EXHIBIT F

Site Distance Memo, Gibson Traffic Consultants, Inc

(March 2020)

P.O. Box 720● 10045 Old Frontier Road NW
Silverdale, Washington 98383
(360) 692-5525● Seattle (206) 682-5574
www.map-limited.com

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POULSBO PLACE 2 DIVISION 8

SIGHT DISTANCE ANALYSES

Prepared for: The Phase II, LLC
c/o David Smith & Mike Brown
3256 Weed Lane
Poulsbo, WA 98370
(360) 779-4614

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SIGHT DISTANCE ANALYSES

Introduction

The Sight Distance Analyses for the proposed project looks at both points of access, one at Jensen Way NE and the other at Iverson Road NE that is planned to be a Right-in/Right-out controlled access. The designs are based on the posted 25 mph speed limit. According to the AASHTO Policy on Geometric Design manual, the minimum required sight distance for a passenger vehicle is for an object 3.5 feet in height to be seen from the driver's height in the vehicle of 3.5 feet, set back 14 feet from the main road.

Provided with the Sight Distance Analysis are the calculations for the minimum required sight distance, along with the plans with the minimum required sight distance triangles shown, and profiles for the required sight distance.

Jensen Way NE Site Access

The access onto Jensen Way NE is almost mid -way between the two 4-way stop controlled intersections with Iverson Road NE and NE Sunset Street.

Case B1 – Left Hand Turn

In order to execute a left hand turn from the Jensen access on the site, (Case B1) the minimum required sight distance is 276 feet. The available sight distance is through the four way stop at the intersection of Jensen Way NE and NE Sunset Street or approximately 400 feet. (Although there is parallel parking on the street, from the 14 foot setback viewpoint, the driver will be able to see behind the cars up through the intersection.)

Case B2 – Right Hand Turn

In order to execute a right hand turn from the Jensen access on the site, (Case B2) the minimum required sight distance is 239 feet. The available sight distance is to the intersection of Jensen Way NE and Iverson Road NE, street or approximately 325 feet.

Case F – Left Hand Turn from Major Road

In order to execute a left hand turn from the Jensen Way NE into the site (Case F) a minimum required sight distance is 202 feet. The available sight distance is to the intersection of Jensen Way NE and Iverson Road NE, street or approximately 325 feet

Iverson Road NE Site Access

The site access on Iverson is located 111 feet west of the 4-way stop controlled intersection with 3rd Avenue NE. The site access is a Right-In/Right-Out only.

Case B2 – Right Hand Turn

In order to execute a right hand turn from the Iverson access on the site, (Case B2) the minimum required sight distance is 239 feet. The available sight distance is up to the crest of the hill, past the 4-way stop controlled intersection with 3rd Avenue NE up to Martha & Mary, and is approximately 300 feet.

Pedestrian Sight Visibility

According to the AASHTO Policy on Geometric Design of Highways and Streets, the average speed of a pedestrian is 4 feet per second. This is equal to 2.7 mph. The walking speed was used in the spreadsheet for the distance required for the pedestrian to be observed by the vehicles leaving the driveway access, and for vehicles making a left hand turn into the site.

Case B1 – Left Hand Turn

In order to execute a left hand turn from the Jensen access on site, (Case B1) the minimum required sight distance to observe a pedestrian is 30 feet. The available sight distance is through the four way stop at the intersection of Jensen Way NE and NE Sunset street or approximately 400 feet. (Although there is parallel parking on the street, from the 14 foot setback viewpoint, the driver will be able to see behind the cars up through the intersection along the sidewalk.)

Case B2 – Right Hand Turn

In order to execute a right hand turn from either the Jensen or Iverson accesses on site, (Case B2) the minimum required sight distance for a pedestrian is 26 feet. This sight distance is available from both site accesses.

Case F – Left Hand Turn from Major Road

In order to execute a left hand turn from the Jensen Way NE access into the site, (Case F) the minimum required sight distance for pedestrians is 22 feet. The available sight distance is to the intersection of Jensen Way NE and Iverson Road NE, street or approximately 325 feet

Summary

Based on the analyses for both access points into the site, the minimum sight distances are available at both the Jensen Way NE and the Right-In/Right-Out at Iverson Road NE for both vehicle and pedestrian situations.

