

February 19, 2019

Project #: 21399

Naomi Vogel  
Washington County Department of Land Use & Transportation  
1400 SW Walnut Street, MS 51  
Hillsboro, OR 97123-5625

**RE: Middlebrook Subdivision & SW Brookman Road, County File Number CP 19-903**

Dear Naomi,

This letter prepared by Kittelson & Associates, Inc. (Kittelson) supplements the record for the subdivision site plan application<sup>1</sup>, providing additional documentation requested by Washington County related to SW Brookman Road's ability to accommodate the additional trips associated with site development.

**CONTEXT**

Key features of SW Brookman Road today are summarized in Figure 1 and include:

- two travel lanes between Highway 99W on the west and SW Ladd Hill Road to the east including along the site frontage
- a stop controlled at-grade crossing of the Portland & Western Railroad tracks
- a posted speed between 25 and 35 miles per hour (MPH)
- east-west stop control at intersections along SW Brookman Road east of Highway 99W
- signage prohibiting thru truck movement between Highway 99W and SW Ladd Hill Road

SW Brookman Road is designated as a 5-lane arterial in Washington County's Transportation System Plan (TSP) and has a planned future posted speed of 45 miles per hour when widened.

Per Figure 11 of the City of Sherwood Transportation System Plan, the western portion of the future widened SW Brookman Road has been identified for future realignment to Highway 99W. As shown in Exhibit 1, the realigned roadway in concept would be aligned north of the existing Chapman Road intersection with Highway 99W and would include a grade separation from the Portland & Western Railroad tracks. No timeline or public funding for implementing widening or realignment of Brookman Road is currently defined.

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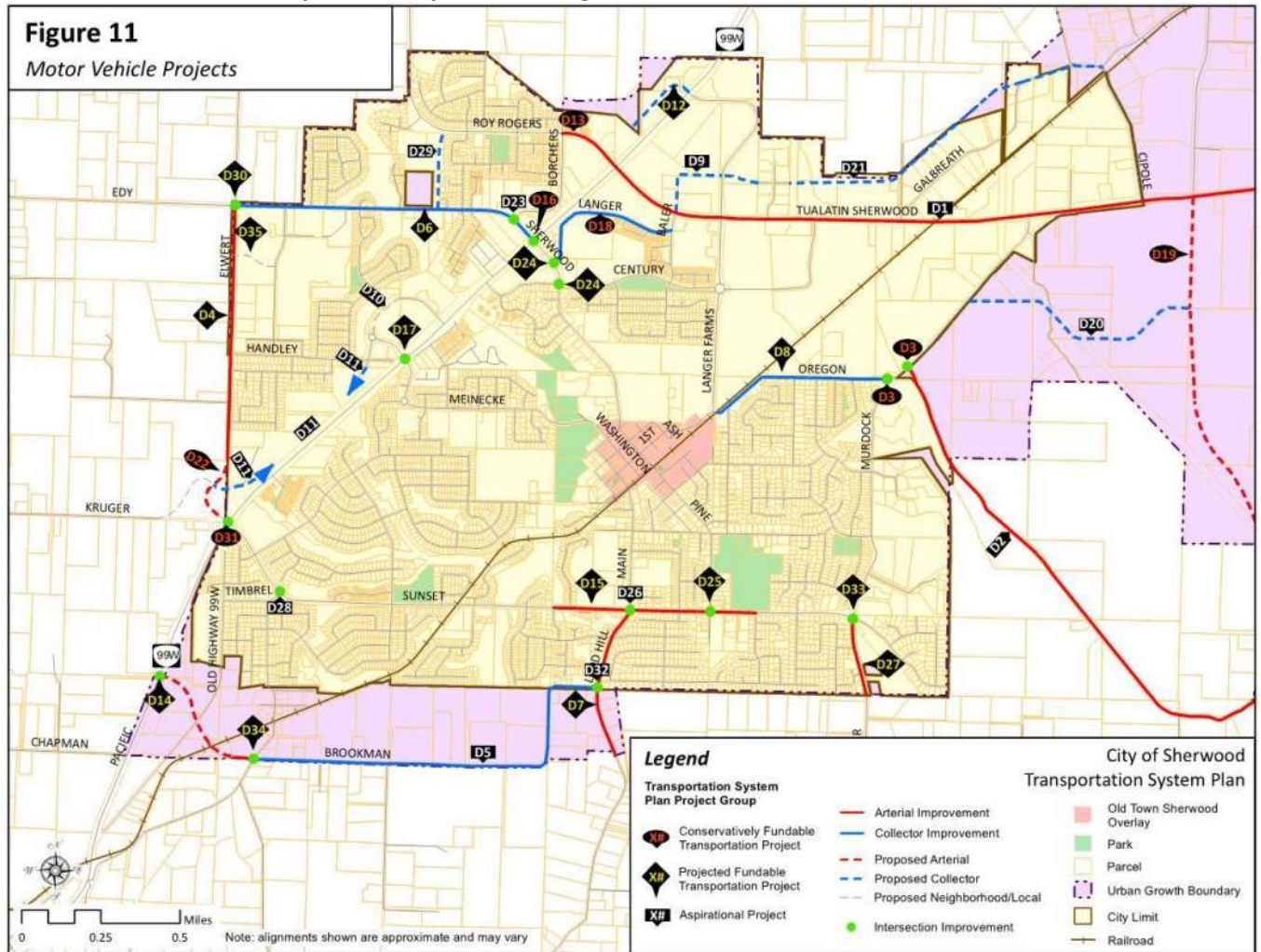
<sup>1</sup> The traffic impacts of site development are documented in the February 5, 2019 *Middlebrook Residential Subdivision Transportation Impact Analysis*.



