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2024-01-23
Project: 230189

284 Plains Road Development Inc.
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**RE: PROPOSED MID-RISE MULTI-FAMILY DEVELOPMENT**
**276, 284 AND 292 PLAINS ROAD EAST, CITY OF BURLINGTON**

This letter reviews the proposed position and design of the site driveway for the planned redevelopment of 276, 284 and 292 Plains Road East relative to the existing driveway serving 300 Plains Road East. **Figure 1** (attached) illustrates the site location.

The adjacent landowner of 300 Plains Road East has raised concerns regarding the proposed site driveway location impacting the ability of drivers to be able to access the lands at 300 Plains Road East.

## Site Description

### Subject Site

The site concept plan includes a seven-storey mid-rise multi-family rental apartment building containing approximately 141 units. The site's parking demand is proposed to be accommodated by 153 parking spaces. The site has approximately 95 metres of frontage to Plains Road East. **Figure 2** (attached) illustrates the site concept plan.

The redevelopment of the subject site will consolidate the four existing private driveways to Plains Road East into one driveway. Vehicle access is proposed by a private driveway to Plains Road East located near the site's east property line. The driveway is positioned approximately 74 metres (CL to CL) west of the Filmandale Road intersection.

The driveway measures 6.0 metres in width at the ultimate property line and is designed with a 9.0 metre inbound right-turn radius and a 4.0 metre outbound right-turn radius. The outbound right-turn radius terminates at the perpendicular extension of the site's east property line. **Figure 3** (attached) illustrates the layout and design of the proposed site driveway.

The site's driveway width and right-turn radii are within the Transportation Association of Canada Geometric Design Guide for Canadian Road[1] (TAC Guide) design domains for private driveways[2].

The site driveway is offset to the west from the private driveway serving 300 Plains Road East by approximately 13 metres (CL to CL). A tangent section measuring approximately 2.3 metres is provided between the site driveway's curb return and the flared driveway serving 300 Plains Road East.

The existing sidewalks across the site's frontage should be designed as continuous through the site driveway. Continuous sidewalks prioritize pedestrians overturning vehicles. Continuous sidewalks communicate to people walking that they have an uninterrupted travel path, while also communicating to drivers that they are crossing a space for walking.

### 300 Plains Road East

The 300 Plains Road East property contains a medical clinic (cardiology) with at grade surface parking to the rear of the building. The site has approximately 26 metres of frontage to Plains Road East. Using aerial measurements, the site's Gross Floor Area (GFA) is estimated to be approximately 1,980 sq.ft. The parking lot to the rear of the building contains parking for approximately 12 vehicles.

Vehicle access to the 300 Plains Road East property is provided by two private driveways to Plains Road East. The driveways are located approximately 40 metres and 60 metres west of the Filmandale Road intersection (CL to CL). The driveways form a crescent shape with the west driveway leading directly to the parking area behind the building and the east driveway providing access to the front door of the building.

## Trip Generation

### Site Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation data is used to estimate the site's trip generation using ITE Land-Use Codes 221 – Multifamily Housing (Mid-Rise) – Not Close to Rail – General Urban/Suburban. **Table 1** summarizes the site's trip generation.

The subject site is forecast to generate approximately 52 vehicle trips during the AM peak hour and 55 vehicle trips during the PM peak hour. The site driveway is considered to be a low volume driveway with less than 100 peak hour vehicle trips generated[3].

[1] Transportation Association of Canada, *Geometric Design Guide for Canadian Roads,* (Ottawa: TAC, 2017).
[2] Ibid. Table 8.9.1: Typical Driveway Dimensions
[3] Ibid, Section 8.9.2 Operational Considerations

### TABLE 1: ESTIMATED TRIP GENERATION – SUBJECT SITE

| Land Use and Quantity | Time Period | Trip Generation | | |
|---|---|---|---|---|
| | | In | Out | Total |
| Multifamily Housing (Mid-Rise) - Not Close to Rail Transit (221) - 141 Units | AM Peak Hour | 12 | 40 | **52** |
| | PM Peak Hour | 34 | 21 | **55** |

**300 Plains Road East**

The ITE Trip Generation data is used to estimate the site's trip generation using Land-Use Codes 630 – Clinic – General Urban/Suburban. **Table 2** summarizes the estimated trip generation for the 300 Plains Road East site. The land use is described as "A clinic is a facility that provides limited diagnostic and outpatient care but is unable to provide prolonged in-house medical and surgical care."

The 300 Plains Road East site is forecast to generate approximately 5 vehicle trips during the AM peak hour and 7 vehicle trips during the PM peak hour. Similar to the subject site, the 300 Plains Road East driveway is also considered a low volume driveway. Trip generation is estimated to be about 7 times lower than the trip generation for the subject site.

