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memo

TO: Alex Gross, Boise County Planning and Zoning Administrator
FROM: Caitlin Trimble, Transportation Planner, T-O Engineers
 Alexander Jondal, P.E., Transportation Engineer, T-O Engineers
DATE: December 5, 2022
JOB NO.: 210530
RE: Trail Creek Ranch, Traffic Impact Study
CC: Derek Cooper, RRC Contractors

Digitally signed by
 Alexander Jondal
 Date: 2022.12.05
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EXECUTIVE SUMMARY

This memorandum summarizes the traffic impact study (TIS) performed for the Trail Creek Ranch development proposed within Boise County, Idaho. The study was prepared to provide a preliminary assessment of development traffic volume impacts on the county, as a function of the permitting process. Boise County is the review agency for this study.

The Trail Creek Ranch project is proposed on 143-acres situated along Harris Creek Road platting the project into 43 single family detached lots in Boise County, Idaho. The project proposes two approaches off Harris Creek Road.

Trail Creek Ranch is forecast to generate 464 total weekday trips with 35 trips generated during the AM peak hour and 45 trips generated during the PM peak hour. Despite these being seasonal homes, ITE land use code 210 for single family homes was utilized to provide a conservative trip generation for the site evaluation. Distributions were determined through readily available ADT and trips were distributed through six intersections. Level of Service operations were not analyzed as the performances of intersection will not severely worsen from the development of the project.

Several assessments and evaluations were conducted to ensure that the proposed project will not interfere with existing traffic conditions. Intersection design sight distance meets within Green Book recommendations for the proposed access points, assuming trees do not cause visibility issues. Crash history of the associated roadways results in a high number of corridor crashes along Harris Creek Road, due to overturning and / or negotiating curves. It is assumed these issues are caused by speeding along the roadway.

Based on existing conditions, the County should consider safety measures such as warning signage, barriers, and speed reduction controls for the switchbacks along Harris Creek Road and Centerville Road.

The development should ensure that trees do not cause sight distance issues from the respective site approaches to provide adequate intersection design decision distances.

1. PROJECT DESCRIPTION

The Trail Creek Ranch subdivision is proposed on 143-acres situated along Harris Creek Road using a portion of four county parcels (RP07N04E289050, RP07N04E276050, RP07N04E343050, and RP07N04E330050) to divide the subdivision into 43 single-family residential lots in Boise County, Idaho. Two project approaches are proposed off Harris Creek Road that form a loop creating an internal neighborhood network.

The property is within a Natural Resources and Conservation land use zone of the County. The project is rezoning the subdivision parcels to Residential, a land use designation that supports the project proposal. Project site work is scheduled to be completed immediately following Boise County approval. Attached **Figure 1** shows the location of the site and **Figure 2** provides the preliminary site plan. Note, the site plan may evolve over time, but conclusions should remain consistent so long as the proposed number of lots and access locations do not vary substantially from what is shown. The following roadways were requested by the County to undergo evaluation for the purpose of this TIS in order to service the proposed development.

- Harris Creek Road & SH 55
- Harris Creek Road & Centerville Road
- Centerville Road & Montgomery Street
- Centerville Rd & Main Street (in Idaho City)
- Montgomery Street & SH 21
- Main Street & SH 21

2. EXISTING CONDITIONS

Descriptions of the roadway network are provided below, with information taken from Idaho Transportation Department (ITD)'s Functional Classification Map. Due to the area being rural in nature, pedestrian and bicycle facilities are not provided.

- **Harris Creek Road** is a two-lane collector that connects Horseshoe Bend to Placerville. The roadway is not paved between the addresses of *300 Harris Creek Rd, Horseshoe Bend, ID 83629* and *1619 Harris Creek Rd, Idaho City, ID 83631*. Harris Creek Road has a posted speed limit of 25 miles per hour (mph) to the east of its intersection with State Highway (SH) 55.
- **State Highway 55** is a four-lane principal arterial that serves as a north / south corridor for Boise County that connects the outer limits of the Boise metro area to Horseshoe Bend, Gardena, and recreational areas within Boise County. The posted speed limit is 35 mph within the limits of Horseshoe Bend and 60 mph otherwise.
- **Centerville Road** is a two-lane collector that connects Idaho City to Placerville. There is no posted speed limit, but paved sections are assumed to be 35 mph and unpaved sections to be 25 mph.
- **Montgomery Street** is a local road that connects Centerville Road with SH 21 through the developed boundaries of Idaho City. The road is not striped. There is no posted speed limit, but is assumed to be 25 mph.
- **Main Street** is a two-lane collector that connects Centerville Road with SH 21 through the developed boundaries of Idaho City. The road is not striped. There is no posted speed limit but is assumed to be 25 mph with no major grade slope within the vicinity of the intersection.
- **State Highway 21** is a two-lane minor arterial that serves as an east / west corridor between I-84 in Boise and SH 75 in Stanley. Between Montgomery Street and Main Street in Idaho City, SH 21 widens to three lanes. The posted speed limit within the area of Idaho City ranges from 35 to 45 mph.