SW Brookman Road Corridor  
Existing Conditions  
Sherwood, Oregon

Figure  
**1**

**Exhibit 1. Sherwood Transportation System Plan Figure 11**

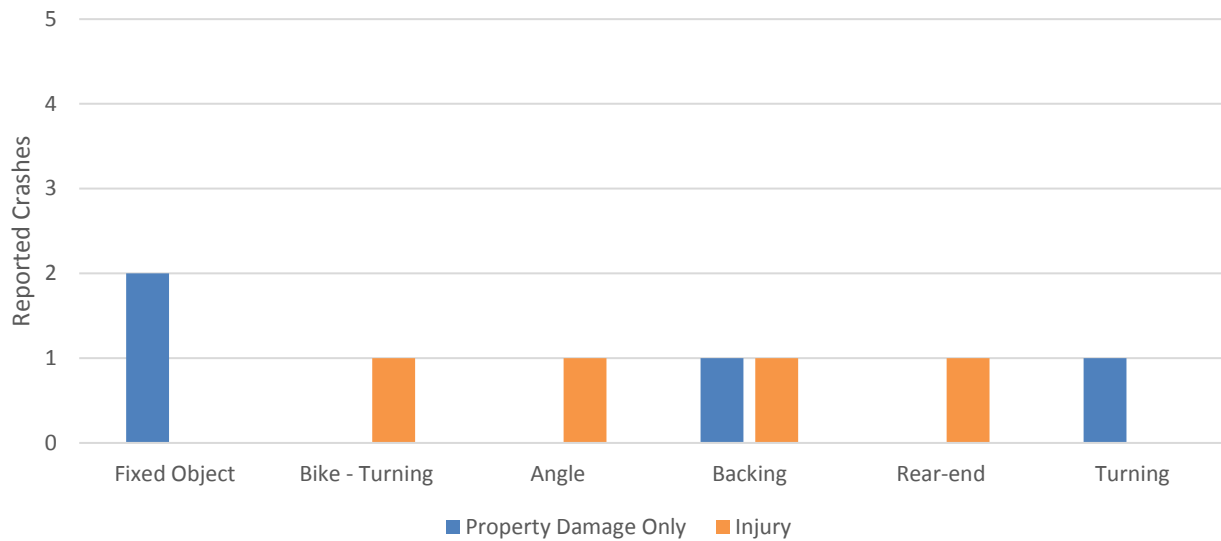


Source: City of Sherwood Transportation System Plan

**Crash History for SW Brookman Road**

The February 5, 2019 *Middlebrook Residential Subdivision Transportation Impact Analysis* documented crashes at study intersections along SW Brookman Road. To provide further context, Kittelson reviewed January 1, 2008 through December 31, 2017 crash data for SW Brookman Road between intersections. The roadway crash data for Brookman Road from Highway 99W to SW Ladd Hill Road were queried from ODOT’s online Crash Data System, with the results provided in Attachment A. This data includes crashes coded as not intersection related. A total of eight crashes were reported over the ten years, summarized in Exhibit 2.

**Exhibit 2. Brookman Road Crash Data by Type and Severity (January 1, 2008 – December 31, 2017)**



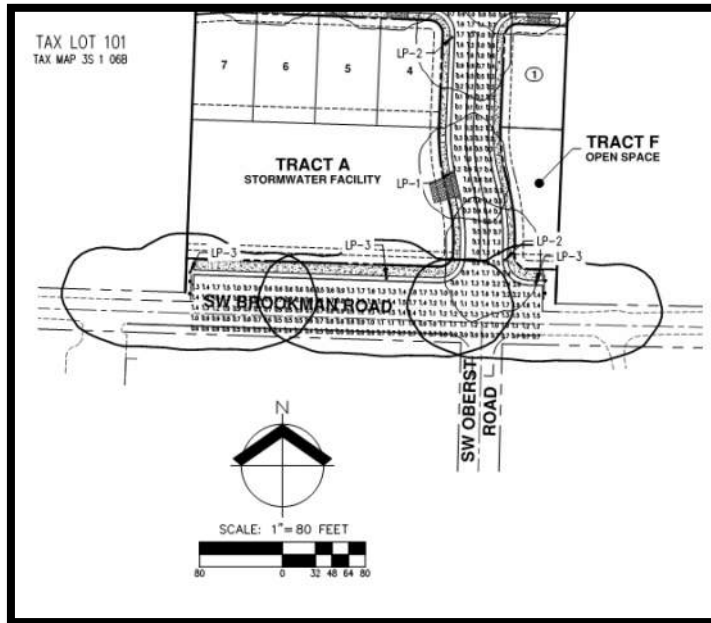
The two fixed object crashes were reported on the curve of Brookman Road just west of SW Ladd Hill Road. The crash data does not suggest clear trends related to crash type or location. None of the reported crashes involved trucks. One reported crash involved a motorcycle and one a bicycle; all other reported crashes included private passenger vehicles.

