ARD ENGINEERING
21370 SW Langer Farms Pkwy
Suite 142, Sherwood, OR 97140

REGISTERED PROFESSIONAL ENGINEER 54983PE
JULY 10, 2002 MICHAEL T. ARD
RENEWS: 12/31/2027

Technical Memorandum

To: AJ Michaud, RA Gray Construction

From: Michael Ard, PE

Date: May 28, 2026

Re: Barker Cabinets Phase 2 – 13470 Galbreath Drive: Transportation Analysis

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This trip generation analysis memorandum is written to provide information related to the proposed Barker Cabinets building at 13470 Galbreath Drive in Sherwood, Oregon. The subject property has an area of approximately 3.48 acres and is currently occupied by one manufacturing building with a gross floor area of 30,916 square feet.

Under the proposed development plan, a second manufacturing building with an area of 30,777 square feet will be added on the west side of the site.

The City of Sherwood has requested an analysis to determine the total number of vehicle trips as well as the number of truck trips that will be generated by the existing and proposed buildings.

SITE TRIP GENERATION

Trip generation calculations were prepared for the existing and proposed buildings using data from the Trip Generation Manual, 12th Edition, published by the Institute of Transportation Engineers in August 2025. The data used was for land use code 140, Manufacturing, with the trip rates based on the gross floor area of the buildings.

A summary of the trip generation calculations is provided in Table 1 below. Detailed trip generation worksheets are also provided in the attached technical appendix.

Table 1: Trip Generation Summary - Barker Cabinets

	Morning Peak Hour			Evening Peak Hour			Daily Trips		
	In	Out	Total	In	Out	Total	In	Out	Total
Total Floor Area - 61,693 sf	23	8	31	11	28	39	132	132	264
- Existing Building - 30,916 sf	-12	-4	-16	-6	-13	-19	-66	-66	-132
Net Increase in Site Trips	**11**	**4**	**15**	**5**	**15**	**20**	**66**	**66**	**132**

Based on the analysis, the proposed new building is projected to add 15 trips during the morning peak hour, 20 trips during the evening peak hour, and 132 daily site trips.

In addition to examination of total trips, truck trips for vehicles over 20,000 pounds were analyzed. These trips were included in the volumes shown in Table 1, but since truck trips can have more significant impacts on area roadways and intersections, the truck trip calculations are detailed in Table 2, below.

Table 2: Truck Trip Generation - Barker Cabinets

	Morning Peak Hour			Evening Peak Hour			Daily Trips		
	In	Out	Total	In	Out	Total	In	Out	Total
Total Floor Area - 61,693 sf	1	1	2	0	1	1	18	18	36
- Existing Building - 30,916 sf	-1	0	-1	0	-1	-1	-9	-9	-18
Net Increase in Truck Trips	**0**	**1**	**1**	**0**	**0**	**0**	**9**	**9**	**18**

Based on the truck trip generation analysis, the proposed new building is projected to generate one additional truck trip during the morning peak hour, no new truck trips during the evening peak hour, and 18 additional daily truck trips.

INTERSECTION SIGHT DISTANCE

City of Sherwood staff requested an examination of sight distance for the proposed new passenger vehicle site access driveway on the west side of the site due to concerns about the horizontal curve to the north of the driveway, with particular emphasis on whether street trees may obstruct sight lines to the north in the future.

Typically, street trees are selected such that the trunk diameters at full maturity are small enough not to obstruct sight lines. However, even trees selected with this in mind may overlap on a curved roadway in a manner that obstructs sight lines. Typically, sight lines are unobstructed by a tree if approaching vehicles are never fully occluded by the tree (i.e., as the approaching vehicle travels behind the tree the front of the vehicle re-emerges before the rear of the vehicle disappears). This ensures that regardless of when a driver looks in that direction, at least some portion of an approaching vehicle will be visible.

In this instance, the proposed driveway is south of the inside of the horizontal curve. Looking to the north, there will be street trees in the planter strip, but the spacing between these trees will not result in visual overlaps of the tree trunks. A diagram demonstrating that the combination of driveway location and curve direction at this site will not lead to vehicle occlusions is provided in Figure 1 on the following page. The driver's eye position from which the red sight lines originate is shown within the exit lane side of the proposed driveway 14.5 feet behind the edge of the traveled way, in accordance with AASHTO standards. The street trees were assumed to be placed on 40-foot spacing, similar to the existing street trees on the property immediately to the south of the project site. The tree trunks within the planter strip (shown in

green) are illustrated with 18-inch diameters, but it is clear from the figure that even if larger trunk diameters were assumed they would not result in obstruction of sight lines to approaching vehicles.