### TABLE 2: ESTIMATED TRIP GENERATION – 300 PLAINS ROAD EAST

| Land Use and Quantity | Time Period | Trip Generation | | |
|---|---|---|---|---|
| | | In | Out | Total |
| Clinic (630) - Approx. 1,980 sq.ft. | AM Peak Hour | 4 | 1 | **5** |
| | PM Peak Hour | 2 | 5 | **7** |

**Figure 4** (attached) illustrates the temporal distribution of traffic generated by the subject site (residential) compared to the temporal distribution of traffic generated by the 300 Plains Road East site (medical clinic).

The peak hours for the two land uses generally occur at different times of the day. Residential land uses typically have two distinct peak hours, typical of a commuter type pattern. During the morning, people leave for work and return during the afternoon/evening hours. For a medical clinic, most traffic is concentrated within the typical "office hours" between 8 AM and 5 PM.

Site traffic exiting the subject site, is expected to be highest during the AM peak hour. During this time, the peak direction of travel for traffic generated by 300 Plains Road East is expected to be inbound. The frequency for two vehicles on the two driveways simultaneously wishing to enter the right-of-way is expected to be low. **Figure 5** (attached) illustrates the temporal distribution of outbound traffic for the two land uses.

## Driveway Spacing

As outline in the TAC Guide, *Driveways are normally located in consideration of their physical relationships to existing or possible future driveways. The following three criteria need to be considered:*

- *minimum spacing between driveways;*
- *minimum offset to property line; and*
- *Maximum number of driveways based on property frontage.*

### Minimum Spacing between Driveways

The spacing between the proposed site driveway and the adjacent driveway serving 300 Plains Road East is measured between the end and start of the curb returns on the adjacent driveways. A distance of approximately 2.3 metres is available between the end and start of the curb returns.

The TAC Guide suggests a minimum spacing of 1.0 metre[4] for local and collector roadways. The TAC Guide does not identify a suggested spacing for residential driveways to an arterial roadway. The proposed spacing exceeds the minimum spacing distance set out in the TAC Guide.

### Minimum Offset to Property Line

As outline in the TAC Guide "It is desirable to locate a driveway so that the curb return radius for the driveway falls entirely within the front of the property being served.[5]"

The proposed curb return for the site driveway terminates at the perpendicular extension of the property line and is contained by the front of the property being served. The proposed spacing between the site driveway and the property line follows the guidance set out in the TAC Guide.

### Maximum Number of Driveways

The maximum number of driveways based on property frontage set out in the TAC Guide for the subject site is three and the maximum number of driveways for the 300 Plains Road East site is two.

The redevelopment of the subject site will consolidate four private driveways into one driveway. Additional driveways to the subject site are not required from an intersection capacity perspective or to allow for heavy vehicle circulation. Additionally, by limiting the number of driveways to Plains Road East, the number of potential conflict points for vehicular traffic, pedestrians, and cyclists is reduced.

[4] Ibid, Section 8.9.8 Spacing of Adjacent Driveways
[5] Ibid.

The 300 Plains Road East property has two driveways and is also in line with the number of driveways based on available frontage as outlined in the TAC guide.

### Spacing from Adjacent Intersections

The closest municipal intersection to the proposed site driveway is the stop controlled Filmandale Road intersection located approximately 74 metres (CL to CL) east of the proposed site driveway. The spacing exceeds the corner clearance distance of 35 metres[6] as set out in TAC Guide for a private driveway to arterial roadway.

The operations of the Plains Road East intersection with Filmandale Road and the two adjacent signalized intersections (that is, Gallagher Road/Shadeland Avenue and Downsview Drive) were assessed as part of the September 2022 Transportation Impact Study[7].

The queuing of vehicles along Plains Road East is not expected to spill back into the proposed site driveway intersection or into the driveway intersection for the 300 Plains Road East property.

## Turning Movements

AutoTURN swept path analysis has been completed to illustrate the movement of typical passenger cars using the proposed site driveway and the existing driveway serving 300 Plains Road East. **Figure 6** (attached) illustrates the AutoTURN analysis.

Left-turns into the subject site and left-turns into the 300 Plains Road site are both accommodated by the existing centre two-way left-turn lane. Left-turns in the opposite direction are not expected as no driveways are located on the north side of Plains Road East opposite the site.

Should a driver entering the 300 Plains Road site be queued on Plains Road East at the same time as a driver wishing to turn left into the subject site, the driver turning into the 300 Plains Road East site should be able to identify a gap in traffic to turn left after the vehicle in front of it has made the turn. Vehicles will discharge in numerical order from the centre two-way left-turn lane when appropriate gaps in the traffic are identified by the leading driver.

### Driver Sightlines

Plains Road East across the site's frontage is straight and flat. There are no horizontal or vertical curves along Plains Road East that would limit driver sightlines.