**PROPOSED SITE DEVELOPMENT IMPACTS**

Kittelson reviewed the traffic impacts of the proposed residential subdivision from a code compliance perspective as documented in the project transportation impact analysis report. Based on the number of proposed homes, the site development is estimated to add approximately 1,362 vehicle trips to the SW Brookman Road corridor on a typical weekday (with approximately 110 occurring during the weekday AM peak hour and 145 during the weekday PM peak hour).

The proposed site plan frontage improvements include half-street widening of SW Brookman Road accommodating the planned future 5-lane roadway cross section. The proposed frontage reconstruction involves regrading SW Brookman Road to reduce the crest vertical curve west of SW Oberst Road and alignment of the site access with SW Oberst Road. The proposed roadway reconstruction increases the available intersection sight distance at the existing SW Oberst Road/SW Brookman Road intersection while also advancing the County’s access management requirements for the corridor. Further, the site frontage improvements will include street lighting along the site frontage including the SW Oberst Road-Site access intersection as shown in Exhibit 3 below.

### Exhibit 3. Preliminary Street Lighting Photometric Plan



Source, AKS Engineering & Forestry Middlebrook Subdivision Sheet P19

### Resident, Truck, School Bus and Emergency Vehicle Implications

As previously noted, SW Brookman Road is currently signed to prohibit thru truck movements between Highway 99W and SW Ladd Hill Road. No changes to that prohibition are proposed in conjunction with site development. The following vehicle movements can be anticipated with site development and subsequent subdivision home occupancy:

- construction related vehicle trips
- resident and visitor personal vehicle trips
- refuse/recycling vehicle trips
- delivery/moving van/truck trips
- emergency service trips
- school bus trips

The volume, frequency, and duration of the above trips is an important risk consideration. The following describes the characteristics of each of the vehicle types and the ability of SW Brookman Road to accommodate two-way traffic:

- *Construction trips* will occur for a limited time while the development and frontage improvements are being constructed. Appropriate signage will be provided in accordance with Washington County requirements.

- *Resident and visitor personal vehicle trips* can readily pass eastbound and westbound today given the available pavement width.
- *Refuse/recycling vehicle trips* to and from the subdivision will be provided by Waste Management. Waste Management currently operates one refuse truck weekly and one recycling truck bi-weekly (one truck one week, two trucks every other week) along the SW Brookman Road corridor on Thursdays. Later this spring, Waste Management may add a separate glass recycling truck to separately convey glass materials<sup>2</sup>. Waste Management eventually will add yard debris pickup involving another truck as the SW Brookman Road corridor services match those provided to the City of Sherwood. Except for the potential new yard debris pickup, no new refuse/recycling vehicle trips are expected to be added given the new subdivision will be serviced by the existing refuse and recycling vehicles that serve existing residents. All new Brookman Subdivision resident curbside service will occur within the subdivision and should pose no impact to east-west trips on SW Brookman Road.
- *Delivery/moving van/truck trips* may serve the development in a variety of vehicle sizes. Larger moving vans/trucks and appliance/furniture deliveries can be anticipated along the corridor, particularly when the new homes within the subdivision are first occupied. Once occupied, moving van/truck movements would occur on an as-needed basis, potentially involving a few truck movements per month. US Mail and package deliveries (such as those by UPS, FedEx, and Amazon) are already occurring to homes along the corridor using vans and single unit delivery vehicles (as opposed to larger articulated tractor trailers). All deliveries to homes in the new subdivision will be handled within the subdivision and turning maneuvers associated with these vehicles can be readily accommodated at the proposed subdivision access to SW Brookman Road given the planned frontage improvements (refer to further discussion below under the subheading *Road Width Implications*). The frequency of mail and package delivery vehicle trips on the corridor may experience some increase during peak holiday shopping season as a result of the additional residents but otherwise is expected to be completed as a function of delivery routes already in place and active today.
- *Emergency service trips* will use the roadway on an as-needed basis; SW Brookman Road is wide enough to convey larger fire trucks and these vehicles have the capability to assume the right-of-way during emergency responses through the use of flashing lights and sirens.
- *School bus trips* can be anticipated during the morning and school afternoon hours to service both existing residents as well as the proposed subdivision residents. We expect that Brookman Subdivision resident school bus service will occur within the subdivision and will not require stopping of east-west trips on SW Brookman Road at the proposed

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<sup>2</sup> Per a Waste Management representative, the recycle truck currently picks up both mixed recycling and glass, with the truck storing glass in a separate compartment of the vehicle.

subdivision access to SW Brookman Road. Turning maneuvers associated with school buses can be readily accommodated at the proposed subdivision access to SW Brookman Road given the planned frontage improvements (refer to further discussion below under the subheading *Road Width Implications*).

