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MEMORANDUM

Date: September 6, 2018 Project #: 23187

To: Curleigh Carothers, PE; City of Camas

cc: Jeff Barsness, Washington State Department of Transportation (WSDOT)
David Jardin, Clark County Public Works Department
Joel Stirling, Sterling Design, Inc.

From: Chris Brehmer, PE & Kelly Laustsen, PE; Kittelison & Associates, Inc.

Project: Green Mountain B1 South Phase

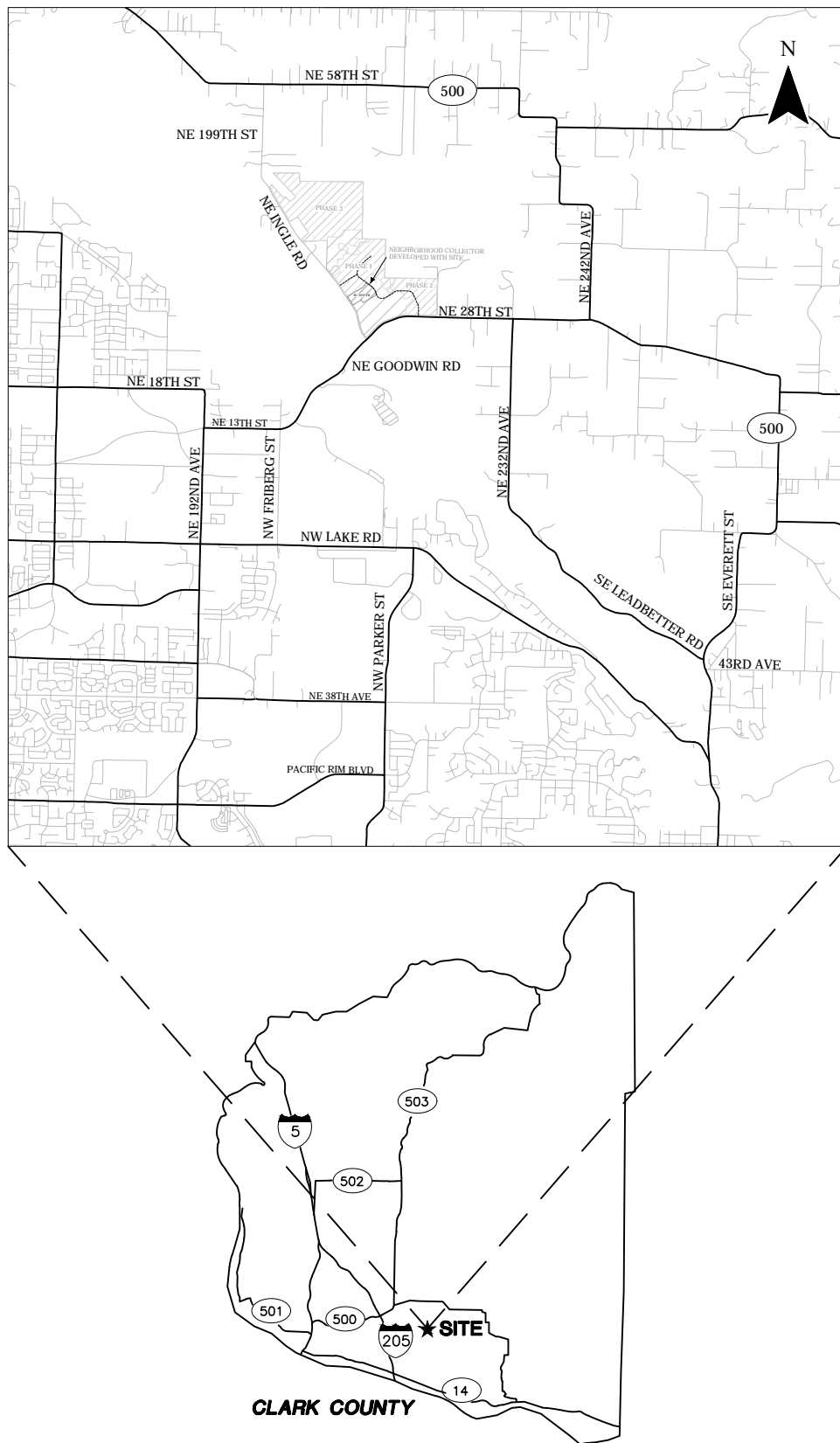
Subject: Transportation Compliance

This memorandum provides transportation compliance documentation supporting the B1 South Phase of the proposed Green Mountain Master Plan development to be located immediately east of NE Ingle Road and north of NE Goodwin Road in Camas, Washington. The contents of this memorandum are based on the recommendations provided