The expected low frequency event where a driver is positioned on the site driveway approach at the same time as a driver on the adjacent 300 Plains Road East driveway may temporarily

[6] Ibid, Figure 8.8.2: Suggested Minimum Corner Clearances to Accesses or Public Lanes at Major Intersections
[7] Paradigm Transportation Solutions Limited, 284-292 Plains Road East Burlington ON, Transportation Impact Study, (Cambridge, Paradigm, September 2022)

limit driver sightlines until such time as when the opposite driver makes a turn to enter the right-of-way.

Paradigm staff observed in the field the platooning of vehicles caused by the signalization of both the Gallagher Road/Shadeland Avenue and Downsview Drive intersections. When east/west traffic on Plains Road East receives a red signal from the adjacent signalized intersections, there are sufficiently large enough gaps in traffic for drivers to enter the right-of-way by making a left or right-turn. Drivers entering Plains Road East from the Filmandale Road intersection were also observed completing a two-stage left-turn. To complete this manoeuvre, drivers turn left across the two eastbound travel lane in one gap and then dwell in the centre turn lane until there is a gap in eastbound traffic allowing them to perform a weaving manoeuvre into the inside westbound travel lane. This manoeuvre does not appear to be legal based on the Highway Traffic Act but is practiced by many drivers along the Plains Road corridor.

**Attachment 1** contains scaled drawing for driver sightlines at the proposed site driveway and at the 300 Plains Road East driveway for the event when two drivers are waiting to enter the right-of-way at the same time.

The vertex for the drivers' eye on both site driveway and the 300 Plains Road East driveway are located within the municipal right-of-way and in front of the tree protection zone identified on the site plan. Sightlines for drivers will not be obstructed by the existing trees located near the shared property line.

The available distance for a driver on the site driveway approach is estimated to be approximately 85 metres to the inside westbound travel lane. The sight triangle is extended to approximately 100 metres for the westbound curb lane.

The available distance for a driver on the 300 Plains Road East driveway approach is estimated to be approximately 35 metres to the eastbound curb lane. The sight triangle is extended to approximately 50 metres for the inside eastbound travel lane.

For both site driveways, the available sight distances estimated for a driver waiting to enter the right-of-way from a stopped condition is less than what is outlined in the TAC Guide for a design speed of 70 km/h (10 km/h over the posted speed limit). The left-turn from stop would require approximately 156 metres of sight distance[8], while the right-turn from stop distance is 130 metres[9].

After the adjacent vehicle has entered the right-of-way, the driver who was experiencing the temporary obstruction caused by the adjacent vehicle, is expected to be able to see oncoming traffic to determine if there is an appropriate gap in traffic to enter the right-of-way.

[8] Ibid, Section 9.9.2.3 Intersection Control, Calculation for three lanes per page 67
[9] Ibid, Table 9.9.6: Design Intersection Sight Distance – Case B2, Right Turn from Stop, and Case B3, Crossing Maneuver

As noted above the peak direction of travel for traffic generated by the subject site and the peak direction of travel for the 300 Plains Road site are inversed and the frequency for two vehicles on the two driveways simultaneously wishing to enter the right-of-way is expected to be low.

## Conclusions

Based on the investigations carried out, it is concluded that:

- The proposed site driveway and the adjacent site driveway serving 300 Plains Road East are considered low volume driveways with less than 100 peak hour vehicle trips.
- Site traffic exiting the subject site is expected to be highest during the AM peak hour. During this time, the peak direction of travel for traffic generated by 300 Plains Road East is expected to be inbound. The frequency for two vehicles on the two driveways simultaneously wishing to enter the right-of-way is expected to be low.
- The design of the proposed site driveway to Plains Road East includes design elements (for example, right-turn radii, driveway width) that are inline with the TAC Guide for low volume private driveways.
- The position of the proposed site driveway to Plains Road East is positioned appropriately far enough removed from the adjacent municipal intersections and the driveway is designed to fit within the available site frontage to Plains Road East.
- Driver sightlines at the proposed site driveway are not impacted by any horizontal or vertical curves along Plains Road East.
- Should two drivers wish to enter the right-of-way simultaneously from the proposed site driveway and the driveway serving 300 Plains Road East, the drivers may experience temporary reductions in sight distances caused by the adjacent vehicle.

  After the adjacent vehicle has entered the right-of-way, the driver who was experiencing the temporary obstruction caused by the adjacent vehicle, is expected to be able to see oncoming traffic to determine if there is an appropriate gap in traffic to enter the right-of-way.

## Recommendations

Based on the findings of this study, it is recommended that:

- The site driveway be designed with continuous sidewalks through the driveway approaches;
- Stop control be provided on the site driveway approach to Plains Road East.

We trust that the foregoing information address your requirements. Please do not hesitate to contact us if we can be of further assistance.