## ROAD WIDTH IMPLICATIONS

The paved surface width of SW Brookman Road was considered from multiple perspectives as documented below. In reviewing the points below, it should be recognized that driver behavior changes as facility type changes. Compared to the existing two-lane roadway, the ultimate desired five-lane arterial roadway will have wider travel lanes, pedestrian and bicycle facilities, and a higher (45 MPH) posted speed limit. While wider travel lanes alone will not materially change roadway capacity, they will change environmental messaging to drivers. The existing relatively narrow two-lane paved section helps to reinforce the lower posted speed limits (25 to 35 MPH today) by de-emphasizing vehicular speeds and through put.

### Site-Access/Frontage

As previously noted, SW Brookman Road will be widened and reconstructed at the SW Oberst Road-Site access intersection. The widening will be sufficient to accommodate design vehicle turns into and out of the proposed site access (Attachment B includes an assessment of design vehicle turning maneuvers at the site access for buses and fire trucks) without overlapping vehicle swept paths or roadway centerlines. In addition to widening the roadway, the frontage improvements will improve available sight distance at the intersection and include street lighting.

### Off-site Paved Roadway Width

Once past the reconstructed site frontage, the paved roadway width varies by road segment along SW Brookman Road. AKS Engineering & Forestry measured the existing pavement and gravel shoulder widths between SW Middlebrook Road and SW Oberst Road and found combined pavement/gravel shoulder widths of 20 to 20½ feet for the entire facility length. Within this road segment, the pavement width was reported to be less than 20 feet (18½ or 19 feet) in two locations but the accompanying gravel shoulder of 1½ to 2 feet provides an all-weather surface exceeding 20 feet in width. Similarly, the roadway width is 21 feet or more from SW Oberst Road to the east for approximately 500 feet.

Based on these findings, the existing width of SW Brookman Road supports the use of the land proposed in the plat (Sherwood Municipal Code 16.120.040(D), one of the approval criteria for a preliminary plat application). Further, the all-weather surface satisfies Tualatin Valley Fire & Rescue guidance for minimum roadway width.

## Portland & Western Railroad Crossing

There is an existing at grade stop-controlled crossing of the Portland & Western Railroad located between SW Old Highway 99W and SW Middleton Road west of the proposed subdivision. Representatives of the Middlebrook Subdivision Applicant, City of Sherwood, ODOT Region 1, and ODOT Rail Division met on August 17, 2017 to discuss whether rail crossing improvements would be needed in conjunction with development of the subdivision site. As an outcome of that meeting, ODOT Rail Division determined that it would not require improvements at the crossing with site development.

## Opportunities for Modifications with Site Development

One potential opportunity for the Applicant to voluntarily collaborate with the City of Sherwood and Washington County to incrementally modify SW Brookman Road would be to provide warning signage along the roadway. For example, subject to Washington County direction and approval, the Applicant could install W11-15 and W16-1P supplemental Share the Road plaque warning signs along SW Brookman Road in accordance with the *Manual on Uniform Traffic Control Devices (MUTCD)*, as illustrated in Exhibit 4.

### Exhibit 4. MUTCD Signage



## CLOSING AND NEXT STEPS

Based on the information provided in this letter, the existing roadway is anticipated to satisfy interim needs and does not exhibit specific safety risks associated with new development. The ultimate roadway character includes five vehicle lanes, bicycle lanes, and sidewalks, which will modernize the facility to County standards. In the near-term, the roadway character supports the limited increase of the use until the ultimate roadway configurations are implemented. The proposed changes with the development are consistent with the long-term vision for the roadway and will provide an improvement to the existing condition in terms of street lighting and sight distance at the intersection of SW Oberst Road/SW Brookman Road.



We look forward to further dialogue with County staff on this matter. Please contact us if you have questions regarding this material.

Sincerely,  
KITTELSON & ASSOCIATES, INC.



Chris Brehmer, PE  
Senior Principal Engineer



Kelly Laustsen, PE  
Senior Engineer

Cc: Melissa Norman, PE, Washington County Department of Land Use & Transportation  
Joy Chang, City of Sherwood  
Chris Goodell, AKS Engineering & Forestry



Attachment A    Crash Data for Brookman  
Road

COUNTY ROAD CRASH LISTING

WASHINGTON COUNTY

**BROOKMAN RD and Intersectional Crashes at BROOKMAN RD, City of Outside City Limits, Washington County, 01/01/2008 to 12/31/2017**

1 - 5 of 8 Crash records shown.

