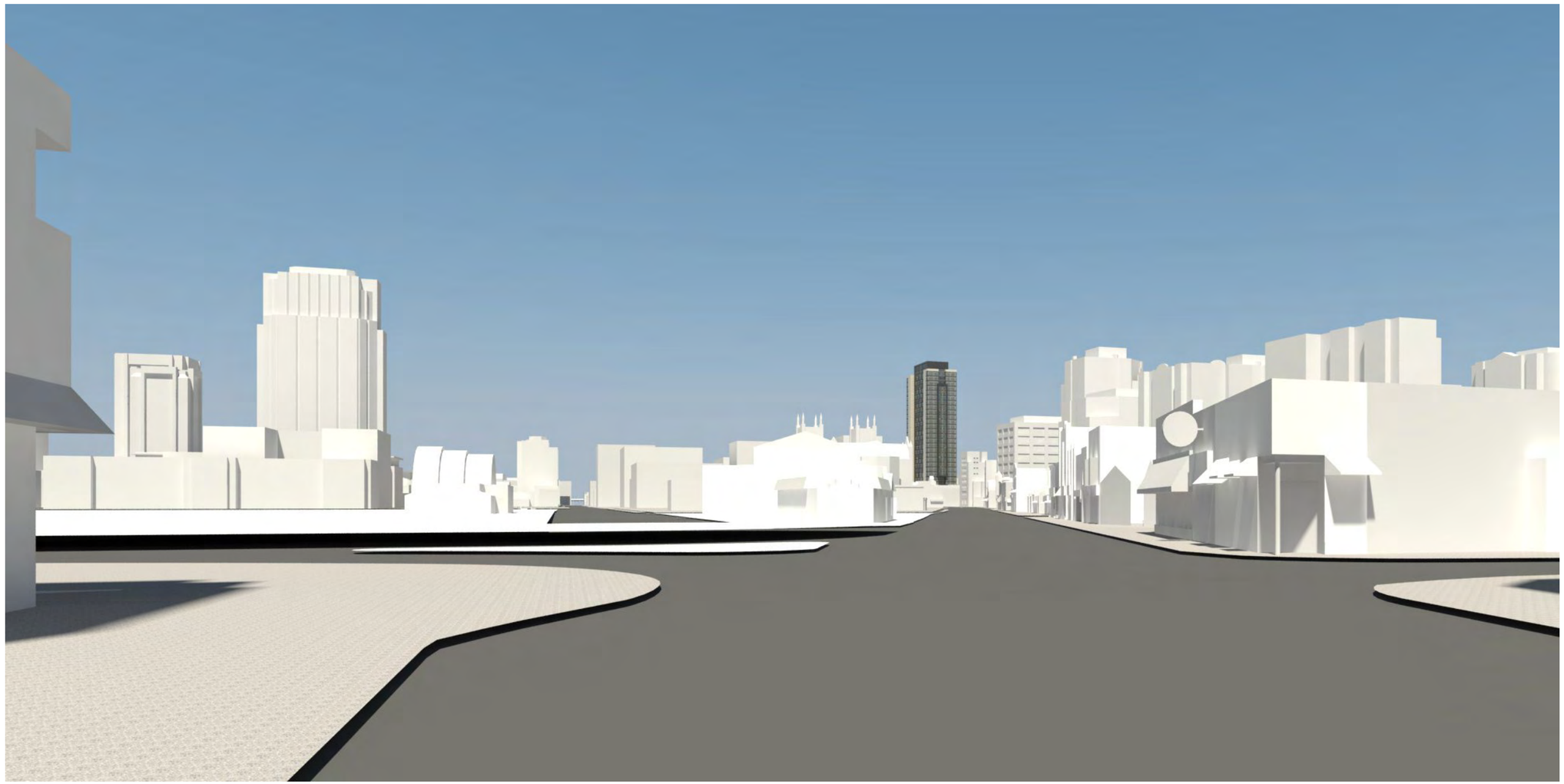

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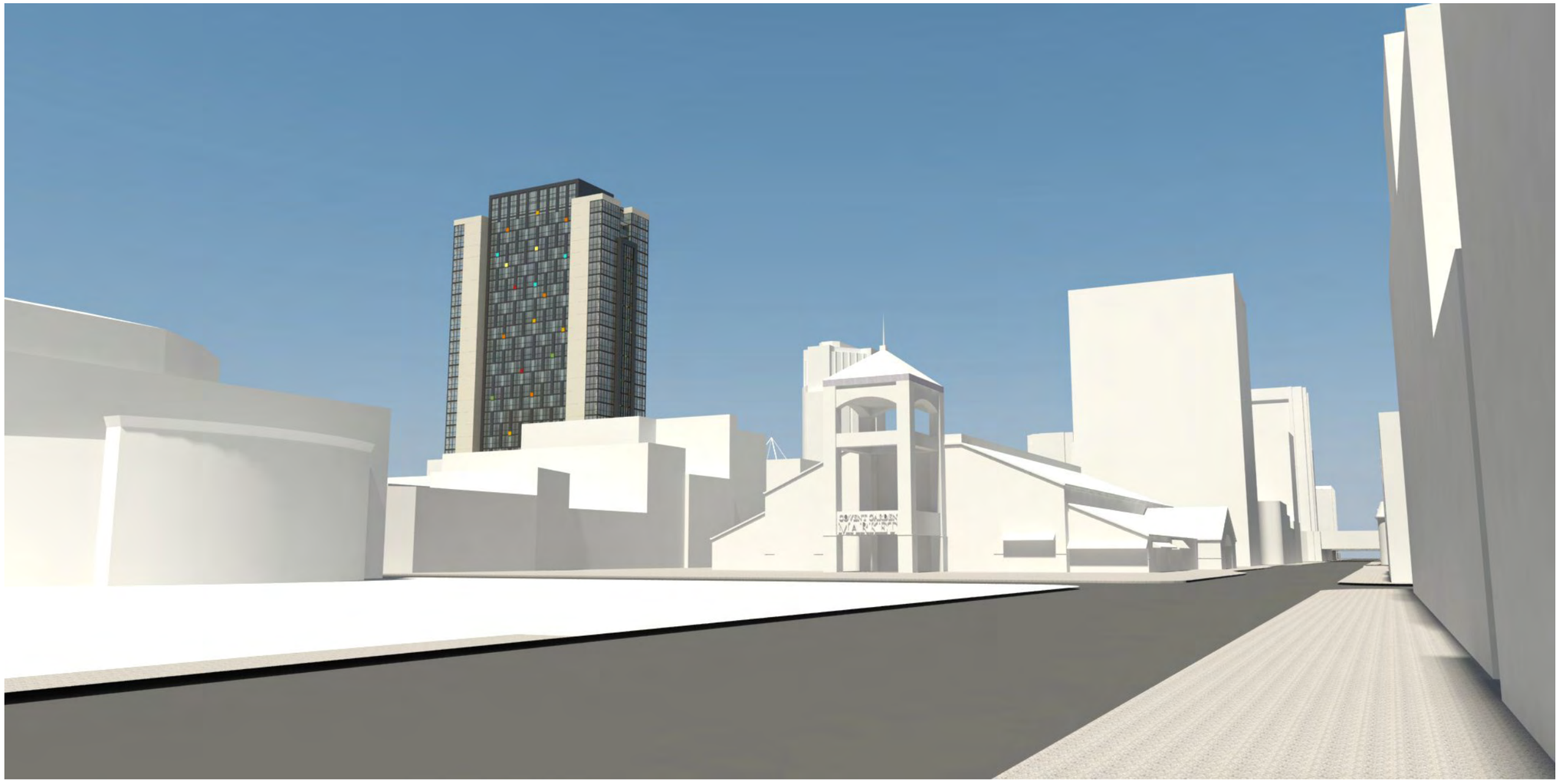
3D PERSPECTIVE VIEW

PROPOSED MIXED USE DEVELOPMENT @ 150 DUNDAS STREET - CITY OF LONDON, ONTARIO



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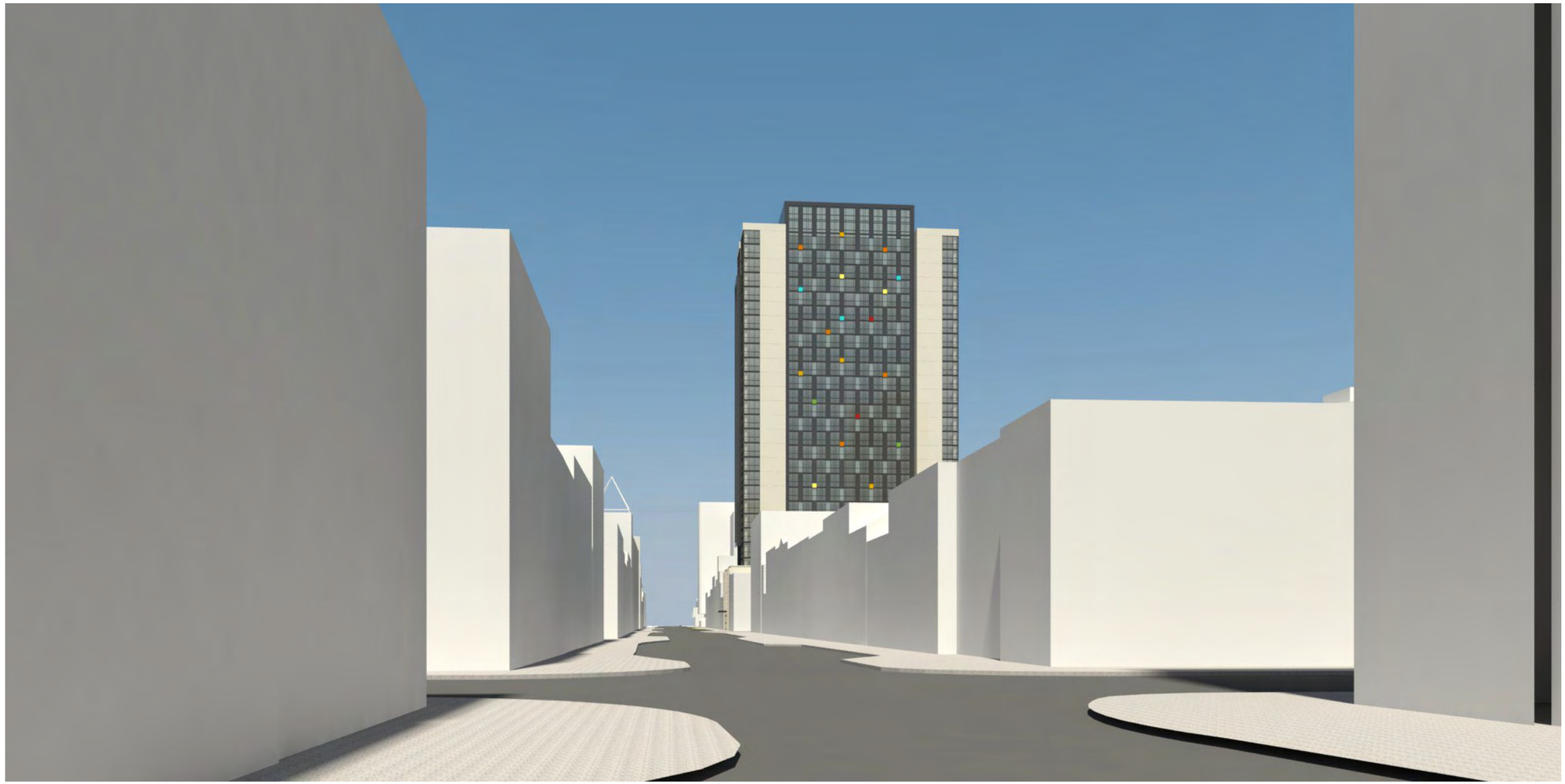

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JANUARY 2017

RYGAR CORPORATION INC.

