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September 27, 2019 Project #: 24221

John Replinger
Replinger & Associates, LLC
6330 SW 36th Avenue
Portland, OR 97202

RE: Tyrone S. Woods Memorial Park - Transportation Analysis Letter

Dear John,

The following Transportation Analysis Letter (TAL) has been prepared for the proposed 8.27-acre Tyrone S. Woods Memorial Park in Oregon City. Based on feedback from City staff, it was determined that a TAL was required to support the land use application. The requirements for a TAL are outlined below, followed by an explanation as to how the requirements are being met.

1. *The expected trip generation of the proposed development including the AM peak hour, the PM peak hour, daily traffic, and other germane periods as may be appropriate, together with appropriate documentation and references.*

Lango Hansen Landscape Architects is proposing to develop the 8.27-acre Tyrone S. Woods Memorial Park located on the southwest corner of Meyers Road and High School Avenue. Trip estimates for the proposed park were prepared using trip rates obtained from *Trip Generation, 10th Edition* (Reference 1), as shown in Table 1. Given the size of the proposed park, the fitted curve rate was determined to be more appropriate. Trip rates are also provided for the Sunday peak hour, which is expected to have a higher trip generation than on weekdays.

Table 1: Tyrone S. Woods Memorial Park Trip Generation Estimate

ITE Land Use	Size	Weekday Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour			Sunday Peak Hour of Generator		
			Total	In	Out	Total	In	Out	Total	In	Out
Public Park (411)	8.27 acres	94	0	0	0	23	13	10	38	15	23

As shown in Table 1, the proposed park could be expected to generate 94 daily trips, minimal weekday AM peak hour trips, and 23 weekday PM peak hour trips. During peak park activity, which is expected to occur on Sundays, the trip generation indicates a demand for approximately 23 parking spaces.

2. *Site plan showing the location of all access driveways or private streets where they intersect with public streets plus driveways of abutting properties and driveways on the opposite side of the street from the proposed development.*

In site planning for the proposed Tyrone S. Woods Memorial Park, Lango Hansen Landscape Architects is seeking to provide access to parking via two driveways on Meyers Road. These two driveways would align directly with existing access to the Oregon City Maintenance Facility and Bus Depot on the north side of

Meyers Road. A concept plan is provided in Attachment A, illustrating the location of the site in relation to the Meyers Road/High School Avenue intersection and Oregon City Transportation Maintenance Facility driveways opposite Meyers Road from the proposed site.

3. *Documentation that all site access driveways meet Oregon City Private Access Driveway Width Standards.*

Section 12.04.025 of the Oregon City Municipal Code requires that a nonresidential or multi-family residential driveway access be a minimum of 15 feet in width and a maximum of 40 feet in width. Each site driveway is proposed to be 24 feet wide, thereby meeting the private access driveway width standards.