SER#	INVEST	RD DPT	UNLOC?	S	D	P R S W DATE	MILEPNT	COUNTY ROADS	INT-TYPE	SPCL USE	MOVE	A	S	RD	CHAR	INT-REL	OFFRD	WTHR	CRASH	TRLR QTY	FROM	PRTC	INJ	G	E	LICNS	PED	ACT	EVENT	CAUSE		
NO	RPT	DPT		D		E A U C O DAY	DIST FROM	FIRST STREET	(MEDIAN)	TYPE				SECOND STREET	DIRECT	TRAFFIC	RANDBT	SURF	COLL	OWNER	TO	TYPE	SVRTY	OR	RES	LOC	ERROR					
NO	RPT	DPT		D		E L G H R TIME	INTERSECT	SECOND STREET	LEGS	TYPE				LONG	LOCTN	CONTL	DRVWY	LIGHT	SVRTY	V#	TYPE		SVRTY		OR	RES	LOC	ERROR				
03556		03556		N	N	Y N N 07/03/2013		SW BROOKMAN RD		N					CURVE		Y	CLR	FIX OBJ	01 NONE 0								088,062,093	27			
CITY						WE 13		SW LADD HILL RD	(NONE)						W	UNKNOWN		DRY	FIX	PRVTE							000	088,062	00			
Y						12P									01			DAY	PDO	PSNGR CAR							016,081	038	093	27		
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00742		00742		Y	N	N 02/11/2009		SW BROOKMAN RD		N					CURVE		Y	CLR	FIX OBJ	01 NONE 0								088,094	32,01			
CITY						WE 19		SW LADD HILL RD	(NONE)						W	UNKNOWN		WET	FIX	PRVTE							000	088	00			
Y						11A									01			DAY	PDO	PSNGR CAR							052,047,080	017	094	32,01		
N						45 20 40.2699998	-122 50 47.4		(02)																							
08516		08516		N	N	N N N N N 12/12/2016		SW BROOKMAN RD	CROSS	N					INTER		N	CLR	BIKE	01 NONE 0									02			
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WASHINGTON COUNTY

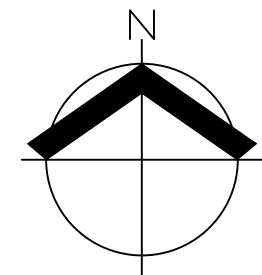
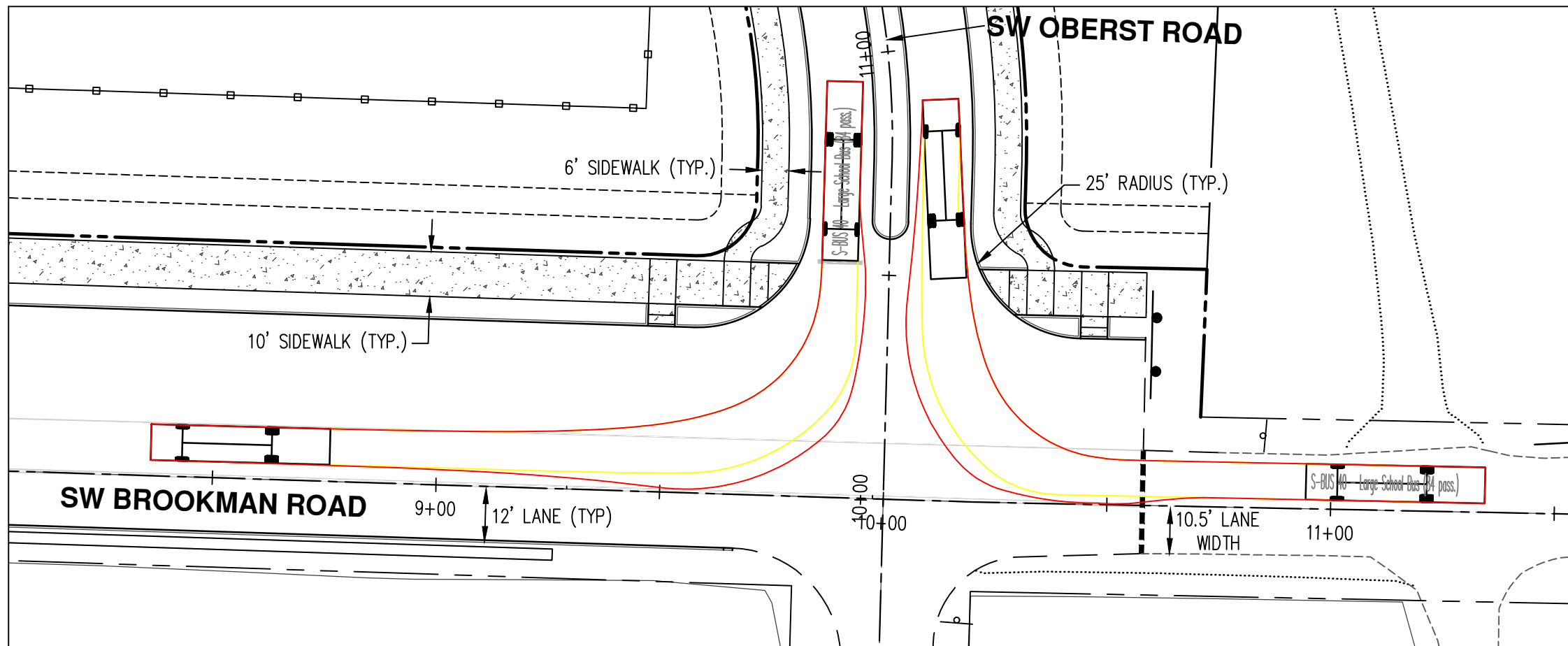
BROOKMAN RD and Intersectional Crashes at BROOKMAN RD, City of Outside City Limits, Washington County, 01/01/2008 to 12/31/2017

6 - 8 of 8 Crash records shown.