It should be noted that this analysis assumes that the only potential obstruction to sight lines created by the street trees is based on the trunk diameter. Accordingly, it will be necessary to ensure that vegetation on the trees does not extend into the required sight lines. This means that the street trees should not have limbs or leaves below about 9 feet above the roadway elevation. Additionally, to provide adequate clearance for travel of trucks on the street, the street trees should not have limbs or leaves below 15 feet above the roadway surface (typical tractor/trailer height is 13.5 feet).

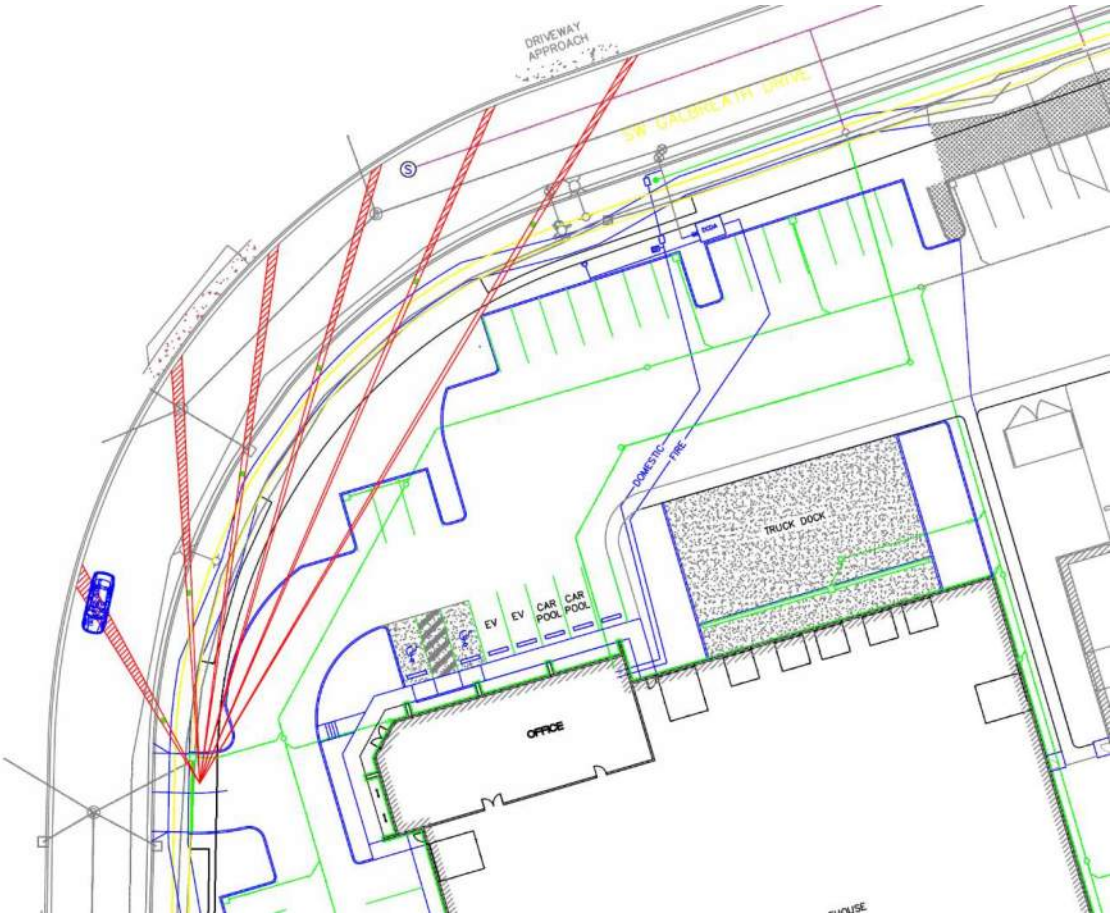

Figure 1: Site Plan Showing Street Tree Occlusion Areas w/ Approaching Vehicle

During our site visit, it was noted that there is a crest vertical curve on SW Galbreath Drive south of the subject property. Accordingly, measurements were made to determine where adequate stopping sight distance can be achieved to the south. The posted speed limit on SW Galbreath Drive is 25 mph, and

design speeds for evaluating stopping sight distance are commonly assumed to be up to 10 mph over the posted speed, since actual driver speeds vary and are commonly higher than the posted limit. Speeds more than 10 mph over the posted speed limit should appropriately be addressed through enforcement rather than accommodated in design.