PROPOSED MIXED USE DEVELOPMENT
150 DUNDAS STREET-CITY OF LONDON, ONTARIO

SUN/SHADOW STUDY

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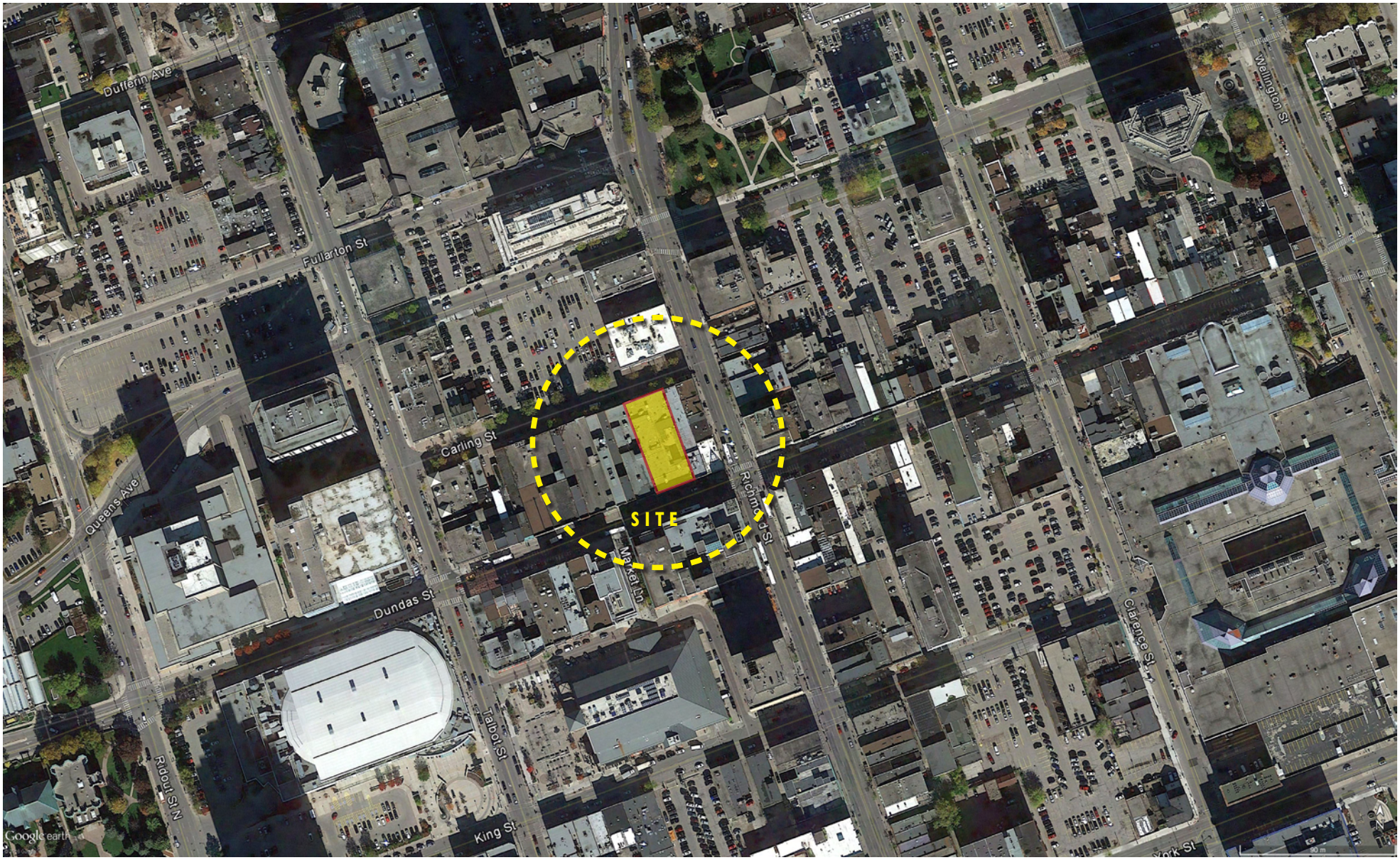

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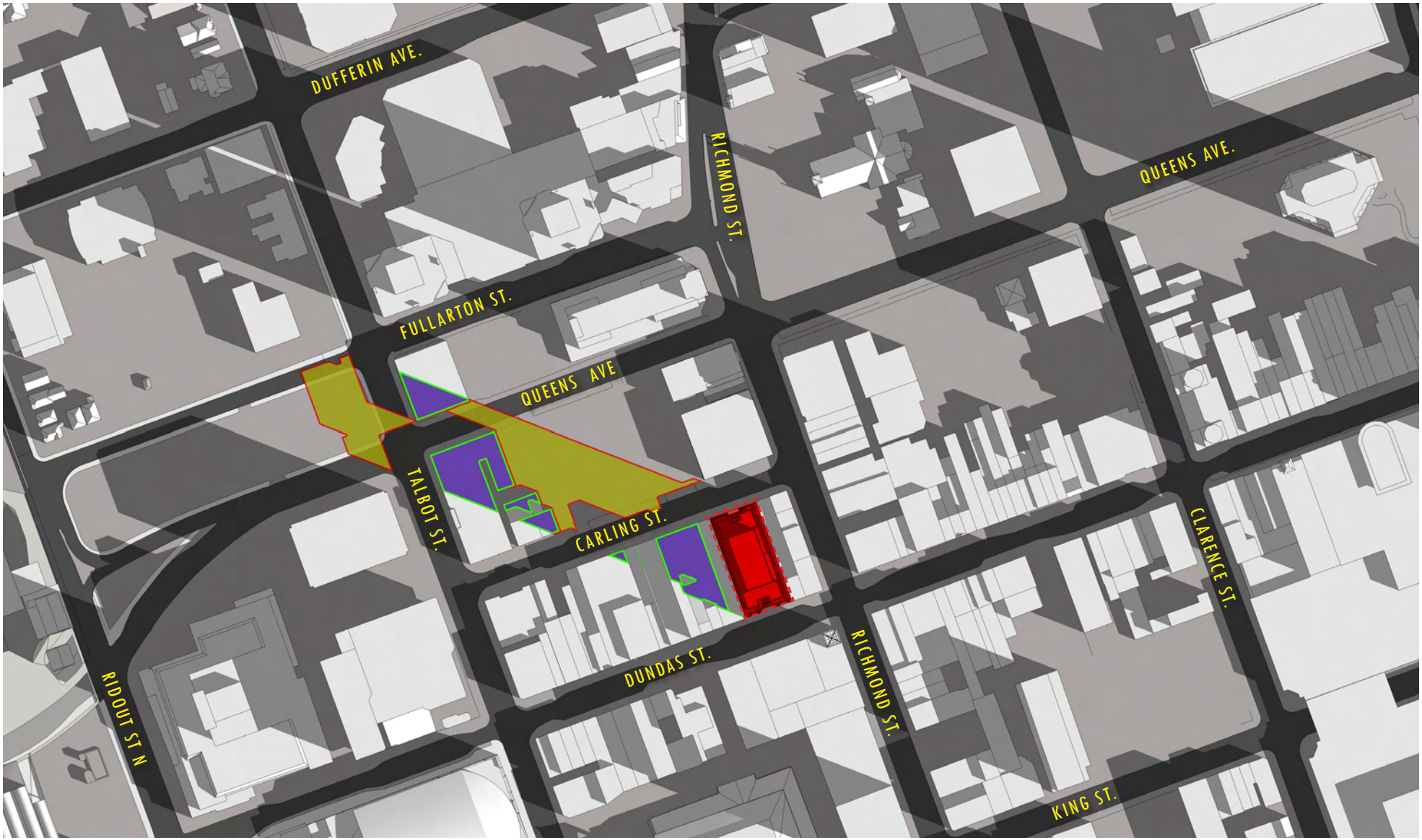
SITE LOCATION

SUN / SHADOW STUDY @ 150 DUNDAS STREET - CITY OF LONDON, ONTARIO



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SITE BOUNDARY

MARCH 21, 9:18 AM

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MARCH 21, 2:18 PM

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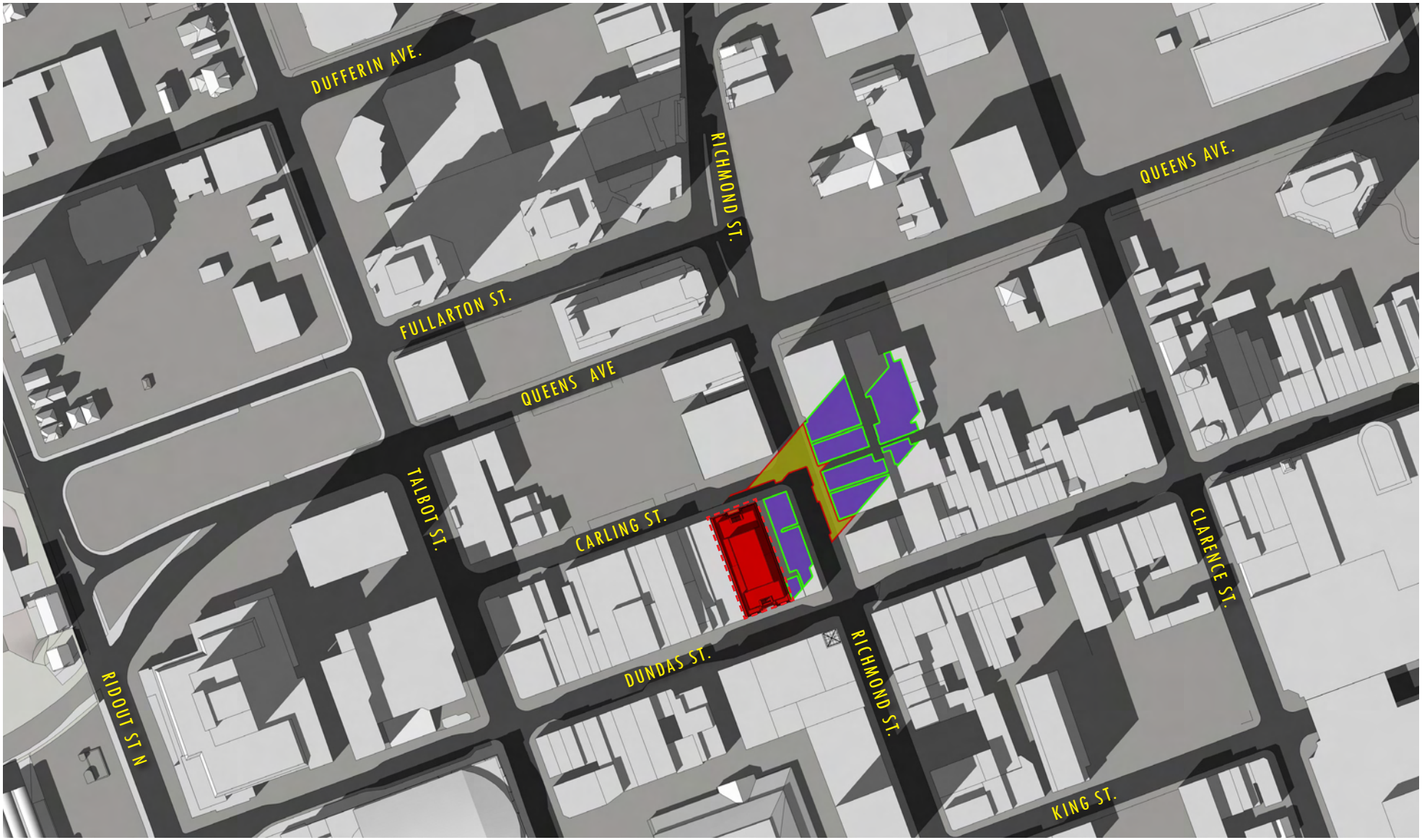

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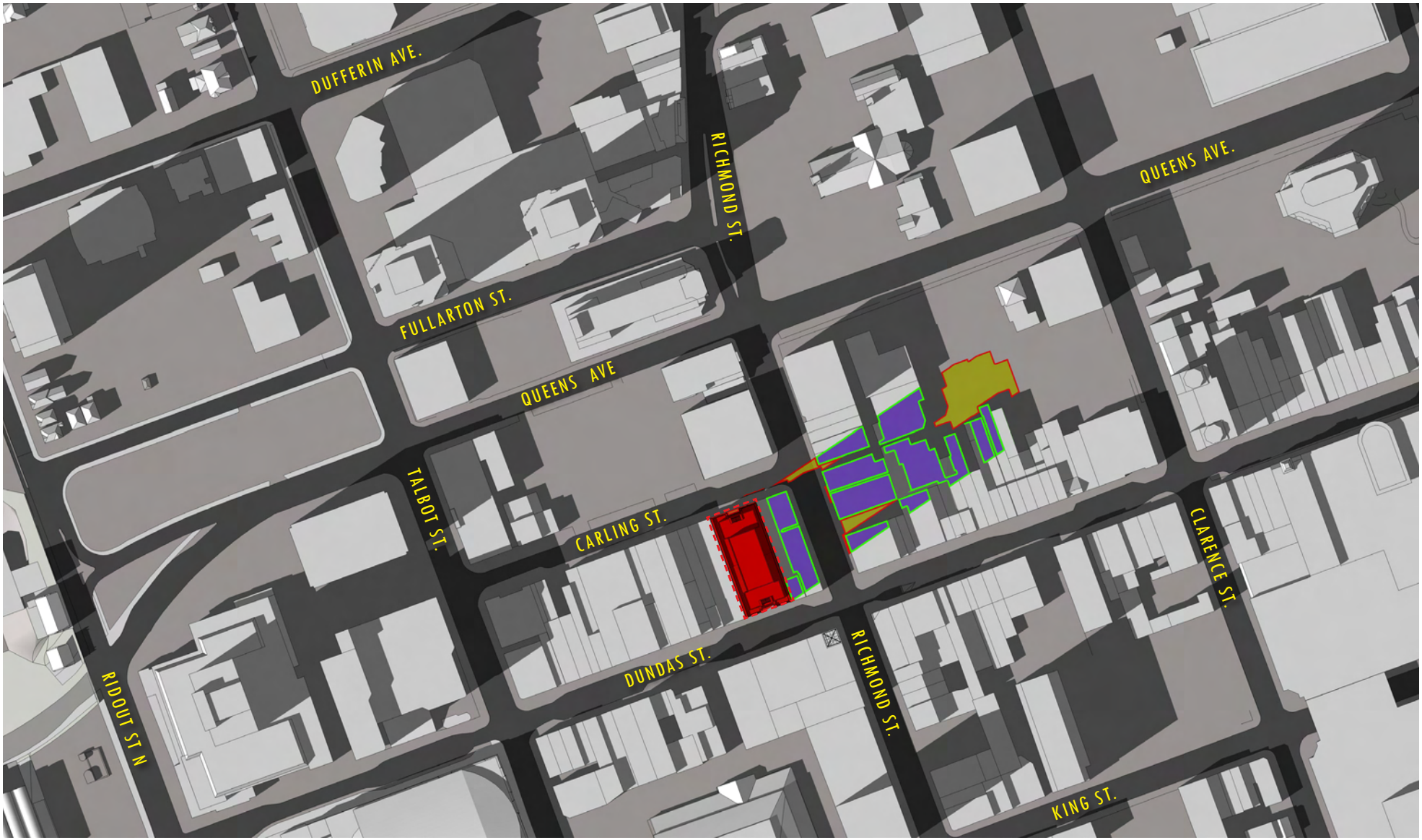
MARCH 21, 3:18 PM