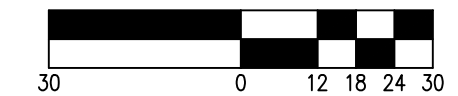
SER#	P	R S W DATE	MILEPNT	COUNTY ROADS	RD CHAR	INT-TYPE (MEDIAN)	INT-REL	OFFRD	WTHR	CRASH	SPCL USE	MOVE	A S
INVEST	E A U C O DAY		DIST FROM	FIRST STREET	DIRECT	LEGS	TRAF-	RNDBT	SURF	COLL	OWNER	FROM	PRTC INJ G E LICNS PED
RD DPT	E L G H R TIME		INTERSECT	SECOND STREET	LOCTN	(#LANES)	CONTL	DRVWY	LIGHT	SVRTY	V# TYPE	TO	P# TYPE SVRTY E X RES LOC
UNLOC?	D C S L K LAT		LONG	LRS									ERROR ACT EVENT CAUSE
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											PSNGR CAR		01 DRVR INJC 55 F OR-Y OR<25
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06795	N N N N N	12/01/2011		SW BROOKMAN RD	INTER	CROSS	N	N	CLR	O-1 L-TURN	01 NONE 0	TURN-L	
COUNTY	TH		0	SW OLD PACIFIC HY 99W	CN		STOP SIGN	N	DRY	TURN	PRVTE	W -NE	
N		6A			02	0		N	DARK	PDO	PSNGR CAR		01 DRVR NONE 41 M OR-Y OR<25
N		45 20	-122 52										004,028 000 02
		32.7487264	16.0688686										
											02 NONE 0	STRGHT	
											PRVTE	E -W	
											PSNGR CAR		01 DRVR NONE 44 M OR-Y OR<25
													000 000 00
05887	N N N	09/02/2016		SW BROOKMAN RD	STRGHT		N	N	CLR	O-1STOP	01 NONE 9	BACK	
NONE	FR		2	SW PACIFIC HY 99W	E	(NONE)	UNKNOWN	N	DRY	BACK	N/A	W -E	
N		12P			03			N	DAY	PDO	PSNGR CAR		01 DRVR NONE 00 Unk UNK
N		45 20 32.91	-122 52			(02)							000 000 00
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Disclaimer: The information contained in this report is compiled from individual driver and police crash reports 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 submittal 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.

Attachment B Design Vehicle Turning  
Maneuvers

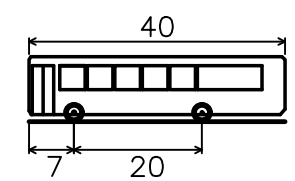
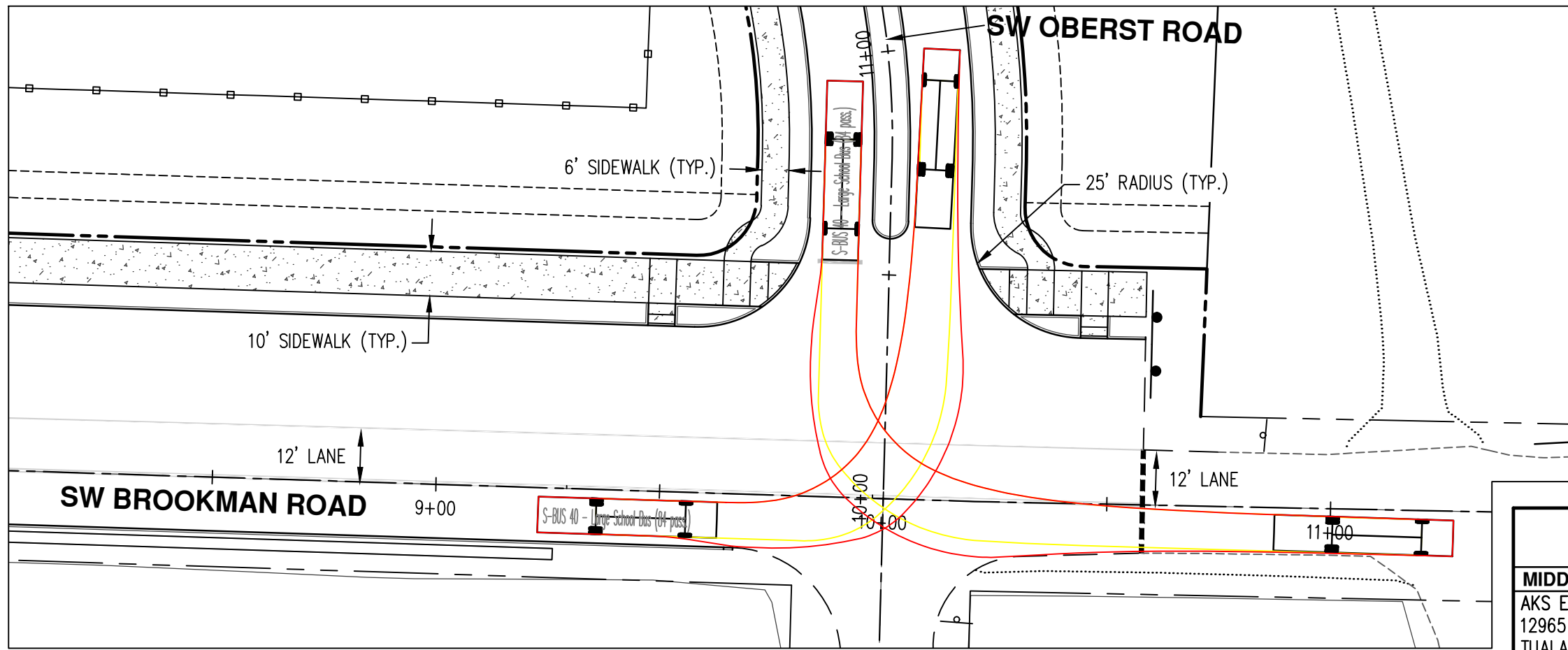