SIGHT VISIBILITY ANALYSIS
Poulsbo Place 2 Division 8

1. REFERENCES

A Policy On Geometric Design of Highways and Streets . American Association of State Highway and Transportation Officials, 2001, Pgs. 660-679

2. CONDITIONS OF PROPOSED INTERSECTION

Project Entrance and Jensen Way NE

POSTED SPEED LIMIT =	25	mph
DESIGN SPEED =	25	mph
NUMBER OF LANES	2	

3. SUMMARY OF REQUIRED SIGHT DISTANCES

			AVAILABLE SIGHT DISTANCE
CASE B1 - LEFT TURNS FROM MINOR ROAD			Site Access
Required Sight Distance =	276	feet	
Available Sight Distance =			400 Feet
CASE B2 - RIGHT TURNS FROM MINOR ROAD			
Required Sight Distance =	239	feet	325 feet
Available Sight Distance =			
CASE F - LEFT TURNS FROM THE MAJOR ROAD			
Required Sight Distance =	202	feet	325 feet
Available Sight Distance =			

SIGHT VISIBILITY ANALYSIS
Poulsbo Place 2 Division 8

CASE B1 - LEFT TURNS FROM MINOR ROAD

REQUIRED SIGHT DISTANCE

$$\mathbf{ISD = 1.47V_{major}\, t_g}$$ (Eq. for calculating minimum required sight distance)

ISD = Intersection sight distance
V_{major} = Design speed of major road, mph
t_g =Time gap for minor road vehicle to enter the major road

t_g=	7.5	seconds (Ex. 9-54, pg. 664)
ISD =	275.6	feet
Minimum Sight Distance =	**276**	**feet**

CASE B2 - RIGHT TURNS FROM MINOR ROAD

REQUIRED SIGHT DISTANCE

$$\mathbf{ISD = 1.47V_{major}\, t_g}$$ (Eq. for calculating minimum required sight distance)

ISD = Intersection sight distance
V_{major} = Design speed of major road, mph
t_g =Time gap for minor road vehicle to enter the major road

t_g=	6.5	seconds (Ex. 9-57, pg. 668)
ISD =	238.9	feet
Minimum Sight Distance =	**239**	**feet**

SIGHT VISIBILITY ANALYSIS
Poulsbo Place 2 Division 8

CASE F - LEFT TURNS FROM THE MAJOR ROAD

REQUIRED SIGHT DISTANCE

$$\mathbf{ISD = 1.47V_{major}\, t_g}$$ (Eq. for calculating minimum required sight distance)

ISD = Intersection sight distance
V_{major} = Design speed of major road, mph
t_g =Time gap for major road vehicle to enter the minor road

t_g =	5.5	seconds	(Ex. 9-66, pg. 678)
ISD =	202.1	feet	
Minimum Sight Distance =	**202**	**feet**	

SIGHT VISIBILITY ANALYSIS
Poulsbo Place 2 Division 8

1. REFERENCES

A Policy On Geometric Design of Highways and Streets . American Association of State Highway and Transportation Officials, 2001, Pgs. 660-679

2. CONDITIONS OF PROPOSED INTERSECTION

Project Entrance and Iverson Road

POSTED SPEED LIMIT =	25	mph
DESIGN SPEED =	25	mph
NUMBER OF LANES	2	

3. SUMMARY OF REQUIRED SIGHT DISTANCES

AVAILABLE SIGHT DISTANCE

Site Access

CASE B2 - RIGHT TURNS FROM MINOR ROAD

Required Sight Distance = 239 feet

Available Sight Distance = 300 Feet

V_{major} = Design speed of major road, mph

t_g =Time gap for minor road vehicle to enter the major road

t_g=	6.5	seconds (Ex. 9-57, pg. 668)
ISD =	238.9	feet
Minimum Sight Distance =	**239**	**feet**

1. REFERENCES

A Policy On Geometric Design of Highways and Streets . American Association of State Highway and Transportation Officials, 2001, Pgs. 660-679

