

January 28, 2013

Tom Soppe, Associate Planner
City of West Linn
22500 Salamo Road
West Linn, OR 97068

Re: **Supplemental Findings of Transportation Impact Analysis**
City of West Linn Police Station
Project Number 2120180.00

Dear Mr. Soppe:

This letter was prepared as a supplement to the November 9, 2012 Transportation Impact Analysis (TIA) prepared by Group Mackenzie for the proposed West Linn Police Station development. The purpose of this letter is to identify final recommended improvement measures for mitigating the traffic impacts of the police station at the 10th Street/8th Avenue and the 12th Street/Willamette Falls Drive intersections. In addition, this letter identifies how the final recommended mitigation measures comply with the City's transportation approval criteria outlined in Section 85.170B(e)(1) of the Community Development Code (CDC).

CDC Transportation Approval Criteria

Section 85.170B(e)(1) of the CDC identifies the City's transportation approval criteria for development proposals that require a TIA. Subsection (A) of the approval criteria requires that the TIA be prepared by a qualified professional traffic engineer and Subsection (B) addresses the City's Level-of-Service criteria. Additional transportation approval criteria is provided in Subsection (C), which states the following:

"The proposed site design and traffic and circulation design and facilities, for all transportation modes, including any mitigation measures, are designed to:

- 1. Have the least negative impact on all applicable transportation facilities; and*
- 2. Accommodate and encourage non-motor vehicular modes of transportation to the extent practicable; and*
- 3. Make the most efficient use of land and public facilities as practicable; and*
- 4. Provide the most direct, safe, and convenient routes practicable between on-site destinations, and between on-site and off-site destinations; and*
- 5. Otherwise comply with applicable requirements of the City of West Linn Community Development Code."*

The approval criteria specified in Subsection (C) was not specifically addressed in the original TIA, but is addressed here in this letter to reinforce the final recommended improvement measures.

Traffic Mitigation Measures for 10th Street/8th Avenue Intersection

Background

The original TIA identified and recommended a single solution to mitigate the traffic impacts of the proposed West Linn Police Station at this intersection. This included eliminating the northbound left-turn lane on the 10th Street approach by constructing a raised pedestrian refuge, and restricting any potential left-turns from the through lane by installing “NO LEFT TURN” signage. The merits of this solution, as identified in the TIA, were as follows:

- A northbound left-turn restriction decreases conflicts between vehicular traffic movements, thereby decreasing traffic delay (improving LOS) for the stop-controlled movements, particularly for the more critical eastbound left-turn movement.
- Eliminating northbound left-turns moves in the direction of meeting the planned improvements for this intersection, as identified in the City’s TSP.
- Providing a pedestrian refuge across 10th Street improves pedestrian/transit user safety by allowing pedestrians to cross the street in two stages.
- The left-turn restriction is for a low-volume movement. Affected traffic will redirect easily to 12th Street on Willamette Falls Drive to access 8th Avenue.

Although the original mitigation measure was determined to comply the City’s Level-of-Service standard and several criteria in Subsection (C), additional research was conducted to identify, evaluate, and recommend a final alternative solution that complies with all elements of the City’s transportation approval criteria.

Alternatives Analysis

In researching an alternative solution, a “time-of-day” left-turn restriction was evaluated as a possible option in lieu of the previous solution to restrict left-turns at all times of the day. As identified in the TIA, the weekday PM peak hour is the most critical time period when intersection volumes reach their highest levels and when traffic delays for the critical stop-controlled left-turn movement on the eastbound approach of 8th Avenue becomes excessive. The TIA also showed that restricting left-turns on the northbound approach of 10th Avenue during the weekday PM peak hour would fully mitigate the increased traffic delay caused by the police station on the 8th Avenue approach, thus, satisfying the City’s level-of-service criteria. Therefore, restricting left-turns only during the critical weekday PM peak period (4-6 PM) would continue to satisfy this standard. Also, as noted in the TIA (See Table 5), traffic operations are adequate during the weekday AM peak hour with no left-turn restriction in place.

A left-turn restriction enforced only on weekdays from 4-6 PM would satisfy other elements of the City's transportation approval criteria. First, by allowing drivers to make left-turns at all other times of the day and on weekends when traffic levels are lower, Criteria (C1) would be satisfied, as it would have the least negative impact on the street system. Also, Criteria (C4) would be satisfied as this solution will maintain the most direct and convenient route to the extent practicable for local drivers destined for the land uses along 8th Avenue, west of 10th Street.

To address the remaining transportation approval criteria of Subsection (C), the previous concept of installing a raised pedestrian refuge on 10th Avenue was revisited. Although this concept would have enhanced pedestrian safety and would have clearly satisfied Criteria (C2), the construction of the raised island refuge would not be located in its ultimate location, per the City's future corridor plan for 10th Avenue. Therefore, construction of the refuge and need for its subsequent removal would not make the most efficient use of public facilities, in violation of approval criteria (C3).

