

# Traffic Engineering Study Windsor Parkway Pedestrian Crossing

*Prepared for:*  
*City of Sandy Springs, GA*

*Prepared by:*  
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*June 10, 2019*



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**INTERNATIONAL**

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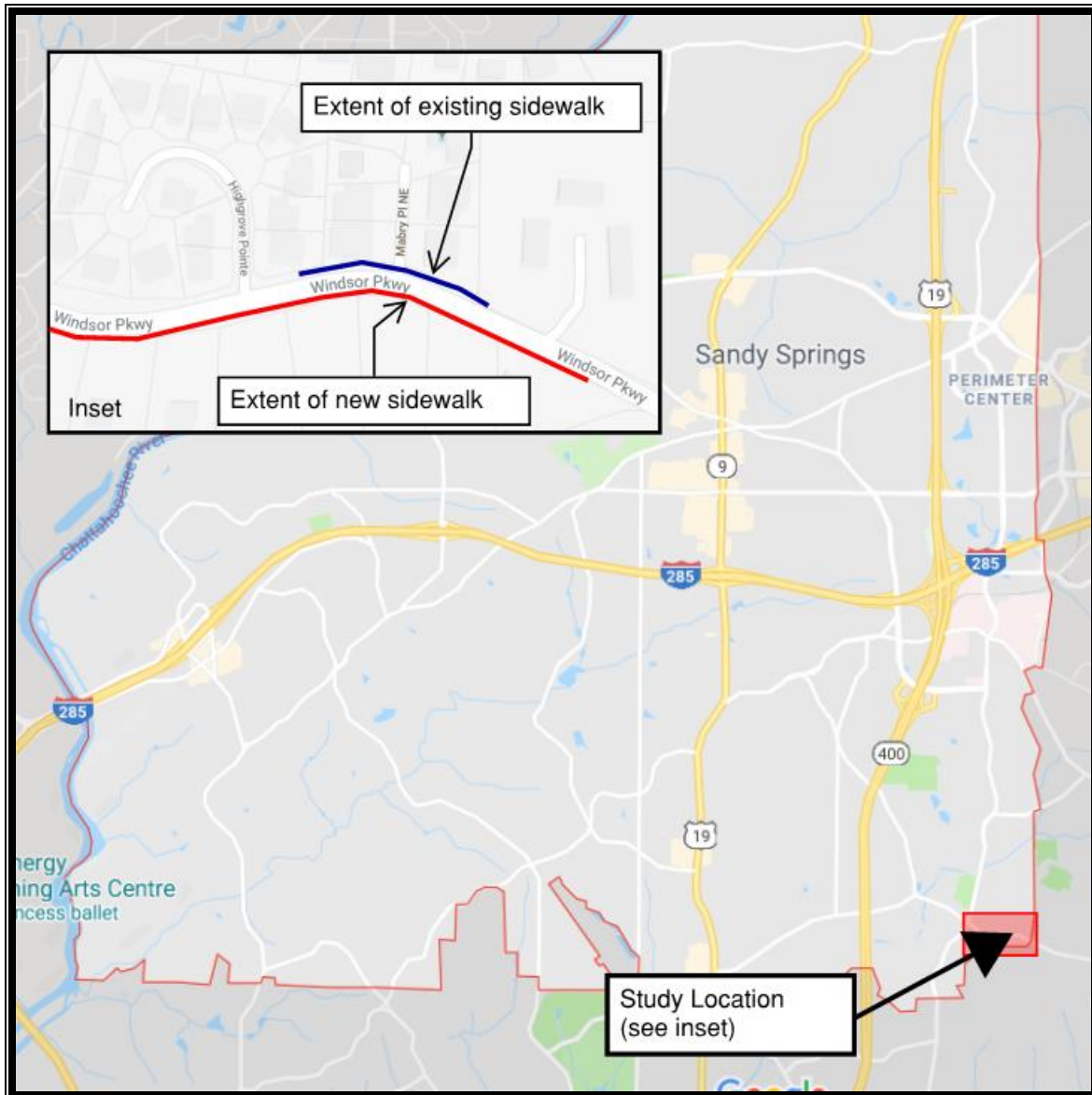
## **1.0 PURPOSE**

The City of Sandy Springs requested a review of potential pedestrian crossing locations along Windsor Parkway in the vicinity of Highgrove Pointe and Mabry Place (see Figure 1). The City is constructing a sidewalk improvement project along Windsor Parkway that will add curb, gutter, and sidewalk on the south side of the road, connecting to existing sidewalk to the west. The north side of Windsor Parkway does not have continuous sidewalk connected to any other pedestrian facility. A segment of sidewalk between Highgrove Pointe and Mabry Place exists but does not fully connect the two subdivisions.

The residents on the north side of Windsor Parkway have requested a pedestrian crosswalk between the north and south side of the roadway, to provide a safe connection. The City of Sandy Springs has expressed their intention to complete a sidewalk extension on the north side of Windsor Parkway that would fully connect Highgrove Pointe to Mabry, and provide walking access to a pedestrian crossing, if one is recommended and constructed.

This memo examines the context and character of the area with respect to pedestrian crossings, briefly examines the literature concerning pedestrian crossings, and makes a recommendation.

Figure 1: Study Area Map



Source: Google, Inc.



## 2.0 CONTEXT AND CHARACTER OF AREA

Windsor Parkway through this area is a two-lane Collector roadway providing an important east-west connection between the City of Sandy Springs and the City of Brookhaven. The roadway connects Peachtree Dunwoody Road and Roswell Road (SR 9) to the west with Ashford Dunwoody Road, Osborne Road, and, through connections, Peachtree Road to the east. The measured ADT of the roadway was 12,574 on April 30, 2019.

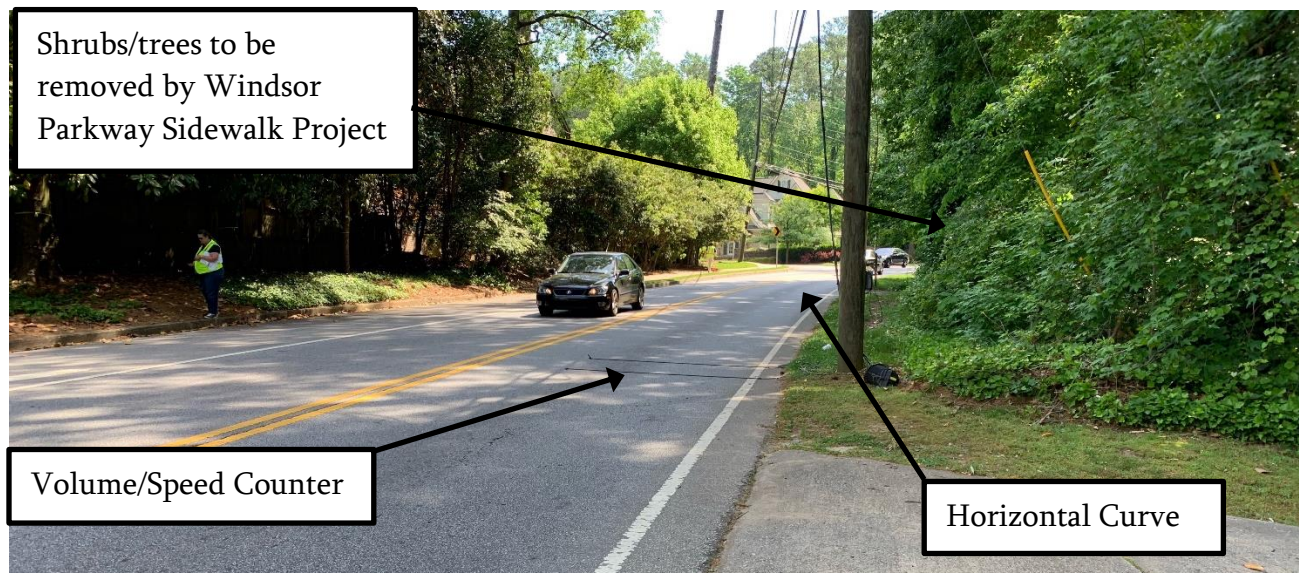
The study area is 100% residential properties in a closely wooded area. Through the study area are two horizontal curves that serve to block line of sight due to trees/shrubs/slopes.

**Figure 2: West of Highgrove Pointe; Looking East**



*Source: Michael Baker International, Inc.*

**Figure 3: East of Highgrove Pointe; Looking East**



*Source: Michael Baker International, Inc.*

### 3.0 SITE VISIT

Michael Baker engineers visited the site on Tuesday, April 30, 2019 between 11:00 AM and 12:00 PM to make field observations and measurements. Specific items of information collected were:

- Site distance measurements
- Presence of street lighting
- Vegetation and slopes on the north side of Windsor Parkway
- Existing signage related to pedestrians
- Potential locations for a pedestrian crossing
- Observed gaps in traffic for pedestrian crossings

#### 3.1 Field Evaluation: Site distance measurements

An important question of pedestrian safety lies outside the control of the pedestrian and is particularly relevant to this study: Can a driver approaching a potential crossing see a pedestrian in time to stop? This question is answered based upon the American Association of State Highway and Transportation Officials (AASHTO) publication, “A Policy on Geometric Design of Highways and Streets.” Otherwise known as the “Green Book” this policy presents design guidelines for roadways and other types of transportation facilities. Contained within Chapter 3.2.2 of the most recent edition of the Green Book is the description of Stopping Sight Distance. To quote from the Green Book:

##### *3.2.2 Stopping Sight Distance*

*Sight distance is the length of the roadway ahead that is visible to the driver. The available sight distance on a roadway should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path.*

*Stopping sight distance is the sum of two distances: (1) the distance traversed by the vehicle from the instant the driver sights an object necessitating a stop to the instant the brakes are applied, and (2) the distance needed to stop the vehicle from the instant brake application begins. These are referred to as brake reaction distance and braking distance, respectively.*

The required stopping sight distance for relevant design speeds on Windsor Parkway is summarized in Table 1.