Based on a design speed of 35 mph and the measured 9 percent downhill grade northbound on SW Galbreath Drive, the minimum stopping distance required for safety was calculated to be 290 feet. This minimum sight distance is achieved near a storm drain inlet on the east side of SW Galbreath Drive. If the driveway were placed south of the storm drain, it would have inadequate sight lines to the south. Conversely, any location north of the storm drain will have adequate stopping sight distance. Accordingly, the proposed site access was placed immediately north of the storm drain to ensure that oncoming vehicles can stop to avoid collisions and the driveway can operate safely. Based on the detailed sight distance analysis, the proposed site access location on SW Galbreath Drive will provide adequate sight lines for safe and efficient access.

TRUCK TURNING MOVEMENTS

To ensure that the proposed development can adequately accommodate trucks, an analysis was conducted using AutoTurn software to illustrate how several different truck types would utilize the loading areas and circulate within the site. The assessment was made for single-unit trucks as well as tractor/trailer combination trucks.

The largest tractor/trailer combination trucks that would utilize the site are classified by AASHTO as "WB-67" interstate trucks. Entry and exit paths for this design vehicle are shown in Figures 2 and 3 in the attached technical appendix. It is expected that these long trucks would need to utilize the loading bays at the east side of the site to accommodate their length when entering the site. For shorter WB-40 tractor/trailer trucks and SU-40 single-unit trucks, there is much more flexibility regarding which loading bays can be used. Example entry and exit turning movement paths for these smaller design vehicles are shown in Figures 4 through 7 in the attached technical appendix.

Based on the analysis, the site can adequately accommodate turning movements into and out from the loading bays for the proposed building.

If you have further questions regarding the transportation impacts of the proposed development or this analysis, please feel free to contact me at any time.

Appendix

Trip Generation Calculation Worksheet

Land Use Description: Manufacturing
ITE Land Use Code: 140
Independent Variable: Gross Floor Area
Quantity: 61.693 Thousand Square Feet

Summary of ITE Trip Generation Data

AM Peak Hour of Adjacent Street Traffic
Trip Rate: 0.51 trips per ksf
Directional Distribution: 75% Entering 25% Exiting

PM Peak Hour of Adjacent Street Traffic
Trip Rate: 0.63 trips per ksf
Directional Distribution: 29% Entering 71% Exiting

Total Weekday Traffic
Trip Rate: 4.27 trips per ksf
Directional Distribution: 50% Entering 50% Exiting

Site Trip Generation Calculations

61.7 ksf Manufacturing

	Entering	Exiting	Total
AM Peak Hour	23	8	31
PM Peak Hour	11	28	39
Weekday	132	132	264

Data Source: *Trip Generation Manual, 12th Edition* , Institute of Transportation Engineers, 2025

Trip Generation Calculation Worksheet

Land Use Description: Manufacturing
ITE Land Use Code: 140
Independent Variable: Gross Floor Area
Quantity: 30.916 Thousand Square Feet

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PM Peak Hour of Adjacent Street Traffic
Trip Rate: 0.63 trips per ksf
Directional Distribution: 29% Entering 71% Exiting

Total Weekday Traffic
Trip Rate: 4.27 trips per ksf
Directional Distribution: 50% Entering 50% Exiting

Site Trip Generation Calculations

30.9 ksf Manufacturing

	Entering	Exiting	Total
AM Peak Hour	12	4	16
PM Peak Hour	6	13	19
Weekday	66	66	132

Data Source: *Trip Generation Manual, 12th Edition* , Institute of Transportation Engineers, 2025

Trip Generation Calculation Worksheet

Land Use Description: Manufacturing
ITE Land Use Code: 140
Independent Variable: Gross Floor Area
Quantity: 61.693 Thousand Square Feet

Summary of ITE Trip Generation Truck Data

AM Peak Hour of Adjacent Street Traffic Trucks
Trip Rate: 0.03 truck trips per ksf
Directional Distribution: 56% Entering 44% Exiting

PM Peak Hour of Adjacent Street Traffic Trucks
Trip Rate: 0.02 truck trips per ksf
Directional Distribution: 41% Entering 59% Exiting