In identifying an alternative solution to the raised pedestrian refuge, the concept of physically maintaining the left-turn lane striping on the 10th Street approach was evaluated. However, such a concept was determined to be unsafe when combined with the "time-of-day" left-turn restriction evaluated above. With an open left-turn lane, drivers may enter the turn pocket when the left-turn restriction is in force, creating a hazardous condition whereby drivers will either choose to make the left-turn illegally or be forced to merge back into the through travel lane. In either case, an unsafe situation would be created, in violation of Criteria (C4).

A final concept was identified to eliminate the left-turn lane northbound on 10th Avenue through the use of striping alone. This final solution is depicted in the attached Figure 1. As shown, the left-turn lane is removed by striping out the median lane, thus forcing all left-turn maneuvers to occur from within the shared through lane. Under this condition, left-turn drivers will not be trapped when the left-turn restriction is in effect and can proceed straight through the intersection safely, thus satisfying the safety element of Criteria (C4). Also, by forcing left-turn movements to occur from the through lane, the left-turn restriction sign posted on the right-hand side of the street will be clearly visible to approaching drivers.

It should be emphasized that the final concept to remove the left-turn lane on 10th Street maintains the crosswalk on this approach. Therefore, pedestrians will continue to be accommodated, and with the added benefit of a striped refuge area, Criteria (C2) is satisfied.

Conclusions

Based on the findings above and in order to meet the City's transportation approval criteria, the following improvements are recommended for the 10th Street/8th Avenue intersection:

- Eliminate northbound left-turn lane striping on 10th Street approach and install cross-hatch striping.
- Allow left-turn movements to be made from the northbound through lane on 10th Street, but restrict left-turns during the weekday PM peak period by installing signage stating "NO LEFT TURN - WEEKDAYS 4 PM - 6 PM".

12th Street/Willamette Falls Drive

Background

Two options were identified in the original TIA to mitigate the traffic impacts of the proposed West Linn Police Station at this intersection. These options and their merits were described as follows:

- Option 1: Provide short 50-foot left-turn “pockets” on the eastbound and westbound approaches of Willamette Falls Drive.
 - Left-turn pockets remove left-turning traffic from the through traffic stream, preventing vehicle blockage, thus allowing all movements to function more efficiently.
 - Short 50-foot pockets do not significantly affect on-street parking along Willamette Falls Drive. More storage length can be provided at the expense of on-street parking if necessary.
 - Left-turn pockets can be provided without any intersection widening.
- Option 2: Change two-way stop-control to all way stop-control, install crosswalks and provide left-turn “pockets” on the eastbound and westbound approaches of Willamette Falls Drive.
 - Left-turn pockets remove left-turning traffic from the through traffic stream, preventing vehicle blockage, thus allowing all movements to function more efficiently.
 - Short 50-foot pockets do not significantly affect on-street parking along Willamette Falls Drive. More storage length can be provided at the expense of on-street parking if necessary.
 - Left-turn pockets can be provided without any intersection widening.
 - All way stop-control and striped crosswalks enhances pedestrian crossing safety.
 - Reduces delay to side-street drivers.
 - Added delay to eastbound users discourages cut-through travel on Willamette Falls Drive.

Although both options above were recommended as potential solutions, additional research was conducted to identify whether or not a more viable solution exists, and to recommend a final alternative that substantially complies with the City’s transportation approval criteria.

Alternatives Analysis

Recent technical analysis supplied by the City and prepared by DKS Associates for the 10th Street corridor and surrounding area indicates a potential future need for a traffic signal installation at the 12th Street/Willamette Falls Drive intersection. However, the analysis findings emphasized that any signalization at this intersection should be preceded by a traffic signal installation at the 10th Street/Willamette Falls Drive intersection. Given the 10th/WFD intersection is currently all-way stop controlled and forecast to operate at levels which meet the City’s Level-of-Service standards with the proposed police station in place, a traffic signal at 12th/WFD would be premature. Also, as

noted in the TIA, MUTCD traffic volume-based warrants for a traffic signal at 12th/WFD are not satisfied.

Furthermore, it should be emphasized that eastbound vehicle queues on Willamette Falls Drive commonly extend up to and through the 12th/WFD intersection during the critical weekday PM peak hour period. So drivers heading eastbound on WFD are already experiencing delays from the stop-and-go effect of queues. This queuing condition is caused by the metering effect of the all-way stop control present at 10th/WFD intersection further downstream, and until that intersection is converted to a traffic signal as planned, the eastbound vehicle queuing and back-up pattern will remain.