**Table 1: Required Stopping Sight Distance**

<b>Stopping Sight Distance</b>	
Per AASHTO Green Book	
MPH	Feet Required
30	200
35	250
40	305

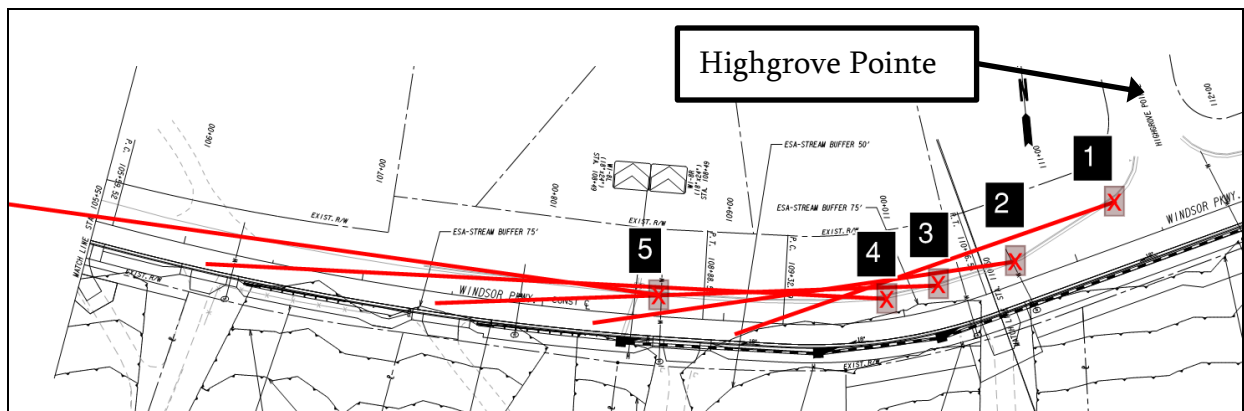
*Source: AASHTO Green Book*



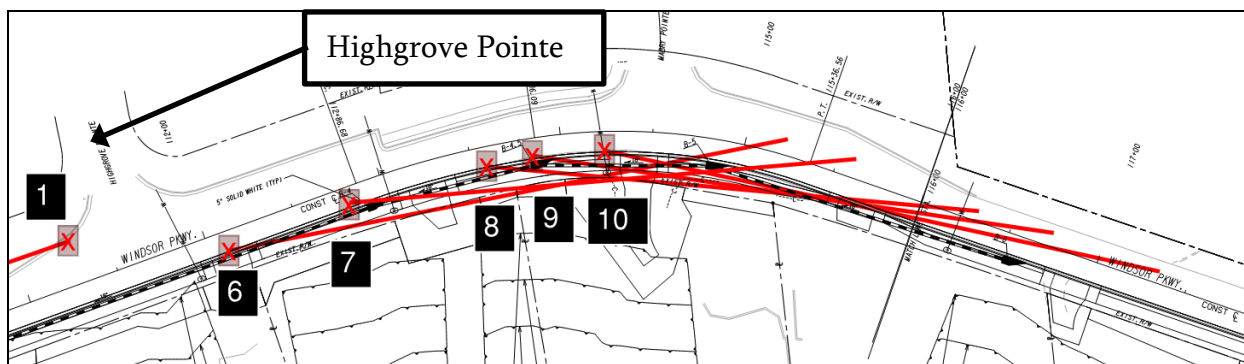
Michael Baker investigated the stopping sight distance along Windsor Parkway from several locations where a pedestrian crossing might be placed. The sight distance measurements were taken using Green Book viewing and target heights<sup>1</sup>, although it is noted that no vertical curves exist on this section of Windsor Parkway that could block sight distance. The only vertical element that was a factor in sight distance measurements was the slope identified in Figure 2. All other sight distance blockages were caused by the horizontal curvature of the roadway and vegetation that occluded the view.

Figure 4 and Figure 5 show a plan view of where the sight distance measurements were taken. The thick red lines are the approximate distances measured in the field. A larger version of these figures is available in the Appendix.

**Figure 4: Field Measured Sight Distance (1/2)**



**Figure 5: Field Measured Sight Distance (2/2)**



Note that all sight distance measurements in Figure 5 were conducted based on existing field conditions and not those that will exist after the Windsor Parkway Sidewalks project removes some trees and shrubbery and installs a turn-down sidewalk with decorative handrail.

The table of measurements for sight distance is shown in Table 2. The sight distances are color coded to show if they meet stopping sight distance criteria for 30 MPH (orange), 35 MPH

<sup>1</sup> 3.5 foot viewing height and 2 foot target height.

(yellow) or 40 MPH (green). See Table 1. A grey cell is an area where a field measurement was not taken because, by inspection, it was greater than 350 feet.

**Table 2: Measured Sight Distances**

Measured Sight Distance			
		Traveling Eastbound	Traveling Westbound
Point #	Side of Road for Target (Pedestrian)	Approximate Distance (ft)	
1	North	225	
2	North	235	
2	South	365	
3	North	275	
4	North	380	>350
5	North	370	205
6	South	365	305
7	South		275
8	South	>350	270
9	South		280
10	South		305
Every Sight Distance east of 9 is longer than 400'			

**3.2 Field Evaluation: Presence of Street Lighting**

Two luminaires were observed on Georgia Power utility poles along the south side of Windsor Parkway. One across from Highgrove Pointe, and one across from Mabry Place.

**3.3 Field Evaluation: Vegetation and Slopes on North Side of Windsor Parkway**

As shown in Figure 1, there is a significant block to viewing distance due to a slope and existing trees/shrubs just to the west of Highgrove Pointe. This area appears to be within the right of way of Windsor Parkway.

**3.4 Field Evaluation: Existing signage related to pedestrians**

No signage was observed related to pedestrians.

**3.5 Field Evaluation: Potential locations for a pedestrian crossing**

Areas between approximately 400 feet to the west of Highgrove Pointe to the Sandy Springs/Brookhaven city limit were observed for crossing potential. More information regarding candidate locations is found in the conclusions and recommendations sections.

**3.6 Field Evaluation: Observed gaps in traffic for pedestrian crossings**

During the 11:00 AM to 12:00 PM hour that Michael Baker was on site, the field engineers crossed Windsor Parkway several times. Approximately half of these crossings required waiting for at least two (2) oncoming vehicles to pass. Gaps in traffic were adequate during the observation time for an adult with no mobility impairments to cross safely.

### **3.7 Field Evaluation: Speed Study**

A speed and volume traffic count was conducted on April 30, 2019. Based on the data gathered the 85<sup>th</sup> percentile speed on Windsor Parkway in this area is 37.5 MPH. This speed has an impact on which Green Book speed level (MPH) is used to determine acceptable stopping sight distance. See Table 1.

### **3.8 Field Evaluation: Likely Pedestrian Need**

The subdivisions of Highgrove Pointe and Mabry Place together comprise twenty-four (24) single family residences. To the west is another set of homes with approximately fifteen (15) housing units. These homes are the ones most likely to generate pedestrian trips that cross Windsor Parkway at a crosswalk inside the study area.

During the field visit, between 11:00 AM and 12:00 PM, no pedestrians were observed. This lack of pedestrians should not be overvalued due to the current lack of acceptable pedestrian facilities along Windsor Parkway.

Pedestrian destinations within one half mile of the study area are limited. These include soccer fields and other residential neighborhoods. Most pedestrian traffic is anticipated to be recreationally in nature, e.g. evening walks and exercise-type trips. Further information on this topic is not available inside the scope of this study.

The maximum anticipated daily pedestrian demand for this crossing can be assumed to include all thirty-nine (39) residences in the study area, on the north side of Windsor Parkway. Good data pedestrian trip generation based on residences is not available, but for purposes of this study, we assume one quarter (25%) of residences will generate a daily pedestrian trip and that the homes are representative of the median household population as determined by the US Census (2.53 persons per household)<sup>2</sup>. This equates to 24.67 trips per day.

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<sup>2</sup> Average Number of People per Household, by Race and Hispanic Origin<sup>1</sup>, Marital Status, Age, and Education of Householder: 2018

#### 4.0 SITE DISTANCE MEASUREMENTS BASED ON DESIGN PLANS

Michael Baker evaluated the sight distance of the various potential crossings identified in Figure 4 and Figure 5 based on the design plans for the Windsor Parkway Sidewalks. The results are shown in Table 3. Again, the color coding is to show if the measurements meet stopping sight distance criteria for 30 MPH (orange), 35 MPH (yellow) or 40 MPH (green).

**Table 3: Post-Sidewalk Construction Sight Distance**

Design Sight Distance Post Windsor Parkway Sidewalk Construction			
		Traveling Eastbound	Traveling Westbound
Point #	Side of Road for Target (Pedestrian)	Approximate Distance (ft)	
1	North	225*	370
2	North	235*	400
2	South	365*	380
3	North	275*	445
4	North	380*	475
5	North	370*	205*
6	South	365*	255
7	South	375	215
8	South	445	275
9	South	470	280
10	South	520	485
* Same as Measured Sight Distance; no work being conducted on north side of Windsor Parkway during sidewalk construction.			

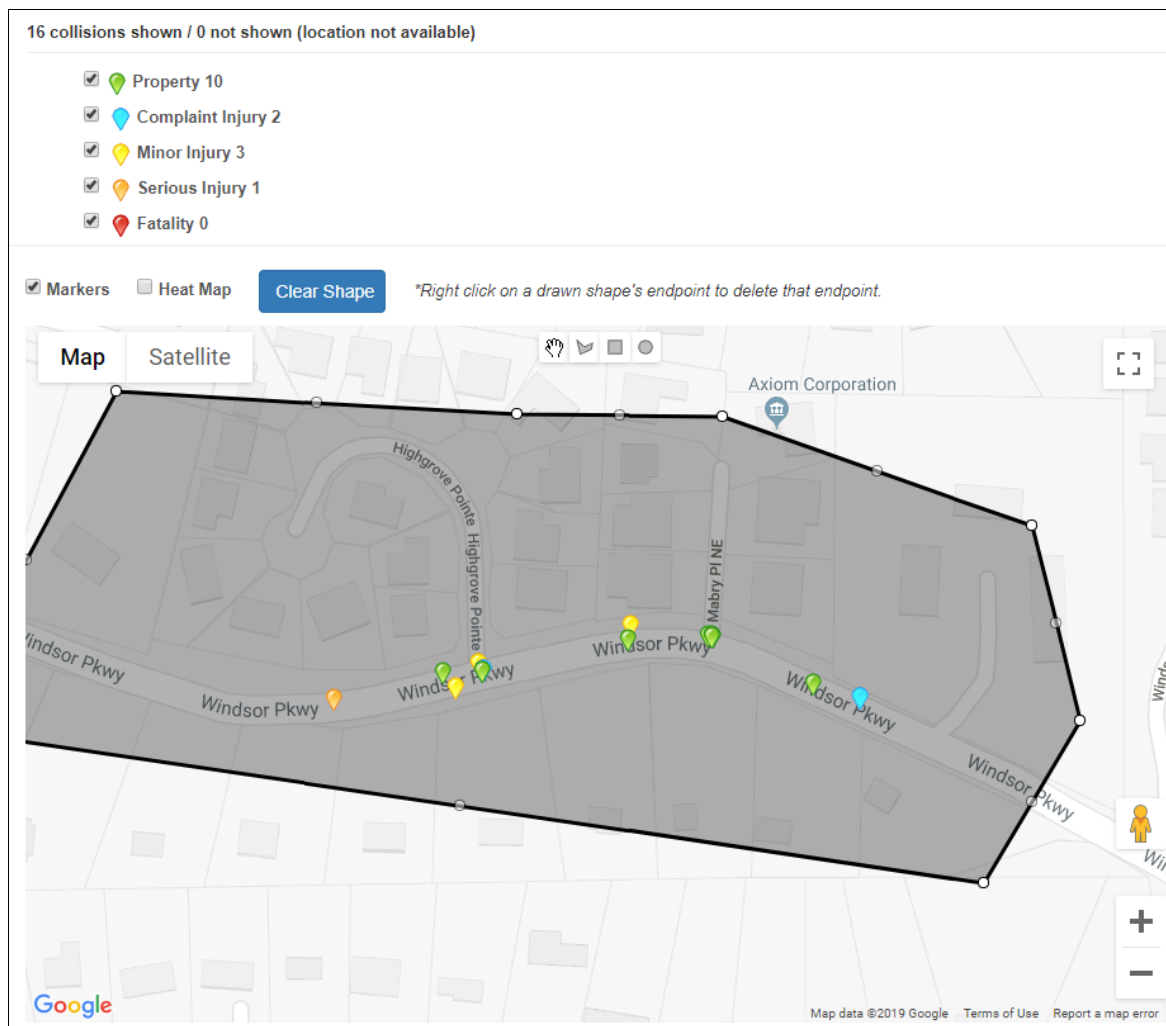
*Source: Michael Baker International, Inc.*

Michael Baker also examined the site distance for Point 5 if the backslope just west of Highgrove Pointe were removed or reduced. If the slope were pulled back toward the right of way line nine (9) feet, that would achieve 250 feet of sight distance. A seventeen (17) foot removal would achieve 305 feet. This removal would help sight distance for all other points (1 through 3) that are occluded by the backslope on the inside of this curve. However, at this time, we have not evaluated what right of way, construction, or landscaping impact this proposed slope reduction might have.