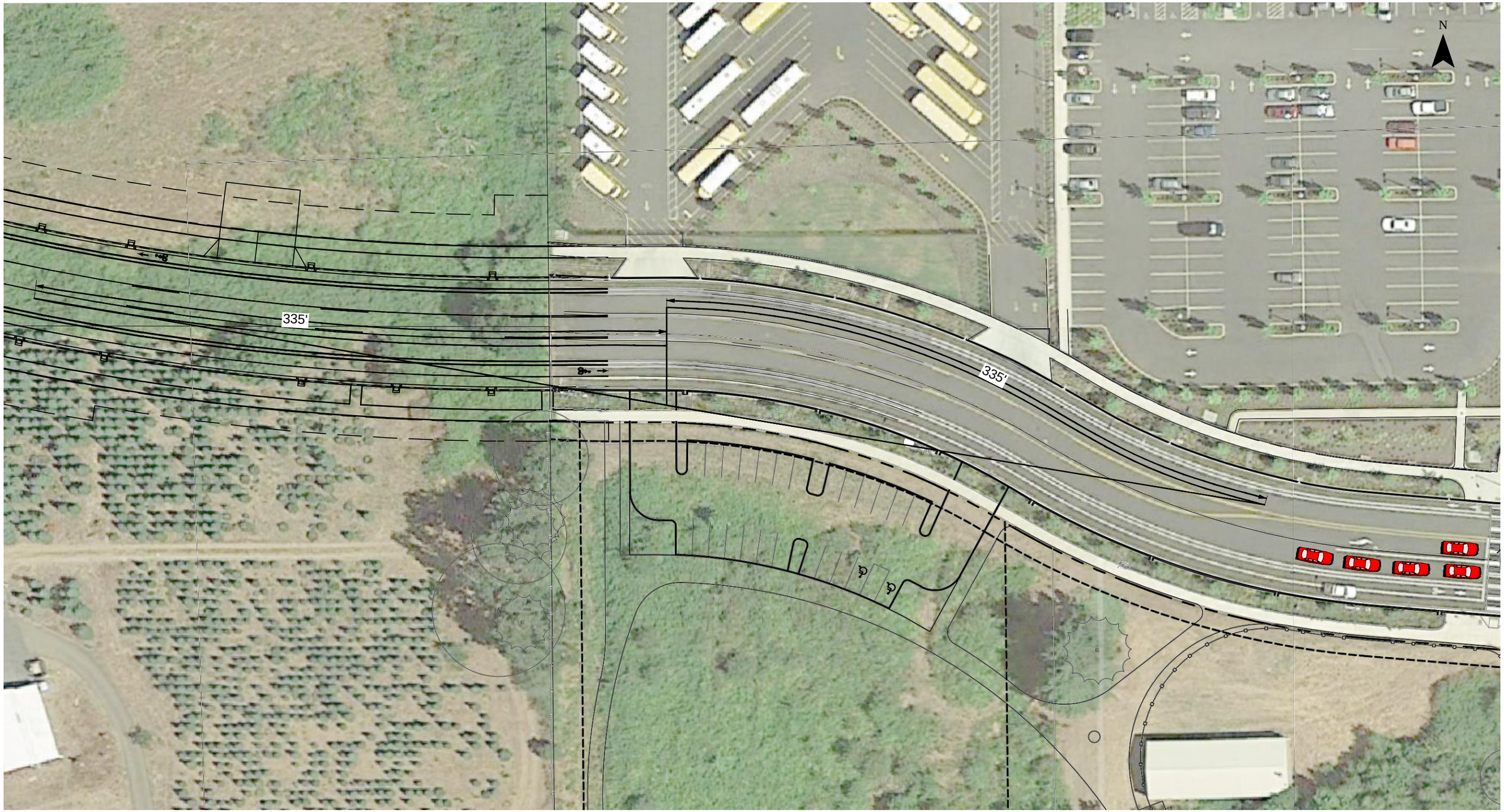
4. *Documentation that all site access driveways meet Oregon City's Minimum City Street Intersection Spacing Standards.*

Meyers Road is classified as a Minor Arterial. Section 12.04.195 of the Oregon City Municipal Code requires that the minimum driveway spacing along a Minor Arterial is 175 feet. The proposed eastern driveway will be located approximately 260 feet west of High School Avenue. The proposed western driveway will be located approximately 165 feet west of the proposed eastern driveway. The spacing between driveways is slightly shorter than the spacing requirement. However, both driveways align with existing curb cuts for the Oregon City Transportation Maintenance Facility across Meyers Road from the site.

5. *Documentation that all site accesses and/or private street intersections meet AASHTO intersection sight distance guidelines.*

Kittelson & Associates, Inc. (KAI) staff visited the site in August 2019 to observe existing area conditions. For the sight distance analysis documented herein, measurements of intersection sight distance (ISD) and stopping sight distance (SSD) were obtained in the field based on guidelines provided in the most recent edition of American Association of State Highway Transportation Officials' (AASHTO) *A Policy on Geometric Design of Highways and Streets.* Consistent with AASHTO guidelines, ISD measurements were measured in the field from the location of the existing accesses from a viewpoint 15 feet behind the edge of the traveled way and from a height of 3.5 feet above the ground, looking toward an object that is 3.5 feet above the ground along the travel way. SSD measurements were obtained in the field from the approaching travel way from a viewpoint 3.5 feet above the ground looking toward an object that is 2 feet above the ground.

Based on field observations, sight distance measurements are documented at each of the two proposed site access locations in Table 2 and corresponding intersection sight distance triangles for the same locations are shown in the figures in Figures 1 and 2. These diagrams also illustrate anticipated 95th percentile eastbound queues at the all-way stop-controlled intersection of Meyers Road and High School Avenue.