2. CONDITIONS OF PROPOSED INTERSECTION

Pedestrian Sight Distance

PEDESTRIAN WALKING =	2.7	mph
PEDESTRIAN WALKING	2.7	mph
NUMBER OF LANES	2	

3. SUMMARY OF REQUIRED SIGHT DISTANCES

CASE B1 - LEFT TURNS FROM MINOR ROAD
Required Sight Distance = 30 feet
Available Sight Distance =

CASE B2 - RIGHT TURNS FROM MINOR ROAD
Required Sight Distance = 26 feet
Available Sight Distance =

CASE F - LEFT TURNS FROM THE MAJOR ROAD
Required Sight Distance = 22 feet
Available Sight Distance =

CASE B1 - LEFT TURNS FROM MINOR ROAD

REQUIRED SIGHT DISTANCE

$$\mathbf{ISD = 1.47 V_{major}\, t_g}$$ (Eq. for calculating minimum required sight distance)

ISD = Intersection sight distance
V_{major} = Design speed of major road, mph
t_g =Time gap for minor road vehicle to enter the major road

t_g=	7.5	seconds (Ex. 9-54, pg. 664)
ISD =	29.8	feet
Minimum Sight Distance =	**30**	**feet**

CASE B2 - RIGHT TURNS FROM MINOR ROAD

REQUIRED SIGHT DISTANCE

$\mathbf{ISD = 1.47V_{major}\, t_g}$ (Eq. for calculating minimum required sight distance)

ISD = Intersection sight distance

V_{major} = Design speed of major road, mph

t_g =Time gap for minor road vehicle to enter the major road

t_g=	6.5	seconds	(Ex. 9-57, pg. 668)
ISD =	25.8	feet	
Minimum Sight Distance =	**26**	**feet**	

CASE F - LEFT TURNS FROM THE MAJOR ROAD

REQUIRED SIGHT DISTANCE

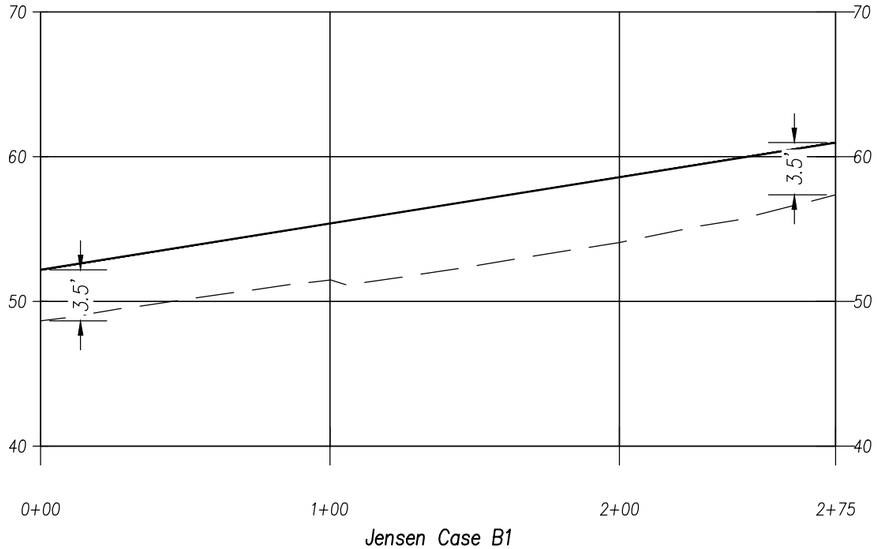
$\mathbf{ISD = 1.47V_{major}\, t_g}$ (Eq. for calculating minimum required sight distance)