## 5.0 REVIEW OF CRASH HISTORY

The most recent six (6) full years of crashes were queried in the study area. Figure 6 shows the locations of sixteen (16) crashes between January 1, 2013 and December 31, 2018. Seven (7) of the crashes were run-off-the-road type crashes. One (1) crash involved a bicycle. All others were crashes involving motor vehicles. No pedestrian crashes were reported.

**Figure 6: Crashes in Area**



Source:

GEARS Website

## 6.0 MIDBLOCK CROSSINGS LITERATURE REVIEW

The Federal Manual on Uniform Traffic Control Devices (MUTCD) discusses the application of pedestrian crossings away from a signalized or stop controlled intersection in Chapter 3B.18. This chapter of the MUTCD spells out the minimum necessary factors to be considered for a crosswalk.

Important quotes from this chapter are included here:

### *Section 3B.18 Crosswalk Markings*

Support:

01 Crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and on approaches to other intersections where traffic stops.

02 In conjunction with signs and other measures, crosswalk markings help to alert road users of a designated pedestrian crossing point across roadways at locations that are not controlled by traffic control signals or STOP or YIELD signs.

Guidance:

08 *Crosswalk lines should not be used indiscriminately. An engineering study should be performed before a marked crosswalk is installed at a location away from a traffic control signal or an approach controlled by a STOP or YIELD sign. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.*

The Federal Highway Administration (FHWA) published a report in 2005 entitled “Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations.” The study report had the following recommendations:

### *GUIDELINES FOR CROSSWALK INSTALLATION*

*Marked pedestrian crosswalks may be used to delineate preferred pedestrian paths across roadways under the following conditions:*

- *At locations with stop signs or traffic signals to direct pedestrians to those crossing locations and to prevent vehicular traffic from blocking the pedestrian path when stopping for a stop sign or red light.*
- *At nonsignalized street crossing locations in designated school zones. Use of adult crossing guards, school signs and markings, and/or traffic signals with pedestrian signals (when warranted) should be considered in conjunction with the marked crosswalk, as needed.*
- *At nonsignalized locations where engineering judgment dictates that the number of motor vehicle lanes, pedestrian exposure, average daily traffic (ADT), posted speed*



*limit, and geometry of the location would make the use of specially designated crosswalks desirable for traffic/pedestrian safety and mobility.*

*Marked crosswalks alone (i.e., without traffic-calming treatments, traffic signals and pedestrian signals when warranted, or other substantial crossing improvement) are insufficient and should not be used under the following conditions:*

- *Where the speed limit exceeds 64.4 km/h (40 mi/h).*
- *On a roadway with four or more lanes without a raised median or crossing island that has (or will soon have) an ADT of 12,000 or greater.*
- *On a roadway with four or more lanes with a raised median or crossing island that has (or soon will have) an ADT of 15,000 or greater.*

The Georgia Department of Transportation (GDOT) has no general guidelines for minimum pedestrian movements for a pedestrian crossing outside of the warrants for a signalized intersection or for a hybrid pedestrian beacon (HPB), however District 7 of GDOT uses a pedestrian volume of 15 per hour to allow for the installation of a rectangular rapid flashing beacon (RRFB).

## 7.0 ALL WAY STOP EVALUATION

The Federal Manual on Uniform Traffic Control Devices (MUTCD) allows the placement of a pedestrian crosswalk at locations that are controlled by a traffic signal, or an all-way stop. In order to add an all-way stop at either Highgrove Pointe or Mabry Place, the following minimum requirements must be met per MUTCD chapter 2B.07.

*Guidance:*

03 *The decision to install multi-way stop control should be based on an engineering study.*

04 *The following criteria should be considered in the engineering study for a multi-way STOP sign installation:*

- A. *Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.*
- B. *Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.*
- C. *Minimum volumes:*
  - 1. *The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and*
  - 2. *The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but*
  - 3. *If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.*
- D. *Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.*

For both the Highgrove Pointe and Mabry Place intersections, neither condition A or B are met. For condition C, the major street (Windsor Parkway) volumes are met, but the volumes for the side street are insufficient to meet the 200 per hour, even with the volume reductions provided for in C.3.

An all-way stop is not warranted at either Highgrove Pointe or Mabry Place.

## 8.0 CONCLUSIONS

The volume of pedestrian traffic in the study area is unlikely to exceed the thresholds necessary to warrant a traffic signal or a hybrid pedestrian beacon. This volume will not be apparent until after construction of the Windsor Parkway sidewalks is complete.

There have been sixteen (16) crashes over six (6) years in the study area. No particular hot spot was observed.

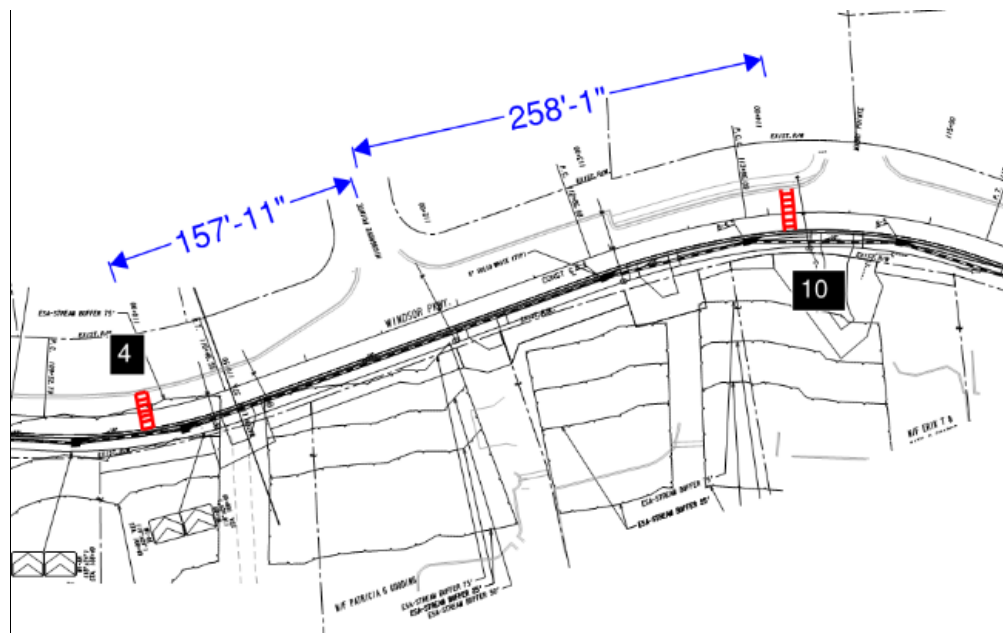
The 85<sup>th</sup> percentile speed along Windsor Parkway at this location is 37.5 MPH. The 40 MPH Green Book site distance criteria should be used when evaluating crossing locations.

All-way stop warrants are not met at either Highgrove Pointe or Mabry Place.

There are multiple locations available under current conditions, or proposed build conditions, for a crosswalk that will have adequate sight distance based on 40 MPH approach speeds. Note that two locations have worse site distance after Windsor Parkway sidewalk construction is complete. Points 6 and 7 will have their view blocked by the proposed turn-down sidewalk and ancillary decorative hand rail. The site distance will reduce by approximately 50 feet.

There are two (2) locations where a crosswalk would have adequate site distance from both approaches. These are points 4 and 10, shown in Figure 7.

**Figure 7: Potential Crossing Locations**



Point 4 would require additional grading and sidewalk construction to access, with possible impacts to the landscaping of Highgrove Pointe. Point 10 is over 250 feet east of Highgrove Pointe and is unlikely to be used by residents of Highgrove who wish to travel west.

It is likely that pedestrians starting or ending at Highgrove Pointe and proceeding to/from the west will not use a crosswalk at Point 10; they will cross Windsor Parkway at the most

convenient location available to them outside Highgrove Pointe. This behavior is well documented at other locations and in other studies.

Conversely, for pedestrians travelling to and from the east, it is unlikely that a crosswalk at point 4 will be used.

Per the FHWA publication, “Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations,” a crosswalk at Point 4 or 10 is unlikely to increase the number of pedestrian collisions so long as additional measures are employed to alert drivers to presence of pedestrians.

## 9.0 RECOMMENDATIONS

1. It is recommended that a marked crosswalk be installed at Pointe 10, at the western radius return of the intersection of Windsor Parkway and Mabry Place. This crosswalk should adhere to City of Sandy Springs requirements for striping to ensure visibility. Furthermore, the crosswalk should be located to minimize the crossing distance of pedestrians and maximize the viewing distance of approaching drivers.
2. It is recommended that MUTCD code W11-2 pedestrian warning signs be installed in advance of the crossing in both directions and that W11-2 and supplemental W16-7p plaques be located at the crossing itself.
3. It is recommended that an R560-5, “State Law Stop for Pedestrians in Crosswalk” sign, per GDOT Detail T-5A be erected on each approach to the crosswalk.
4. It is recommended that a letter, pamphlet, brochure, or brochure be distributed to the homes likely to use this crosswalk, explaining the nature and use of a mid-block crossing and how to use it safely.
5. It is recommended that this crossing be illuminated adequately for drivers to see pedestrians in the crosswalk at night. The local streetlighting may not be adequate.
6. It is not recommended that the location be signalized with either stop-and-go traffic signals or hybrid pedestrian beacon. It is also not recommended that a rectangular rapid flashing beacon be installed at this time.