SUN / SHADOW STUDY @ 150 DUNDAS STREET - CITY OF LONDON, ONTARIO



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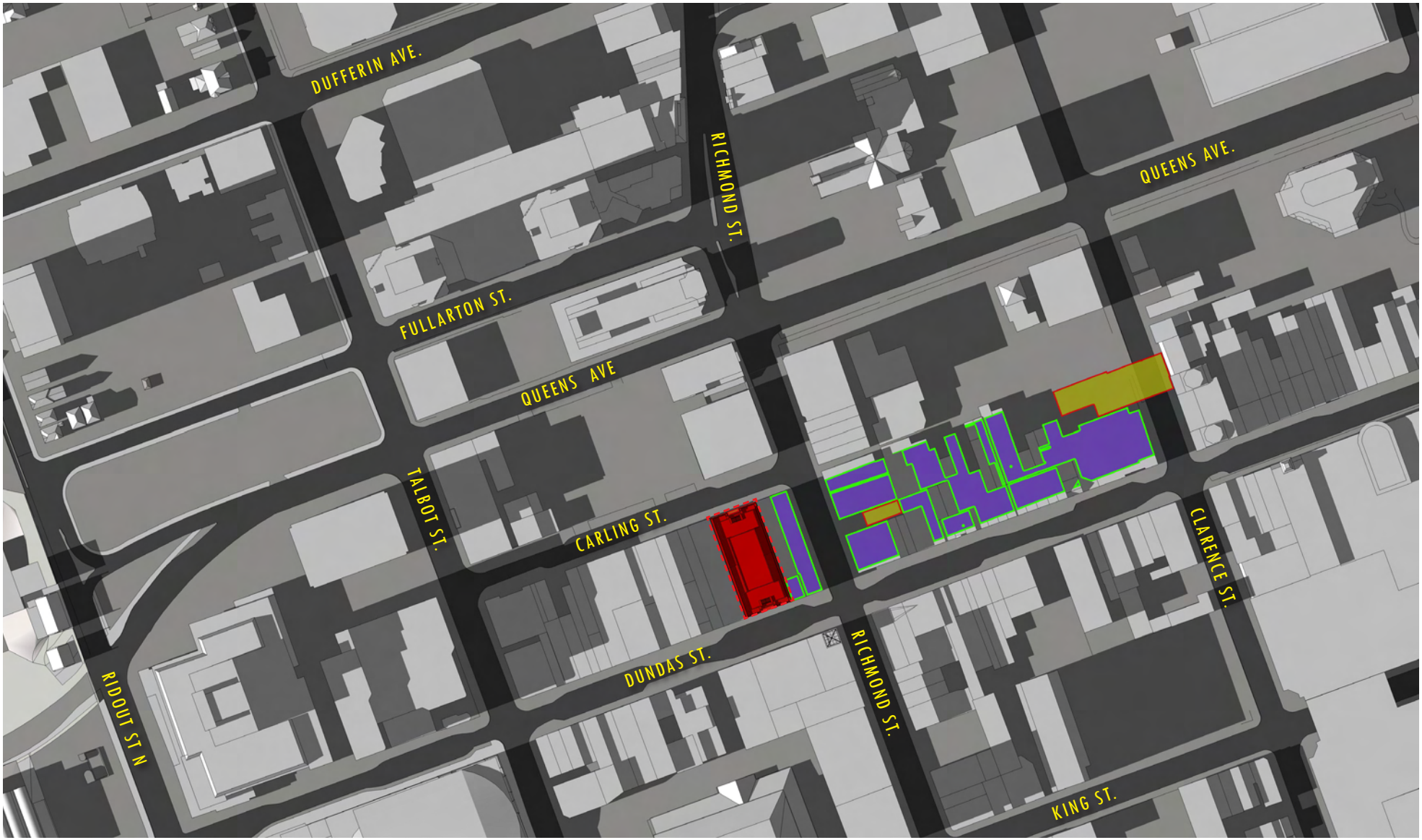

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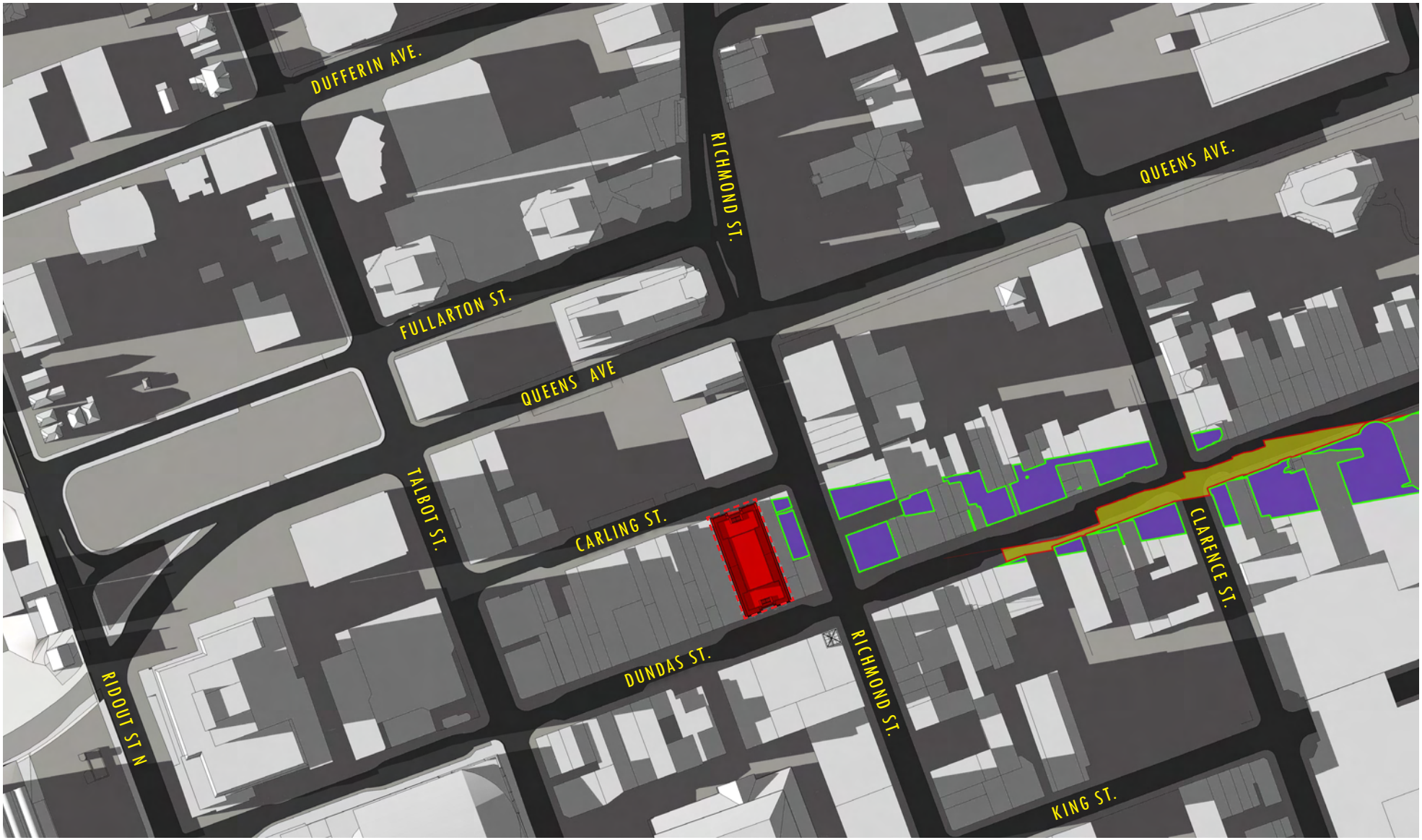

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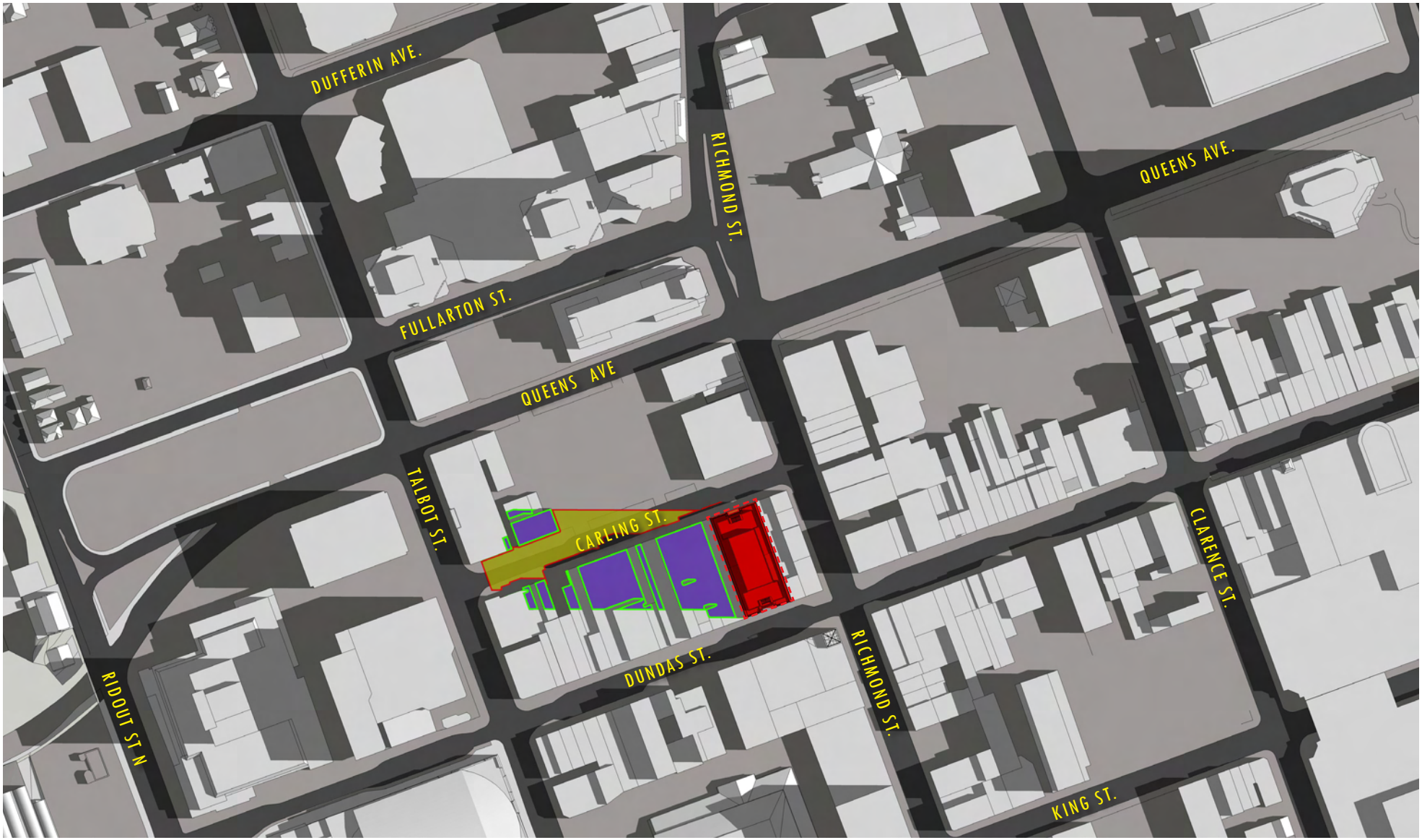