in the *Green Mountain Master Plan Transportation Impact Analysis (TIA)*, prepared by Kittelison & Associates, Inc. and dated June 2014 (provided in *Appendix A*). This memorandum documents current project phase trip generation relative to the overall master plan and the applicability of mitigation measures identified in the master plan TIA to the current phase of development.

BACKGROUND

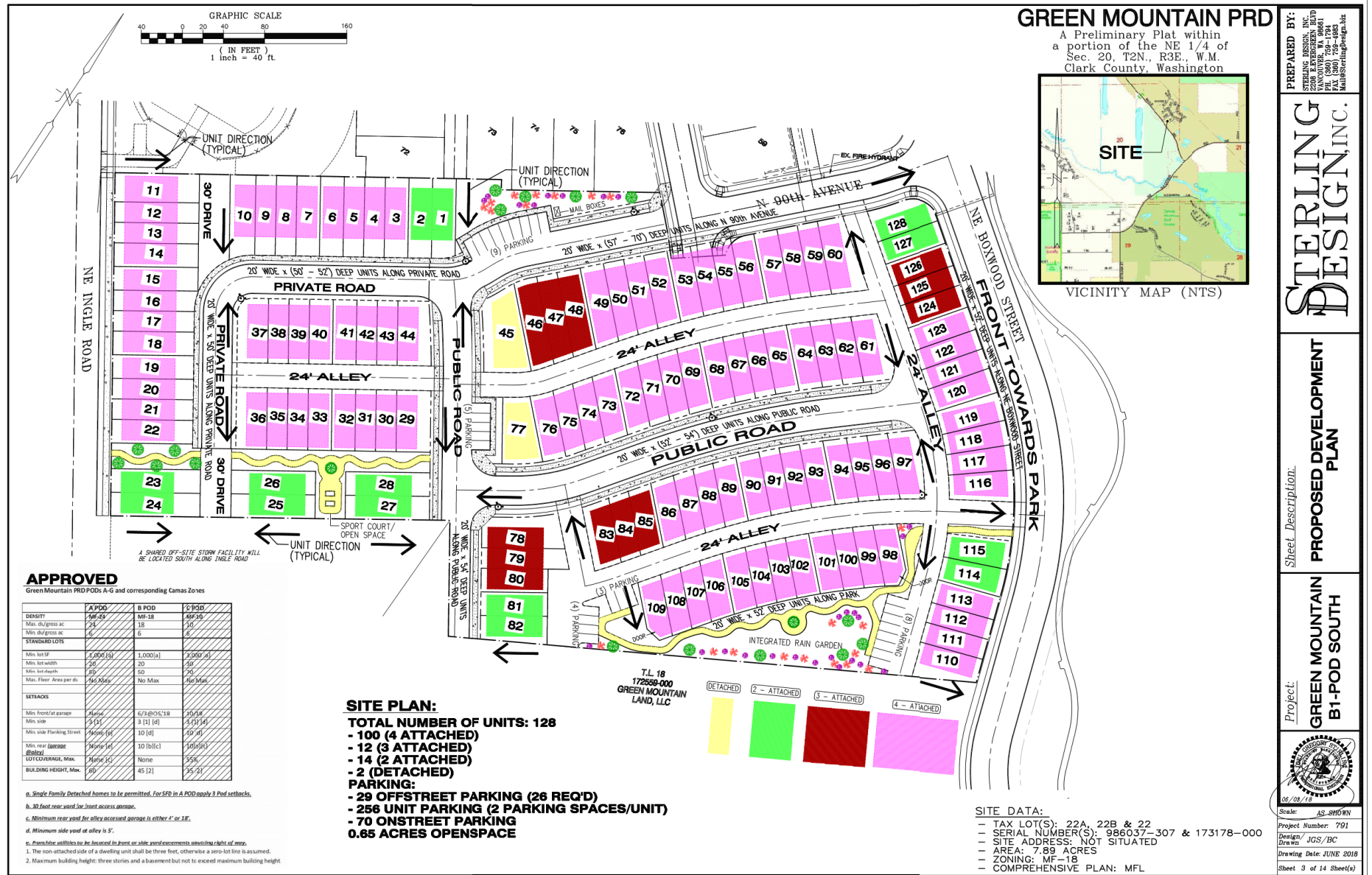
The TIA for the Green Mountain Master Plan provided a near- and long-term analysis for full buildout of the Green Mountain site, including 283-acres of mixed-use development. A mix of residential and commercial uses is planned for the full site in accordance with the zoning. The master plan assumed eight phases of the development, the first, second and third of which are currently underway.