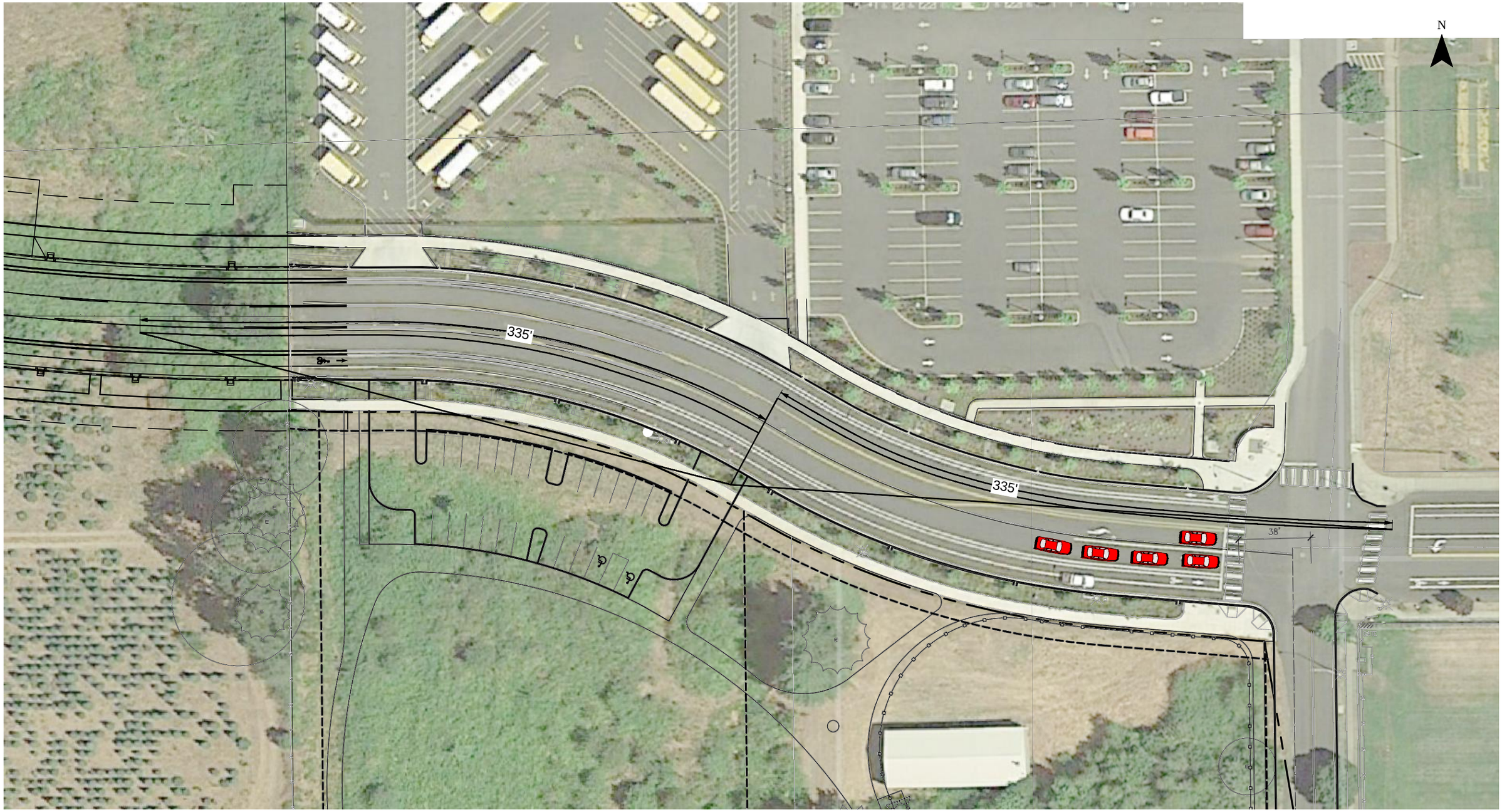
Scale: 1" = 50'

50 25 0 50

Sight Distance - West Driveway
Oregon City, Oregon

Figure
1

KITTELSON & ASSOCIATES



Scale: 1" = 50'

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Sight Distance - East Driveway
Oregon City, Oregon