Yours very truly,

**PARADIGM TRANSPORTATION SOLUTIONS LIMITED**

**Scott Catton, C.E.T.**
Senior Project Manager, Associate

**Stew Elkins, B.E.S.**
Vice President and CRO, Principal

**Erica Bayley, P. Eng.**
Senior Project Manager, Associate



# Attachments

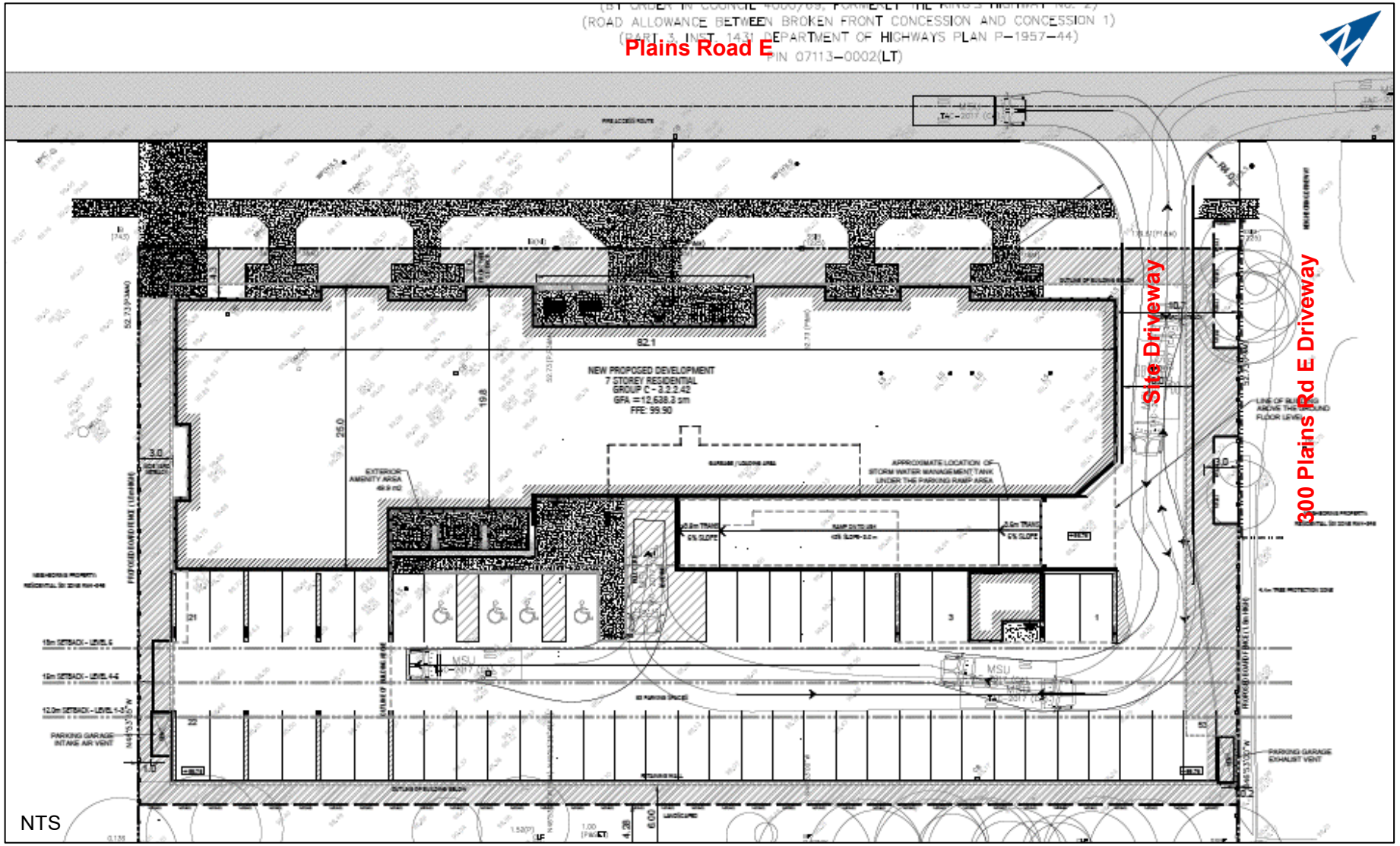