## APPENDIX A - SPEED AND VOLUME TRAFFIC COUNTS



**SPEED**

## Windsor Pkwy Bet. HighGrove Pointe &amp; Mabry Pl NE

Day: Tuesday  
Date: 4/30/2019

City: Sandy Springs  
Project #: GA19\_9332\_001e

**East Bound**

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	2	0	4	3	4	0	0	0	0	0	0	13
01:00	0	0	0	0	1	4	2	0	0	0	0	0	0	7
02:00	0	0	0	0	0	0	1	0	0	0	0	0	0	1
03:00	0	0	0	0	0	3	1	1	0	0	0	0	0	5
04:00	0	0	0	0	4	7	1	1	0	0	0	0	0	13
05:00	0	0	0	0	9	11	6	1	0	0	0	0	0	27
06:00	0	0	1	7	33	37	14	0	0	0	0	0	0	92
07:00	0	3	14	49	116	92	8	0	0	0	0	0	0	282
08:00	0	0	2	101	174	45	1	0	0	0	0	0	0	323
09:00	0	0	3	42	153	97	10	0	0	0	0	0	0	305
10:00	0	1	5	35	178	107	14	0	0	0	0	0	0	340
11:00	0	3	6	60	183	79	9	1	0	0	0	0	0	341
12:00 PM	1	1	11	68	160	115	9	1	0	0	0	0	0	366
13:00	1	1	0	52	199	122	8	0	0	0	0	0	0	383
14:00	0	1	4	47	200	145	15	2	0	0	0	0	0	414
15:00	3	6	23	81	236	107	11	2	0	0	0	0	0	469
16:00	1	15	51	140	269	121	10	1	0	0	0	0	0	608
17:00	144	57	98	146	128	58	2	0	0	0	0	0	0	633
18:00	67	44	57	121	197	105	9	0	0	0	0	0	0	600
19:00	0	1	6	41	222	142	13	1	0	0	0	0	0	426
20:00	0	2	13	27	120	84	17	1	0	0	0	0	0	264
21:00	0	0	0	9	58	38	12	3	0	0	0	0	0	120
22:00	0	0	0	12	35	25	6	1	0	0	0	0	0	79
23:00	0	0	0	4	8	15	1	0	0	0	0	0	0	28
<b>Totals</b>	<b>217</b>	<b>135</b>	<b>296</b>	<b>1042</b>	<b>2687</b>	<b>1562</b>	<b>184</b>	<b>16</b>						<b>6139</b>
% of Totals	4%	2%	5%	17%	44%	25%	3%	0%						100%

<b>AM Volumes</b>	0	7	33	294	855	485	71	4	0	0	0	0	0	1749
<b>% AM</b>		0%	1%	5%	14%	8%	1%	0%						28%
<b>AM Peak Hour</b>		07:00	07:00	08:00	11:00	10:00	06:00	03:00						11:00
<b>Volume</b>		3	14	101	183	107	14	1						341
<b>PM Volumes</b>	217	128	263	748	1832	1077	113	12	0	0	0	0	0	4390
<b>% PM</b>	4%	2%	4%	12%	30%	18%	2%	0%						72%
<b>PM Peak Hour</b>	17:00	17:00	17:00	17:00	16:00	14:00	20:00	21:00						17:00
<b>Volume</b>	144	57	98	146	269	145	17	3						633
<b>Directional Peak Periods</b>			<b>AM 7-9</b>			<b>NOON 12-2</b>			<b>PM 4-6</b>			<b>Off Peak Volumes</b>		
<b>All Speeds</b>			Volume		%	Volume		%	Volume		%	Volume		%
			605	↔	10%	749	↔	12%	1241	↔	20%	3544	↔	58%

Street Name	Direction	Percentiles					ADT
		15th	50th	Average	85th	95th	
Windsor Pkwy	East Bound	26	33	32	38	40	6139
Windsor Pkwy	West Bound	20	32	30	37	39	6435

**SPEED**

## Windsor Pkwy Bet. HighGrove Pointe &amp; Mabry Pl NE

Day: Tuesday  
Date: 4/30/2019

City: Sandy Springs  
Project #: GA19\_9332\_001w

**West Bound**

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	0	1	6	2	0	0	0	0	0	0	0	9
01:00	0	0	0	0	3	0	0	0	0	0	0	0	0	3
02:00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
03:00	0	0	0	0	2	0	0	1	0	0	0	0	0	3
04:00	0	0	0	0	3	3	2	0	0	0	0	0	0	8
05:00	0	0	0	2	23	16	4	1	0	0	0	0	0	46
06:00	0	0	0	4	75	97	11	0	0	0	0	0	0	187
07:00	121	157	40	43	162	121	4	0	0	0	0	0	0	648
08:00	245	323	74	24	24	5	0	0	0	0	0	0	0	695
09:00	19	18	4	46	238	157	12	1	0	0	0	0	0	495
10:00	0	0	2	35	173	120	13	0	0	0	0	0	0	343
11:00	1	0	5	58	165	79	7	0	0	0	0	0	0	315
12:00 PM	0	0	1	27	196	119	15	0	0	0	0	0	0	358
13:00	0	0	6	45	192	108	15	0	0	0	0	0	0	366
14:00	0	2	1	32	232	136	8	0	0	0	0	0	0	411
15:00	4	46	80	79	179	105	5	0	0	0	0	0	0	498
16:00	0	4	9	56	255	114	6	0	0	0	0	0	0	444
17:00	0	2	15	103	253	72	6	0	0	0	0	0	0	451
18:00	0	1	12	63	237	102	4	0	0	0	0	0	0	419
19:00	0	0	1	37	151	91	6	0	0	0	0	0	0	286
20:00	0	1	0	25	115	66	10	0	0	0	0	0	0	217
21:00	0	0	1	13	70	50	2	1	0	0	0	0	0	137
22:00	0	0	0	6	40	26	2	0	0	0	0	0	0	74
23:00	0	0	0	0	12	6	3	0	0	0	0	0	0	21
<b>Totals</b>	<b>390</b>	<b>554</b>	<b>251</b>	<b>699</b>	<b>2807</b>	<b>1595</b>	<b>135</b>	<b>4</b>						<b>6435</b>
% of Totals	6%	9%	4%	11%	44%	25%	2%	0%						100%

<b>AM Volumes</b>	386	498	125	213	875	600	53	3	0	0	0	0	0	2753			
<b>% AM</b>	6%	8%	2%	3%	14%	9%	1%	0%						43%			
<b>AM Peak Hour</b>	08:00	08:00	08:00	11:00	09:00	09:00	10:00	03:00						08:00			
<b>Volume</b>	245	323	74	58	238	157	13	1						695			
<b>PM Volumes</b>	4	56	126	486	1932	995	82	1	0	0	0	0	0	3682			
<b>% PM</b>	0%	1%	2%	8%	30%	15%	1%	0%						57%			
<b>PM Peak Hour</b>	15:00	15:00	15:00	17:00	16:00	14:00	12:00	21:00						15:00			
<b>Volume</b>	4	46	80	103	255	136	15	1						498			
<b>Directional Peak Periods</b>		<b>AM 7-9</b>				<b>NOON 12-2</b>			<b>PM 4-6</b>			<b>Off Peak Volumes</b>					
<b>All Speeds</b>		Volume	↔		%	Volume	↔		%	Volume	↔		%	Volume	↔		%
		1343			21%	724			11%	895			14%	3473			54%

Street Name	Direction	Percentiles					ADT
		15th	50th	Average	85th	95th	
Windsor Pkwy	East Bound	26	33	32	38	40	6139
Windsor Pkwy	West Bound	20	32	30	37	39	6435

**SPEED**

## Windsor Pkwy Bet. HighGrove Pointe &amp; Mabry Pl NE

Day: Tuesday  
Date: 4/30/2019

City: Sandy Springs  
Project #: GA19\_9332\_001

**Summary**

Time	< 15	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 +	Total
00:00 AM	0	0	2	1	10	5	4	0	0	0	0	0	0	22
01:00	0	0	0	0	4	4	2	0	0	0	0	0	0	10
02:00	0	0	0	0	1	0	1	0	0	0	0	0	0	2
03:00	0	0	0	0	2	3	1	2	0	0	0	0	0	8
04:00	0	0	0	0	7	10	3	1	0	0	0	0	0	21
05:00	0	0	0	2	32	27	10	2	0	0	0	0	0	73
06:00	0	0	1	11	108	134	25	0	0	0	0	0	0	279
07:00	121	160	54	92	278	213	12	0	0	0	0	0	0	930
08:00	245	323	76	125	198	50	1	0	0	0	0	0	0	1018
09:00	19	18	7	88	391	254	22	1	0	0	0	0	0	800
10:00	0	1	7	70	351	227	27	0	0	0	0	0	0	683
11:00	1	3	11	118	348	158	16	1	0	0	0	0	0	656
12:00 PM	1	1	12	95	356	234	24	1	0	0	0	0	0	724
13:00	1	1	6	97	391	230	23	0	0	0	0	0	0	749
14:00	0	3	5	79	432	281	23	2	0	0	0	0	0	825
15:00	7	52	103	160	415	212	16	2	0	0	0	0	0	967
16:00	1	19	60	196	524	235	16	1	0	0	0	0	0	1052
17:00	144	59	113	249	381	130	8	0	0	0	0	0	0	1084
18:00	67	45	69	184	434	207	13	0	0	0	0	0	0	1019
19:00	0	1	7	78	373	233	19	1	0	0	0	0	0	712
20:00	0	3	13	52	235	150	27	1	0	0	0	0	0	481
21:00	0	0	1	22	128	88	14	4	0	0	0	0	0	257
22:00	0	0	0	18	75	51	8	1	0	0	0	0	0	153
23:00	0	0	0	4	20	21	4	0	0	0	0	0	0	49
<b>Totals</b>	<b>607</b>	<b>689</b>	<b>547</b>	<b>1741</b>	<b>5494</b>	<b>3157</b>	<b>319</b>	<b>20</b>						<b>12574</b>
% of Totals	5%	5%	4%	14%	44%	25%	3%	0%						100%

<b>AM Volumes</b>	386	505	158	507	1730	1085	124	7	0	0	0	0	0	4502
<b>% AM</b>	3%	4%	1%	4%	14%	9%	1%	0%						36%
<b>AM Peak Hour</b>	08:00	08:00	08:00	08:00	09:00	09:00	10:00	03:00						08:00
<b>Volume</b>	245	323	76	125	391	254	27	2						1018
<b>PM Volumes</b>	221	184	389	1234	3764	2072	195	13	0	0	0	0	0	8072
<b>% PM</b>	2%	1%	3%	10%	30%	16%	2%	0%						64%
<b>PM Peak Hour</b>	17:00	17:00	17:00	17:00	16:00	14:00	20:00	21:00						17:00
<b>Volume</b>	144	59	113	249	524	281	27	4						1084
<b>Directional Peak Periods</b>			<b>AM 7-9</b>				<b>NOON 12-2</b>			<b>PM 4-6</b>			<b>Off Peak Volumes</b>	
<b>All Speeds</b>			Volume		%		Volume		%		Volume		%	
			1948		15%		1473		12%		2136		7017 56%	

Street Name	Direction	Percentiles					ADT
		15th	50th	Average	85th	95th	
Windsor Pkwy	Summary	25	32	31	38	40	12574