Figure 1 illustrates the site vicinity and location of the Master Plan site, as well as the B1 South Phase. Development of the B1 South Phase of the site is currently proposed, with the site plan shown in Figure 2. This phase consists of 128 residential units accessed via the public roadway connection to NE Ingle Road built with Phase 1. The Phase 1 site plan is provided in *Appendix B* for reference, as the B1 South Phase is located immediately south of the site.



Site Vicinity
Camas, Washington

Figure
1



Conceptual Site Plan
Camas, Washington

Figure
2

SCOPE OF THE REPORT

This analysis identifies the transportation-related impacts associated with the B1 South Phase of the proposed Green Mountain Master Plan development and was prepared in accordance with the recommendations outlined in the Master Plan TIA. It documents the following:

- The number of site-generated trips (daily, weekday AM peak hour, weekday PM peak hour) estimated with the B1 South Phase.
- The number of site-generated trips (daily, weekday AM peak hour, weekday PM peak hour) previously debited by approved site development applications on the master plan site.
- An accounting of the number of site-generated trips (daily, weekday AM peak hour, weekday PM peak hour) remaining assuming approval of the B1 South Phase subdivision application.
- Evaluation of outstanding mitigation needs (as appropriate consistent with the Master Plan recommendations) involving:
 - Assessment of proportionate share contribution at NE 199th Avenue/NE 58th Street (SR 500);
 - NE Ingle Road/NE Goodwin Road intersection operations; and
 - Assessment of proportionate share contribution at NE 192nd Avenue/NE 13th Street intersection.
- On-site access and circulation.
- Conclusions and recommendations.

ANALYSIS METHODOLOGY

As with the Master Plan TIA, all level of service analyses described in this report were performed in accordance with the procedures stated in the *2010 Highway Capacity Manual* (Reference 1).

To ensure that this analysis was based on a reasonable worst-case scenario, the peak 15 minute flow rate during the peak hour analysis periods was used in the evaluation of all intersection levels of service. For this reason, the analysis reflects conditions that are only likely to occur for 15 minutes out of each average peak hour.

CURRENT PROPOSED DEVELOPMENT PLAN

The B1 South Phase consists of 124 attached units and 2 single-family detached homes and is expected to be completed by 2020. It is located in the southwest portion of the overall site, directly south of Phase 1. Access will be provided via the neighborhood collector built with Phase 1, which connects to NE Ingle Road. In the future, this neighborhood collector will connect to Phase 3 of the site.

Trip Generation

Trip generation estimates for the proposed development were generated based on information provided in the standard reference manual *Trip Generation, 9th Edition* published by the Institute of Transportation Engineers (ITE – Reference 2). Table 1 summarizes the daily, weekday AM, and weekday PM peak-hour trips for the B1 South Phase assumed development.