The grade for each roadway was measured from Google Earth Imagery and roughly stayed within a range of 2 to 4%, with a maximum grade on Centerville Road of 17.9% between Bear Run and the intersection of Main Street. The portion of Harris Creek Road that is not paved has an elevation gain of approximately 2329 feet across 12.6 miles, with a maximum grade of approximately 13%.

Recent average daily traffic volumes help predict the pattern of traffic movements that are taken through the roadway network as there is little surrounding development. **Table 1** below provides the ADT found for the roadway network and the source used.

Location	ADT	Source	Year
Harris Creek Road, east of Highway 55	301	Boise County	2022
Centerville Road, east of Harris Creek Road	305	Boise County	2022
Montgomery Street	640	ITD	2021
Main Street	860	ITD	2021
SH 21, vicinity of Idaho City	2,000	ITD	2021
SH 55, vicinity of Horseshoe Bend	7,200	ITD	2021

Source: ITD AADT GIS Map and Boise County

3. CRASH HISTORY

Per County code, a crash history analysis of the most recent available three-year data is required through this TIS. The Local Highway Technical Assistance Council (LHTAC) maintains a GIS platform that provides visual and downloadable collision data for roads in Idaho. LHTAC maintains data for the previous five years (2017-2021), with intersection and corridor segment crashes identified. **Table 3** summarizes this crash data for the past five years, classified by the crash severity and crash type, and calculates the Intersection Crash Rate (ICR) in terms of the number of crashes per million entering vehicles and the Corridor Crash Rate (CCR) in terms of the number of crashes per million vehicle miles traveled.

Table 2. Summary Intersection Collision

Intersection	Traffic Control				Severity		
	5 Year Totals	Average Annual	ADT ¹	ICR ²	PDO ⁴	Inj. ⁵	Fat. ⁶
Harris Creek Road at SH 55	1	0.2	7501	0.07	100%	0%	0%
Montgomery Street at SH 21	1	0.2	2640	0.21	100%	0%	0%
Total Intersection Collisions	2	0.4	10141	0.11	100%	0%	0%

Corridor	Traffic Control				Severity		
	5 Year Totals	Average Annual	ADT ¹	CCR ³	PDO ⁴	Inj. ⁵	Fat. ⁶
Harris Creek Road, SH 55 to Centerville Road (17.8 miles)	25	5	301	2.56	60%	36%	4%
Centerville Road, Harris Creek Road to Main Street (11.7 miles)	19	3.8	305	2.92	74%	26%	0%
Montgomery Street (0.4 miles)	1	0.2	640	2.14	100%	0%	0%
Main Street (0.4 miles)	1	0.2	860	1.59	100%	0%	0%
SH 21, vicinity of Idaho City (1 mile)	3	0.6	2,000	0.82	100%	0%	0%
SH 55, vicinity of Horseshoe Bend (1 mile)	3	0.6	7,200	0.23	33%	67%	0%
Total Corridor Collisions	52	10.4	11,306	2.52	67%	31%	2%

1. ADT = Entering at intersections or as a count average for the corridor.	4. PDO = Property Damage Only
2. ICR = Intersection Collision Rate	5. Inj. = Injury Incident
3. CCR = Collision Corridor Rate	6. Fat. = Fatally

As shown, intersection collisions appear to be of low concern; however, corridor crashes, particularly along Harris Creek Road and Centerville Road, are of greater concern. Harris Creek Road and Centerville Road each experience more than one crash per year on average. Along Harris Creek Road it should be noted that one fatality occurred due to negotiating curves and overturning. This collision was on the paved portion of Harris Creek Road near SH-55, at night during dry conditions. The fatality was a 79-year-old individual.