ISD = Intersection sight distance

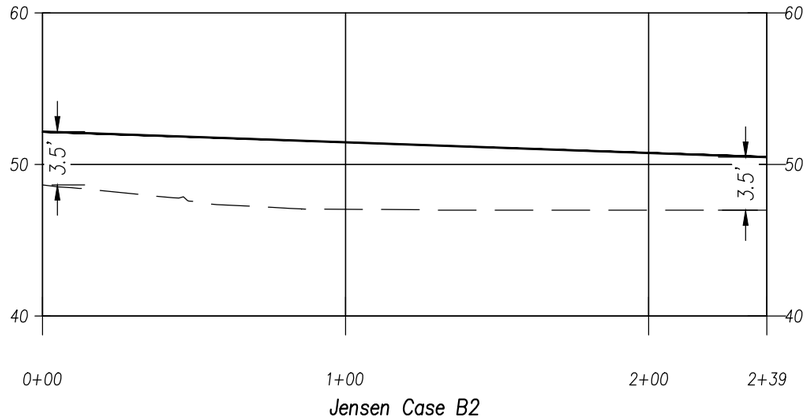
V_{major} = Design speed of major road, mph

t_g =Time gap for major road vehicle to enter the minor road

t_g =	5.5	seconds	(Ex. 9-66, pg. 678)
ISD =	21.8	feet	
Minimum Sight Distance =	**22**	**feet**	



Jensen Case B1
1" = 50' Horiz
1" = 10' Vert



Jensen Case B2
1" = 50' Horiz
1" = 10' Vert

POULSBO PLACE 2 DIVISION 8
SIGHT DISTANCE ANALYSIS
JENSEN WAY NE

Design vehicle	Time gap (s) at design speed of major road (t_g)
Passenger car	7.5
Single-unit truck	9.5
Combination truck	11.5

Note: Time gaps are for a stopped vehicle to turn right or left onto a two-lane highway with no median and grades 3 percent or less. The table values require adjustment as follows:

For multilane highways:

For left turns onto two-way highways with more than two lanes, add 0.5 seconds for passenger cars or 0.7 seconds for trucks for each additional lane, from the left, in excess of one, to be crossed by the turning vehicle.

For minor road approach grades:

If the approach grade is an upgrade that exceeds 3 percent; add 0.2 seconds for each percent grade for left turns

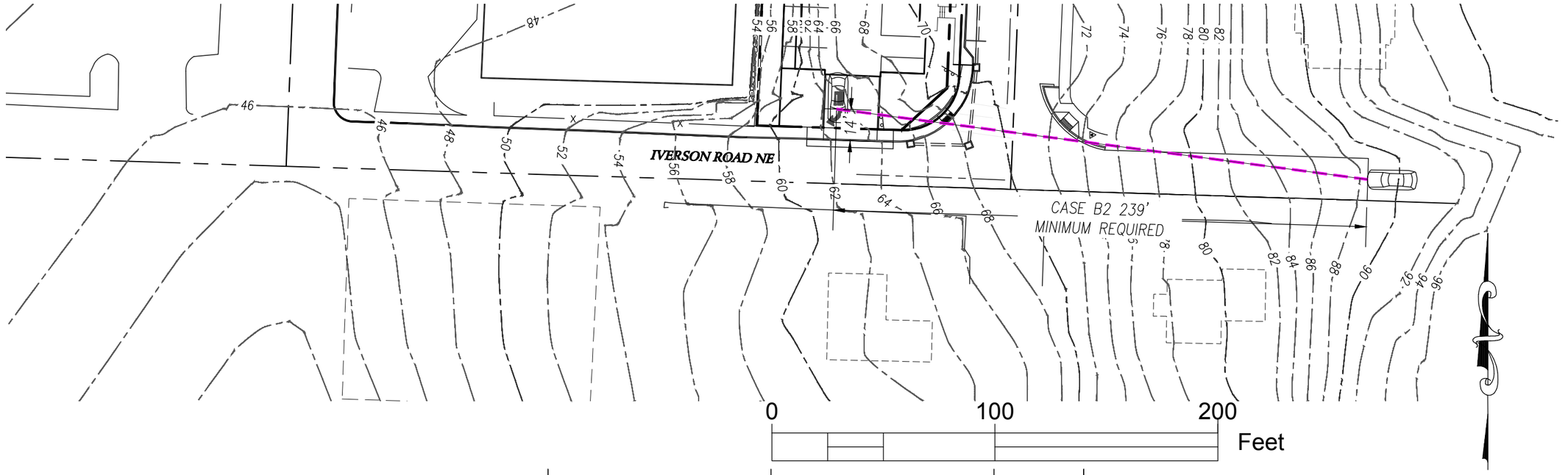
Exhibit 9-54. Time Gap for Case B1—Left Turn from Stop