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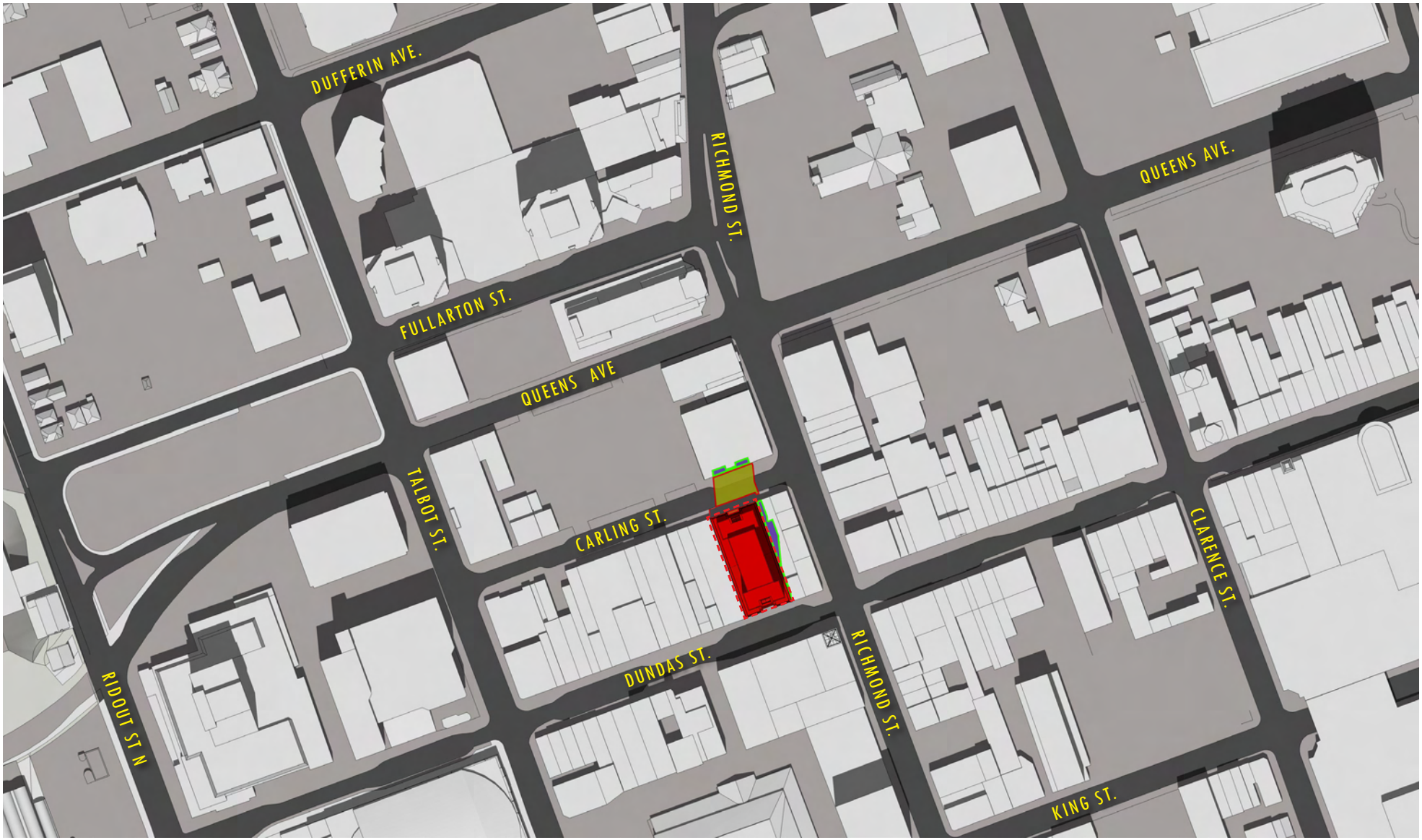

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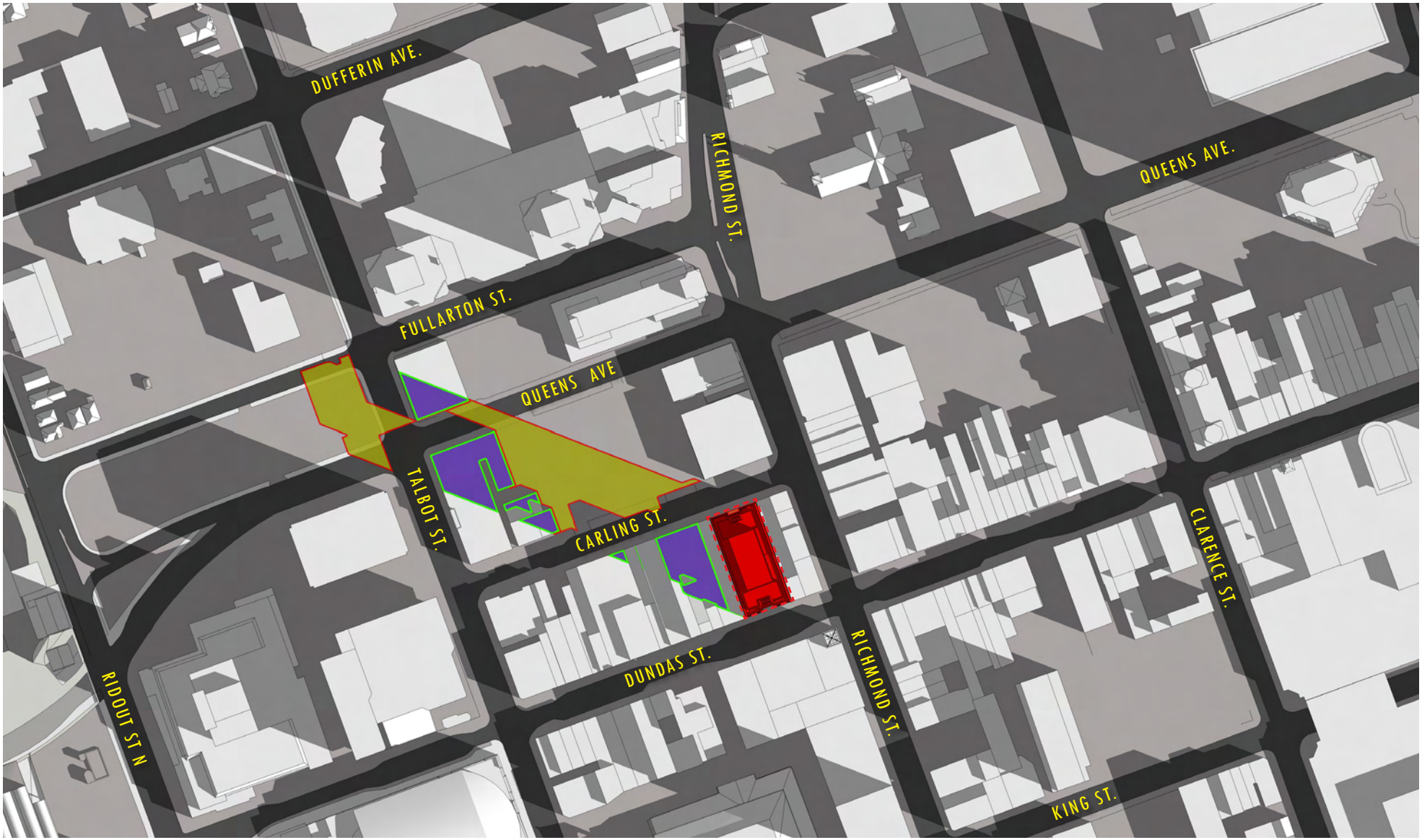

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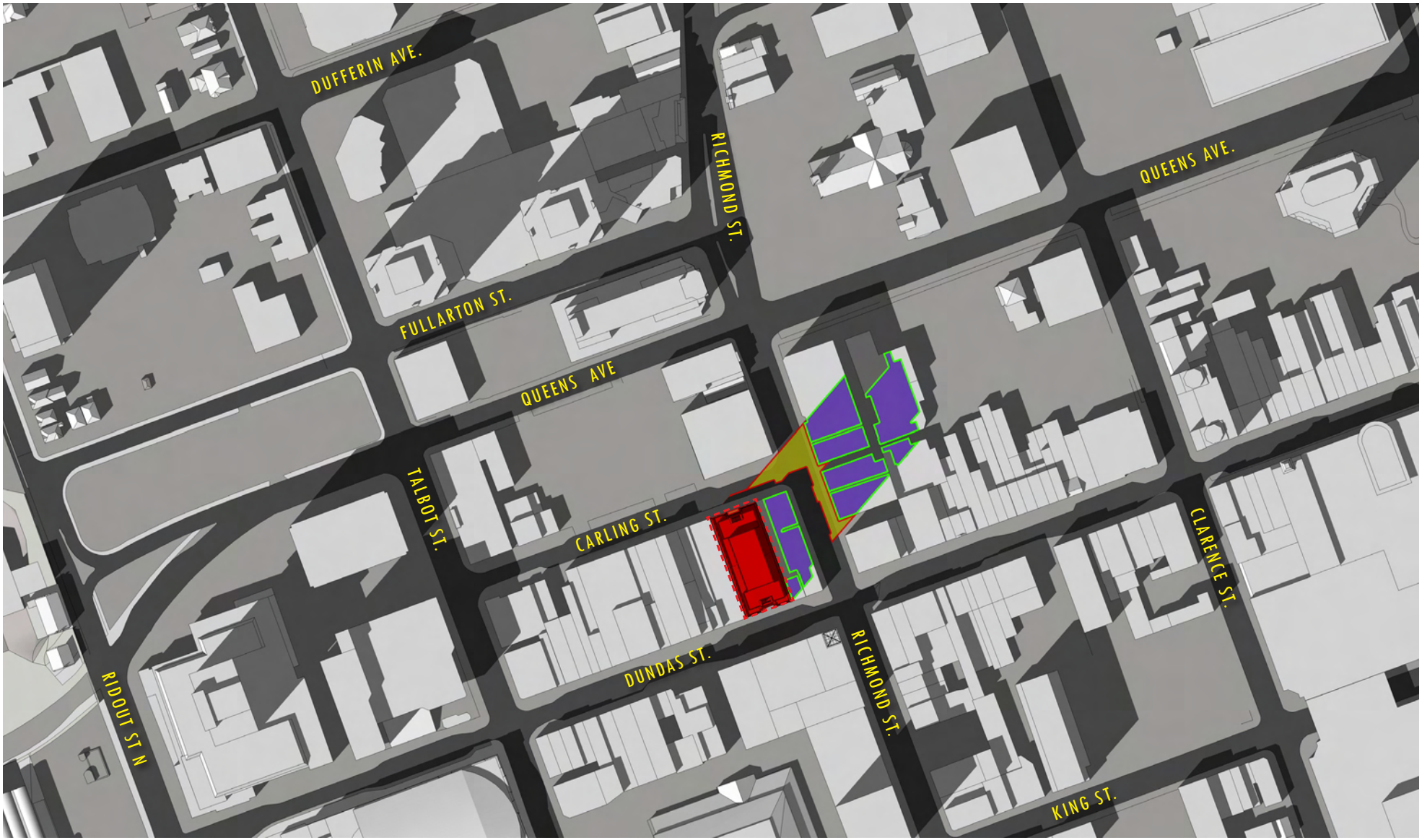

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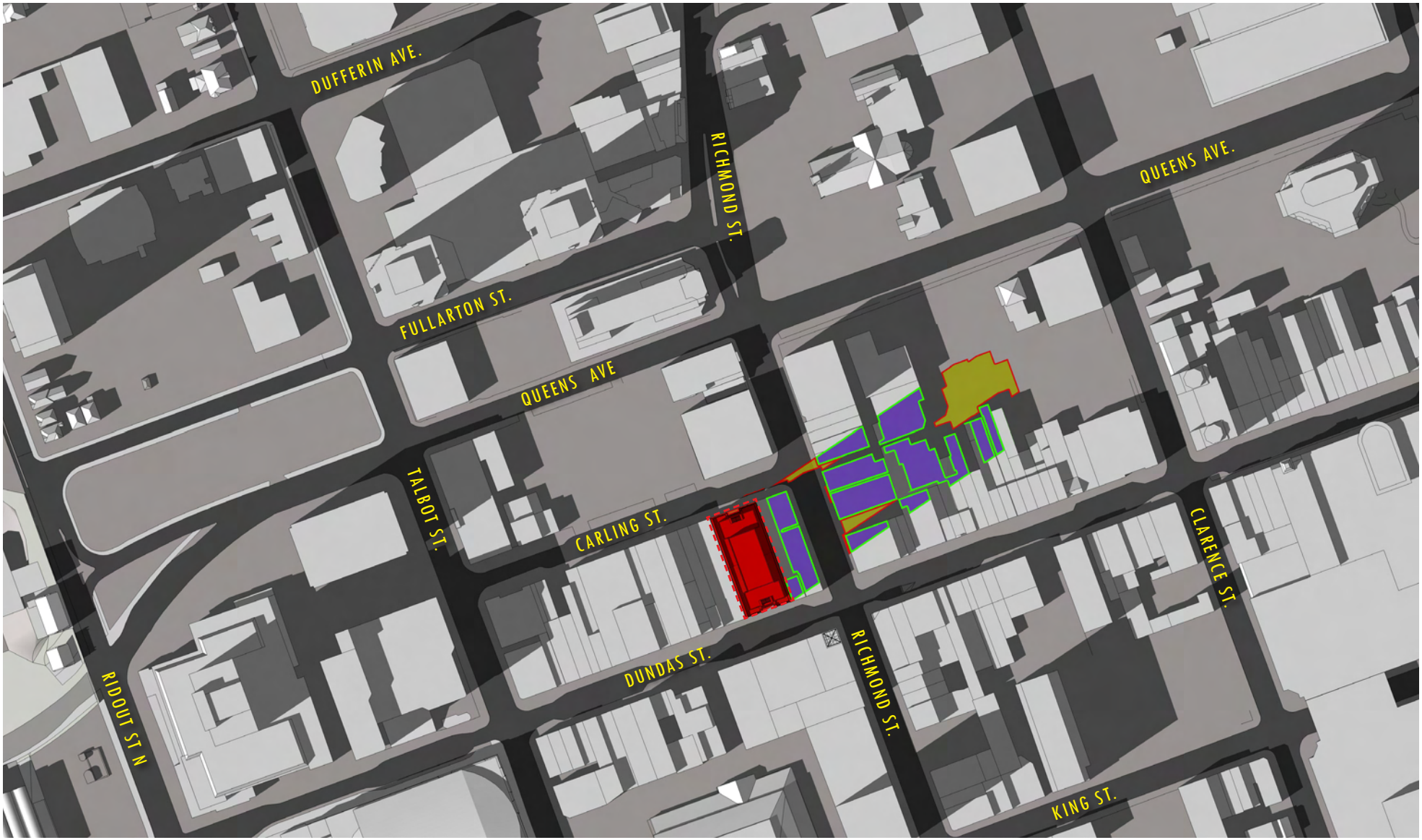