Further analysis was conducted for the all-way stop-control intersection solution (Option 2) to evaluate the impacts of all-way stop control on driver delay along Willamette Falls Drive during other peak and off-peak periods besides the critical PM peak hour. Based on additional analysis of the weekday AM peak hour traffic condition in the year 2014 post-development scenario, average driver delays on both Willamette Falls Drive approaches will be low, at less than 8.0 seconds, which equates to a LOS "A" condition. The operations analysis results are attached to this letter for reference.

Considering the findings of the TIA, and the technical findings above, a traffic signal installation is not warranted and would be premature for the 12th/WFD intersection. Instead, the all-way stop control measure previously described as Option #2 is the final recommended mitigation measure. Supportive reasons are as follows:

- As explained in the *Mitigated Analysis Results* section of the TIA, all-way stop control will assist other turning movements that need to occur at this intersection, resulting in acceptable levels of delay (LOS "B" or better) on 3 out of 4 intersection legs during the critical PM peak hour. Operations will be adequate on all approaches during the AM peak hour. Based on these findings, the City's Level-of-Service standards are substantially satisfied.
- As stated herein, delays associated with the eastbound PM vehicle queuing pattern on WFD will remain regardless of whether the eastbound approach to 12th/WFD is uncontrolled or stop-controlled. Therefore, the recommended solution will have the least negative impact on the street system, consistent with Criteria (C1).
- The all-way stop solution will allow pedestrians associated with the nearby grade-school and bus transit stops, as well as patrons of the local business district to cross the intersection more safely, thus satisfying Subsection (C2) of the transportation approval criteria.
- The installation of short left-turn pockets on WFD within the available street width and stop signs posted on all approaches makes the most efficient use of this public facility by maximizing capacity without substantial intersection enhancements, thus satisfying Subsection (C3).
- All-way stop control will provide the most direct, safe, and convenient routes between on- and off-site destinations, by allowing all users of 12th Street to access WFD more easily, thus satisfying Subsection (C4).

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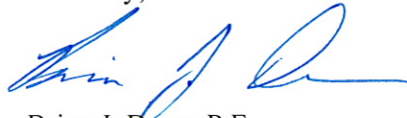
Conclusions

Based on the findings above and in order to meet the City's transportation approval criteria, the following improvements are recommended for the 12th Street/WFD intersection:

- Implement all way stop-control with STOP signs posted on all approaches.
- Install crosswalks on all approaches.
- Stripe in left-turn "pockets" on the eastbound and westbound approaches of Willamette Falls Drive.

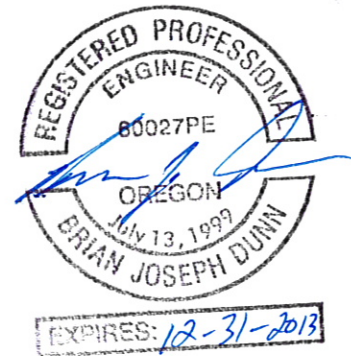
We hope this supplemental letter adequately addresses final mitigation measures necessary to support the West Linn Police Station development. If City staff has any further questions or comments regarding this letter and the transportation impact analysis prepared for the proposed land use action, please feel free to call.

Sincerely,



Brian J. Dunn, P.E.
Traffic Engineer

c: Bob Galante – City of West Linn





NOT TO SCALE



MITIGATION: STRIPE PEDESTRIAN REFUGE IN PLACE OF NORTHBOUND LEFT-TURN LANE. INSTALL "NO LEFT TURN" SIGNAGE. EXTEND SOUTHBOUND LEFT-TURN LANE AT WILLAMETTE FALLS DRIVE.

①
R3-2
WITH
R10-20A
PLAQUE



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DATE: 1.23.13
DRAWN BY: JRB
CHECKED BY: BJD
JOB NO:
2120180.00

RECOMMENDED MITIGATION
10th STREET/8th AVENUE

WEST LINN POLICE STATION
WEST LINN, OREGON

FIGURE
1



NOT TO SCALE



**MITIGATION: STRIPE EAST/WESTBOUND LEFT-TURN LANE
POCKETS.
ADD EAST/WESTBOUND STOP SIGNS TO PROVIDE
ALL-WAY STOP-CONTROL.**

2
R1-1
WITH
R1-3P
PLAQUE



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RECOMMENDED MITIGATION
WILLAMETTE FALLS DR./12th
WEST LINN POLICE STATION
WEST LINN, OREGON

FIGURE
2

4: 12th Street & Willamette Falls Drive Performance by lane

Lane	EB	EB	WB	WB	NB	SB	All
Movements Served	L	TR	L	TR	LTR	LTR	
Denied Del/Veh (s)							0.2
Total Del/Veh (s)	3.7	7.3	4.4	6.9	5.8	4.5	6.5