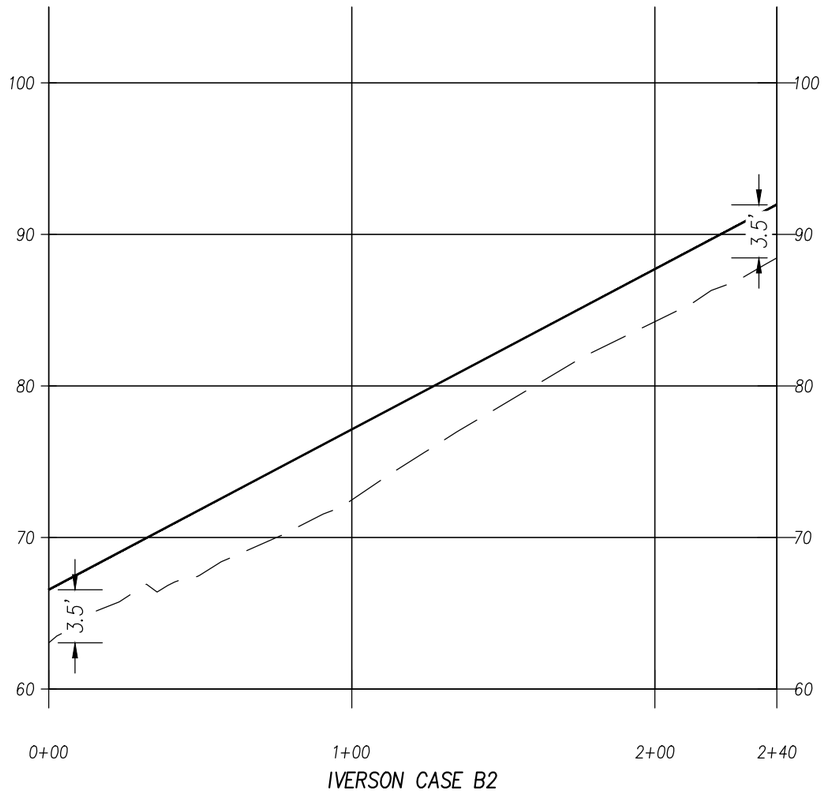
For example, a passenger car turning left onto a two-lane major road should be provided sight distance equivalent to a time gap of 7.5 s in major-road traffic. If the design speed of the major road is 90 km/h [60 mph], this corresponds to a sight distance of 0.278(90)(7.5) = 187.7 or 190 m [1.47(60)(7.5) = 661.5 or 665 ft], rounded for design.

A passenger car turning left onto a four-lane undivided roadway will need to cross two near lanes, rather than one. This increases the recommended gap in major-road traffic from 7.5 to 8.0 s. The corresponding value of sight distance for this example would be 200 m [704 ft]. If the minor-road approach to such an intersection is located on a 4 percent upgrade, then the time gap selected for intersection sight distance design for left turns should be increased from 8.0 to 8.8 s, equivalent to an increase of 0.2 s for each percent grade.

The design values for intersection sight distance for passenger cars are shown in Exhibit 9-55. Exhibit 9-56 includes design values, based on the time gaps for the design vehicles included in Exhibit 9-54.

No adjustment of the recommended sight distance values for the major-road grade is generally needed because both the major- and minor-road vehicle will be on the same grade when departing from the intersection. However, if the minor-road design vehicle is a heavy truck and the intersection is located near a sag vertical curve with grades over 3 percent, then an adjustment to extend the recommended sight distance based on the major-road grade should be considered.