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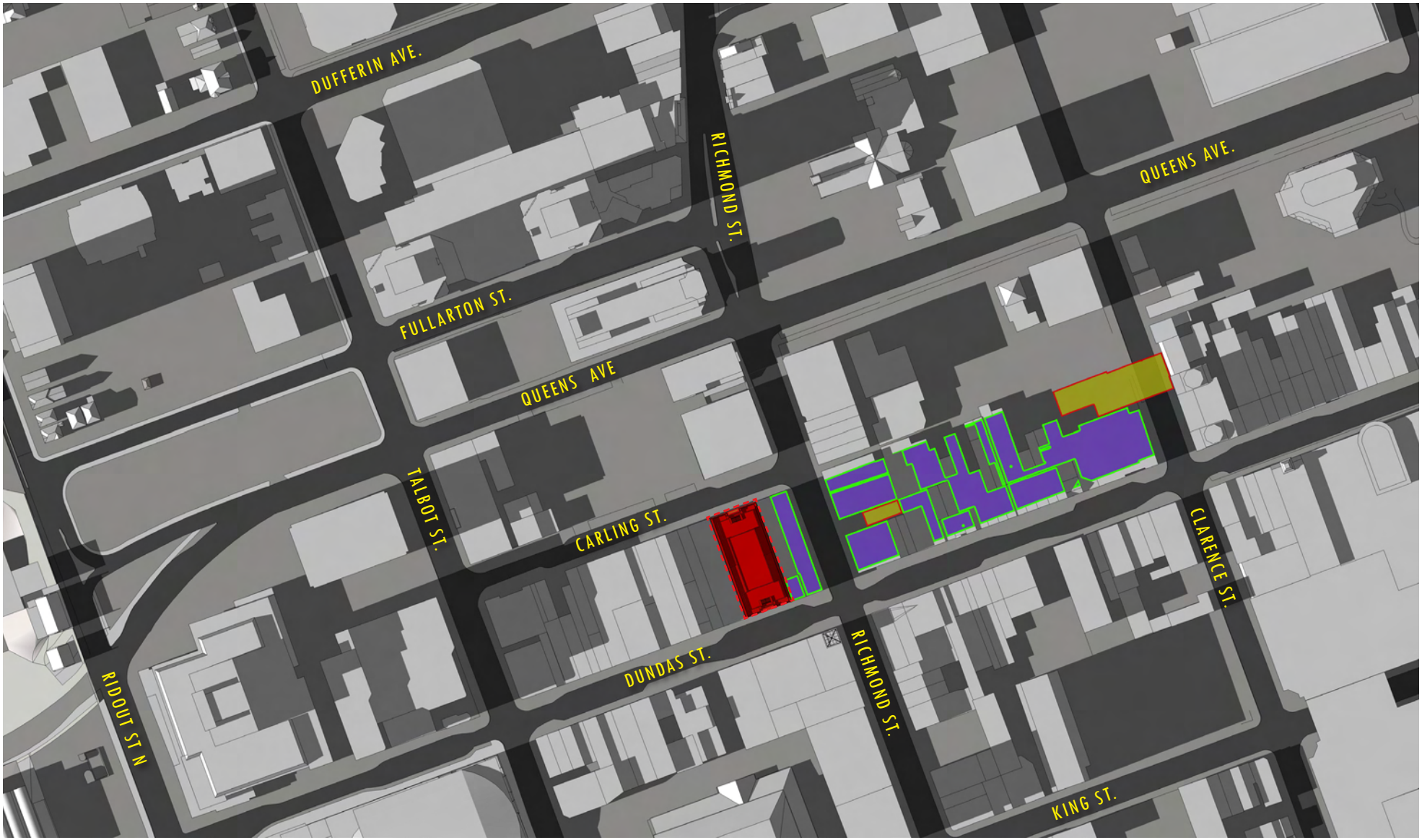

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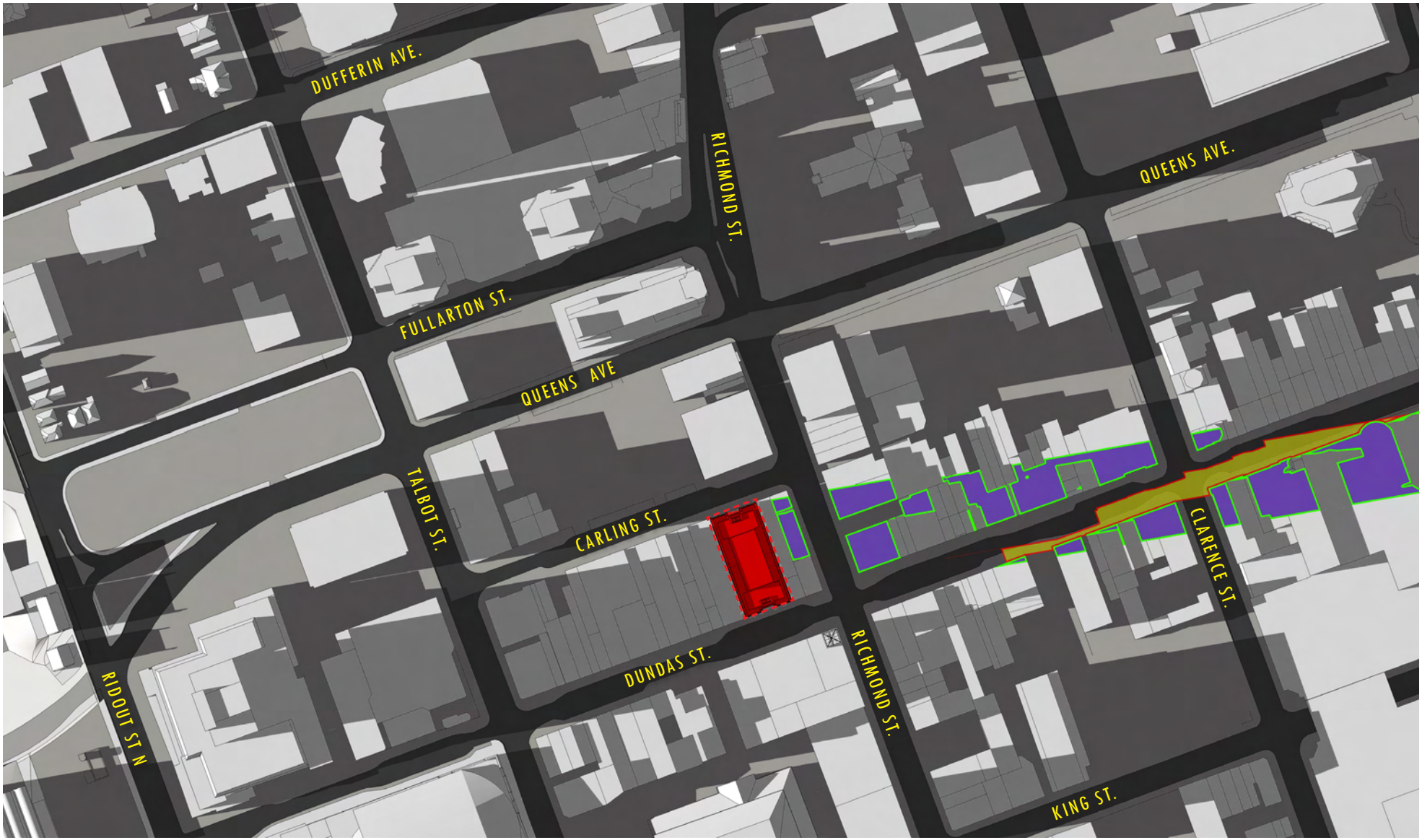

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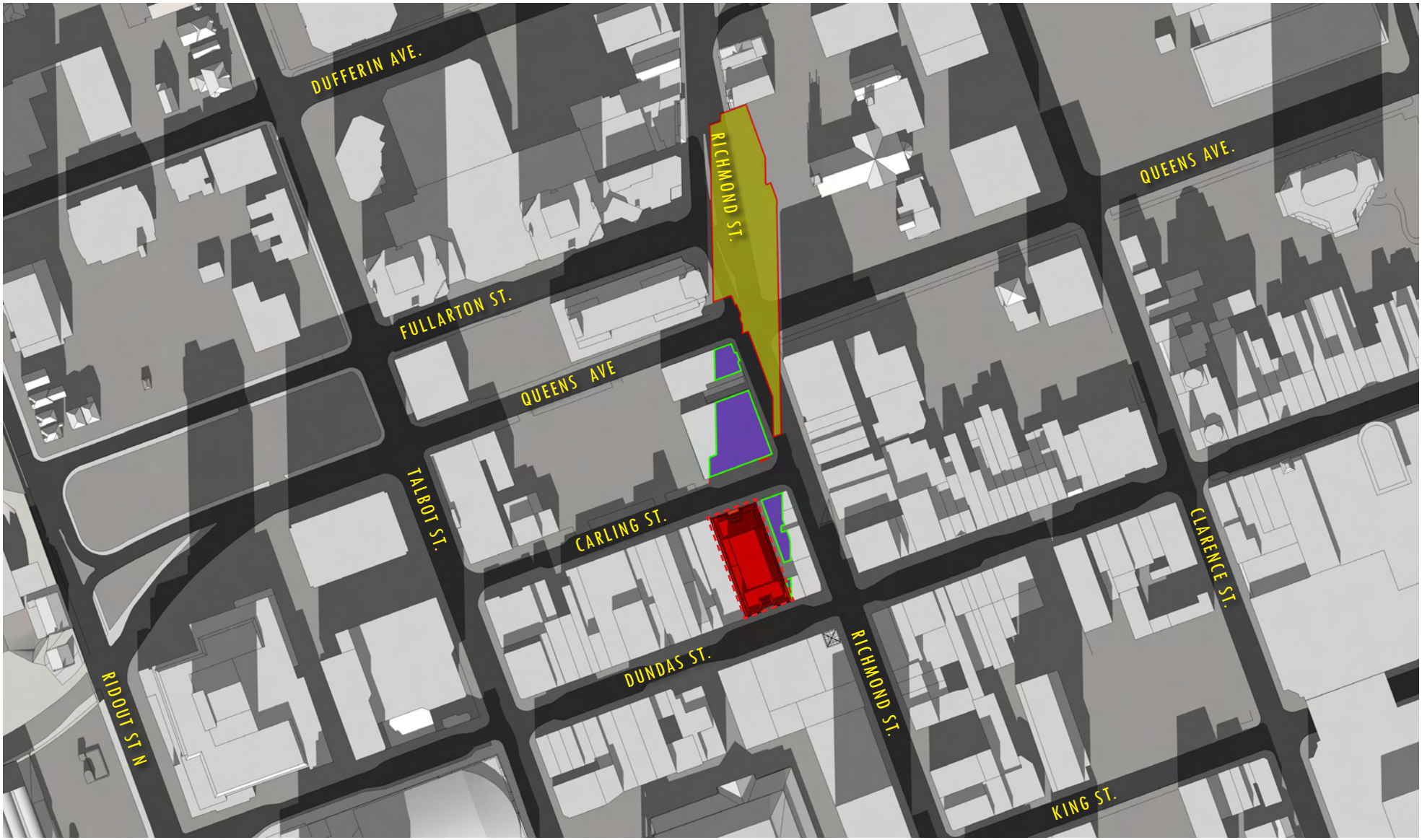

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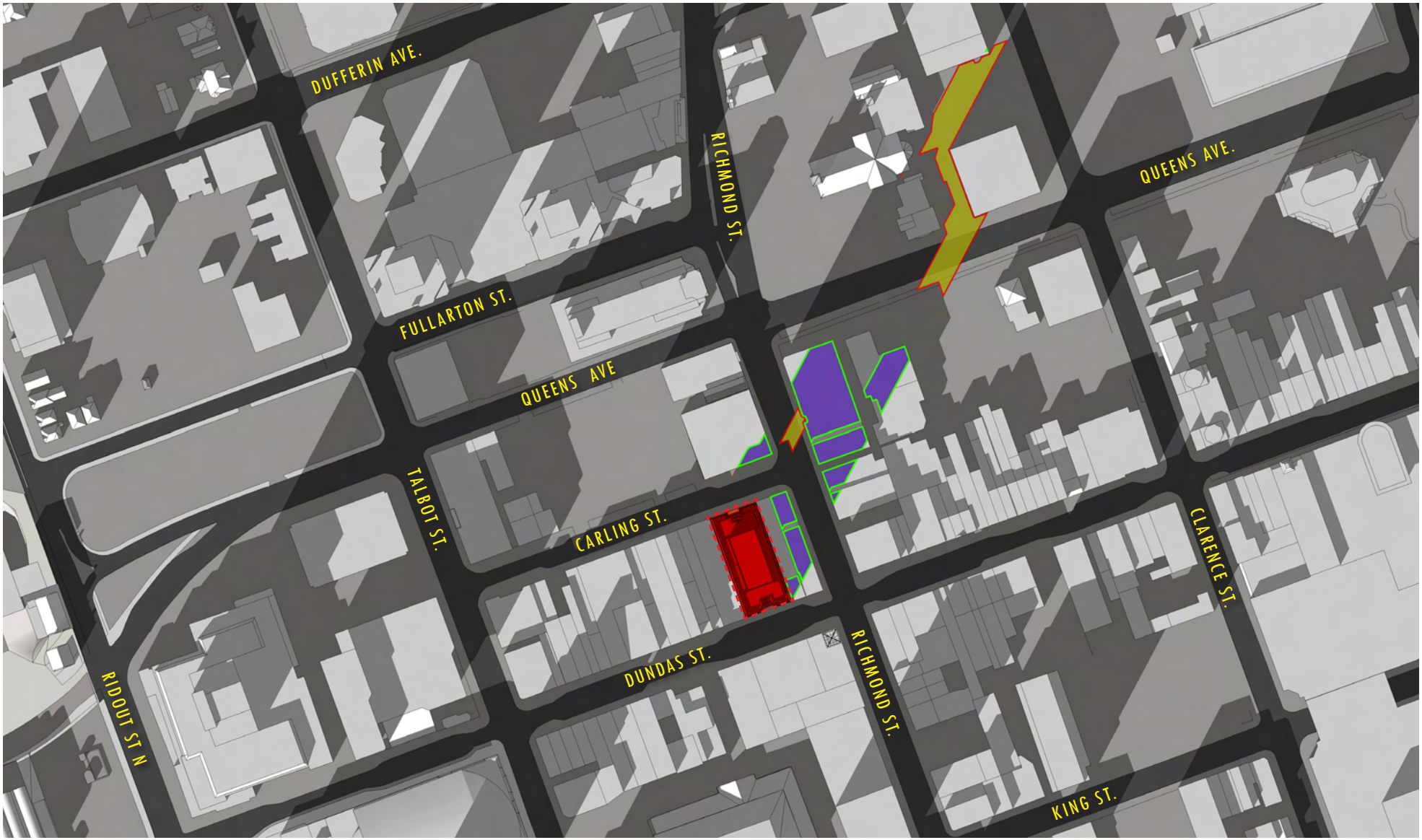

