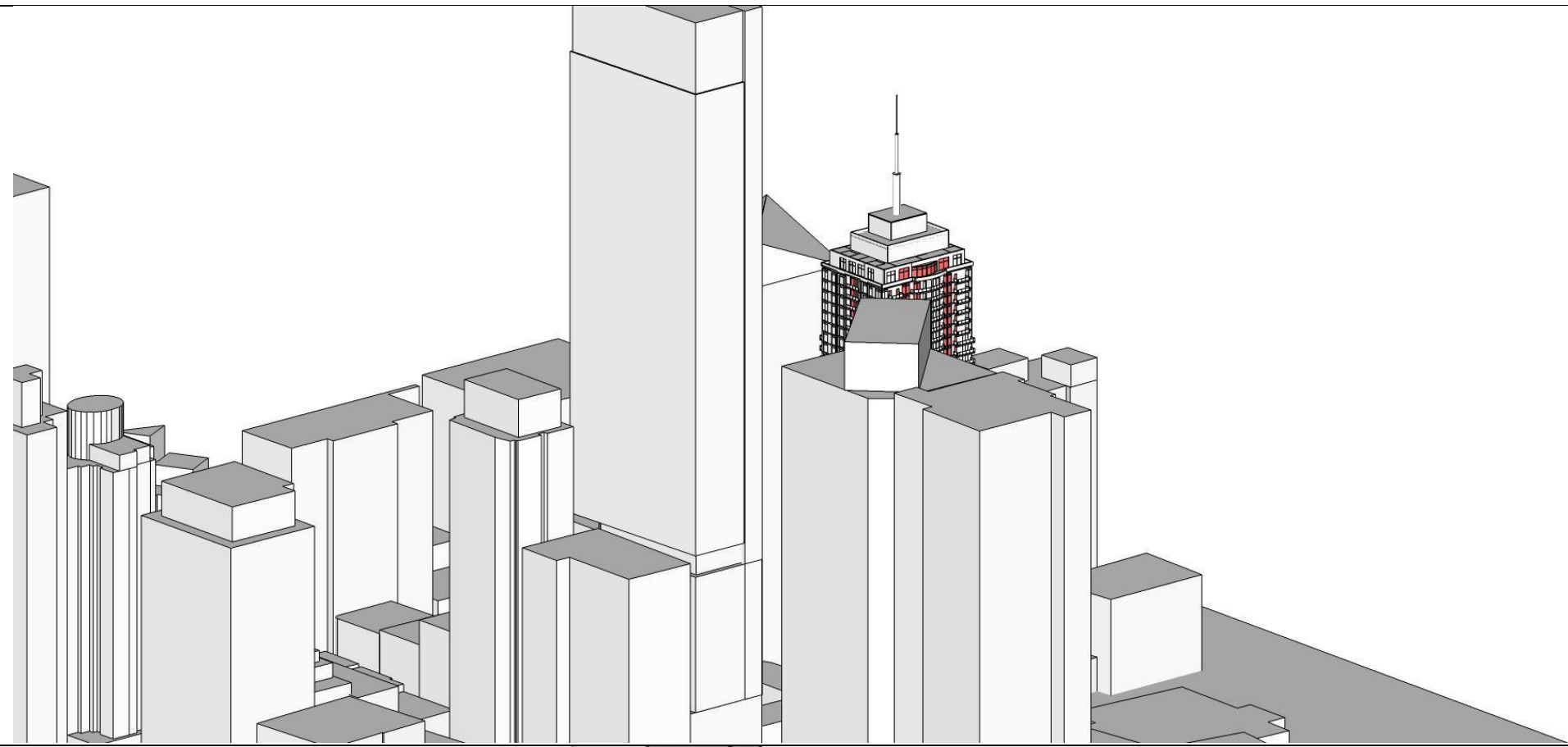


Proposed

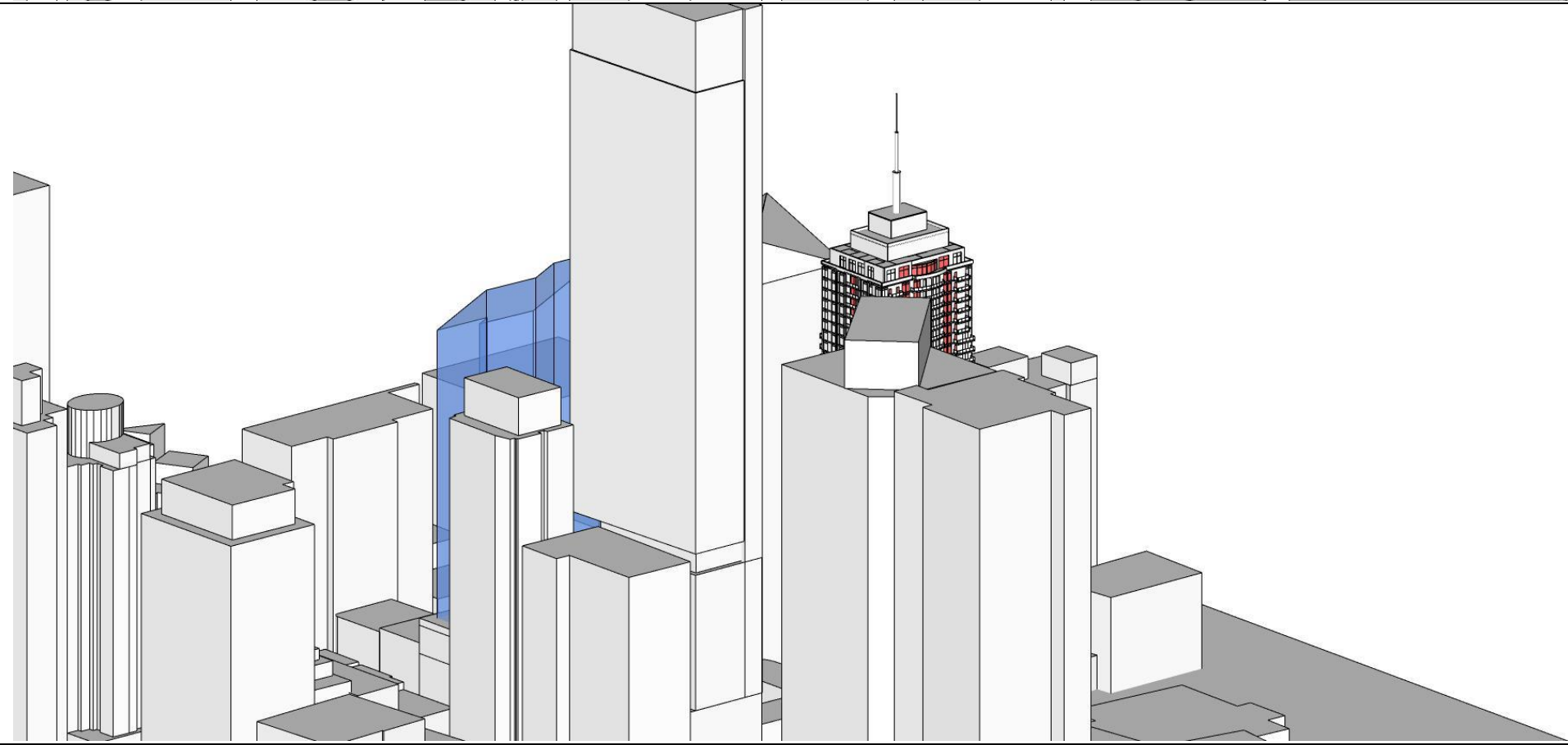


1500

Existing



Proposed



ATTACHMENT C: DETAILED TABLES

Detailed tables follow for:

- **Century Tower:** Solar access comparison for Existing and Proposed
- **Princeton Apartments:** Solar access comparison for Existing and Proposed

ATTACHMENT C: DETAILED TABLES

Detailed tables follow for:

- **Century Tower:** Solar access comparison for Existing and Proposed
- **Princeton Apartments:** Solar access comparison for Existing and Proposed

		Solar access																Solar compliance					
Level	UNIT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun

CENTURY TOWER - EXISTING

296

>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun
5	15	2	50	89
1.7%	5.1%	0.7%	16.9%	30.1%
	6.8%	7.4%	24.3%	