For corridor crashes, the following crash types were the most frequent:

- **25.9%** Overturn.
- **24.1%** Ditch.
- **14.8%** Sideswipe.
- **11.1%** Head-On
- **11.1%** Other Fixed Object.
- **13%** Other.

A majority of these overturn collisions occurred on Harris Creek Road between SH 55 and the subdivision site, with 6 out of 9 overturn collisions being the result of 'negotiating turn.' Several of these crashes were due to speeding with dry road conditions or failure to maintain lane, where the section of the road was not paved. However, within the vicinity of the site, there are no known collisions along Harris Creek Road. The remaining six overturn crashes occurred on Centerville Road with one case of alcohol impairment and three cases of speeding. Ditch collisions have similar incidents, with speeding and negotiating curves being the most common conditions. Harris Creek Road does contain significant switchbacks and elevation gain with an unpaved section between Horseshoe Bend and the site approaches.

The AASHTO Roadside Design Manual: *Chapter 12 Roadside Safety on Low Volume Roads and Streets* recommends having a clear zone in areas accessible, with signage and roadside barriers being the next step. With the steep grade of sections of the roadway and limited access to right of way, signage for significant curves could help reduce the dangerous roadway conditions for areas with significant curves. With lack of access to updated imagery, accurate assumptions of existing warning feature inventory could not be made at this time. With the potential for adding features to the roadway, the Crash Modification Factor (CMF) Clearinghouse website maintained by the Federal Highway Administration (FHWA) provides information on the benefits of various safety countermeasures. Although rural collectors are not listed as a result, the crash reduction factor (CRF) for the installation of chevron signs at horizontal curves along rural roads results in a 12% reduction for run off road collisions resulting in serious injury. For all types of road collisions, static curve warning signs produce a reduction of up to 30% of serious injury crashes. It is suggested the county further investigate providing additional warning signage along Harris Creek Road and Centerville Road to mitigate crashes associated with roadway curves.

4. SIGHT DISTANCE

Per Boise County code, intersection sight distance was evaluated at the proposed site access points for Trail Creek Ranch. AutoCAD files were utilized for this process.

The AASHTO manual A Policy on Geometric Design of Highways and Streets (commonly referred to as The Green Book) provides standards for site distance evaluation and measurement. Based off of Chapter 9 *Intersections*, **Tables 9-7** and **9-9** provides intersection decision sight distances, which results in minimum sight distance of 280 feet for left turns and 240 feet for right turns from project approaches. Harris Creek Road within the vicinity of the project is a relatively flat grade and a straight segment, providing adequate sight distance at the northern approach and for right turning vehicles at the southern approach. However, for left turning vehicles at the southern approach, site distance appears to be only approximately 290 feet due to visibility being limited from the horizontal curve to the south. It is recommended that trees be trimmed / set back to provide adequate sight distance from the development's approaches. Additional information is provided in **Technical Appendix A**.

5. TRIP GENERATION

Trip generation for the Trail Creek Ranch project was developed using the methods outlined by the Trip Generation Manual (11th Edition, ITE, 2021). Trip Generation is a nationally recognized and locally accepted method for forecasting trip generation for a range of commercial, retail, and residential land uses. The forecasting methods were developed based on the survey of other land use developments located throughout the United States.

Trip generation was determined using ITE Code 210 for single family detached homes. The location of the site is rural in nature and located outside of any local town, however, to keep a conservative analysis, ITE 210 for single family homes was used rather than ITE 260 for recreational homes. Trip generations were calculated based on variables that relate dwelling units to ITE equations. A description of this use/code is as follows:

- **Single Family Detached Housing.** A single-family detached housing site includes any single-family detached home on an individual lot. A typical site surveyed is a suburban subdivision.

Total trip generation and various trip types were forecasted for the typical weekday AM and PM peak hours. A summary of trip forecasts is shown with **Table 3** for the weekday and peak hours.

Development	Size	Weekday	AM Peak Hour			PM Peak Hour		
			Inbound	Out bound	Total	Inbound	Out bound	Total
Single Family Detached Housing	43 Dwelling Units	464	9	26	35	28	17	45

Source: ITE Trip Generation Manual (11th Edition)

As shown, 464 total weekday trips are generated by the project with 35 trips generated for the AM peak hour and 45 trips generated for the PM peak hour. The AM and PM peak hour account for 17% of total weekday trips.