Figure
2

KITTELSON & ASSOCIATES

Table 2: Site Driveway Sight Distance Analysis Results on Meyers Road

Site Driveway	Posted Roadway Speed	AASHTO Requirements			Observed Sight Distance	Satisfies AASHTO Requirements? (ISD/SSD)
		ISD: Right Turn from Stop	ISD: Left turn from Stop	SSD		
1: West Driveway	30 MPH	290 feet	335 feet	200 feet	>335 feet (facing east) >335 feet (facing west)	Yes/Yes
2: East Driveway	30 MPH	290 feet	335 feet	200 feet	>335 feet (facing east) >335 feet (facing west)	Yes/Yes Yes/Yes

ISD: Intersection Sight Distance
SSD: Stopping Sight Distance

As summarized in Table 2, both ISD and SSD were observed to be in excess of AASHTO requirements at each proposed site access. Any landscaping, signage, and any above-ground utilities on-site and at the site access should be provided and maintained appropriately to provide adequate sight distance per City standards.

6. *Documentation that there are no inherent safety issues associated with the design and location of the site access driveways.*

In addition to Items #4 and #5 above, City staff requested an assessment of future intersection capacity and queuing at the Meyers Road/High School Avenue intersection and proposed park driveways. For the purposes of this analysis, the critical hour occurs during the weekday afternoon commuter peak. Concurrent with this time when traffic along the future Meyers Road extension is expected to experience the highest traffic volumes, we have conservatively assumed arrivals and parking circulation for an evening event at the adjacent high school (football game, etc.). We have also assumed future conditions with completion of the Meyers Road extension. The full traffic volume development is included as Attachment B, and described below.

Future weekday PM peak hour traffic volumes for the Meyers Road/High School Avenue intersection were provided by the City of Oregon City. Anticipated peak hour traffic volumes for the Oregon City High School and Transportation Maintenance Facility Campus were added to the future intersection volumes to develop future background traffic volumes.

Trip generation for the park during the critical peak period was based on the assumption that all 25 proposed parking spaces would be utilized by high school event attendees. These 25 trips were assigned to the proposed driveways and Meyers Road/High School Avenue intersection with the same general distribution as trips for the transportation maintenance facility. These trips were added to the future background traffic volumes to develop future total traffic volumes.

Additional trips were assigned to the network to account for possible circling through the parking lot to search for a space, as well as the addition of vehicles to the network who may use the transportation maintenance facility parking lot during events at the high school. These trips were added to the future total traffic volumes to provide a more conservative analysis.

Highway Capacity Software (HCS) was used to analyze intersection performance in accordance with the *Highway Capacity Manual* (HCM) 6th Edition methodology. The capacity reports can be found in Attachment C. Under future traffic conditions, the Meyers Road/High School Avenue intersection is projected to operate under capacity at Level of Service "C" with an eastbound 95th percentile queue of 4.1 vehicles.

Intersection capacity at the existing all-way stop-controlled intersection of Meyers Road and High School Avenue is sufficient to accommodate expected park traffic, routine commuter traffic, as well as additional traffic associated with high school events. Eastbound queues at the all-way stop-controlled intersection are not expected to reach the proposed site driveways or impair sight distance.

7. *Documentation that the applicant has reviewed the City's TSP and that proposed streets and frontage improvements do or will comply with any applicable standards regarding the functional classification, typical sections, access management, traffic calming and other attributes as appropriate.*

A review of the Oregon City TSP indicates that Meyers Road will be extended to the west to OR 213. Frontage along Meyers Road meets the Minor Arterial street standard as outlined in Section 12.04.180 of the Oregon City Municipal Code. The TSP indicates that High School Avenue will be improved to an Industrial Collector along the site frontage. The development will dedicate sufficient right-of-way along High School Avenue to achieve 44 feet from the centerline. The development will also dedicate sufficient right-of-way along Glen Oak Road to achieve 43 feet from the centerline, and construct sidewalk and street parking.