IVERSON CASE B2
1" = 50' Horiz
1" = 10' Vert

POULSBO PLACE 2 DIVISION 8
SIGHT DISTANCE ANALYSIS
IVERSON ROAD NE
RIGHT-IN/RIGHT-OUT ONLY

Design vehicle	Time gap (s) at design speed of major road (t_g)
Passenger car	6.5
Single-unit truck	8.5
Combination truck	10.5

Note: Time gaps are for a stopped vehicle to turn right onto or cross a two-lane highway with no median and grades 3 percent or less. The table values require adjustment as follows:

For multilane highways:
For crossing a major road with more than two lanes, add 0.5 seconds for passenger cars and 0.7 seconds for trucks for each additional lane to be crossed and for narrow medians that cannot store the design vehicle.

For minor road approach grades:
If the approach grade is an upgrade that exceeds 3 percent, add 0.1 seconds for each percent grade.

Exhibit 9-57. Time Gap for Case B2—Right Turn from Stop and Case B3—Crossing Maneuver

Metric				US Customary			
		Intersection sight distance for passenger cars				Intersection sight distance for passenger cars	
Design speed (km/h)	Stopping sight distance (m)	Calculated (m)	Design (m)	Design speed (mph)	Stopping sight distance (ft)	Calculated (ft)	Design (ft)
20	20	36.1	40	15	80	143.3	145
30	35	54.2	55	20	115	191.1	195
40	50	72.3	75	25	155	238.9	240
50	65	90.4	95	30	200	286.7	290
60	85	108.4	110	35	250	334.4	335
70	105	126.5	130	40	305	382.2	385
80	130	144.6	145	45	360	430.0	430
90	160	162.6	165	50	425	477.8	480
100	185	180.7	185	55	495	525.5	530
110	220	198.8	200	60	570	573.3	575
120	250	216.8	220	65	645	621.1	625
130	285	234.9	235	70	730	668.9	670
				75	820	716.6	720
				80	910	764.4	765

Note: Intersection sight distance shown is for a stopped passenger car to turn right onto or cross a two-lane highway with no median and grades 3 percent or less. For other conditions, the time gap must be adjusted and required sight distance recalculated.

Exhibit 9-58. Design Intersection Sight Distance—Case B2—Right Turn from Stop and Case B3—Crossing Maneuver

However, if the traffic signal is to be placed on two-way flashing operation (i.e., flashing yellow on the major-road approaches and flashing red on the minor-road approaches) under off-peak or nighttime conditions, then the appropriate departure sight triangles for Case B, both to the left and to the right, should be provided for the minor-road approaches. In addition, if right turns on a red signal are to be permitted from any approach, then the appropriate departure sight triangle to the left for Case B2 should be provided to accommodate right turns from that approach.

Case E—Intersections With All-Way Stop Control

At intersections with all-way stop control, the first stopped vehicle on one approach should be visible to the drivers of the first stopped vehicles on each of the other approaches. There are no other sight distance criteria applicable to intersections with all-way stop control and, indeed, all-way stop control may be the best option at a limited number of intersections where sight distance for other control types cannot be attained.

Case F—Left Turns From the Major Road

All locations along a major highway from which vehicles are permitted to turn left across opposing traffic, including intersections and driveways, should have sufficient sight distance to accommodate the left-turn maneuver. Left-turning drivers need sufficient sight distance to decide when it is safe to turn left across the lane(s) used by opposing traffic. Sight distance design should be based on a left turn by a stopped vehicle, since a vehicle that turns left without stopping would need less sight distance. The sight distance along the major road to accommodate left turns is the distance traversed at the design speed of the major-road in the travel time for the design vehicle given in Exhibit 9-66.

Design vehicle	Time gap (s) at design speed of major road (t_g)
Passenger car	5.5
Single-unit truck	6.5
Combination truck	7.5

Adjustment for multilane highways:
For left-turning vehicles that cross more than one opposing lane, add 0.5 seconds for passenger cars and 0.7 seconds for trucks for each additional lane to be crossed.

Exhibit 9-66. Time Gap for Case F—Left Turns From the Major Road

The table also contains appropriate adjustment factors for the number of major-road lanes to be crossed by the turning vehicle. The unadjusted time gap in Exhibit 9-66 for passenger cars was used to develop the sight distances in Exhibit 9-67 and illustrated in Exhibit 9-68.