Total Weekday Truck Traffic
Trip Rate: 0.57 truck trips per ksf
Directional Distribution: 50% Entering 50% Exiting

Site Truck Trip Generation Calculations

61.7 ksf Manufacturing

	Entering	Exiting	Total
AM Peak Hour	1	1	2
PM Peak Hour	0	1	1
Weekday	18	18	36

Data Source: *Trip Generation Manual, 12th Edition* , Institute of Transportation Engineers, 2025

Trip Generation Calculation Worksheet

Land Use Description: Manufacturing
ITE Land Use Code: 140
Independent Variable: Gross Floor Area
Quantity: 30.916 Thousand Square Feet

Summary of ITE Trip Generation Truck Data

AM Peak Hour of Adjacent Street Traffic Trucks
Trip Rate: 0.03 truck trips per ksf
Directional Distribution: 56% Entering 44% Exiting

PM Peak Hour of Adjacent Street Traffic Trucks
Trip Rate: 0.02 truck trips per ksf
Directional Distribution: 41% Entering 59% Exiting

Total Weekday Truck Traffic
Trip Rate: 0.57 truck trips per ksf
Directional Distribution: 50% Entering 50% Exiting

Site Truck Trip Generation Calculations

30.9 ksf Manufacturing

	Entering	Exiting	Total
AM Peak Hour	1	0	1
PM Peak Hour	0	1	1
Weekday	9	9	18

Data Source: *Trip Generation Manual, 12th Edition* , Institute of Transportation Engineers, 2025