We trust this letter adequately addresses the requirements for a TAL. Please let us know if you have any questions.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Kristine Connolly, PE
Senior Engineer

Brian Dunn, PE
Associate Engineer

REGISTERED PROFESSIONAL ENGINEER
93661PE
OREGON
MAY 8, 2018
KRISTINE M. CONNOLLY
EXPIRES: 12/31/2019

REFERENCES

1. Institute of Transportation Engineers. *Trip Generation Manual, 10th Edition.* 2017.

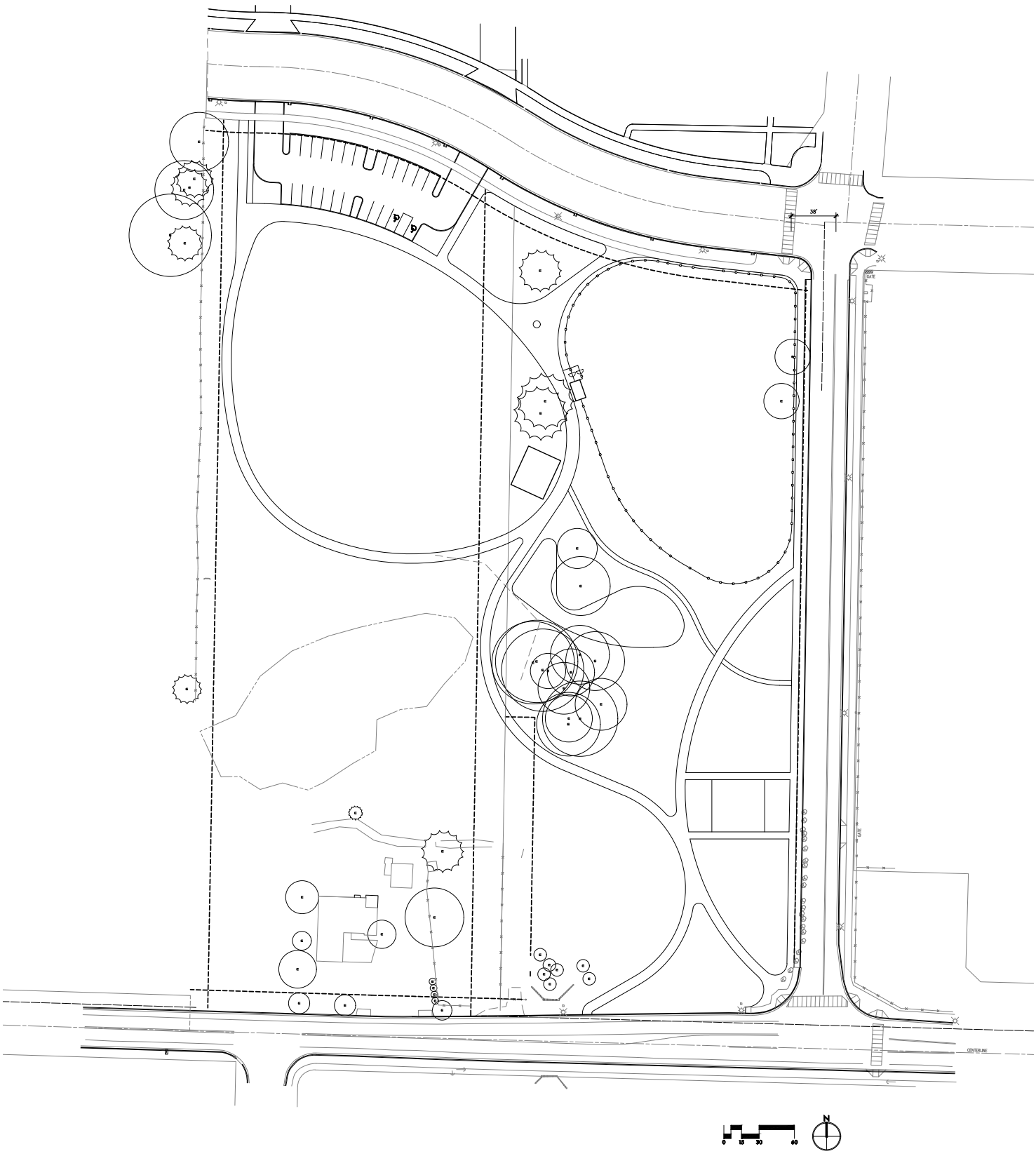
ATTACHMENTS

Attachment A: Concept Plan

Attachment B: Traffic Volumes

Attachment C: Capacity Analysis

Attachment A
Concept Plan



NOT TO SCALE