**VOLUME**

Windsor Pkwy Bet. HighGrove Pointe & Mabry PI NE

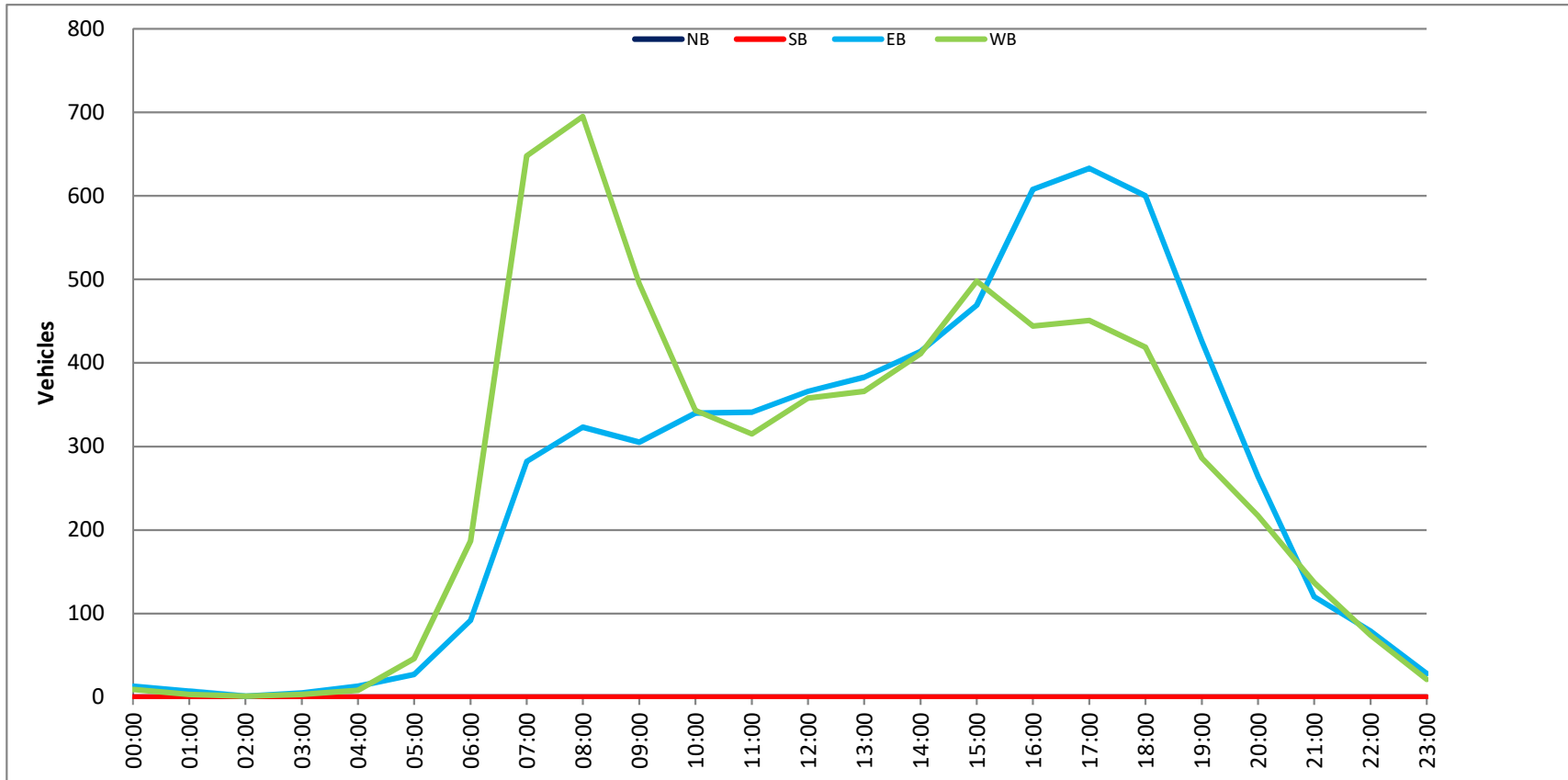
Day: Tuesday  
 Date: 4/30/2019

City: Sandy Springs  
 Project #: GA19\_9332\_001

DAILY TOTALS						NB	SB	EB	WB	Total				
						0	0	6,139	6,435	12,574				
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL			
00:00	0	0	2	3	5	12:00	0	0	96	79	175			
00:15	0	0	3	3	6	12:15	0	0	93	79	172			
00:30	0	0	5	2	7	12:30	0	0	85	96	181			
00:45	0	0	3	13	1	12:45	0	0	92	366	104	358	196	724
01:00	0	0	1	0	1	13:00	0	0	98	92	190			
01:15	0	0	2	1	3	13:15	0	0	97	79	176			
01:30	0	0	2	1	3	13:30	0	0	98	107	205			
01:45	0	0	2	7	1	13:45	0	0	90	383	88	366	178	749
02:00	0	0	0	0	0	14:00	0	0	85	105	190			
02:15	0	0	1	0	1	14:15	0	0	101	110	211			
02:30	0	0	0	0	0	14:30	0	0	111	98	209			
02:45	0	0	0	1	1	14:45	0	0	117	414	98	411	215	825
03:00	0	0	0	1	1	15:00	0	0	129	111	240			
03:15	0	0	3	0	3	15:15	0	0	128	106	234			
03:30	0	0	1	1	2	15:30	0	0	110	160	270			
03:45	0	0	1	5	1	15:45	0	0	102	469	121	498	223	967
04:00	0	0	4	0	4	16:00	0	0	138	98	236			
04:15	0	0	0	1	1	16:15	0	0	173	124	297			
04:30	0	0	3	3	6	16:30	0	0	134	129	263			
04:45	0	0	6	13	4	16:45	0	0	163	608	93	444	256	1052
05:00	0	0	9	2	11	17:00	0	0	168	115	283			
05:15	0	0	6	9	15	17:15	0	0	159	113	272			
05:30	0	0	1	17	18	17:30	0	0	157	103	260			
05:45	0	0	11	27	18	17:45	0	0	149	633	120	451	269	1084
06:00	0	0	10	20	30	18:00	0	0	159	113	272			
06:15	0	0	17	38	55	18:15	0	0	161	123	284			
06:30	0	0	27	50	77	18:30	0	0	149	95	244			
06:45	0	0	38	92	79	18:45	0	0	131	600	88	419	219	1019
07:00	0	0	56	109	165	19:00	0	0	118	70	188			
07:15	0	0	63	184	247	19:15	0	0	110	85	195			
07:30	0	0	88	184	272	19:30	0	0	98	66	164			
07:45	0	0	75	282	171	19:45	0	0	100	426	65	286	165	712
08:00	0	0	62	177	239	20:00	0	0	88	66	154			
08:15	0	0	91	164	255	20:15	0	0	72	64	136			
08:30	0	0	83	171	254	20:30	0	0	46	49	95			
08:45	0	0	87	323	183	20:45	0	0	58	264	38	217	96	481
09:00	0	0	80	137	217	21:00	0	0	30	43	73			
09:15	0	0	75	122	197	21:15	0	0	30	40	70			
09:30	0	0	72	126	198	21:30	0	0	27	29	56			
09:45	0	0	78	305	110	21:45	0	0	33	120	25	137	58	257
10:00	0	0	81	110	191	22:00	0	0	23	20	43			
10:15	0	0	75	72	147	22:15	0	0	28	30	58			
10:30	0	0	83	87	170	22:30	0	0	15	14	29			
10:45	0	0	101	340	74	22:45	0	0	13	79	10	74	23	153
11:00	0	0	71	77	148	23:00	0	0	12	8	20			
11:15	0	0	85	81	166	23:15	0	0	5	6	11			
11:30	0	0	82	80	162	23:30	0	0	8	4	12			
11:45	0	0	103	341	77	23:45	0	0	3	28	3	21	6	49
<b>TOTALS</b>			1749	2753	4502	<b>TOTALS</b>			4390	3682	8072			
<b>SPLIT %</b>			38.8%	61.2%	35.8%	<b>SPLIT %</b>			54.4%	45.6%	64.2%			

DAILY TOTALS						NB	SB	EB	WB	Total
						0	0	6,139	6,435	12,574

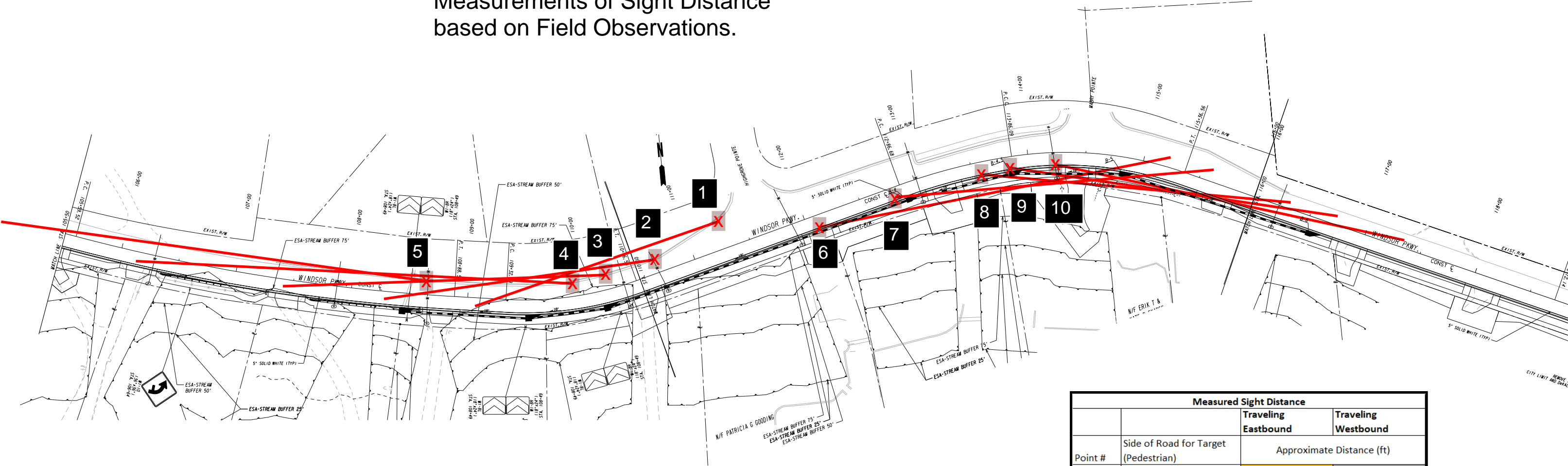
AM Peak Hour	11:45	07:15	08:00	PM Peak Hour	16:45	15:30	16:15				
AM Pk Volume	377	716	1018	PM Pk Volume	647	503	1099				
Pk Hr Factor	0.915	0.973	0.943	Pk Hr Factor	0.963	0.786	0.925				
7 - 9 Volume	0	0	605	1343	1948	4 - 6 Volume	0	0	1241	895	2136
7 - 9 Peak Hour	08:00	07:15	08:00	4 - 6 Peak Hour	16:45	16:15	16:15				
7 - 9 Pk Volume	0	0	323	716	1018	4 - 6 Pk Volume	0	0	647	461	1099
Pk Hr Factor	0.000	0.000	0.887	0.973	0.943	Pk Hr Factor	0.000	0.000	0.963	0.893	0.925