CENTURY TOWER - PROPOSED

296

>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun
5	11	6	30	89
1.7%	3.7%	2.0%	10.1%	30.1%
	5.4%	7.4%	17.6%	

CENTURY TOWER - COMPARISON TABLE

LEVEL	APT	8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun
LEVEL 10	APT 1	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0					
	APT 2	0	0	0	BB	1	1	B	0	0	0	0	0	B	0	0	0	0					
	APT 3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0					
	APT 4	0	0	0	0	0	B	0	0	0	0	0	0	0	0	0	0	0					
	APT 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 8	0	0	B	0	0	0	0	0	0	0	B	0	0	0	0	0	0					
LEVEL 11	APT 1	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0					
	APT 2	0	0	0	BB	1	1	B	0	0	0	0	0	B	0	0	0	0					
	APT 3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0					
	APT 4	0	0	0	0	0	B	0	0	0	0	0	0	0	0	0	0	0					
	APT 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 8	0	0	B	0	0	0	0	0	0	0	B	0	0	0	0	0	0					
LEVEL 12	APT 1	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0					
	APT 2	0	0	0	BB	1	1	B	0	0	0	0	0	B	0	0	0	0					
	APT 3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0					
	APT 4	0	0	0	0	0	B	0	0	0	0	0	0	0	0	0	0	0					
	APT 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 8	0	0	B	B	0	0	0	0	0	0	B	0	0	0	0	0	0					
LEVEL 13	APT 1	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0					
	APT 2	0	0	0	BB	1	1	B	0	0	0	0	0	B	0	0	0	0					
	APT 3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0					
	APT 4	0	0	0	0	0	B	0	0	0	0	0	0	0	0	0	0	0					
	APT 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES
	APT 8	0	0	B	B	0	0	0	0	0	0	B	0	0	0	0	0	0					

	APT 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					YES		
	APT 6	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		YES				
	APT 7	B	B	B	B	0	0	0	0	0	0	1	1	1	1	1	1	1	1		YES				
LEVEL 47	APT 1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	0	YES					
	APT 2	1	1	1	1	1	1	0	0	0	0	0	0	B	B	B	B	B				YES			
	APT 3	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0				YES		
	APT 4	1	1	1	1	1	B	0	0	0	0	0	0	0	0	0	0	0	0				YES		
	APT 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				YES		
	APT 6	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		YES				
	APT 7	B	B	B	B	0	0	0	0	0	0	1	1	1	1	1	1	1	1		YES				
LEVEL 48	APT 1	1	1	1	1	1	1	1	0	0	0	0	B	B	B	B	B	B		YES					
	APT 2	1	1	1	1	1	1	B	0	0	0	0	0	0	0	0	0	0	0				YES		
	APT 3	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1		YES				
	APT 4	B	B	B	B	B	0	0	0	0	0	1	1	1	1	1	1	1	1		YES				
																					>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun
																					5	11	6	30	89
																					1.7%	3.7%	2.0%	10.1%	30.1%
																						5.4%	7.4%	17.6%	

296

0	Bedroom(s) lose sun
0	Living loses sun
BB	Living loses sun, Bedroom in sun

Level	UNIT	Solar access																	Solar compliance				
		8	830	9	930	10	1030	11	1130	12	1230	13	1330	14	1430	15	1530	16	>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun

PRINCETON TOWER - EXISTING																											
116																						>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun	
																							41	2	19	1	17
																							35.3%	1.7%	16.4%	0.9%	14.7%
																								37.1%	53.4%	54.3%	

PRINCETON TOWER - PROPOSED																											
116																							>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun
																							0	5	0	17	17
																							0.0%	4.3%	0.0%	14.7%	14.7%
																								4.3%	4.3%	19.0%	