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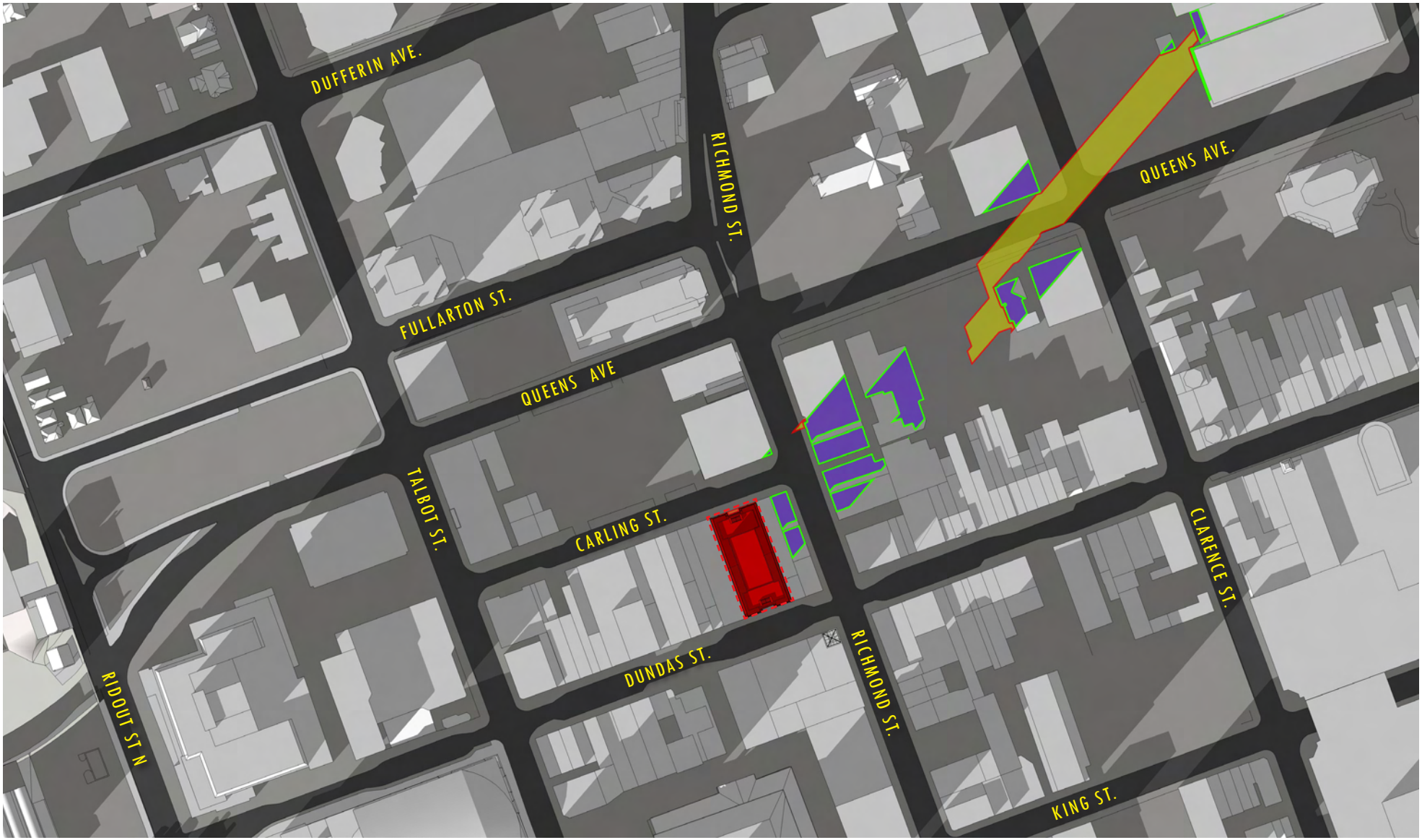
ADDITIONAL SHADOW ON THE ROOFS
SITE BOUNDARY

DECEMBER 21, 2:18 PM

SUN / SHADOW STUDY @ 150 DUNDAS STREET - CITY OF LONDON, ONTARIO



RICHMOND | Architects Ltd.

243 COLLEGE STREET
SECOND FLOOR
TORONTO, ONTARIO M5T 1R5

T: 416 961 1567
F: 416 961 1321
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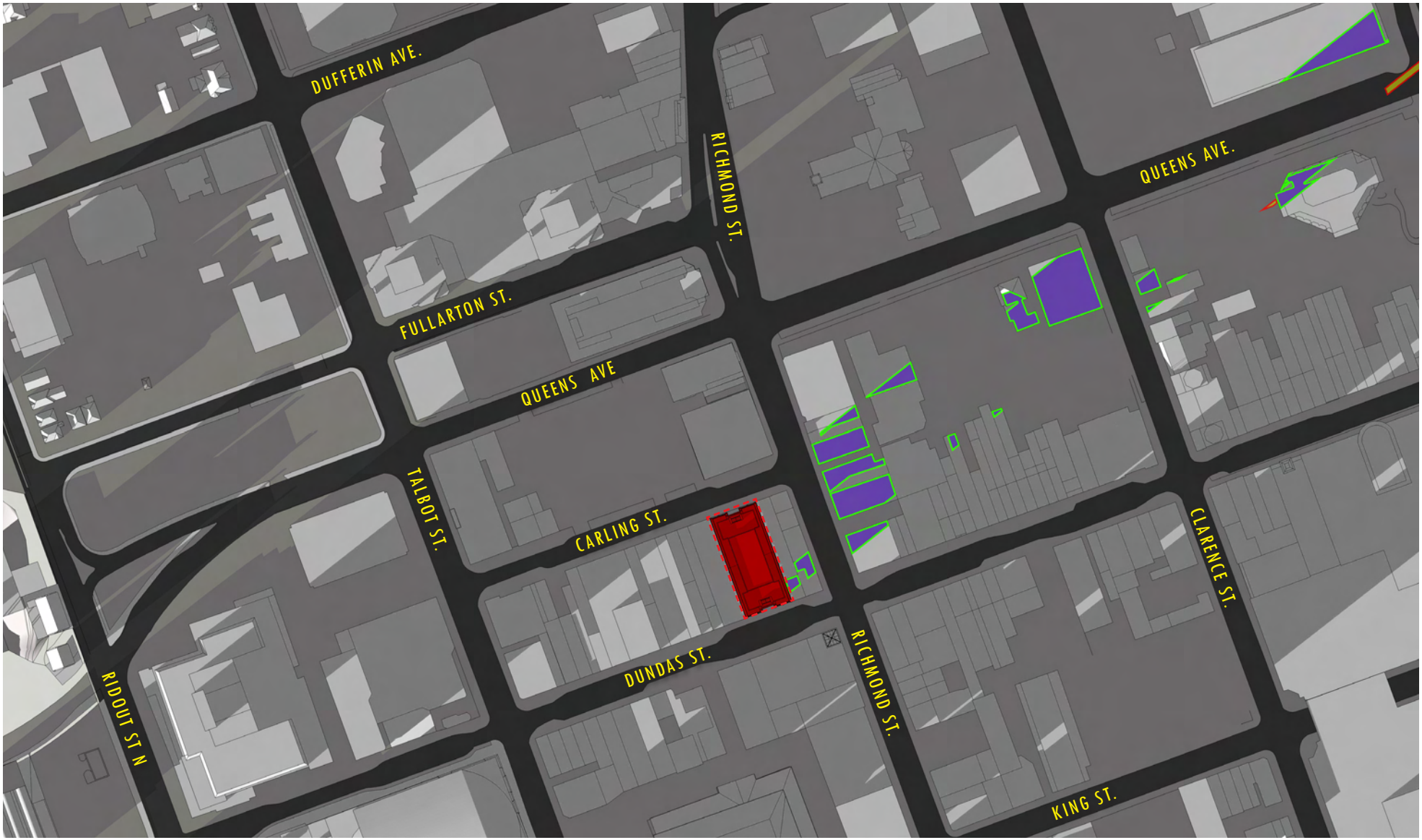
ADDITIONAL SHADOW ON THE GROUND
ADDITIONAL SHADOW ON THE ROOFS
SITE BOUNDARY

DECEMBER 21, 3:18 PM

SUN / SHADOW STUDY @ 150 DUNDAS STREET - CITY OF LONDON, ONTARIO



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ADDITIONAL SHADOW ON THE GROUND
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SITE BOUNDARY

DECEMBER 21, 4:18 PM

SUN / SHADOW STUDY @ 150 DUNDAS STREET - CITY OF LONDON, ONTARIO

February 17, 2017

Rygar Properties Inc.
Attn: John Rogers
100 Fullarton Street
London, Ontario N6A 1K1
Canada

Dear Mr. Rogers:

Re: Qualitative Pedestrian Level Wind Assessment
150 Dundas Street, London
GWE File No.: 17-018-DTPLW

1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Rygar Properties Inc. to undertake a qualitative pedestrian level wind assessment for 150 Dundas Street, a proposed mixed-use development located in London, Ontario. This report provides a qualitative assessment of wind comfort at the pedestrian level for the noted site based on architectural drawings provided by Richmond Architects Ltd. in February 2017, consideration of existing and approved future surrounding buildings, statistical knowledge of the London wind climate, as well as experience with similar projects in London.

In the early stages of design development, a qualitative wind assessment is useful to identify any significant massing features or design elements which may adversely impact pedestrian activities within the study area, and to provide initial recommendations for mitigation strategies, as may be required.

2. TERMS OF REFERENCE

The focus of this qualitative wind assessment is 150 Dundas Street, a proposed mixed-use development located on the east side of a city block bounded by Carling Street to the north, Richmond Street to the east, Dundas Street to the south, and Talbot Street to the west in London, Ontario. The new building is sandwiched between existing low-rise buildings on both the east and west elevations.

Upon completion, the development will comprise a 27-storey I-shaped planform building rising from the centre of a 3-storey rectangular podium. The ground floor will contain retail space along the west elevation and in the southeast corner, with access from Carling Street and Dundas Street. The residential lobby entrance, served by a vestibule and canopy, is in the centre of the south elevation, while vehicular entry to the loading zone is located on the north side with access from Dundas Street.

The 2nd floor of the podium includes an amenity area and bicycle storage, while the 3rd floor is reserved for student residences. At the 4th floor, the podium steps back to the base of the tower, providing space for a wrap-around terrace. Above the 4th floor, the residential tower rises with a uniform floorplan to the 27th floor, where a mechanical penthouse brings the total height of the tower to 90.3 metres (m).

Regarding wind exposures, the near-field surroundings of the development (defined as an area falling within a 200-m radius from the subject site) are characterized by a moderately dense concentration of low- and mid-rise buildings in all directions. The far-field surroundings (defined as the area beyond the near field and within a two-kilometre radius), consist of a continuation of the near-field rotating clockwise from the southeast to the northeast, for 700 m, beyond which the wind expose is characterised by primarily low-rise massing. The remaining east quadrant is represented by a continuation of the near-field for 1200 m, beyond which the wind exposure is characterised by a moderate density of low-rise massing.

The ground floor and fourth level terrace plans, including letter tags identifying wind sensitive pedestrian locations considered in this assessment, are illustrated in Figures 1 and 2.