With these homes being seasonal or recreational homes, it is assumed that trips would only occur during peak summer or winter months depending on the type of recreation. That being said, residents more than likely will not be commuting, and trips will mostly consist of resource or shopping trips (such as the grocery store). Due to this being a conservative analysis, it is not expected that trips will interfere with the capacity or mobility of the roadways. Based off of conservative analysis and the site location 12 miles from town centers / intersections in either direction, level of service performances were not required as they will cause minimal disturbance to existing intersections.

6. TRIP DISTRIBUTION & ASSIGNMENT

The distribution and assignment of new project trips were estimated to provide an initial impact assessment to help identify where volume changes are forecast on area streets. To predict these trip distributions, Average Daily Traffic (ADT) count volumes were compared for arterials that provide primary approach and departure routes to/from the development. ADT counts available from Boise County and ITD's Traffic Counts Map were compared to gain a sense of how commuters are approaching, departing, and traveling through the study area (as defined via volume densities). Distributions were proportioned initially to these streets based on the comparison of ADT volumes. Some adjustments (rounding) were applied to better reflect geographical characteristics.

Trip assignments were then developed by multiplying distributions and total trip generation. Trip distributions and the resulting trip assignments are shown in **Table 4** for the weekday and peak hours. With the driving time to and from Boise being an hour or more, it is assumed that if resources are available for the purpose of the trip, then residents will more likely stop in Horseshoe Bend. These assumptions are supported through the raw distribution of the area, when taking into account the convenience of the closest location.

Location	ADT Comparison	Raw Distribution	Adjusted Distribution	New Total Weekday Trips	Weekday AM Peak	Weekday PM Peak
SH 21, east of Main St	630	4%	5%	23	2	2
SH 21, west of Montgomery St	2000	12%	15%	70	5	7
SH 55, north of Harris Creek Rd	7200	42%	40%	186	14	18
SH 55, south of Harris Creek Rd	7200	42%	40%	186	14	18
Totals on ADT	27500	100%	100%	464	35	45

About 80-percent of development trips are assumed to enter the site from SH 55 north or south of Harris Creek Road, with the remaining 20-percent entering and exiting from SH 21 in Idaho City. Raw distribution and adjusted distribution have little change; as the state highways are the only roadways within the network that do not remain internal. This is reflected through **Figure 3**, which summarizes the trip generation and assignment for the site.

7. SUMMARY AND RECOMMENDATIONS

The Trail Creek Ranch project is proposed on 143-acres situated along Harris Creek Road platting the project into 43 single family lots in Boise County, Idaho. These proposed lots are detached single family lots with most being assumed to be utilized as vacation or seasonal homes. Two project approaches are proposed off Harris Creek Road.

The development is forecast to generate 464 total weekday trips with 35 trips generated during the AM peak hour and 45 trips generated during the PM peak hour. Despite these being seasonal homes, ITE land use code 210 for single family homes was utilized to provide a conservative trip generation for the site evaluation. Distributions were determined through readily available ADT. Level of Service operations were not analyzed as the performance of the intersections will not be hindered by the development of the project.

Per County code, several assessments and evaluations were conducted to ensure that the proposed project will not interfere with existing traffic conditions. Intersection design sight distance meets within Green Book recommendations for the proposed access points, presuming trees do not cause visibility issues. Crash history of the associated roadways results in a high number of corridor crashes along Harris Creek Road, due to overturning and / or negotiating curves. It is assumed these issues are caused by speeding along the roadway. One fatality did occur on Harris Creek Road due to the above-stated issues.

Based on existing crash history, the County should consider safety measures such as warning signage, barriers, and speed reduction controls for the switchbacks along Harris Creek Road and Centerville Road. This will remain a problem with / without the project.

The development should ensure that trees do not cause sight distance issues from the respective site approaches to provide adequate intersection design decision distances.

Please contact our office with questions or comments.