## APPENDIX B - SIGHT DISTANCE DIAGRAM



# Measurements of Sight Distance based on Field Observations.

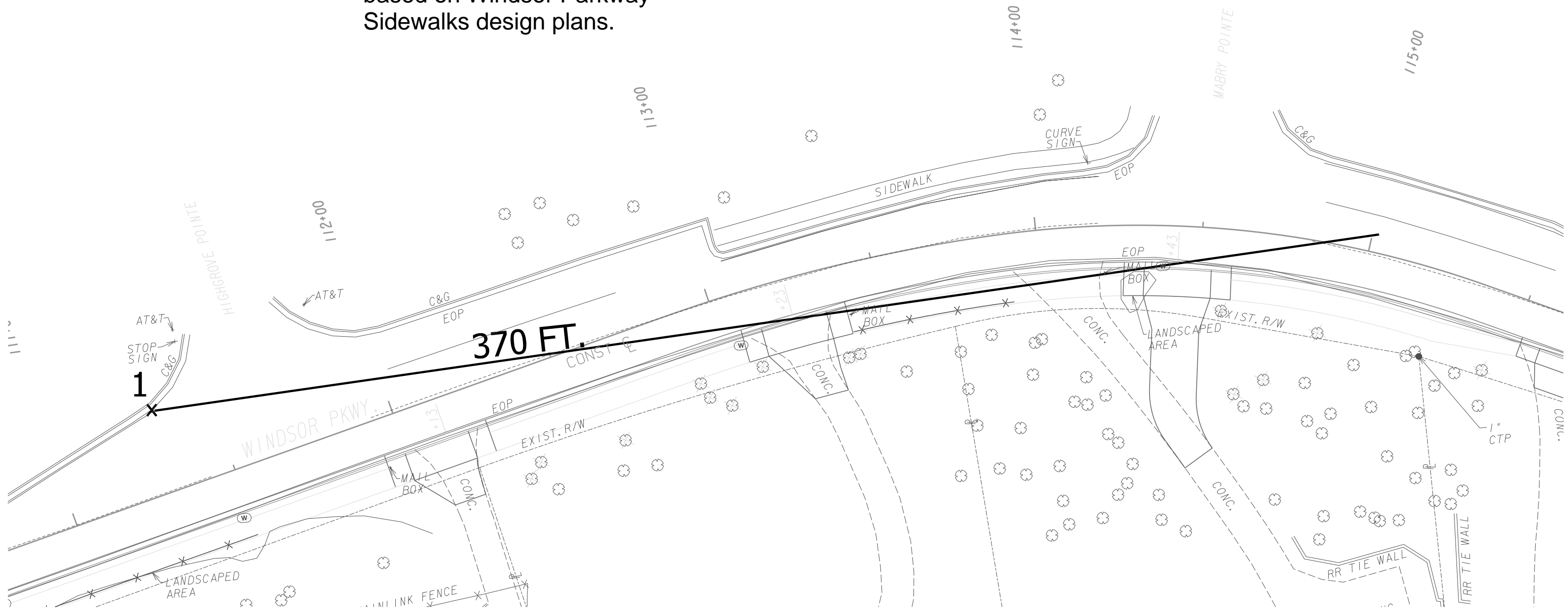


Stopping Sight Distance Per AASHTO Green Book	
MPH	Feet Required
30	200
35	250
40	305

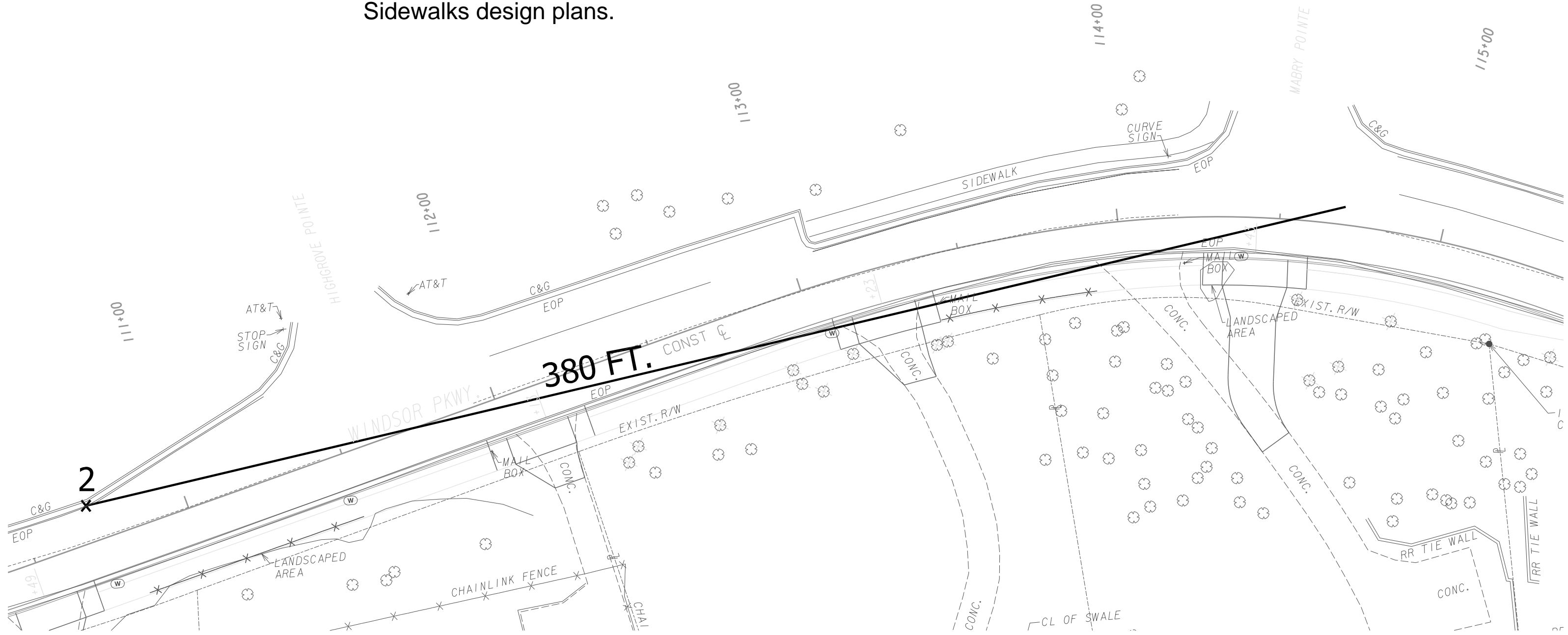
Measured Sight Distance			
Point #	Side of Road for Target (Pedestrian)	Traveling	Traveling
		Eastbound	Westbound
Approximate Distance (ft)			
1	North	225	
2	North	235	
2	South	365	
3	North	275	
4	North	380	>350
5	North	370	205
6	South	365	305
7	South		275
8	South	>350	270
9	South		280
10	South		305

Every Sight Distance east of 9 is longer than 400'

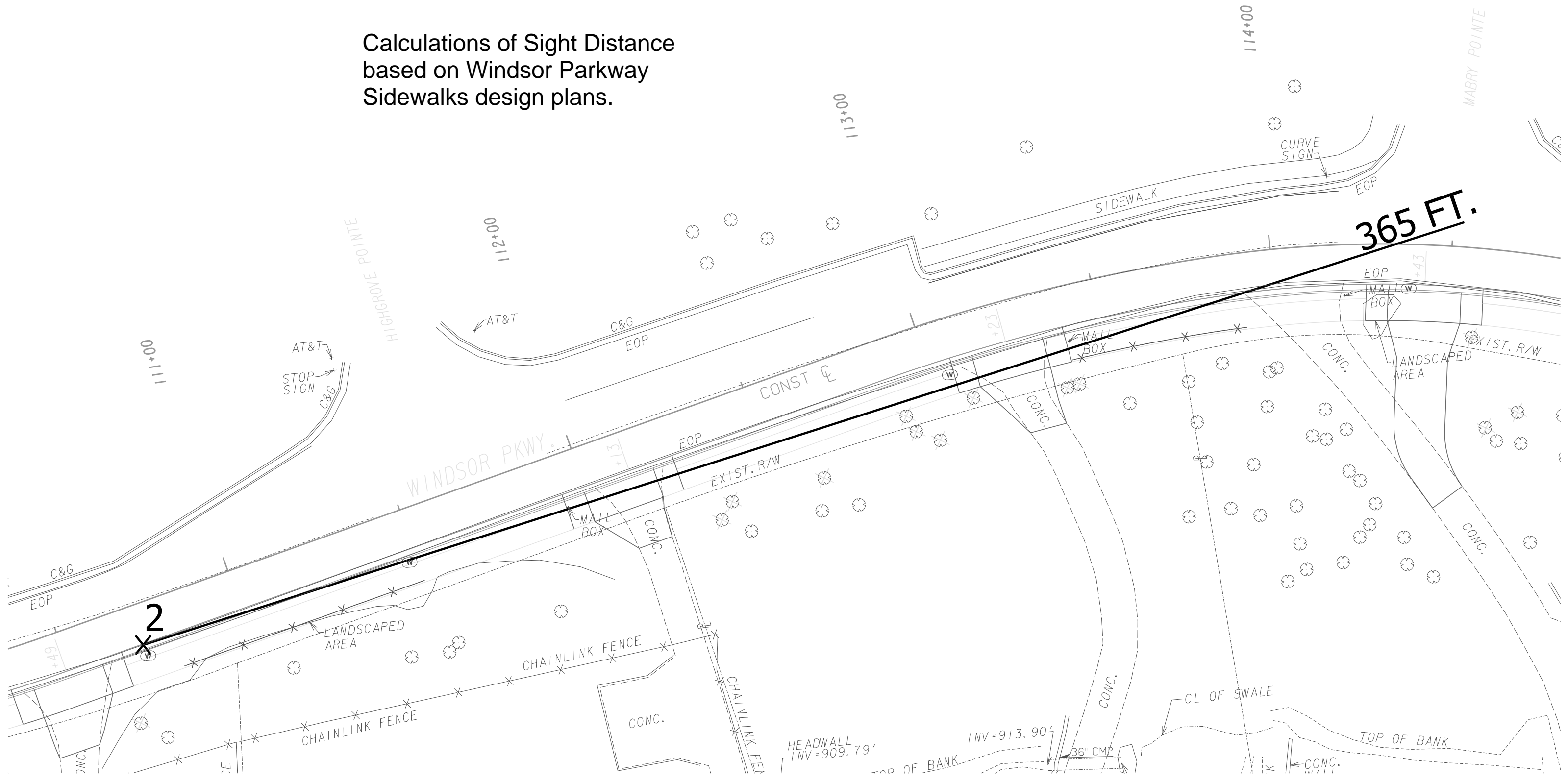
Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.