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# Site Location

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**Figure 1**

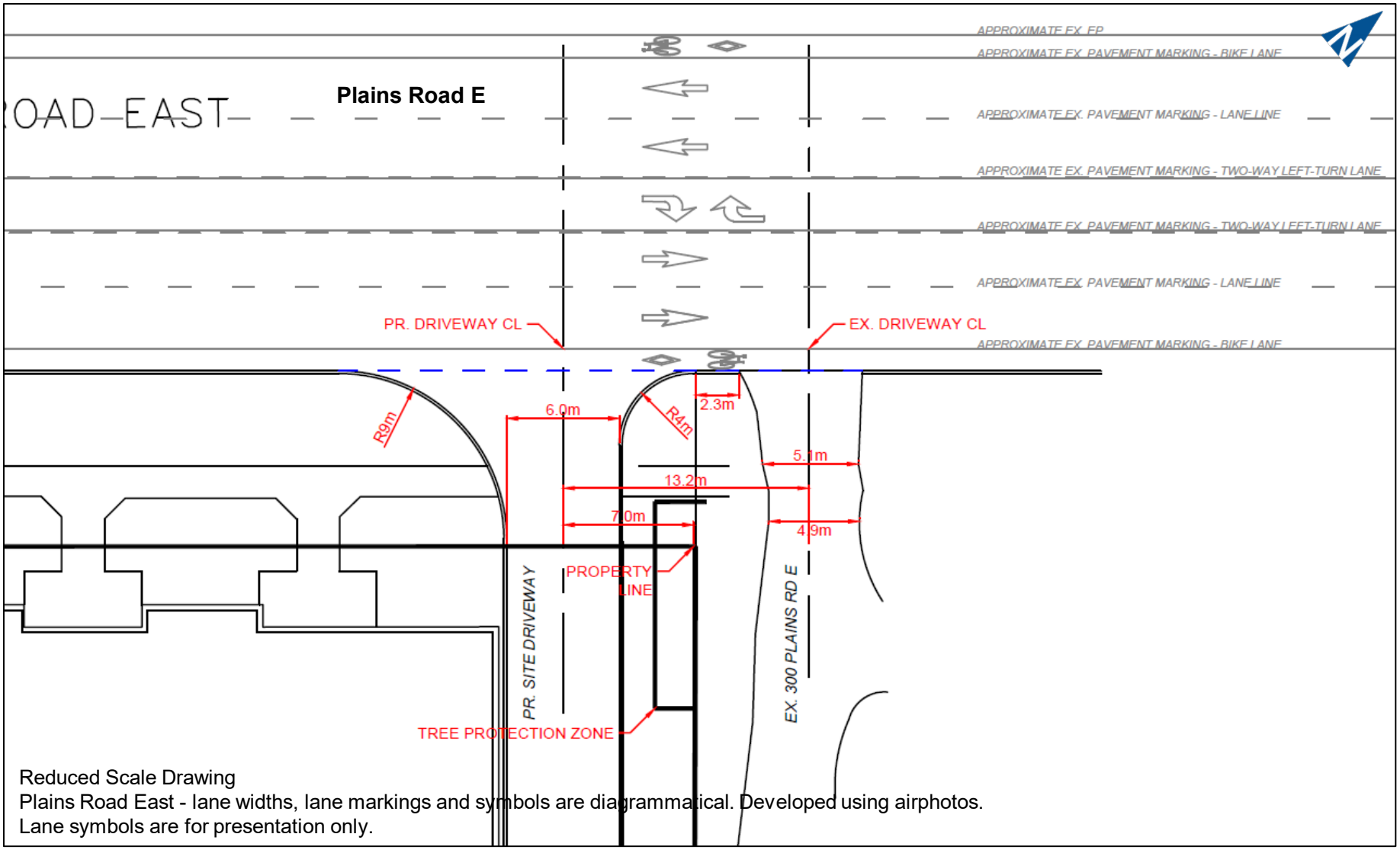



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# Site Concept Plan

276, 284 and 292 Plains Road East
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Figure 2