Prepared by Caitlin Trimble, T-O Engineers
In Association with Alex Jondal, P.E., T-O Engineers



1 SITE VICINITY
SOURCE: GOOGLE MAPS

TRAIL CREEK SUBDIVISION
TRAFFIC IMPACT STUDY



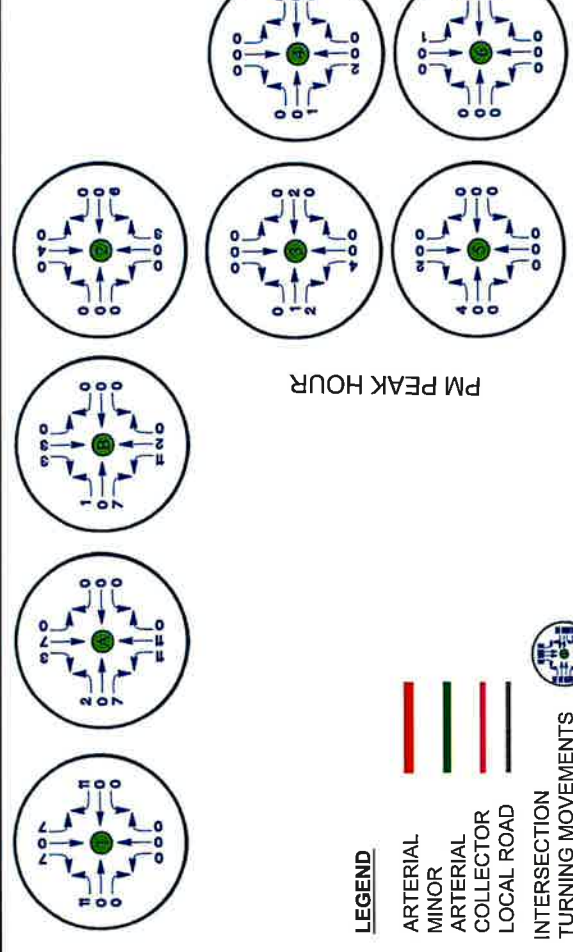
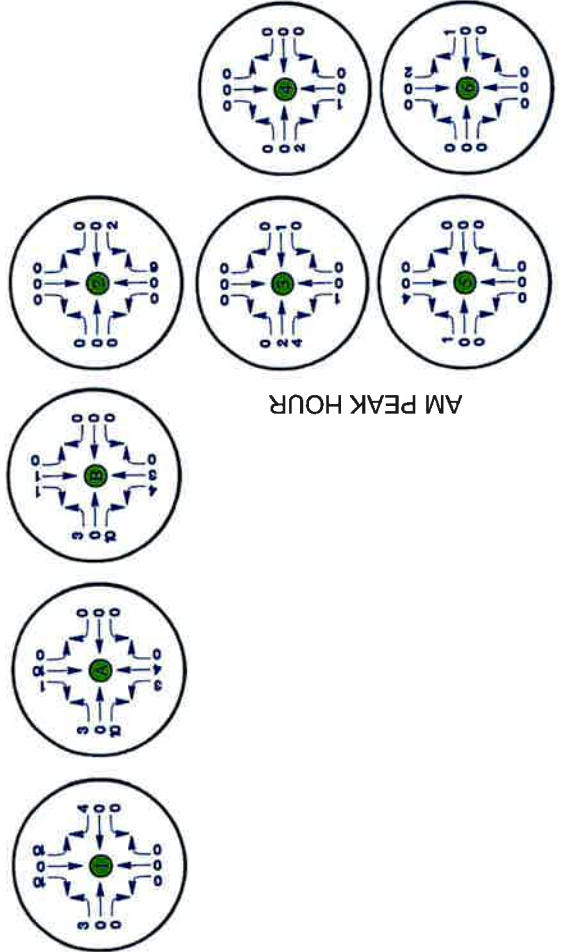
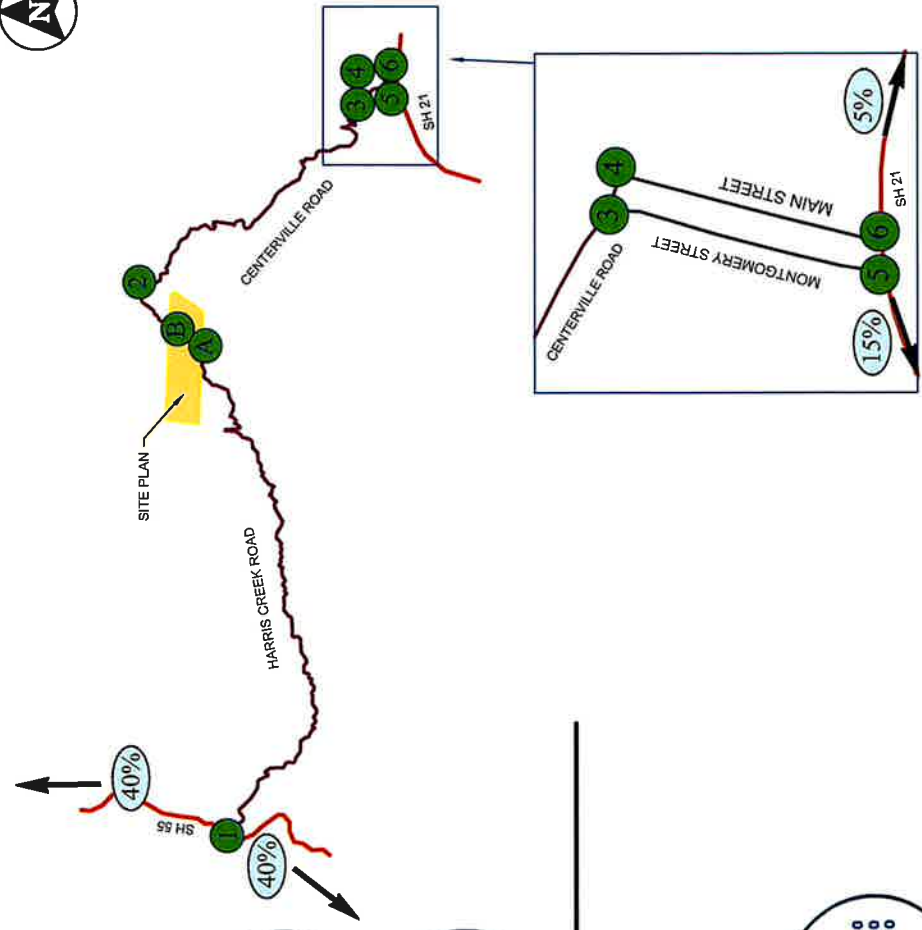
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2 SITE PLAN
NOT TO SCALE
TRAIL CREEK SUBDIVISION
TRAFFIC IMPACT STUDY