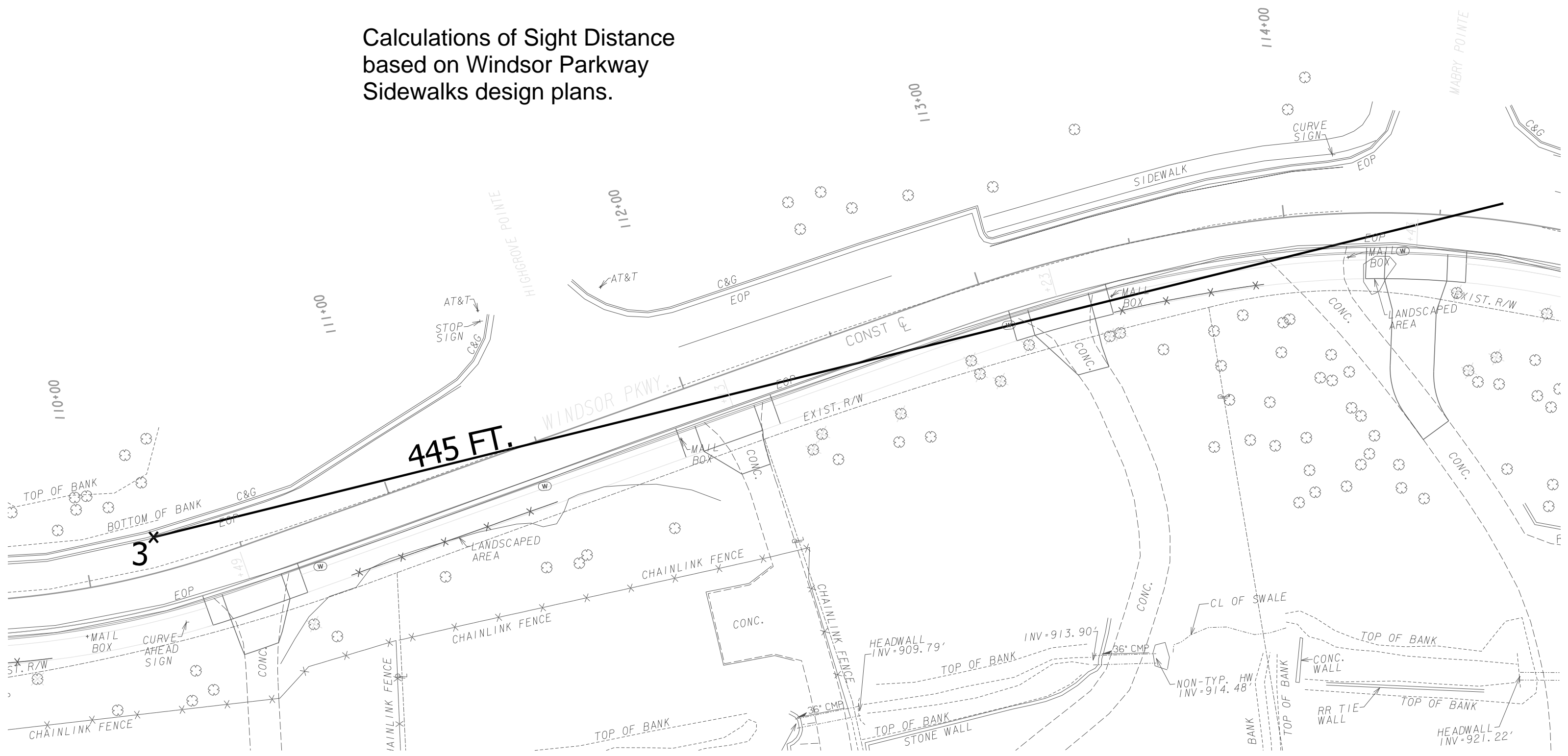
Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.



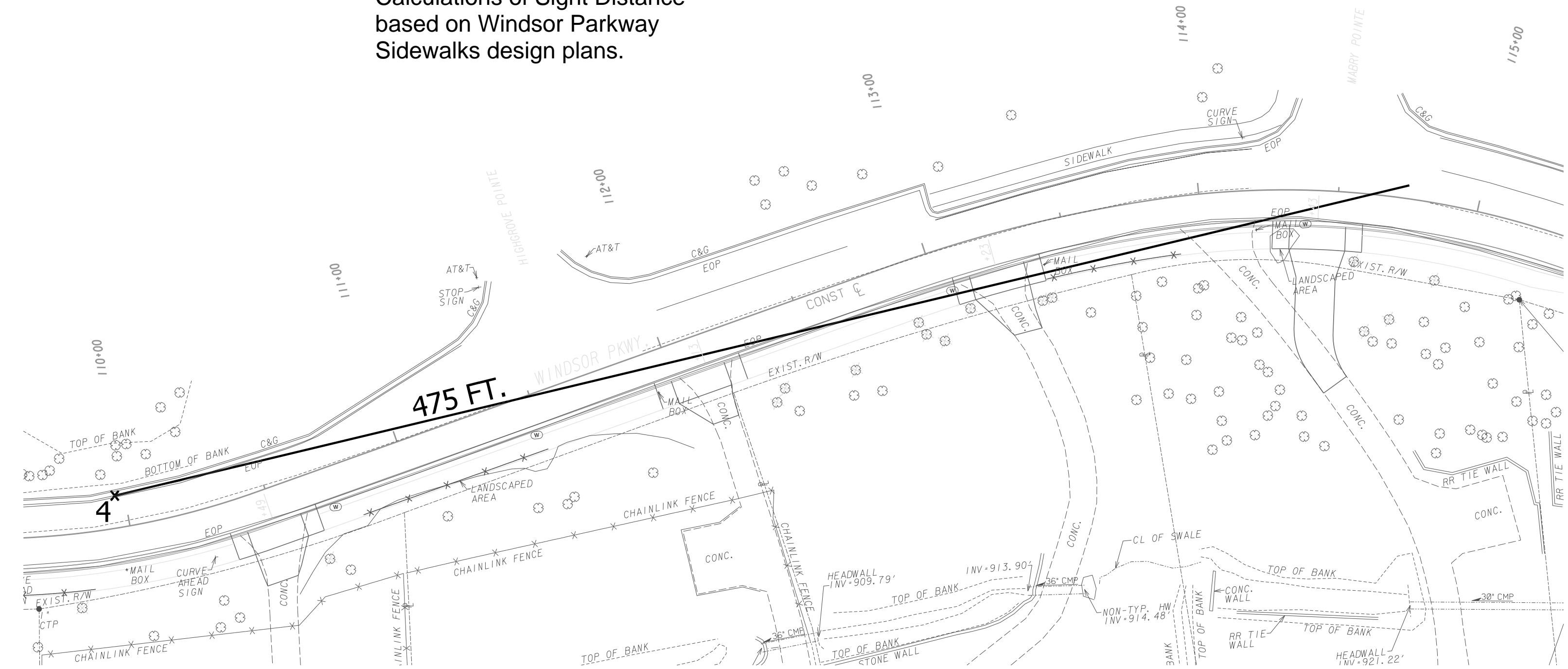
Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.



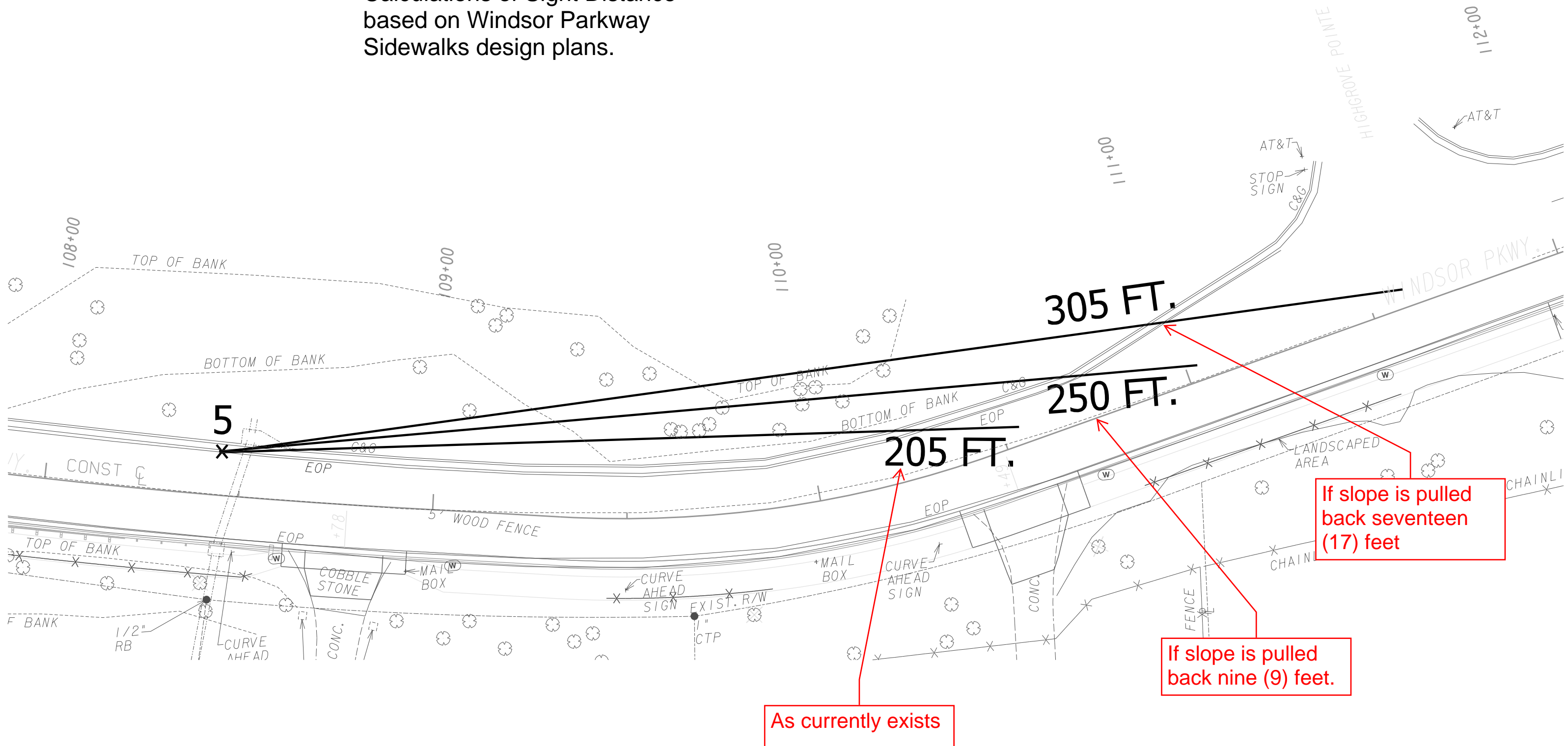
Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.