Table 1: Trip Generation Estimate – B1 South Phase

Land Use	ITE Code	Size	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Residential Condominium/ Townhouse	230	124 units	720	55	9	46	65	43	22
Single-Family Detached Housing	210	2 units	20	2	1	1	2	1	1
Total Residential (126 units)			740	57	10	47	67	44	23

Table 2 summarizes the overall master plan trip generation and then deducts for the cumulative Phase 1¹, Phase 2¹ Phase 3, and B1 South Phase trips to summarize the number of net new trips that will remain vested.

¹ While previous traffic analysis assumed 215 units in Phase 1, Phase 1 as platted consists of 201 units. While previous traffic analysis assumed 230 units in Phase 2, Phase 2 is now platted for 228 units. The updated trip totals are shown in Table 2.

Table 2: Master Plan Trip Generation and Build-out Debiting (Includes Phase 1, 2 and 3)

Land Use	ITE Code	Size	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Apartment	220	536 units	3,570	275	55	220	330	215	115
Single-Family Detached Housing	210	764 units	7,270	575	145	430	765	480	285
Total Residential (1,300 units)			10,840	850	200	650	1,095	695	400
Internalization (6% Daily,54% PM)			630	0	0	0	60	30	30
Shopping Center	820	90,000 square feet	6,340	145	90	55	560	270	290
Internalization (10% Daily, 11% PM)			630	0	0	0	60	30	30
Pass-By Trips (34%)			1,940	50	25	25	170	85	85
Total Vested Trips			17,180	995	290	705	1,655	965	690
Less Internalization			1,260	0	0	0	120	60	60
Less Pass-by trips			1,940	50	25	25	170	85	85
Vested Net New Trips for Full Build-out			13,980	945	265	680	1,365	820	545
Deduct for Net New Trips for Phase 1			1,914	150	40	110	200	125	75
Deduct for Net New Trips for Phase 2			2,170	170	40	130	230	145	85
Deduct for Net New Trips for Phase 3			1,514	120	30	90	160	100	60
Deduct for Net New Trips for B1 South Phase¹			740	55	10	45	70	45	25
Remaining Trips			7,642	450	145	305	705	405	300

¹Consistent with the accounting for the other phases, peak hour trips have been rounded to the nearest five trips for the overall trip generation debiting.

As seen in Table 2, after accounting for Phase 1, Phase 2, Phase 3 and B1 South Phase development, a total of 7,642 daily; 450 weekday AM peak hour; and 705 weekday PM peak hour trips remain in the master plan approval.

Trip Distribution and Assignment

The distribution of site-generated trips onto the study area roadway system was estimated utilizing the trip distribution provided in the Master Plan TIA. Appendix C illustrates the trip assignment.

EVALUATION OF OUTSTANDING MITIGATION NEEDS

The Master Plan TIA identified recommended mitigations for intersections not meeting standards under background and/or total traffic conditions. As part of each phase's transportation compliance letter, the TIA recommended evaluation of the following:

- Need for an eastbound right-turn lane at NE 199th Avenue/NE 58th Street (SR 500). As part of the Phase 3 Transportation Compliance Letter, this recommendation was adapted to provide a proportionate share contribution to a future roundabout, per direction from WSDOT.
- NE Ingle Road/NE Goodwin Road operations (including traffic signal warrant analysis).

- Assessment of proportionate share contribution at NE 192nd Avenue/NE 13th Street.

NE 199th Avenue/NE 58th Street (SR 500)

The Master Plan TIA recommended that future subdivision applications provide an updated assessment as to the potential need for providing a right-turn taper or lane at NE 199th Avenue/NE 58th Street (SR 500), considering both the need for a right-turn taper or lane and delay with the northbound left-turn. Based on subsequent discussions with WSDOT and Clark County staff, WSDOT has identified a single-lane roundabout as the preferred mitigation at the intersection in lieu of installation of a westbound right-turn lane. Recognizing the cost of designing and constructing a roundabout exceeds the impacts associated with the Green Mountain Master Plan and represents an “ultimate” long-term improvement need, WSDOT and Clark County will coordinate to administer a proportionate share impact mitigation methodology.