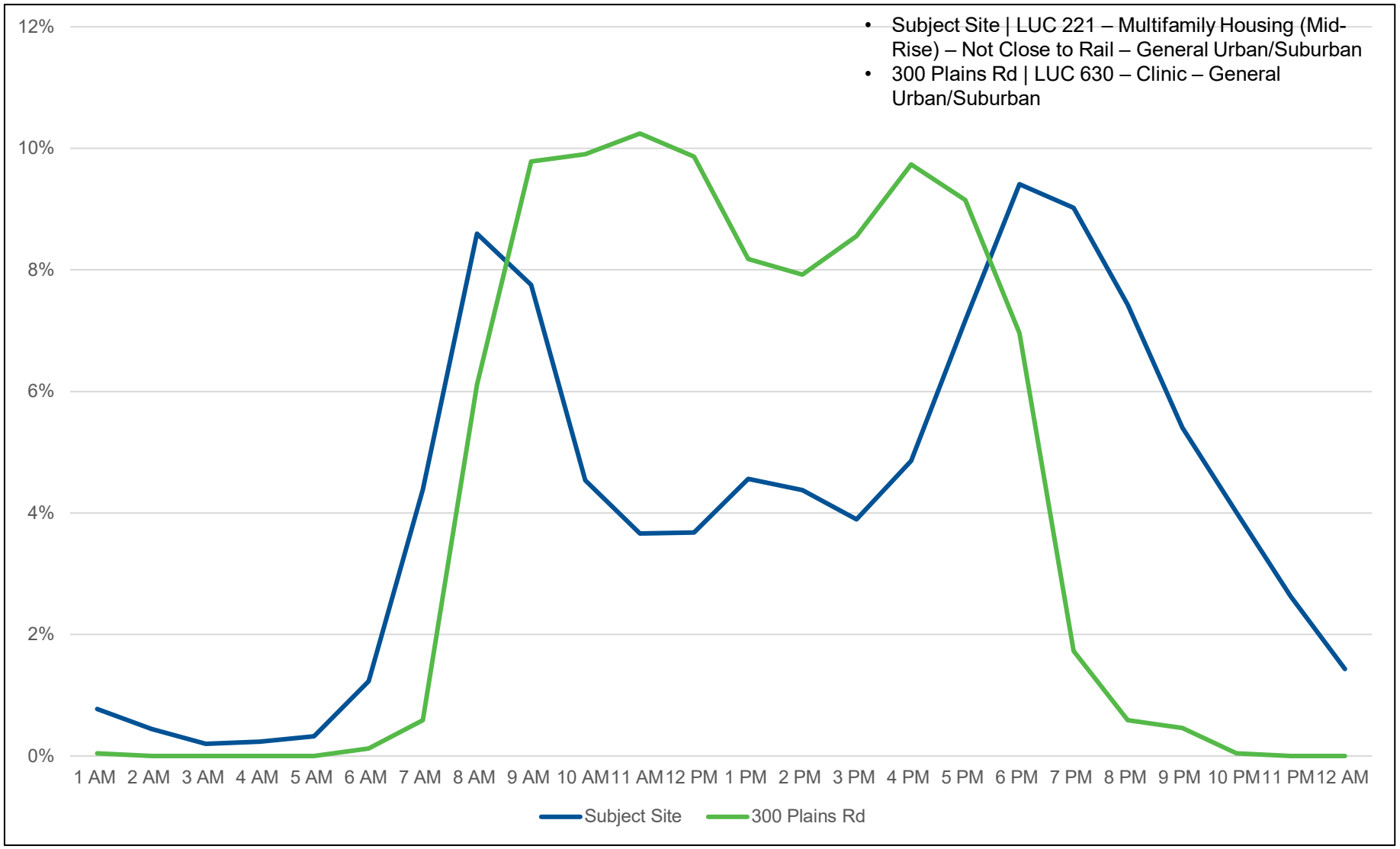

Reduced Scale Drawing
Plains Road East - lane widths, lane markings and symbols are diagrammatical. Developed using airphotos.
Lane symbols are for presentation only.

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# Proposed Site Driveway Geometry

276, 284 and 292 Plains Road East
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Figure 3