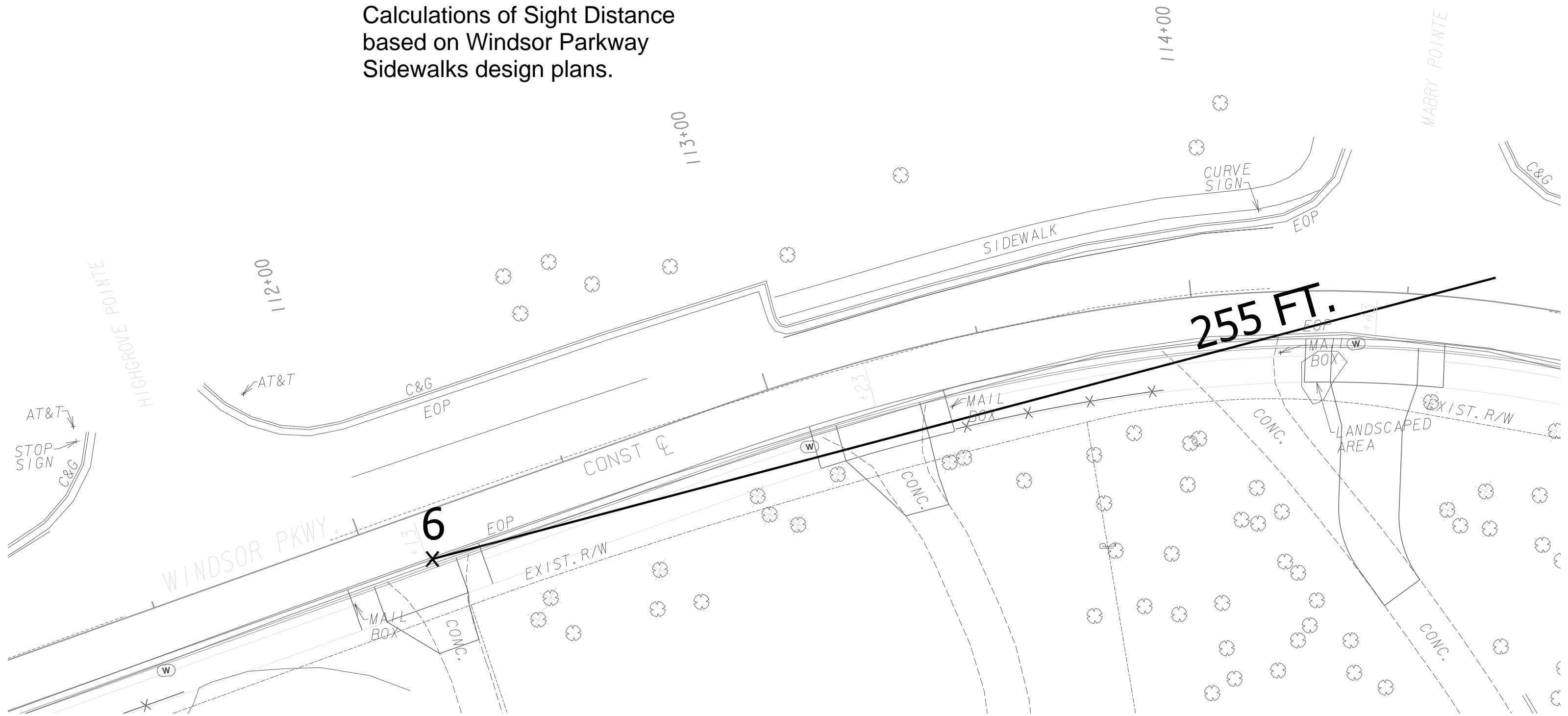
Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.



Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.

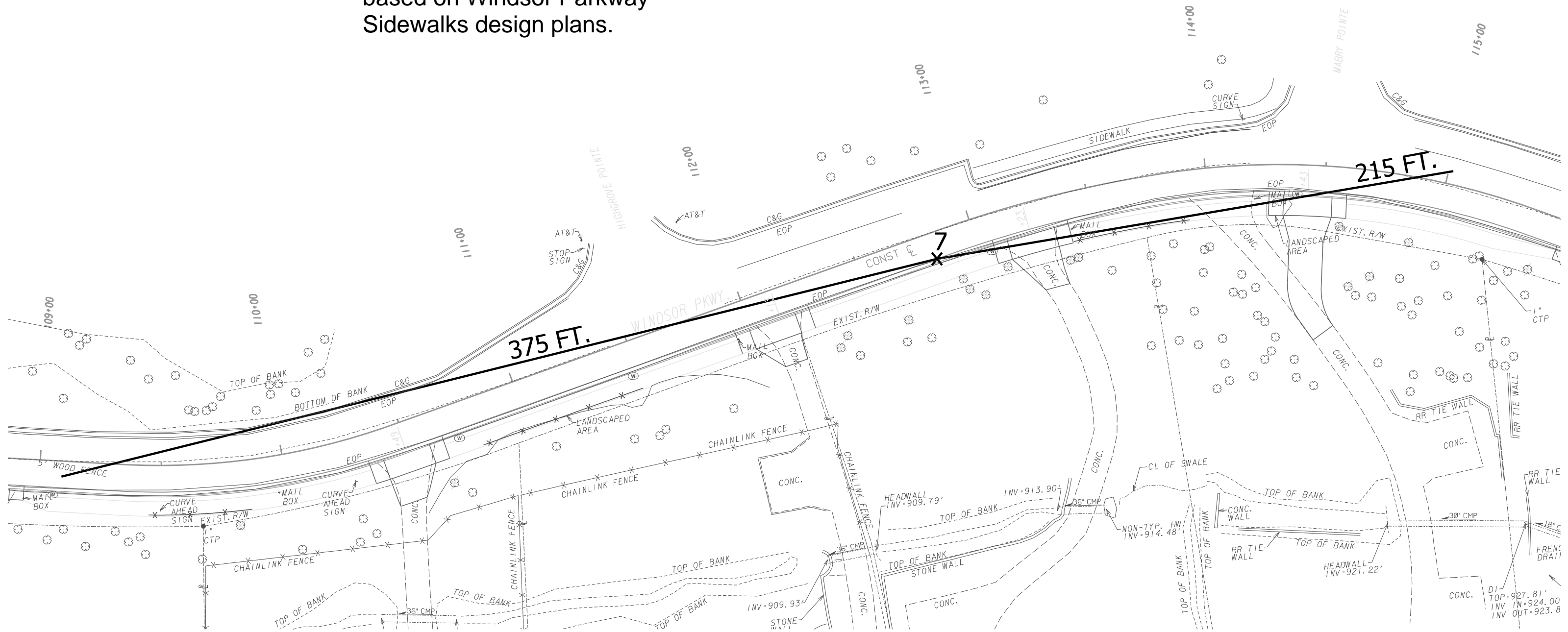


Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.

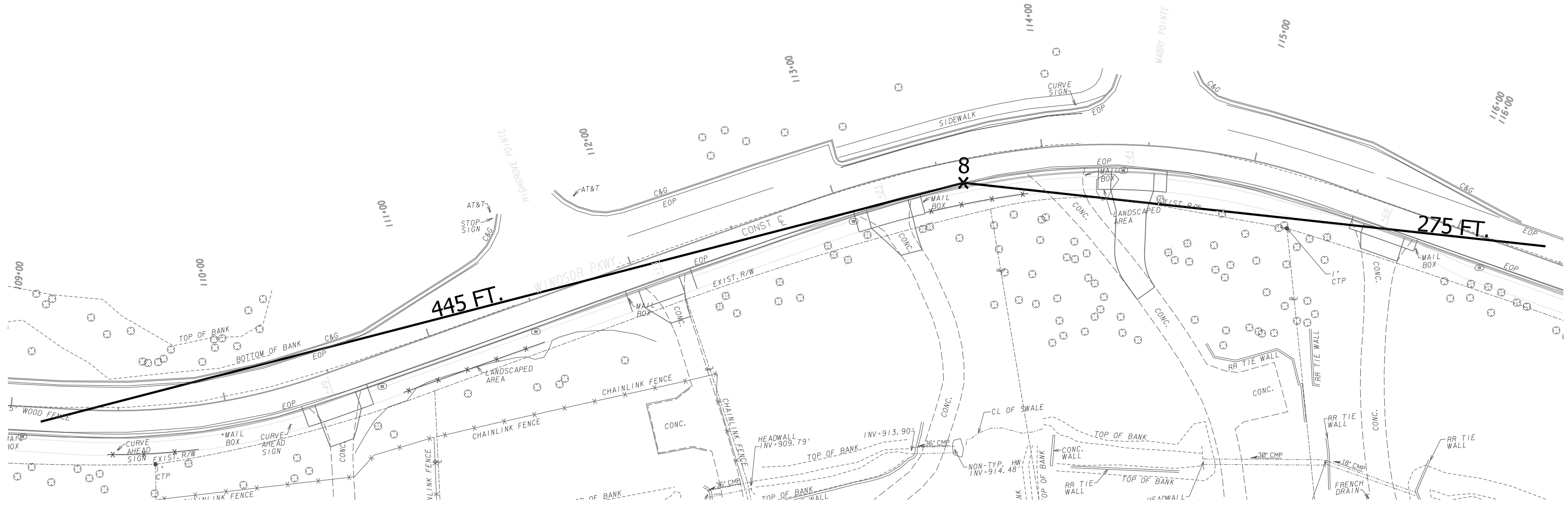




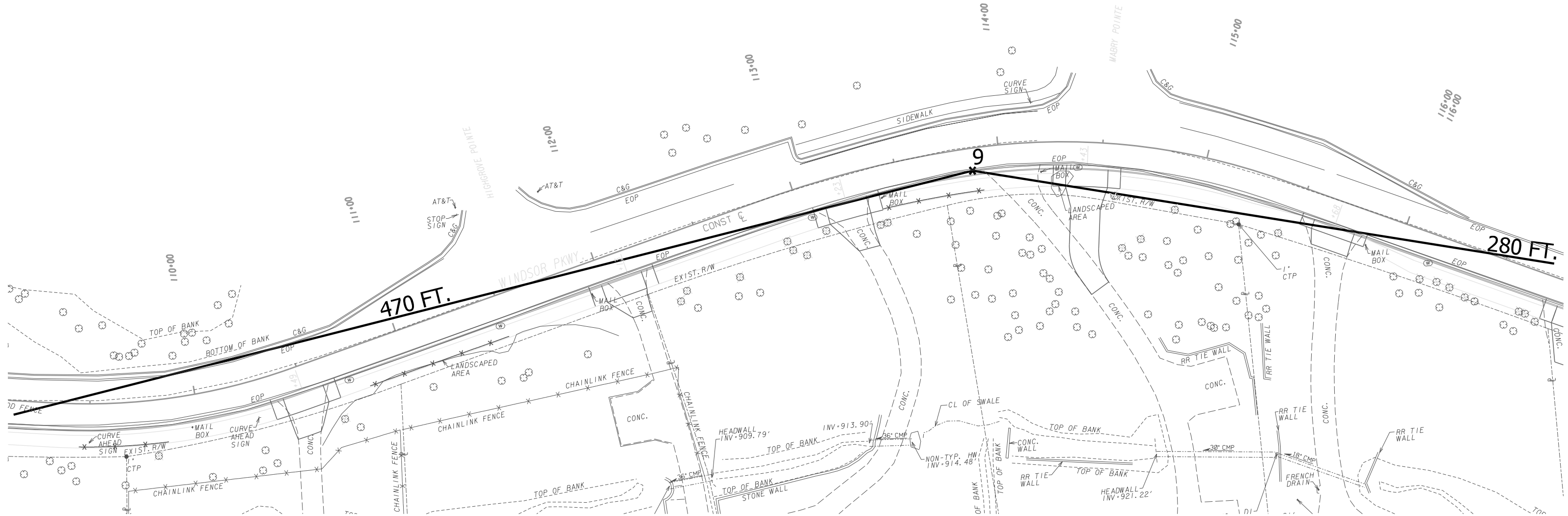
Calculations of Sight Distance based on Windsor Parkway Sidewalks design plans.



Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.



Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.



Calculations of Sight Distance  
based on Windsor Parkway  
Sidewalks design plans.