PRINCETON TOWER - COMPARISON TABLE																						
LEVEL 9	Unit 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	YES
	Unit 2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
	Unit 4	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 10	Unit 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 6	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
	Unit 8	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 11	Unit 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 10	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 11	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
	Unit 12	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 12	Unit 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 14	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 15	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
	Unit 16	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 13	Unit 17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 18	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 19	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
	Unit 20	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 14	Unit 21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 22	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 23	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
	Unit 24	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 15	Unit 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 26	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 27	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
	Unit 28	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 16	Unit 29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 30	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 31	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 32	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 17	Unit 33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 34	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 35	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 36	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 18	Unit 37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES
	Unit 38	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 39	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
	Unit 40	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEVEL 19	Unit 41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B			YES

	Unit 42	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0					
	Unit 43	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0					
	Unit 44	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0					
LEVEL 20	Unit 45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B				YES
	Unit 46	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 47	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 48	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0				
LEVEL 21	Unit 49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B				YES
	Unit 50	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 51	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 52	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 22	Unit 53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B				YES
	Unit 54	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 55	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 56	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 23	Unit 57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B				YES
	Unit 58	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 59	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 60	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 24	Unit 61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B				YES
	Unit 62	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 63	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 64	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 25	Unit 65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B				YES
	Unit 66	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 67	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0				
	Unit 68	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 26	Unit 69	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 70	1	1	0	0	0	0	0	0	BB	BB	BB	0	0	0	0	0	0				
	Unit 71	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 27	Unit 72	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 73	1	1	0	0	0	0	0	0	BB	BB	BB	0	0	0	0	0	0				
	Unit 74	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 28	Unit 75	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 76	1	1	0	0	0	0	0	0	BB	BB	BB	0	0	0	0	0	0				
	Unit 77	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 29	Unit 78	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 79	1	1	0	0	0	0	0	0	BB	BB	BB	0	0	0	0	0	0				
	Unit 80	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 30	Unit 81	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 82	1	1	0	0	0	0	0	0	BB	BB	BB	0	0	0	0	0	0				
	Unit 83	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 31	Unit 84	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 85	1	1	0	0	0	0	0	0	BB	BB	BB	0	0	0	0	0	0				
	Unit 86	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 32	Unit 87	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 88	1	1	0	0	0	0	0	0	BB	BB	BB	0	0	0	0	0	0				
	Unit 89	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 33	Unit 90	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 91	1	1	0	0	0	0	0	0	BB	BB	BB	0	0	0	0	0	0				
	Unit 92	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 34	Unit 93	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 94	1	1	0	0	0	0	0	0	BB	BB	BB	BB	0	0	0	0	0				
	Unit 95	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 35	Unit 96	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 97	1	1	0	0	0	0	0	0	BB	BB	BB	BB	0	0	0	0	0				
	Unit 98	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0			YES	
LEVEL 36	Unit 99	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B				
	Unit 100	1	1	0	0	0	0	0	0	BB	BB	BB	BB	0	0	0	0	0				

	Unit 101	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0				YES	
LEVEL 37	Unit 102	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B					
	Unit 103	1	1	0	0	0	0	0	0	BB	BB	BB	BB	0	0	0	0						
	Unit 104	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		YES				
LEVEL 38	Unit 105	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B					
	Unit 106	1	1	0	0	0	0	0	0	BB	BB	BB	BB	0	0	0	0						
	Unit 107	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		YES				
LEVEL 39	Unit 108	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B					
	Unit 109	1	1	0	0	0	0	0	0	BB	BB	BB	BB	0	0	0	0						
	Unit 110	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		YES				
LEVEL 40	Unit 111	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	B					
	Unit 112	1	1	0	0	0	0	0	0	BB	BB	BB	BB	0	0	0	0						
	Unit 113	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		YES				
LEVEL 41	Unit 114	1	1	1	1	1	0	0	0	0	B	0	0	0	0	0	0	B				YES	
	Unit 115	1	1	0	0	0	0	0	0	BB	BB	BB	BB	0	0	0	0						
	Unit 116	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0		YES				
																		>3 hrs 9-3	>2 hrs 9-3 (>3hrs 8-4)	>2 hrs 9-3	>2hrs 8-4	No sun	
																		0	5	0	17	17	
																		0.0%	4.3%	0.0%	14.7%	14.7%	
																			4.3%		19.0%		
																				4.3%			

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0	Bedroom(s) lose sun
0	Living loses sun
BB	Living loses sun, Bedroom in sun