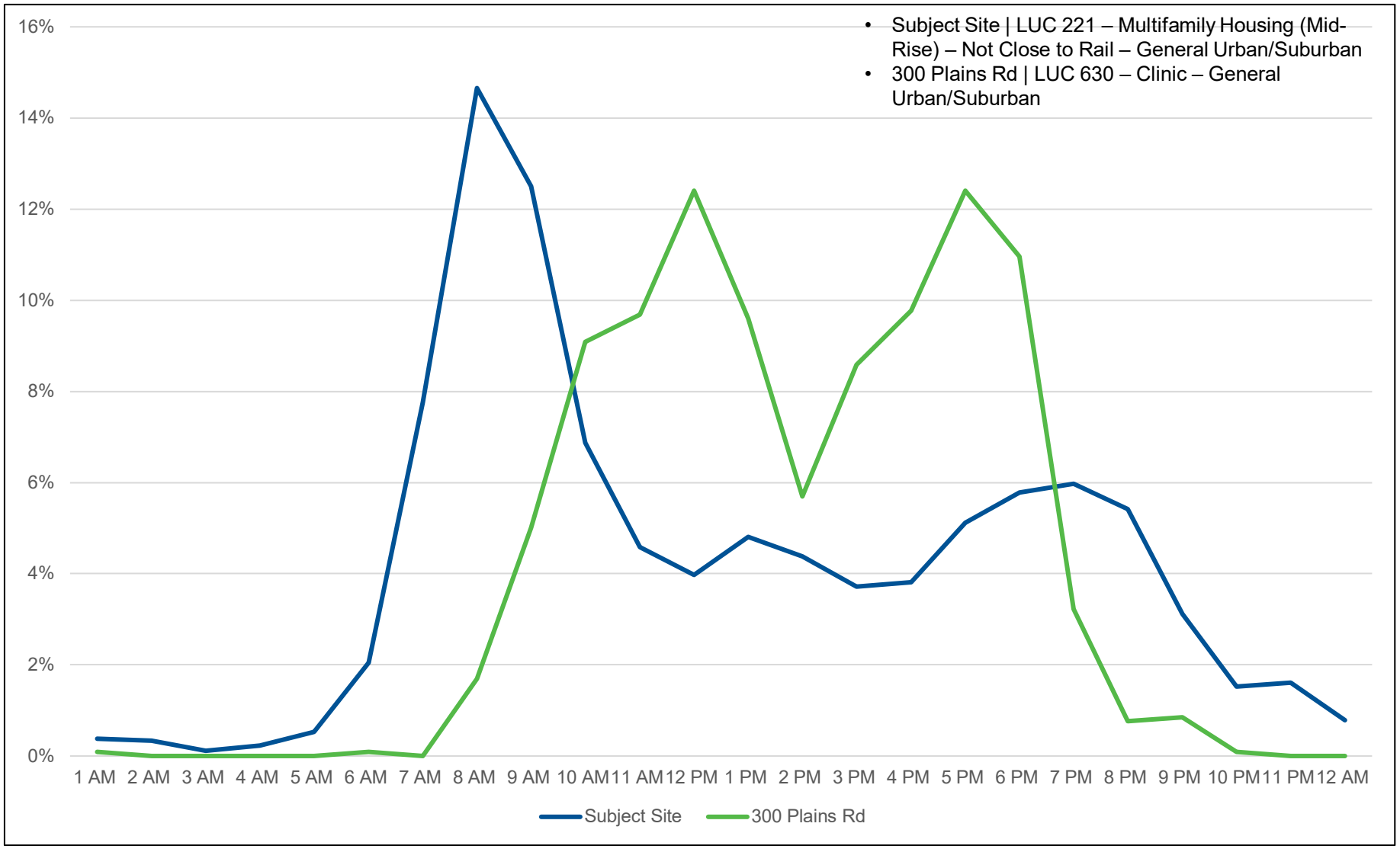



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# ITE Trip Generation Data Temporal Distribution of Two-Way Traffic – Percent of Daily Traffic

276, 284 and 292 Plains Road East
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Figure 4




# ITE Trip Generation Data Temporal Distribution of Outbound Traffic – Percent of Daily Total

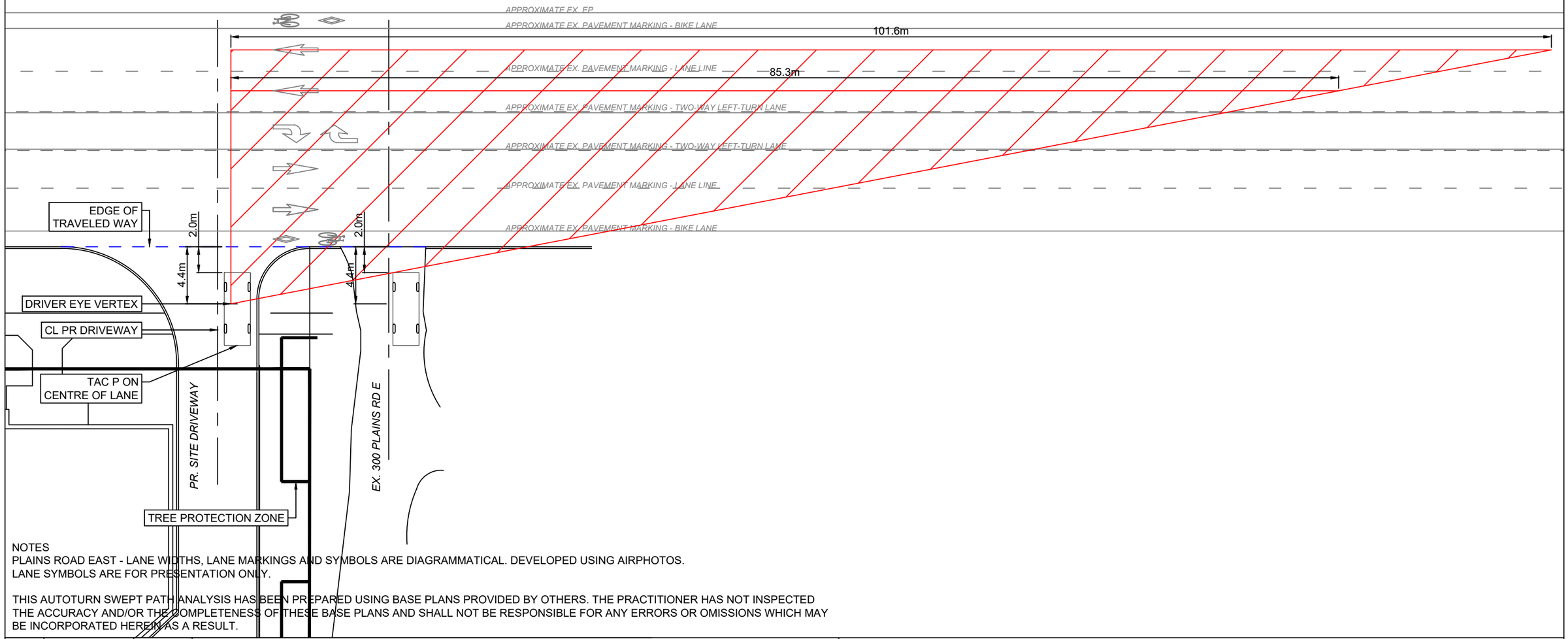
276, 284 and 292 Plains Road East
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Figure 5

# Attachment 1

## Sight Distance Plot

# SITE DRIVEWAY




NOTES
PLAINS ROAD EAST - LANE WIDTHS, LANE MARKINGS AND SYMBOLS ARE DIAGRAMMATICAL. DEVELOPED USING AIRPHOTOS.
LANE SYMBOLS ARE FOR PRESENTATION ONLY.

