

MEMORANDUM

DATE: December 2, 2019

TO: Steve Miller, Emerio Design

FROM: Dana Beckwith, PE, PTOE Richard Martin, EIT

SUBJECT: 23000 & 23010 SW Bland Circle Trip Generation and Safety Evaluation

This memorandum summarizes the existing conditions, trip generation, crash and sight distance evaluation for the proposed development located at 23000 and 23010 SW Bland Circle in West Linn, Oregon. The evaluation is done in support of a new 15-lot subdivision.

The trip generation is based on the current Institute of Transportation Engineer's (ITE) *Trip Generation Manual, 10th Edition.* Crash data was obtained from the Oregon Department of Transportation's Online Crash Data Reporting website. The sight distance evaluation is based on the American Association of State Highway and Transportation Official's (AASHTO) Geometric Design of Highway and Streets, 2011.

PROJECT DESCRIPTION

The proposed subdivision at 23000 and 23010 SW Bland Circle is located with an area of West Linn zoned as R-7 single family residential detach and attached housing. Figure 1 shows the proposed site plan for the development. The development is a conforming land use per the City of West Linn Municipal Code Section 12 and consists of 14 new and one existing single-family dwelling units. The new subdivision will have a single access point onto Bland Circle, north of Fircrest Drive until such time further development occurs and a future internal roadway access can be created.

EXISTING CONDITIONS

An inventory of the existing transportation conditions was conducted along Salamo Road and Bland Circle within the project vicinity. All modes of travel including pedestrians, bicycles, transit, and motor vehicles were included. The Salamo Road / Bland Circle intersections is both stop controlled and provides full access onto Bland Circle.

Roadway	Roadway Posted Functional Speed Class ¹ Limit		Sidewalks	Bike Facilities	Road Geometry	On-Street Parking	Transit Route	
Salamo Road	Minor Arterial	35 mph	Both sides	Both sides	One lane in each direction, separated by a 20' wide median. (≈18' travel lane)	No	No	
Bland Circle	Neighborhood Route	25 mph	South side	No	One lane in each direction. (≈32' total cross section)	No	No	

Table 1: Existing Study Area Roadway Conditions

¹ Based on the City of West Linn Transportation System Plan.

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Figure 1: Site Vicinity

Bland Circle is improved where recent development has improved roadways to meet City standards. Approximately 155 feet north of the site access, beyond the site boundaries, Bland Circle is essentially an unimproved one-lane roadway with speeds anticipated to be well below 25 mph.

TRIP GENERATION

Trip rates presented in the Institute of Transportation Engineer's (ITE) *Trip Generation Manual, Tenth Edition*, were utilized to estimate the number of vehicle trips per dwelling unit that are anticipated to be generated by the site. The trip generation is based on the ITE Single-Family Detached Housing land use (ITE Code 210) for weekdays during the peak hour of adjacent street traffic. Table 2 summarizes the estimated trip generation for the site.

Table 2: Trip Generation Summa	ſy
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	Duusliine	Weekday											
Land Use	Dweiling		AN	1 Peak Hoι	ır	PM Peak Hour							
	Units	AUT	Total	Enter	Exit	Total Enter		Exit					
Single-Family Detached Housing (ITE 210)													
Generation Rate Per Dwelling Units ¹	Each	9.44	0.74	25%	75%	0.99	63%	37%					
Existing Site Trips	1	9	1	0	1	1	1	0					
New Site Trips	14	133	10	2	8	14	9	5					
Total Trips	15	142	11	2	9	15	10	5					

¹ Source: *Trip Generation Manual, Tenth Edition,* ITE, 2017, Average Rates.

² Average Daily Trips

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As summarized in Table 2, it is estimated that 133 new daily trips including 10 AM peak hour trips and 14 PM peak hour trips will be added to the local street network due to the proposed development. Based on the current roadway network, traffic patterns and location of commercial, retail and institutional (schools and public offices) development to the north and south, it is reasonable to anticipate traffic will distribute evenly along Bland Circle to access Salamo Road to points north and along Tannler Road to Blankenship Road to points south.