SCALE: 1" = 30 FEET



**LEGEND**

- 40' LARGE (84 PASS.) SCHOOL BUS TURNING MOVEMENT VEHICLE BODY OUTLINE
- 40' LARGE (84 PASS.) SCHOOL BUS TURNING MOVEMENT WHEEL PATH OUTLINE

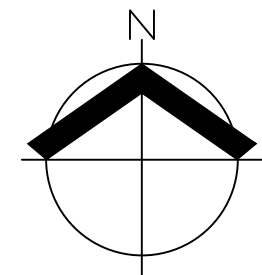
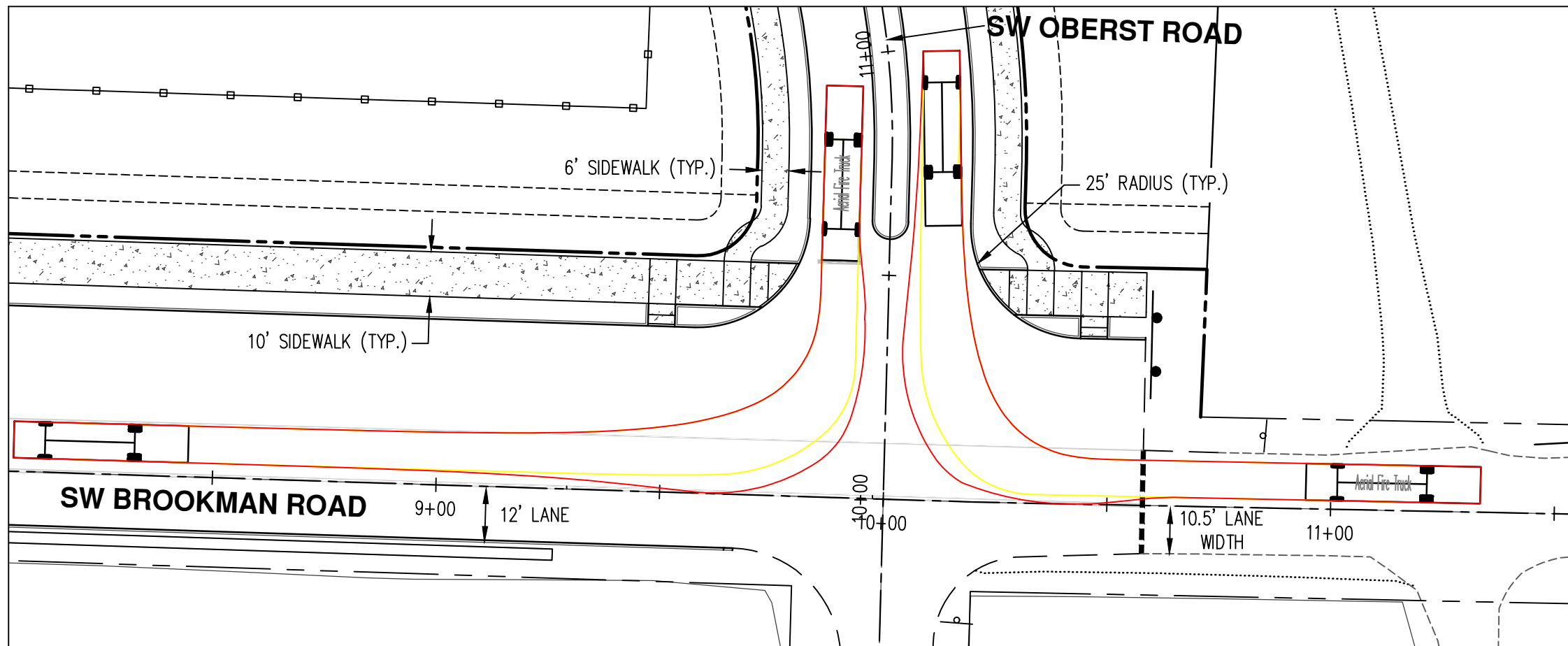


S-BUS 40 - Large School Bus (84 pass.)  
 Overall Length 40.000ft  
 Overall Width 8.000ft  
 Overall Body Height 10.140ft  
 Min Body Ground Clearance 1.070ft  
 Track Width 8.000ft  
 Lock-to-lock time 5.00s  
 Curb to Curb Turning Radius 39.400ft