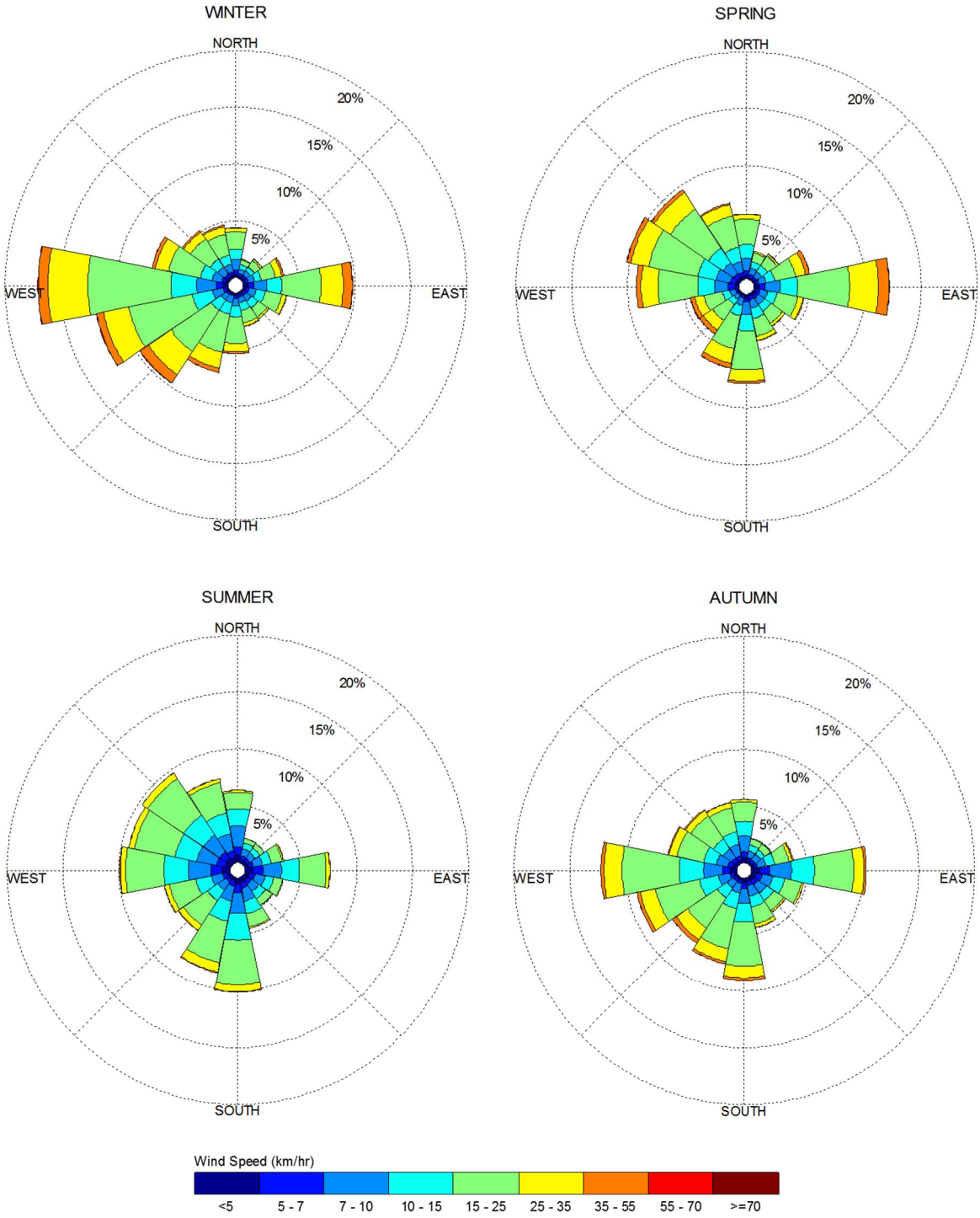
3. METHODOLOGY

The main aspects of a qualitative pedestrian level wind assessment include: (i) consideration of the statistical properties of the local wind climate; (ii) knowledge of wind flow behaviour in typical urban, suburban, and open environments; and (iii) an understanding of how common wind conditions relate to typical pedestrian activity types.

3.1. London Wind Climate

The statistical model of the London wind climate, which indicates the directional character of local winds on a seasonal basis, is illustrated on the following page. The plots illustrate seasonal distribution of measured wind speeds and directions in meters per second. Probabilities of occurrence of different wind speeds are represented as stacked polar bars in sixteen azimuth divisions. The radial direction represents the percentage of time for various wind speed ranges per wind direction during a 43-year measurement period. The preferred wind speeds and directions can be identified by the longer length of the bars. For London, the most common winds concerning pedestrian comfort occur from the south clockwise to the northwest, as well as those from the east. The directional preference and relative magnitude of the wind speed varies somewhat from season to season, with the summer months displaying the calmest winds relative to the remaining seasonal periods.

SEASONAL DISTRIBUTION OF WINDS FOR VARIOUS PROBABILITIES
LONDON INTERNATIONAL AIRPORT, LONDON



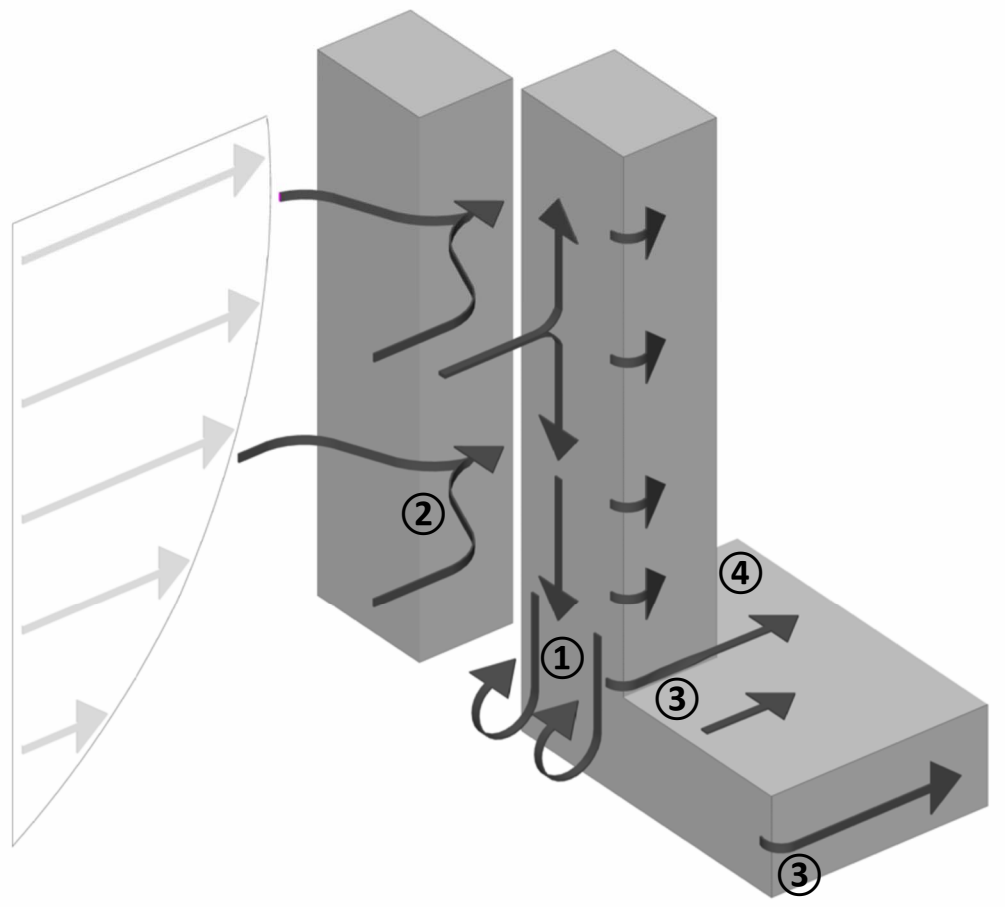
NOTES:

1. Radial distances indicate percentage of time of wind events.
2. Wind speeds are mean hourly in km/h, measured at 10 m above the ground.

3.2. Massing vs. Climate – Geometric Effects

The physical features of a development site that are most influential to the local wind conditions include the massing and relative spacing of surrounding buildings, the geometry and orientation of the study building, and the alignment of the study building with respect to statistically prominent wind directions.

Wind flow characteristics which combine to determine how conditions will develop include phenomena known as downwash, channelling coupled with acceleration, and shielding, as illustrated in the image below. Downwash ① relates to the effect of winds against a tall building, whereby much of the impinging flow on the windward side of the building, nominally below two-thirds of the total height, is directed to lower levels. Taller buildings with smooth façades and no podiums produce the strongest downwash effects at grade, while the presence of protruding balconies and a tower setback from the podium edge mitigates downwash effects at the ground level. Channelling ② refers to acceleration of wind through gaps between buildings, while acceleration of wind ③ occurs around building corners. Shielding ④ relates to calm zones on the leeward side of buildings, protected from prevailing winds.



3.3. Pedestrian Wind Comfort Guidelines

The pedestrian wind comfort guidelines used by GWE, which correspond to industry-accepted standards, are based on the correlation between a variety of pedestrian activity types and acceptable wind speed ranges for those activities. More specifically:

- Wind conditions are considered to be comfortable for *sitting* when gust wind speeds less than or equal to 14 km/h occur at least 70% of the time;
- Wind conditions are considered to be comfortable for *standing and strolling* when gust wind speeds less than or equal to 22 km/h occur at least 80% of the time; and
- Wind conditions are considered to be comfortable for *walking* when gust wind speeds less than or equal to 30 km/h occur at least 80% of the time.

The GWE guidelines are based on average gust wind speeds, since people are most sensitive to wind gusts rather than to mean winds. The guidelines are applied to the intended use of an outdoor area. For example, an entrance to a building not served by a vestibule or revolving door should be suitable for standing, but need not be suitable for sitting, while a public sidewalk need only be suitable for walking in most circumstances.

4. ANTICIPATED PEDESTRIAN COMFORT

Based on consideration of the proposed development at 150 Dundas Street, surrounding building massing, and the relationship to the local wind climate, the following statements summarize our opinion of how these influences will affect pedestrian comfort at key areas.

Sidewalk along Dundas Street, Inclusive of Building Access Points (Figure 1, Tag A): The sidewalk area along the south elevation of the study building is shielded from most prominent winds by the surrounding massing. The orientation of the building and presence of the podium will protect the south sidewalk and elevation from downwash effects off the tower. The full sidewalk area is thus expected to be suitable for sitting during the summer season, standing during the autumn season, and walking during the remaining colder seasons, which is considered acceptable. The building entrance is also protected by a substantial canopy which will promote calmer conditions year-round.

Sidewalk along Carling Street, Inclusive of Building Access Points (Figure 1, Tag B): The sidewalk area along the north elevation, adjacent to Carling Street, is exposed to prominent east-west winds during the winter and northwest winds during the spring, inclusive of the open parking lot to the immediate north. The orientation of the building's small floor plate dimension fronting onto Carling Street, as well as the modest height of the building, and the step-back of the tower at level four minimize any tendency for downwash effects. As a result, conditions are expected to be similar to those along Dundas Street, which are considered acceptable.

Wind conditions close to the building façade are expected to be calmer, particularly including the main entrance protected by a large canopy. The collective access points are expected to be comfortable for sitting during the summer and autumn seasons, becoming suitable for standing during the spring and winter seasons, which are acceptable.

4th Floor Terraces (Figure 1, Tags C & D): Sitting conditions during the typical use period of late spring through early autumn are often desired for outdoor amenity areas and communal terraces. To achieve conditions suitable for sitting, a recommended mitigation strategy is outlined below.

The east elevation terrace (Tag C) is shielded on all sides by the study building itself, except from prominent east winds which are expected to generate downwash of higher level winds incident on the building. As such, the integration of vertical wind screens/barriers measuring at least 1.6 m above the walking surface is recommended along the entire east perimeter, along with a canopy extending 2 m outward from the east façade over the hatched section in the attached Figure 1. Also, if seating is desired within the northeast and southeast corners of the roof, it is recommended that 1.6 m tall wind screens replace the perimeter guards to assure adequate wind protection.

The terrace space on the west side of the proposed development (Tag D) is generally expected to be impacted by stronger wind conditions from a variety of directions. As such, the mitigation strategy should mimic that for the east side listed above but with perimeter wind screens measuring 2.0 m above the walking surface, as well as a canopy extending at least 3 m outward from the west façade over the hatched section in the attached Figure 1. If the noted mitigation strategy is implemented, sitting conditions would be expected during the typical use period.

Influence of the Proposed Development on Existing Wind Conditions near the Study Site: Beyond those surrounding pedestrian-sensitive locations mentioned above, the introduction of the proposed development at 150 Dundas Street is not expected to significantly influence pedestrian wind comfort over neighbouring areas. In particular, nearby building entrances, sidewalks, amenity spaces, parking lots, and other pedestrian-sensitive areas beyond the development site will continue to experience wind conditions similar to those that presently exist without the proposed building in place.

Applicability of Predictions: The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g., thunderstorms, tornadoes, and downbursts), wind comfort cannot be predicted with the current state of scientific knowledge. These events are generally short-lived and infrequent, however, and there is often sufficient warning for pedestrians to take appropriate cover.

5. SUMMARY AND RECOMMENDATIONS

Based on a qualitative analysis of architectural drawings, surrounding building massing, and the London wind climate, the following general statements summarize our prediction of future wind conditions for the proposed development at 150 Dundas Street in London, Ontario.

1. Wind comfort at all grade-level pedestrian-sensitive locations across the study site is expected to be suitable for the anticipated uses without mitigation. These areas include adjacent public sidewalks, building entrances, and stairwell exits.

2. The terrace serving the podium roof will likely require a combination of vertical wind barriers and canopies to provide suitably calm conditions throughout the typical use period of late spring through early autumn. A recommended mitigation strategy is detailed in Section 4.

3. The introduction of the proposed building is not expected to significantly influence pedestrian wind comfort at neighbouring areas beyond the development site due largely to the step-back of the tower on the podium. More specifically, nearby sidewalks, building entrances, amenity spaces, parking lots, and other pedestrian-sensitive areas beyond the site will continue to experience wind conditions similar to those that presently exist without the proposed building in place.

The foregoing analysis and statements are based on knowledge and experience of wind flow patterns for the study site and in similar settings. As such, this assessment is intended to ensure adequate pedestrian safety relating to wind, and to provide general guidance for pedestrian comfort over the full study site.