CRASH DATA

Reported crash data summarized by the State of Oregon for local roadways was reviewed for the Bland Circle / Salamo Road intersection. Crash data from January 1, 2013 to December 31, 2018 was reviewed. It was found that three crashes have occurred at the intersection. One rear end crash for northbound traveling vehicles, one angle crash with a vehicle turning north from Bland Circle and a third fixed object crash. No apparent pattern (repeat crashes) are present based on the evaluation. The three crashes over the evaluation period do not indicate there is an on-going safety issue at the intersection. Detailed crash data has been attached in Appendix A.

SIGHT DISTANCE EVALUATION

This sight distance evaluation was conducted to verify the stopping sight distance for traffic approaching the intersection of Bland Circle at Salamo Road and intersection sight distance for traffic turning out of the proposed site onto Bland Circle.

Intersection sight distance is the minimum clear distance needed for drivers to anticipate and avoid collisions while determining whether to proceed through an intersection. The intersection sight distance evaluation assumes vehicles traveling at 40 mph along Salamo Road based on a speed survey¹ and 25 mph along Bland Circle based on the posted speed limit and the proposed site plan frontage improvements. For both analyses, the driver's eye is measured at a height of 3.5 feet, an approaching object height of 3.5 feet, and a driver setback of 14.5 feet from the existing traveled way. Intersection sight distance was compared to the AASHTO design intersection sight distance for the following cases:

- Case B1, Left Turn from the Minor Road²
- Case B2, Right Turn from the Minor Road³

Stopping sight distance for each intersection was also compared to the AASHTO Design Standards⁴. The sight distance evaluation is summarized in Table 3.

¹ Based on 85th percentile speed determined in tube counts, attached in the Appendix.

² AASHTO, Case B1 – Intersections with stop control on the minor road (AASHTO, Case B1, Table 9-6).

³ AASHTO, Case B2 – Intersections with stop control on the minor road (AASHTO, Case B2, Table 9-8).

⁴ AASHTO Stopping Sight Distance, Exhibit 3-1.



Table 3: Sight Distance Evaluation

Sight Distance Evaluated	Available Sightline (ft)		Sight Distance Standard (ft)	Meets Standard?		
Bland Circle at Salamo Roa	ad					
Case B1: Loft turn	To the right	400	390	Yes		
	To the left	680	390	Yes		
Case B2: Right-turn	400		335	Yes		
SSD Northbound Vehicle	680		250	Yes		
SSD Southbound Vehicle	390		250	Yes		
Bland Circle at Site Access	5					
Case R1: Loft turn	To the right	260	280	No		
	To the left	240	280	No		
Case B2: Right-turn	240		240	Yes		
SSD Northbound Vehicle	>155		155	Yes		
SSD Southbound Vehicle	>155		155	Yes		

As summarized in Table 1, intersection sight distance is met for both left- and right-turning vehicles at the Bland Circle / Salamo Road intersection. Figures 2 and 3 show the existing view from the driver's eye location on the Bland Circle approach. ISD to the left was found to just meet the standard, so maintenance of vegetation around the roadway curve should be made a priority by the City to continue meeting the standard.

Figures 4 and 5 show the existing view from the driver's eye location at the proposed Site Access. The driver's eye location was estimated in the field due to embankments. Intersection sight distance at the site access is not met for Case B1 (left-turn from the minor side street). However, stopping sight distance is met for both directions based on the current plans. Although intersection sight distance is not met, it is anticipated that with further development, sight lines will be improved as roadways are constructed to meet City standards.

FINDINGS

The current site evaluation identifies that the proposed development will generate an estimated 142 average daily trips, of which 9 are existing today. These trips are forecasted to utilize the intersections of Bland Circle / Salamo Road and Tannler Road / Blankenship Road to access commercial, retail and educational facilities beyond the neighborhood.

A safety evaluation consisting of a crash data review and a sight distance evaluation did not identify areas of concern at the Bland Circle / Salamo Road intersection. A sight distance evaluation at the Bland Circle / Site Access intersection identified that intersection sight distance for a left turning vehicle from the side street is not met but is anticipated to improve as new development occurs to the north and as Bland Circle is improved to meet City standards. All other sight distance measures were met.