Figure 2: WB-67 Tractor/Trailer Truck Entry

Figure 3: WB-67 Tractor/Trailer Truck Exit

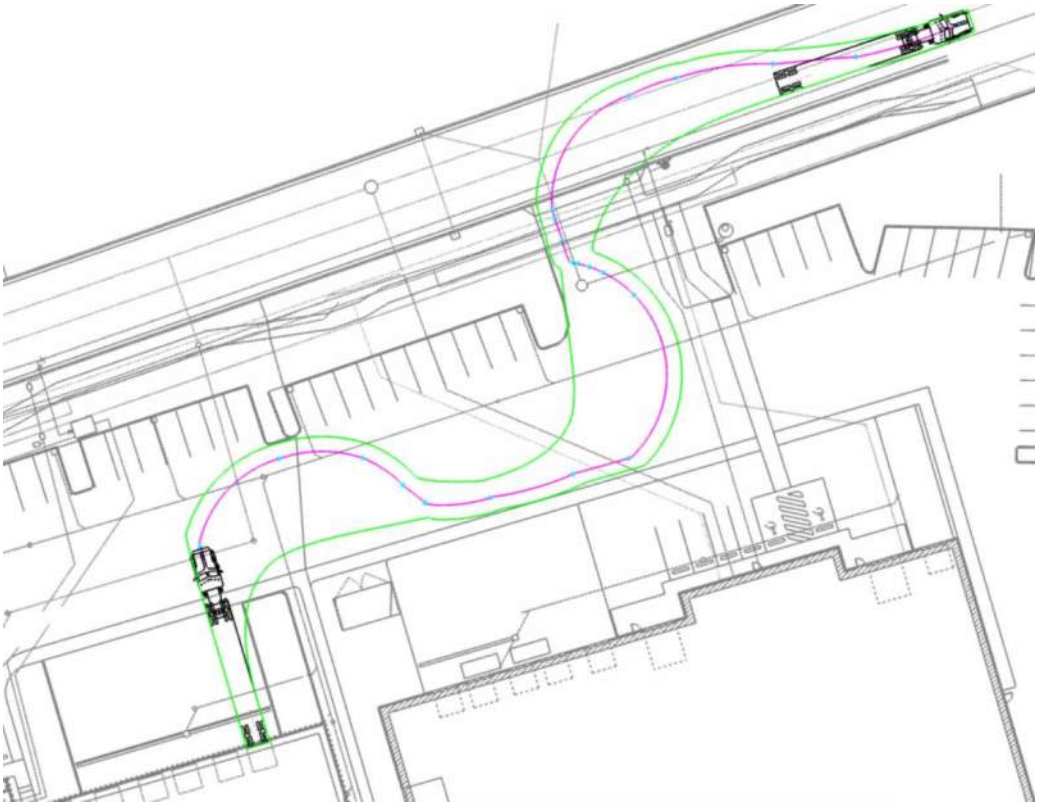

Figure 4: WB-42 Tractor/Trailer Truck Entry

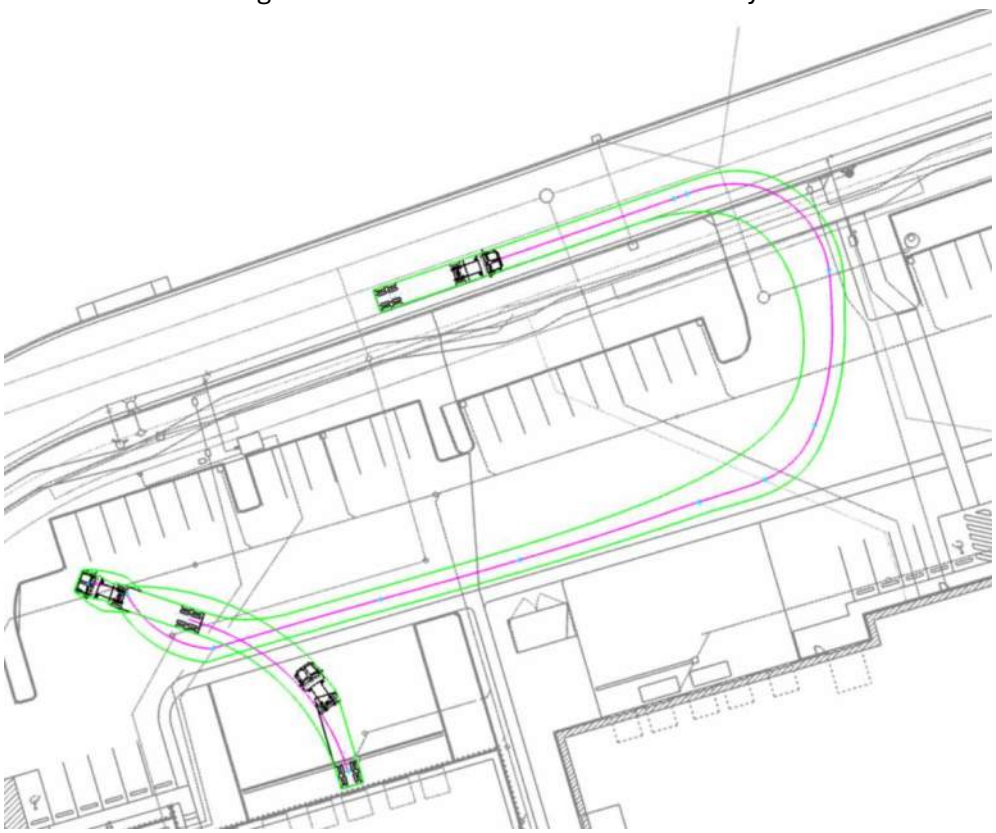

Figure 5: WB-42 Tractor/Trailer Truck Exit

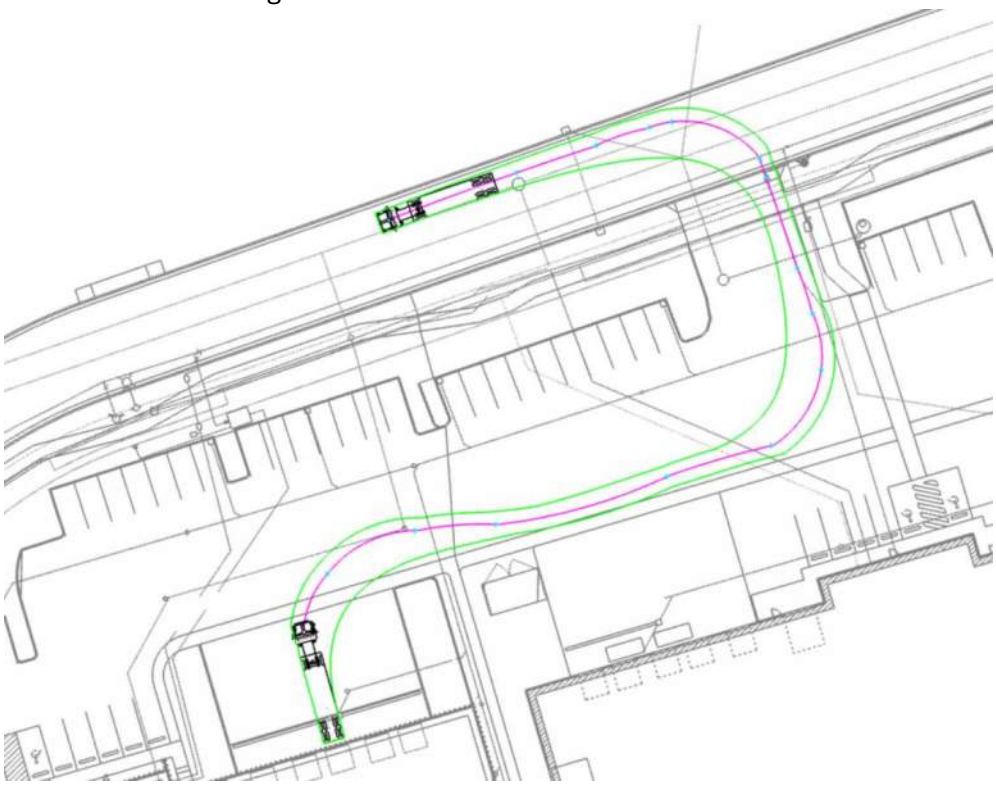

Figure 6: SU-40 Truck Entry

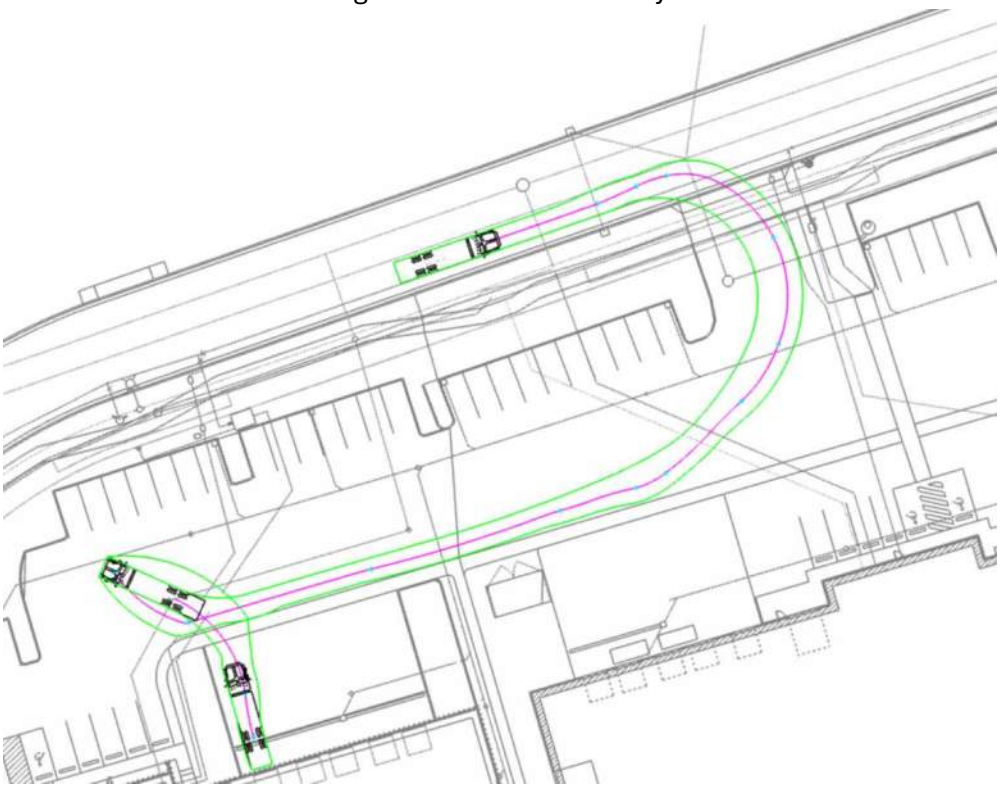

Figure 7: SU-40 Truck Exit

19355 sw 125th ct – Tualatin, OR 97062

10-3-2024

Subject: New Building Traffic Analysis- SW GALBREATH DRIVE

To whom it may concern,

Regarding expected traffic and building usage. The proposed building will be build exclusively as warehouse overflow space. Employees will include 3-5 full-time employees on-site per day. Deliveries will come out of existing buidling.

Sincerely,

CHAD BARKER
CEO - BARKER CABINETS, 10-20-22