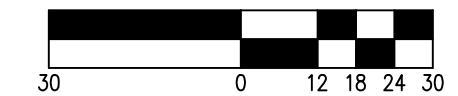
DATE: 2/14/2019

<b>SCHOOL BUS TURNING MOVEMENTS</b> <b>SW BROOKMAN ROAD AND SW OBERST ROAD</b>	EXHIBIT
<b>MIDDLEBROOK SUBDIVISION</b>	<b>TM1</b>
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD, STE 100 TUALATIN, OR 97062 P: 503.563.6151 F: 503.563.6152 aks-eng.com	DRWN: DRS CHKD: PAS AKS JOB: 3591



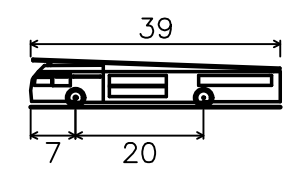
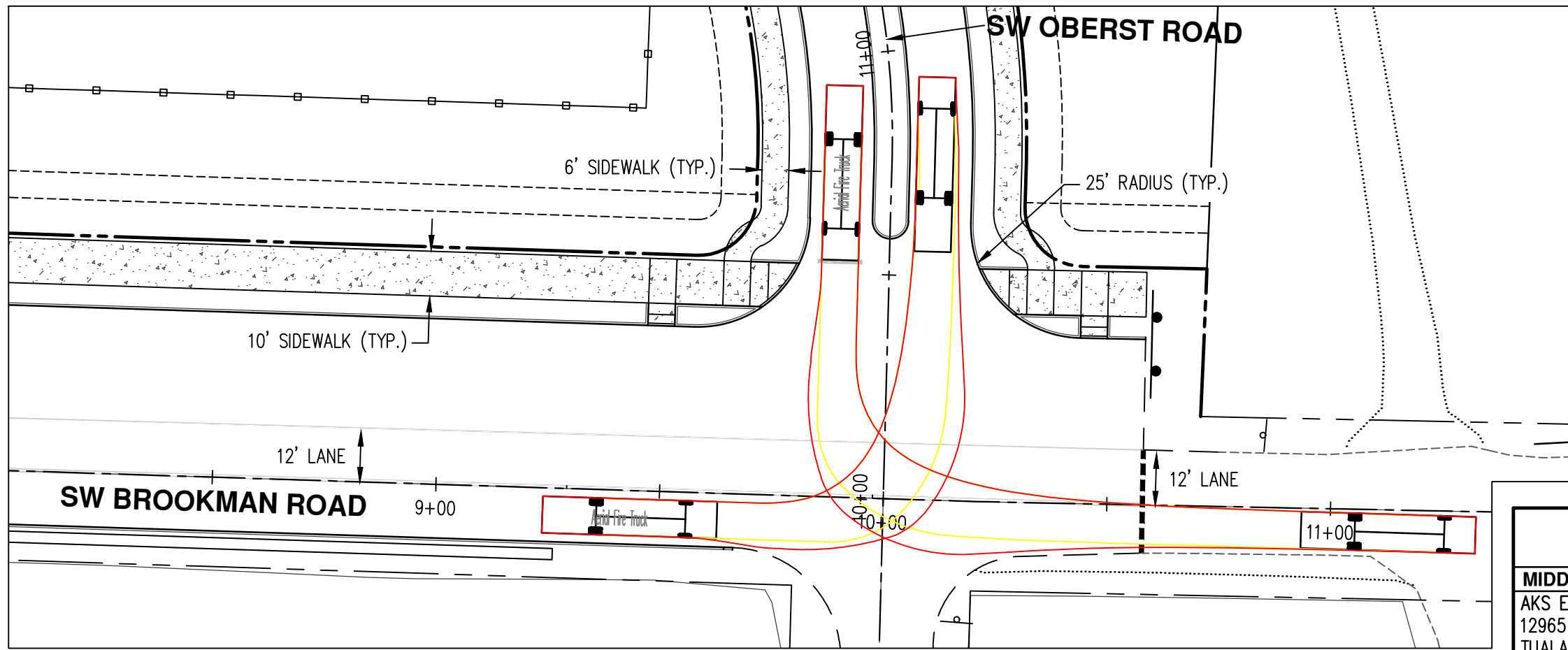


SCALE: 1" = 30 FEET



**LEGEND**

- 39' AERIAL APPARATUS FIRE TRUCK TURNING MOVEMENT VEHICLE BODY OUTLINE
- 39' AERIAL APPARATUS FIRE TRUCK TURNING MOVEMENT WHEEL PATH OUTLINE



Aerial Apparatus Fire Truck	
Overall Length	39.000ft
Overall Width	8.167ft
Overall Body Height	7.500ft
Min Body Ground Clearance	0.750ft
Track Width	8.167ft
Lock-to-lock time	5.00s
Max Wheel Angle	45.00°

DATE: 2/14/2019

<b>FIRE TRUCK TURNING MOVEMENTS</b> <b>SW BROOKMAN ROAD AND SW OBERST ROAD</b>	EXHIBIT
<b>MIDDLEBROOK SUBDIVISION</b>	<b>TM2</b>
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD, STE 100 TUALATIN, OR 97062 P: 503.563.6151 F: 503.563.6152 aks-eng.com	DRWN: DRS CHKD: PAS AKS JOB: 3591