Figure 2: View North from Bland Circle Approach Figure 3: View south from Bland Circle approach



Figure 4: View North from Site Access

Figure 5: View South from Site Access

Appendix

Appendix A: Crash Data

OREGON.. DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION

BLAND CIR at SALAMO RD, City of West Linn, Clackamas County, 01/01/2013 to 12/31/2018

TRANSPORTATION DATA SECTION - CRASH ANAYLYSIS AND REPORTING UNIT

URBAN NON-SYSTEM CRASH LISTING

CITY OF WEST LINN, CLACKAMAS COUNTY

1-3 of 3 Crash records shown.

	S D	М																		
SER#	P R	J S W DATE	CLASS	CITY STREET		INT-TYPE					SPCL USE									
INVEST	EAU	I C O DAY	DIST	FIRST STREET	RD CHAR	(MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	TRLR QTY	MOVE			A S	;				
RD DPT	ELG	N H R TIME	FROM	SECOND STREET	DIRECT	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	FROM	PRTC	INJ	G E	LICNS	PED			
UNLOC?	DCS	V L K LAT	LONG	LRS	LOCTN	(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V# TYPE	TO	P# TYPE	SVRTY	E X	RES	LOC	ERROR	ACT EVENT	CAUSE
02140	N N N	N N 06/20/2018	17	BLAND CIR	INTER	CROSS	Ν	Ν	CLR	S-1STOP	01 NONE 0	STRGHT							004	29
CITY		WE	0	SALAMO RD	S		UNKNOWN	N	DRY	REAR	PRVTE	S -N							000	00
N N		3P 45 21 54.8:	2 -122 38		06	0		Ν	DAY	INJ	PSNGR CAR		01 DRVR	NONE	42 F	OR-Y OR<25		026	000	29
			5511								02 NONE 0	STOP								
											PRVTE	S -N							011 004	00
											PSNGR CAR		01 DRVR	INJC	42 M	OR-Y OR<25		000	000	00
01290	Y N N	N N 04/03/2014	17	BLAND CIR	INTER	3-LEG	Ν	Y	RAIN	FIX OBJ	01 NONE 0	TURN-L							121,079,062	01,08
CITY		TH	0	SALAMO RD	W		NONE	N	WET	FIX	PRVTE	S-W							000 121,079,062	00
N N		5P 45 21 26.9510759	-122 38 47.117615	9	05	0		Ν	DAY	PDO	PSNGR CAR		01 DRVR	NONE	20 M	OR-Y OR<25		047,001	017	01,08
03569	N N N	09/01/2015	17	BLAND CIR	INTER	CROSS	N	N	CLR	ANGL-OTH	01 NONE 0	TURN-L								02
NONE		TU	0	SALAMO RD	CN		STOP SIGN	Ν	DRY	TURN	PRVTE	W -N							015	00
N N		5P 45 21 54.8	1 -122 38 53.4		03	0		Ν	DAY	PDO	PSNGR CAR		01 DRVR	NONE	20 M	NONE OR<25		028	000	02
											02 NONE 0 PRVTE	STRGHT N -S	01 תיזפת	NONE	70 M	OP-V		000	000	00
											PSINGR CAR		UI DRVR	NONE	/3 M	OR-1 OR<25		000	000	00

Disclaimer: The information contained in this report is compiled from individual driver and police crash report submitted to the Oregon Department of Transportation as required in ORS 811.720. The Crash Analysis and Reporting Unit is committed to providing the highest quality crash data to customers. However, because submitted of crash report forms is the responsibility of the individual driver, the Crash Analysis and Reporting Unit can not guarantee that all qualifying crashes are represented nor can assurances be made that all details pertaining to a single crash are accurate. Note: Legislative changes to DMV's vehicle crash reporting requirement, effective 01/01/2004, may result in fewer property damage only crashes being eligible for inclusion in the Statewide Crash Data File.

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