Payment of proportionate share mitigation towards the future roundabout will allow Green Mountain Master Plan development (as well as other subsequent development) a basis to satisfy transportation concurrency while providing a funding mechanism to allow the public agencies to advance intersection improvements. The proportionate cost share of intersection improvements attributable to Green Mountain B1 South Phase will be based on weekday PM peak hour trips through the intersection. The B1 South Phase is projected to add 14 site-generated trips to the intersection during the weekday PM peak hour (refer to Appendix C).

NE Ingle Road/NE Goodwin Road

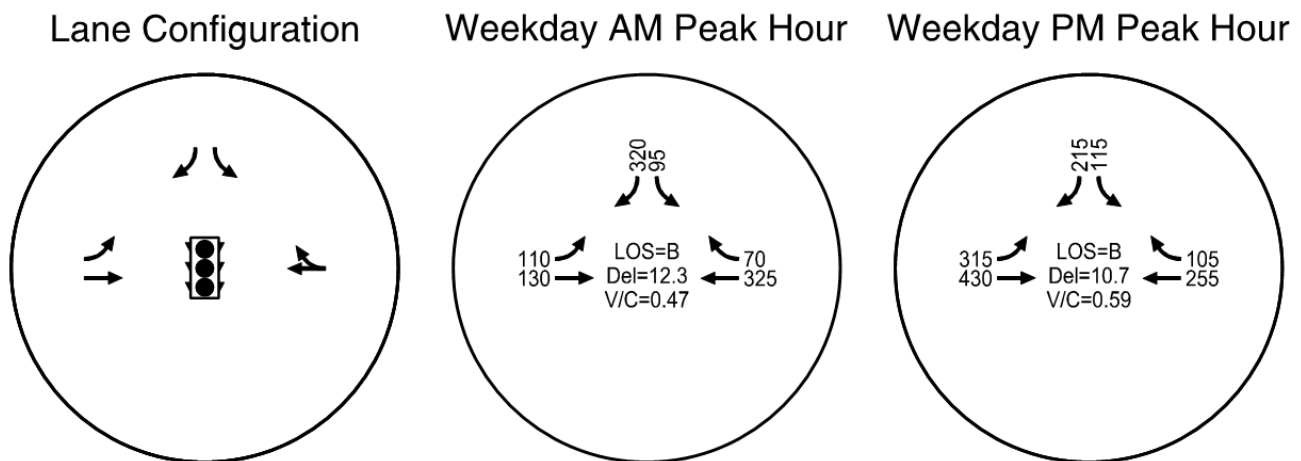
In the Master Plan TIA, the intersection of NE Ingle Road/NE Goodwin Road was projected to not meet City of Camas intersection operating standards in the 2029 background conditions during the weekday PM peak hour and the 2029 total traffic conditions during both the weekday AM and PM peak hours. Therefore, the following series of mitigations were recommended in conjunction with the Master Plan development:

- Construct an eastbound left-turn lane on NE Goodwin Road at NE Ingle Road with the first Phase 1 trip (*completed*).
- Construct a westbound right-turn lane on NE Goodwin Road at NE Ingle Road with the 203rd Phase 1 trip (prior to occupancy of 203rd single family home on site). The right-turn lane should provide at least 100 feet of storage (*this improvement was reprioritized after signalization of NE Goodwin Road at NE Ingle Road. It is anticipated that the right-turn lane will be constructed prior to or in-conjunction with completion of the phase that fronts Goodwin Road in the turn-lane area*).

- Construct a three-lane roadway section (with center two-way left-turn lane) on NE Goodwin Road along the site frontage in conjunction with standard frontage improvements as adjacent development occurs (*will be constructed with Phase 2 development*).
- Upon completion of Phase 1 site development (including construction of the eastbound left-turn lane on NE Goodwin Road at NE Ingle Road with Phase 1), the developer shall monitor the need for installation of a traffic signal with each future subdivision application at the intersection and construct a traffic signal when the intersection no longer satisfies City of Camas performance standard (LOS "D" and v/c of 0.90 or better) and the intersection volumes meet traffic signal warrants (subject to direction from the City of Camas) (*recommended with Phase 3 site development*).