Concept Plan provided by Lango Hansen Landscape Architects 8/2/2019

Attachment B
Traffic Volumes

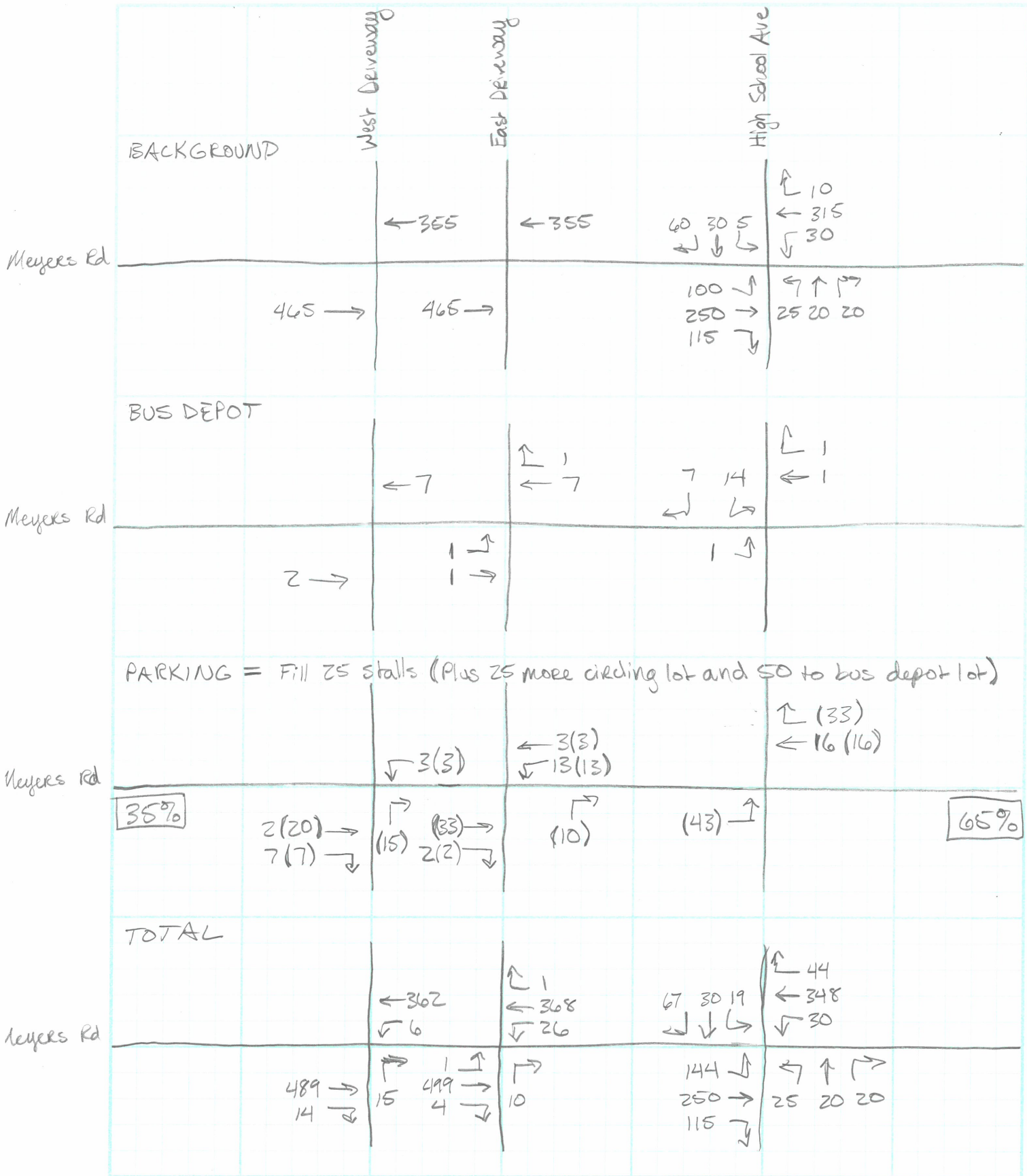
KITTELSON & ASSOCIATES

CALCULATION/DESIGN RECORD

DATE 8/29/2019 PROJECT# 24221

PROJECT NAME Tyrone S. Woods Memorial Park

SUBJECT Traffic Volumes - PM Peak BY KMC SHEET# 1 OF 1



Attachment C
Capacity Analysis

HCS7 All-Way Stop Control Report

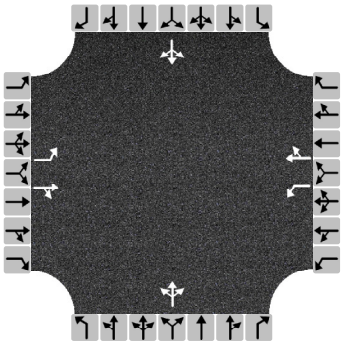
General Information

Analyst	KMC
Agency/Co.	Kittelson
Date Performed	8/12/2019
Analysis Year	2019
Analysis Time Period (hrs)	0.25
Time Analyzed	Future PM Background
Project Description	Tyrone S. Woods Memorial Park