THIS AUTOTURN SWEPT PATH ANALYSIS HAS BEEN PREPARED USING BASE PLANS PROVIDED BY OTHERS. THE PRACTITIONER HAS NOT INSPECTED THE ACCURACY AND/OR THE COMPLETENESS OF THESE BASE PLANS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

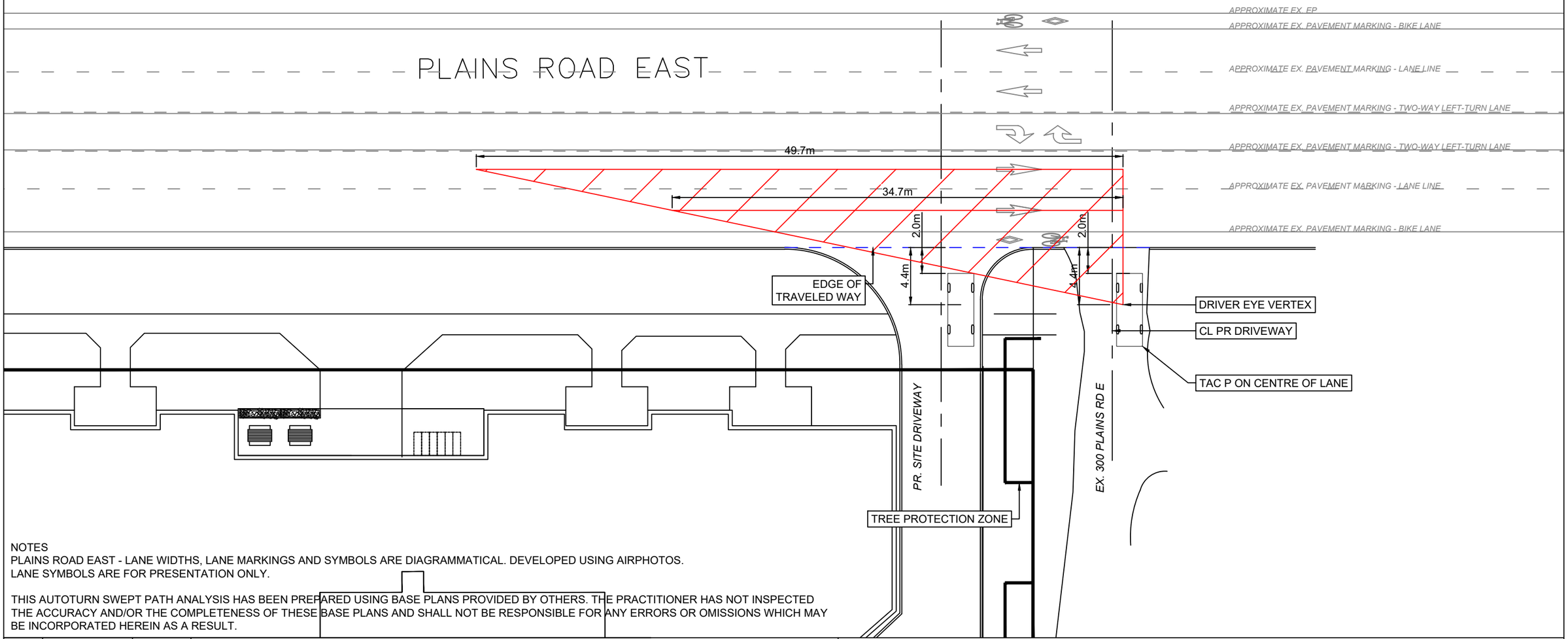
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## DRIVER SIGHT LINES
## 276-292 PLAINS ROAD EAST
## CITY OF BURLINGTON

paradigm TRANSPORTATION SOLUTIONS LIMITED

| PROJECT NO.: 230189 | DATE: JANUARY 2024 | SCALE: 1:300 | DRAWING NO.: |
|---|---|---|---|
| DRAWN: SC | DESIGN: SC | CHECK: SC | 01 |

# 300 PLAINS ROAD EAST DRIVEWAY




NOTES
PLAINS ROAD EAST - LANE WIDTHS, LANE MARKINGS AND SYMBOLS ARE DIAGRAMMATICAL. DEVELOPED USING AIRPHOTOS.
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## DRIVER SIGHT LINES
## 276-292 PLAINS ROAD EAST
## CITY OF BURLINGTON

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|---|---|---|---|
| PROJECT NO.: 230189 | DATE: JANUARY 2024 | SCALE: 1:300 | DRAWING NO.: 02 |
| DRAWN: SC | DESIGN: SC | CHECK: EB | |