Signalized intersection operations are provided in Exhibit 1 assuming Phase 1, Phase 2, Phase 3 and B1 South Phase site development as well as approved background traffic. Given ongoing construction activity in the area, traffic counts previously collected in October 2016 for the Phase 2 TCL were used with four years of growth added² to inform an updated operations analysis. The count sheets are provided in Appendix D. Appendix E contains the 2020 total traffic conditions traffic operations worksheets.

Exhibit 1: NE Ingle Road/NE Goodwin Road 2020 Total Traffic Lane Configuration and Operations



As seen in Exhibit 1, with buildout of the B1 South Phase and the prior approved master plan development phases, the intersection is projected to satisfy City of Camas performance standard (LOS "D" and v/c of 0.90 or better).

² Based on direction provided in the original traffic study, a 1% growth was applied to City of Camas roadways.

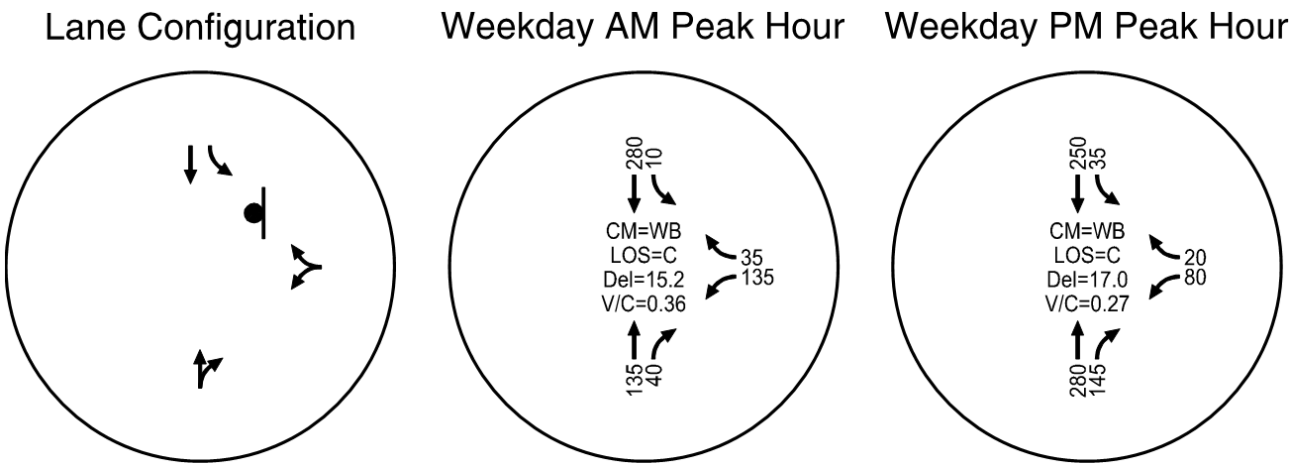
NE 192nd Avenue/NE 13th Street

The Master Plan TIA identified a proportionate cost sharing methodology to fund future construction of a northbound right-turn lane and a westbound right-turn lane on NE 13th Avenue at NE 192nd Avenue, provided in *Appendix F*. Under this methodology, each weekday PM peak hour trip would be assessed a fee of \$391. Based on the B1 South Phase trip assignment (refer to *Appendix C*), the B1 South Phase adds 31 trips to the intersection of NE 192nd Avenue/NE 13th Street and therefore should be responsible for contributing \$12,121 towards future improvements at the intersection.

ON-SITE CIRCULATION AND OPERATIONS

As seen in Figure 2, the B1 South Phase is located in the southwest portion of the overall site, immediately south of Phase 1. Access will be provided via a local roadway off the neighborhood circulator that connects to NE Ingle Road, developed with Phase 1. The neighborhood circulator will be located along the east edge of the B1 South Phase and connect to Phase 2 and NE 28th Street in the future. All trips were assumed to utilize the neighborhood circulator access on NE Ingle Road developed with Phase 1. The Phase 1 access was analyzed in the April 2015 memorandum *Phase 1 Access Assessment*, provided in *Appendix G*. Operations were reassessed with the additional B1 South Phase trips, as well as through trips on NE Ingle Road associated with prior approved phases and background growth. The weekday AM and PM peak hour operations are shown in Exhibit 2. *Appendix E* contains the traffic operations worksheets.