This concludes our qualitative assessment of pedestrian wind comfort. Thank you for the opportunity to be of service.

Sincerely,

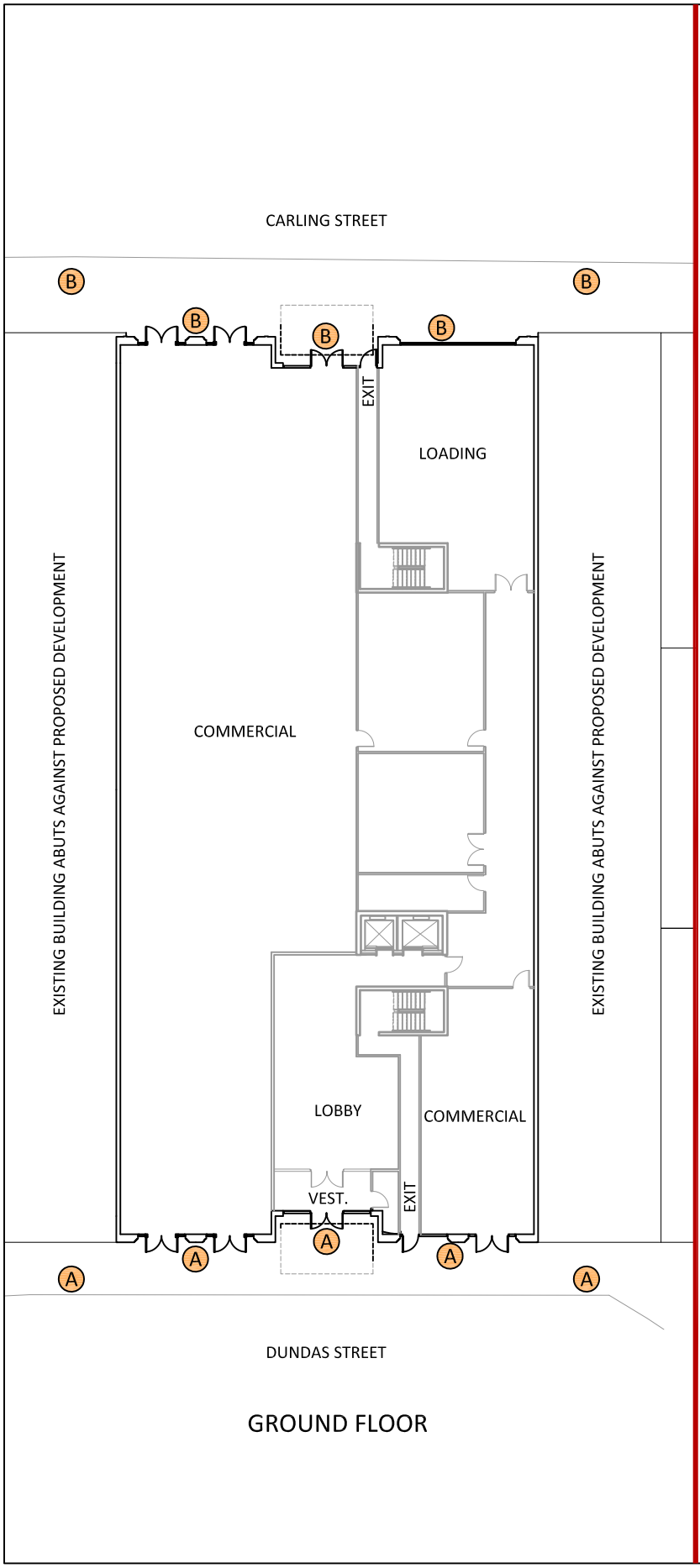
Gradient Wind Engineering Inc.

Justin Ferraro, B.Eng., EIT
Technical Project Manager

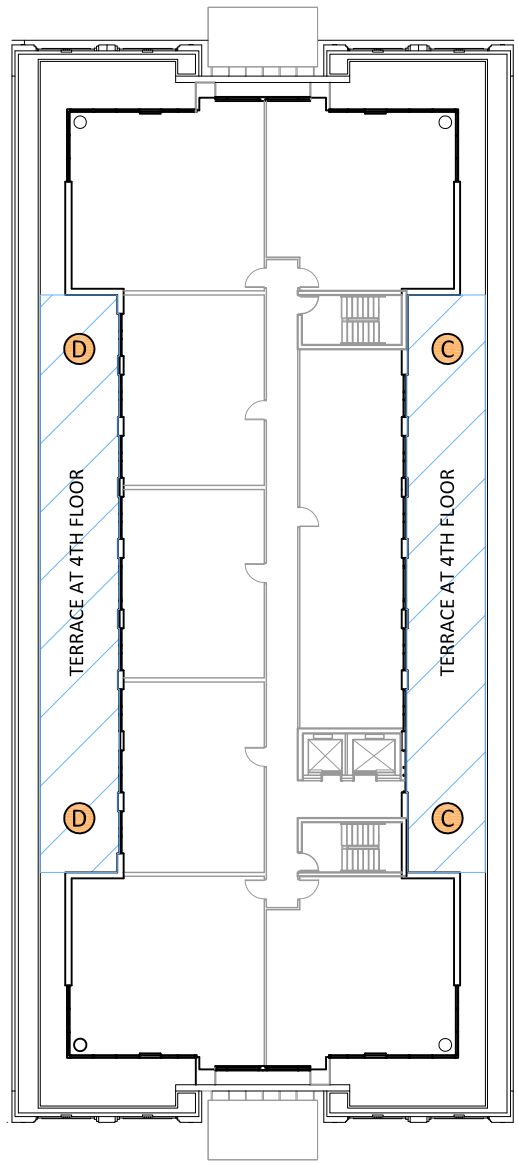
Vincent Ferraro, M.Eng., P.Eng.
Managing Principal

Nick Petersen, B.Eng., EIT
Microclimate Specialist

GWE17-018-DTPLW



GROUND FLOOR



4TH FLOOR

GRADIENT WIND ENGINEERING INC
127 Walgreen Road
Ottawa, Ontario
(613) 836 0934

PROJECT	150 DUNDAS STREET, LONDON, ONTARIO QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT		
SCALE	1:500 (APPROX.)	DRAWING NO.	GWE17-018-DTPLW-1
DATE	FEBRUARY 15, 2017	DRAWN BY	B.J.

DESCRIPTION

FIGURE 1:
GROUND FLOOR AND 4TH FLOOR PLANS
WITH WIND REFERENCE MARKERS

Appendix 3

ZELINKA PRIAMO LTD
A Professional Planning Practice

HEATHER GARRETT, *Dipl. Urban Design, B.A., CPT*

PROFESSIONAL ASSOCIATIONS

Member, Canadian Association of Certified Planning Technicians (CACPT)

EDUCATION

Bachelor of Arts, Urban Planning, University of Windsor, 2000;
Diploma Urban Design, Fanshawe College of Applied Arts and Technology, 1998.

PROFESSIONAL EXPERIENCE

September 2003 to Present: - Zelinka Priamo Ltd. London, Ontario - Senior Planner
May 2000 to September 2003 - Prince and Associates Ltd., Kingsville, Ontario – Assistant Planner

SELECT PROJECT EXPERIENCE

Municipal Planning

Consulting Planner for the Township of Pelee

- reporting to the office of the Chief Administrative Officer (CAO) with duties including: responding to inquiries from the public; providing advice and opinion on a range of planning topics to the CAO's Office; providing pre-consultation opinion on planning applications; preparing planning reports with recommendations on applications predominantly for consents, for amendments to the Zoning By-law, for applications to the Committee of Adjustment and for site plans; preparing By-laws; attending Council meetings and make presentations as required.

Preparation of new Official Plan and new Zoning By-law for the Township of Pelee

- preparation of documentation in support of the Official Plan and the Zoning By-law; attend public consultation meetings and respond to questions from Council, staff and the public; negotiate with the Ministry of Municipal Affairs and Housing and other Ministries in preparing modifications to the Official Plan and concurrent amendments to the Zoning By-law.

Community Master Plans & Urban Design Guidelines

Town of Amherstburg Urban Design Guidelines

Land Use Planner for Commercial Development

Loblaw Properties Limited Seasonal Garden Centre program for Ontario – Obtain municipal approvals for approximately 300 sites across Ontario;
Cara Operations Limited – Due Diligence Reports for various properties across British Columbia, Alberta, and Ontario.

Development Planning

Provide consulting services and prepare planning applications for private sector clients for:

- Official Plan Amendments

- Zoning By-Law Amendments
- Minor Variance
- Site Plan Approval
- Land Use Planning Analyses

Appeals to the Ontario Municipal Board (OMB)

Expert Witness – Minor Variance Application, 297 Eramosa Road, City of Guelph
Expert Witness – Conditions of Minor Variance Application, 487 Queens Street South, Town of Caledon

Appeals to the Ontario Municipal Board – Heritage (OMB)

Researcher – Property on Registry – 265 St. David Street, Town of Stratford;
Researcher – Heritage Conservation District – City of Windsor.

Appeal(s) to Ontario Superior Court of Justice

Preparation of Affidavit to Ontario Superior Court of Justice – 769 Borden Avenue, City of Peterborough

Heritage Impact Statements (HIS)

Heritage Impact Statement – Redevelopment Part IV Property -13305 Coleraine Drive, Town of Caledon;
Heritage Impact Statement – Redevelopment Part IV Property – 1040 Waterloo Street, City of London;
Heritage Impact Statement – Redevelopment Part V Property – 764/754 Waterloo Street, City of London;
Heritage Impact Statement – Adjacent to HCD – 515 Richmond Street, City of London;
Heritage Impact Statement – Adjacent to HCD – 356 Dundas Street, City of London;
Heritage Impact Statement – Alteration to Property on Local Registry – Springbank Drive, City of London.

Cultural Heritage Evaluation Report (CHERs)

Cultural Heritage Evaluation Report - 875 St. David Street, Fergus.

Due Diligence Reports - Heritage

Due Diligence Report – Redevelopment Opportunities – Part IV Property, 1180 Western Road, City of London;
Due Diligence Report - Redevelopment Opportunities – Part IV Property, 83 Rolph Street, Town of Tillsonburg;
Due Diligence Report - Redevelopment Opportunities – Part IV Property, 497 Richmond Street West, City of Toronto;
Due Diligence Report - Redevelopment Opportunities – Part V Property, 723 Lorne Avenue, City of London;
Due Diligence Report - Redevelopment Opportunities – Part IV Property, Boblo Island, Town of Amherstburg;
Due Diligence Report - Redevelopment Opportunities – Property on Local Registry, 20 Balaclava Street, City of St. Thomas;
Due Diligence Report - Redevelopment Opportunities – Property on Local Registry, 43 Myrtle Street, City of St. Thomas;
Due Diligence Report - Redevelopment Opportunities - Property on Local Registry, 4402 Colonel Talbot Road, City of London;
Due Diligence Report - Redevelopment Opportunities – Property on Local Registry, 255 Delacourt Road, City of London.

Other Heritage Consulting Services

Supervised the Review of heritage status of LCBO properties and adjacent properties – LCBO, Ontario.

PROFESSIONAL DEVELOPMENT

Workshop, Walking Tour Stratford Heritage Conservation District, Ontario Professional Planners Institute (OPPI), October 2016;

Lecture, International Archeology Day, City of London, Archaeology Master Plan presentation, October, 2016;

Workshop, Walking Tour Downtown Detroit, Michigan, Ontario Professional Planners Institute (OPPI), November 2014;

Workshop, Heritage Conservation District, Old East Industrial Area, City of London, October, 2014;

Workshop, Heritage Conservation, Archaeology and Land Use Planning, Ministry of Tourism, Culture and Sport, November 2012;

Workshop, Provincial Policy Review, Ministry of Municipal Affairs and Housing, October 2012;
Certificate, Heritage Conservation District Workshop, The Heritage Resources Centre, University of Waterloo, March 2012;

Urban Design Charrette, Woodstock's Hospital Site, Ontario Professional Planners Institute, Woodstock, September 2009;

Conference, Preserving Our Past, Canadian Association of Certified Planning Technicians, October 2009;

Course Work, Statement of Significant Heritage Writing Workshop, Province of Ontario, 2007;

Course Work, Past Perfect: The Standards and Guidelines for the Conservation of Historic Places in Canada, Parks Canada, 2006;

Certificate, Heritage Planning, Urban and Regional Planning, University of Waterloo, January – April 2002.

COMMITTEES AND VOLUNTEER WORK

Archaeology Master Plan Steering Committee, City of London - Committee Member - 2016 and 2017;

London Advisory Committee on Heritage (LACH) - Committee Member - October 2012 to Present:

- Vice Chair – December 2015 – December 2016,
- Education sub-committee – Chair
- Planning and Policy sub-committee – Chair,
- Archaeology sub-committee – member;

London Area Planning Consultants (LAPC) - Member - January 2011 to Present;

Municipality of Chatham-Kent Municipal Heritage Committee - Committee Member – 2005 to 2007;

Amherstburg Architectural Conservation Advisory Committee - Committee Member - 2000 to 2003;

Amherstburg Revitalization Committee (A.R.C.), Amherstburg Chamber of Commerce - Member - 2000 to 2003;

Mayor's Task Force, Redevelopment of Olde East London, Ontario - Member – 1999;

The Park House Museum, Amherstburg Ontario - Assistant to the Curator/Volunteer - 1994 to 2005.