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- LEGEND**
- ARTERIAL
 - MINOR ARTERIAL
 - ARTERIAL
 - COLLECTOR
 - LOCAL ROAD
 - INTERSECTION
 - TURNING MOVEMENTS
 - PERCENT DISTRIBUTION

3 TRIP GENERATION & DISTRIBUTION
NOT TO SCALE

TRAIL CREEK SUBDIVISION
 TRAFFIC IMPACT STUDY

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Technical Appendix A: Sight Distance

Table 9-7. Design Intersection Sight Distance—Case B1, Left Turn from Stop

U.S. Customary				Metric			
Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars		Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (ft)	Design (ft)			Calculated (m)	Design (m)
15	80	165.4	170	20	20	41.7	45
20	115	220.5	225	30	35	62.6	65
25	155	275.6	280	40	50	83.4	85
30	200	330.8	335	50	65	104.3	105
35	250	385.9	390	60	85	125.1	130
40	305	441.0	445	70	105	146.0	150
45	360	496.1	500	80	130	166.8	170
50	425	551.3	555	90	160	187.7	190
55	495	606.4	610	100	185	208.5	210
60	570	661.5	665	110	220	229.4	230
65	645	716.6	720	120	250	250.2	255
70	730	771.8	775	130	285	271.1	275
75	820	826.9	830				
80	910	882.0	885				

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

Table 9-9. Design Intersection Sight Distance—Case B2, Right Turn from Stop

U.S. Customary				Metric			
Design Speed (mph)	Stopping Sight Distance (ft)	Intersection Sight Distance for Passenger Cars		Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (ft)	Design (ft)			Calculated (m)	Design (m)
15	80	143.3	145	20	20	36.1	40
20	115	191.1	195	30	35	54.2	55
25	155	238.9	240	40	50	72.3	75
30	200	286.7	290	50	65	90.4	95
35	250	334.4	335	60	85	108.4	110
40	305	382.2	385	70	105	126.5	130
45	360	430.0	430	80	130	144.6	145
50	425	477.8	480	90	160	162.6	165
55	495	525.5	530	100	185	180.7	185
60	570	573.3	575	110	220	198.8	200
65	645	621.1	625	120	250	216.8	220
70	730	668.9	670	130	285	234.9	235
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 to cross a two-lane roadway with no median and with grades of 3 percent or less. For other conditions, the time gap should be adjusted and the sight distance recalculated.