Exhibit 2: NE Ingle Road Neighborhood Circulator Site Access – 2020 Total Traffic Lane Configuration and Operations



As seen in the exhibit, the access is projected to operate acceptably during both the weekday AM and PM peak hours. The anticipated 95th percentile queueing is provided in Table 3. Queues are rounded up to the nearest 25 feet.

Table 3: NE Ingle Road/Neighborhood Circulator Site Access Queueing – 2020 Total Traffic Conditions

Intersection	Movement	95 th Percentile Queue (feet)	
		Weekday AM Peak Hour	Weekday PM Peak Hour
Ingle Road/Neighborhood Circulator (Site Access)	Westbound left-/right-turn	50	50
	Northbound right-turn/through	<25	<25
	Southbound left-turn	<25	<25

As seen in Table 5, 95th percentile queues are anticipated to be two vehicles or less during the weekday AM and PM peak hours.

FINDINGS AND RECOMMENDATIONS

Based on the results of the transportation compliance letter, the B1 South Phase of the Green Mountain Master Plan can be developed while maintaining acceptable levels of service at the study intersections assuming provision of identified off-site mitigation measures. The primary findings and recommendations of this study are summarized below.

Trip Generation

- Phase B1 South includes 124 attached units and 2 single family homes and is estimated to generate 740 daily trips, 57 net new AM peak hour trips, and 67 net new PM peak hour trips.
- After accounting for Phases 1-3 and the B1 South Phase site development; a total of 7,642 daily; 450 weekday AM peak hour; and 705 weekday PM peak hour trips remain vested in the master plan approval.

NE 199th Avenue/NE 58th Street (SR 500) Intersection

- WSDOT has identified a single-lane roundabout as the preferred long-term improvement at the intersection.
- A proportionate share impact methodology will be developed in cooperation with Clark County and WSDOT to support future design and construction of a roundabout.
- Green Mountain Phase 3, B1 South Phase and other subsequent developments adding trips to the intersection will be assessed a proportionate share mitigation payment based on the number of peak hour trips they add to the intersection.
- The B1 South Phase is projected to add 14 trips during the weekday PM peak hour.

NE Ingle Road/NE Goodwin Road Intersection

- With the planned signalization (by a prior Master Plan development phase) and addition of trips associated with the B1 South Phase, the intersection of NE Ingle/NE Goodwin Road is projected to satisfy City operating standards.

NE 192nd Avenue/NE 13th Street Intersection

- The B1 South Phase is projected to add 31 weekday PM peak hour trips to the intersection of NE 192nd Avenue/NE 13th Street. This trip impact triggers a proportionate cost share of \$12,121 (\$391 per trip) based on the mitigation methodology presented in the Master Plan TIA.

Recommendations

- The following should be provided in conjunction with Phase 3 site development:
 - Contribution of a proportionate share payment towards design and construction of a single-lane roundabout at the intersection of NE 199th Avenue/NE 58th Street (payment amount to be determined in coordination with WSDOT and Clark County based on 14 PM peak hour trips added).
 - Contribution of \$12,121 towards future improvements at NE 192nd Avenue/NE 13th Street.
 - On-site and off-site landscaping and any above ground utilities at internal roadways should be provided per City of Camas standards.

We trust this letter adequately addresses the traffic impacts associated with the proposed Green Mountain Master Plan B1 South Phase site development. Please contact us if you have questions or comments regarding the contents of this report or the analysis performed.

REFERENCES

1. Transportation Research Board 2010. Highway Capacity Manual. 2010.
2. Institute of Transportation Engineers. *Trip Generation Manual*, 9th Edition. 2012.