Site Information

Intersection	Meyers/High School
Jurisdiction	Oregon City
East/West Street	Meyers Road
North/South Street	High School Avenue
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	100	250	115	30	315	10	25	20	20	5	30	60
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LTR			LTR		
Flow Rate, v (veh/h)	109	397		33	353		71			103		
Percent Heavy Vehicles	2	2		2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.097	0.353		0.029	0.314		0.063			0.092		
Final Departure Headway, hd (s)	6.03	5.30		6.16	5.63		6.14			5.80		
Final Degree of Utilization, x	0.182	0.584		0.056	0.553		0.121			0.166		
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.0			2.0		
Service Time, ts (s)	3.73	3.00		3.86	3.33		4.14			3.80		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	109	397		33	353		71			103		
Capacity	597	679		584	639		586			620		
95% Queue Length, Q_{95} (veh)	0.7	3.8		0.2	3.4		0.4			0.6		
Control Delay (s/veh)	10.1	15.2		9.2	15.1		10.0			10.0		
Level of Service, LOS	B	C		A	C		A			A		
Approach Delay (s/veh)	14.1			14.6			10.0			10.0		
Approach LOS	B			B			A			A		
Intersection Delay, s/veh | LOS	13.6						B					

HCS7 All-Way Stop Control Report

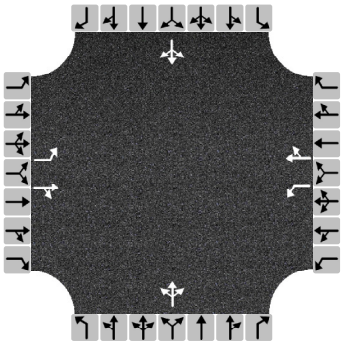
General Information

Analyst	KMC
Agency/Co.	Kittelson
Date Performed	8/12/2019
Analysis Year	2019
Analysis Time Period (hrs)	0.25
Time Analyzed	Future PM Total
Project Description	Tyrone S. Woods Memorial Park

Site Information

Intersection	Meyers/High School
Jurisdiction	Oregon City
East/West Street	Meyers Road
North/South Street	High School Avenue
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	101	250	115	30	332	11	25	20	20	19	30	67
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LTR			LTR		
Flow Rate, v (veh/h)	110	397		33	373		71			126		
Percent Heavy Vehicles	2	2		2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.098	0.353		0.029	0.331		0.063			0.112		
Final Departure Headway, hd (s)	6.16	5.44		6.28	5.75		6.30			5.94		
Final Degree of Utilization, x	0.188	0.599		0.057	0.595		0.124			0.208		
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.0			2.0		
Service Time, ts (s)	3.86	3.14		3.98	3.45		4.30			3.94		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	110	397		33	373		71			126		
Capacity	584	662		574	626		571			606		
95% Queue Length, Q_{95} (veh)	0.7	4.0		0.2	3.9		0.4			0.8		
Control Delay (s/veh)	10.3	15.9		9.4	16.5		10.2			10.5		
Level of Service, LOS	B	C		A	C		B			B		
Approach Delay (s/veh)	14.7			16.0			10.2			10.5		
Approach LOS	B			C			B			B		
Intersection Delay, s/veh | LOS	14.4						B					

HCS7 All-Way Stop Control Report

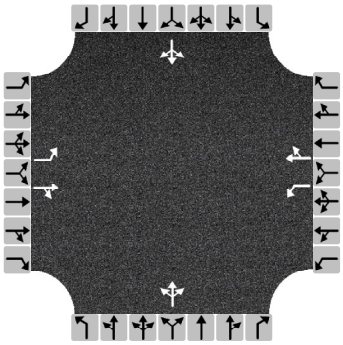
General Information

Analyst	KMC
Agency/Co.	Kittelson
Date Performed	8/12/2019
Analysis Year	2019
Analysis Time Period (hrs)	0.25
Time Analyzed	Future PM Total Plus Circling
Project Description	Tyrone S. Woods Memorial Park

Site Information

Intersection	Meyers/High School
Jurisdiction	Oregon City
East/West Street	Meyers Road
North/South Street	High School Avenue
Peak Hour Factor	0.92

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	144	250	115	30	348	44	25	20	20	19	30	67
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LTR			LTR		
Flow Rate, v (veh/h)	157	397		33	426		71			126		
Percent Heavy Vehicles	2	2		2	2		2			2		

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20			3.20		
Initial Degree of Utilization, x	0.139	0.353		0.029	0.379		0.063			0.112		
Final Departure Headway, hd (s)	6.26	5.53		6.38	5.79		6.52			6.15		
Final Degree of Utilization, x	0.272	0.610		0.058	0.686		0.128			0.215		
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.0			2.0		
Service Time, ts (s)	3.96	3.23		4.08	3.49		4.52			4.15		

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	157	397		33	426		71			126		
Capacity	575	651		564	621		552			586		
95% Queue Length, Q_{95} (veh)	1.1	4.1		0.2	5.4		0.4			0.8		
Control Delay (s/veh)	11.3	16.5		9.5	20.2		10.5			10.8		
Level of Service, LOS	B	C		A	C		B			B		
Approach Delay (s/veh)	15.0			19.4			10.5			10.8		
Approach LOS	C			C			B			B		
Intersection Delay, s/veh | LOS	16.0						C					

Tyrone S. Woods Memorial Park Parking Study

Nature Parks & Natural Areas	Acres	Parking Stalls	Facilities & Amenities	Management	Dogs Off-leash Area	Parking Stalls/Acre
Spring Park	7	3	Playground Trails Picnic Tables	NCPRD	Yes	
Lowami Hart Woods Park	28	9	Restroom Trails	Tualatin Hills Parks & Recreation District	Yes	0.3
Stewart Park	35	42	Playground Sports Fields Tennis Court Volleyball Court Picnic Shelter Restrooms Dog Area	City of Roseburg	Yes	1.2
Holmes Park	13	21	Playground Basketball Court Picnic Shelter Dog Area	City of Medford	Yes	
Bear Creek Natural Area	37	90	Playground Sports Fields Tennis Court Skate Park Picnic Shelter Trails	City of Medford	Yes	
Rotary Nature Preserve at Tice Woods	25	16	Restroom Trails	City of McMinnville	No	0.6
Airport Park	14	14	Picnic Tables Dog Area Trails	City of McMinnville	Yes	1.0
Noble Woods Park	39	42	Restroom Picnic Shelter Trails	Hillsboro P&R	Yes	1.1
Orchard Park	21	28	Playground Disc Golf Restrooms Trails	Hillsboro P&R	No	1.3
Orenco Woods Nature Park	42	30	Picnic Shelter Playground Restrooms Trails	Hillsboro P&R / Metro	No	0.7

Oregon City Parks	Acres	Parking Stalls	Facilities & Amenities	Management	Dogs Off-leash Area	Parking Stalls/Acre
Wesley Lynn Park	17.5	63	Playground Picnic Shelter Sports Fields Restrooms Dog Area	Oregon City P&R	Yes	3.6
Hillendale Park	16	56	Playground Picnic Shelter Sports Fields/Courts Wetland Observation Deck Restrooms	Oregon City P&R	No	3.5
Chapin Park	18.5	64	Playground Picnic Shelter Sports Fields Restroom	Oregon City P&R	No	3.5
Park Place Park	18.5	11	Playground Restroom Dog Area	Oregon City P&R	Yes	0.6
Stafford Park	1.5	8	Picnic Table	Oregon City P&R	No	5.3
Abernathy Creek Park	2.5	3	Picnic Area	Oregon City P&R	No	1.2
Atkinson Park	5.5	3	BBQ Grills	Oregon City P&R	No	0.5
Canemah Children's Park	0.3	8	Playgronud Picnic Shelter Sports Fields/Courts Restrooms	Oregon City P&R	No	26.7
Tyrone S. Woods Memorial Park	7.5	24	Playground Picnic Shelter BBQ Grills Restroom Skate Spot Pickleball Courts Dog Area	Oregon City P&R	Yes	3.2