# IPCO Site Expansion & Independent Way Street Connection

## Traffic Impact Analysis

November 11, 2013 (Original Report)
Amended February 5, 2015

Prepared By:

Southern Oregon Transportation Engineering, LLC

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# I. EXECUTIVE SUMMARY

## Summary

Southern Oregon Transportation Engineering, LLC prepared a traffic impact analysis for a proposed IPCO site expansion and street connection of Independent Way from Washington Street to Tolman Creek Road in Ashland, Oregon. The extent of the impact area included Tolman Creek Road to the west, Ashland Street (OR 66) to the north, railroad tracks to the south, and Interstate-5 to the east.

A traffic analysis is required by the City of Ashland to evaluate potential development impacts to the transportation system. Four key intersections were included in the study area and evaluated during the p.m. peak hour, which was shown to be the peak hour of the day. These included:

1. Tolman Creek Road / Ashland Street (OR 66)
2. Washington Street / Ashland Street (OR 66)
3. Proposed Independent Way / Tolman Creek Road
4. Proposed Independent Way / Washington Street

The proposed IPCO site expansion is planned to begin in the design year 2015 with or without an Independent Way street connection. An existing year 2013 analysis was performed to create a base year. Additional analyses were evaluated with and without a street connection under design year 2015 and future year 2034 conditions during the p.m. peak hour.

## Recommendations and Conclusions

The findings of the traffic impact analysis conclude that Phase 1 development of the proposed IPCO site expansion in the design year 2015 can be accommodated on the existing transportation system with or without an Independent Way street connection. By the future year 2034, background growth causes the signalized intersection of Tolman Creek Road/ Ashland Street (OR 66) to exceed its performance standard, with or without the proposed IPCO site expansion and with or without an Independent Way street connection. Full build out of the IPCO site in the future year 2034 is shown to increase the intersection v/c ratio 0.01 more than no-build conditions. The Independent Way street connection is shown to decrease the intersection v/c ratio by 0.07 when compared to no connection. An Independent Way street connection is shown to be beneficial to the surrounding area and provide improvements with increased connectivity and mobility for all transportation modes. The two components evaluated in this traffic analysis included the impacts of an IPCO site expansion and an Independent Way street connection. Results of each are summarized below:

**IPCO Site Expansion**

The IPCO site expansion can be approved with or without an Independent Way street connection in the design year 2015. By the future year 2034, the signalized intersection of Tolman Creek Road / Ashland Street (OR 66) exceeds its performance standard with full build out (phases 1-2) of the IPCO site. This also occurs under year 2034 no-build conditions. The IPCO site is shown to benefit from an Independent Way street connection, but can function adequately with its current access points to Tolman Creek Road with minor improvements by the year 2034. Minor improvements include:

1. Removing on-street parking along Tolman Creek Road and striping a center two-way-left-turn-lane (TWLTL) at the northern IPCO site driveway (or Independent Way street connection) to provide vehicle refuge for the southbound left turn movement. This is recommended based upon 95th percentile queue lengths and turn lane criterion under build conditions. To provide the most benefit along Tolman Creek Road, the TWLTL should transition from the northbound left turn lane at the signalized intersection of Tolman Creek Road / Ashland Street and extend to a point south of the proposed Independent Way street connection. To provide a minimum benefit, the TWLTL should be designed to accommodate a queue length of 100 feet.

**Independent Way Street Connection**

Improvements on Tolman Creek Road and at the signalized intersection of Tolman Creek Road / Ashland Street (OR 66) are recommended as a result of background growth in the surrounding area, with or without an Independent Way street connection. With the Independent Way street connection, traffic from Tolman Creek Road and Washington Street re-routes, which is an overall improvement to the area, but still produces queuing and operational impacts. All study area intersections operate acceptably under existing year 2013 and design year 2015 conditions, but improvements are recommended by future year 2034 conditions to facilitate the expected background growth in the area. These improvements include:

2. The addition of an exclusive northbound right turn lane or second westbound left turn lane at the signalized intersection of Tolman Creek Road / Ashland Street (OR 66). Either one of these improvements adequately mitigates the intersection operationally and will be required under no-build conditions as a result of background growth by the future year 2034.

3. Extend the northbound left turn pocket on Tolman Creek Road at Ashland Street (OR 66) to accommodate existing and future queue lengths. The northbound left turn lane storage is at capacity under existing year 2013 conditions and is exceeded by the design year 2015. The storage length requirement is 125' in the design year 2015 and 375' by the future year 2034. Proposed mitigation includes removing parking on Tolman Creek Road and re-striping to extend the northbound left turn pocket to include 400' of storage and an adequate transition. As was recommended with the IPCO site expansion, a TWLTL is recommended along Tolman Creek Road from the transition of the northbound left turn lane at Ashland Street to a point south of the Independent Way street connection to support future queuing and congestion along Tolman Creek Road.

# II. INTRODUCTION

## Background

Southern Oregon Transportation Engineering, LLC prepared a traffic impact analysis for a proposed IPCO site expansion and street connection of Independent Way from Washington Street to Tolman Creek Road in Ashland, Oregon. The extent of the impact area included Tolman Creek Road to the west, Ashland Street (OR 66) to the north, railroad tracks to the south, and Interstate 5 to the east.

A traffic analysis is required by the City of Ashland to evaluate potential development impacts to the transportation system. This analysis was also coordinated with the Oregon Department of Transportation (ODOT). Four key intersections were included in the study area and evaluated during the p.m. peak hour, which was shown to be the peak hour of the day. These included:

1. Tolman Creek Road / Ashland Street (OR 66)
2. Washington Street / Ashland Street (OR 66)
3. Proposed Independent Way / Tolman Creek Road
4. Proposed Independent Way / Washington Street

The proposed IPCO site expansion is planned to begin in the design year 2015 with or without an Independent Way street connection. An existing year 2013 analysis was performed to create a base year. Additional analyses were evaluated with and without a street connection under design year 2015 and future year 2034 conditions during the p.m. peak hour.

## Project Location

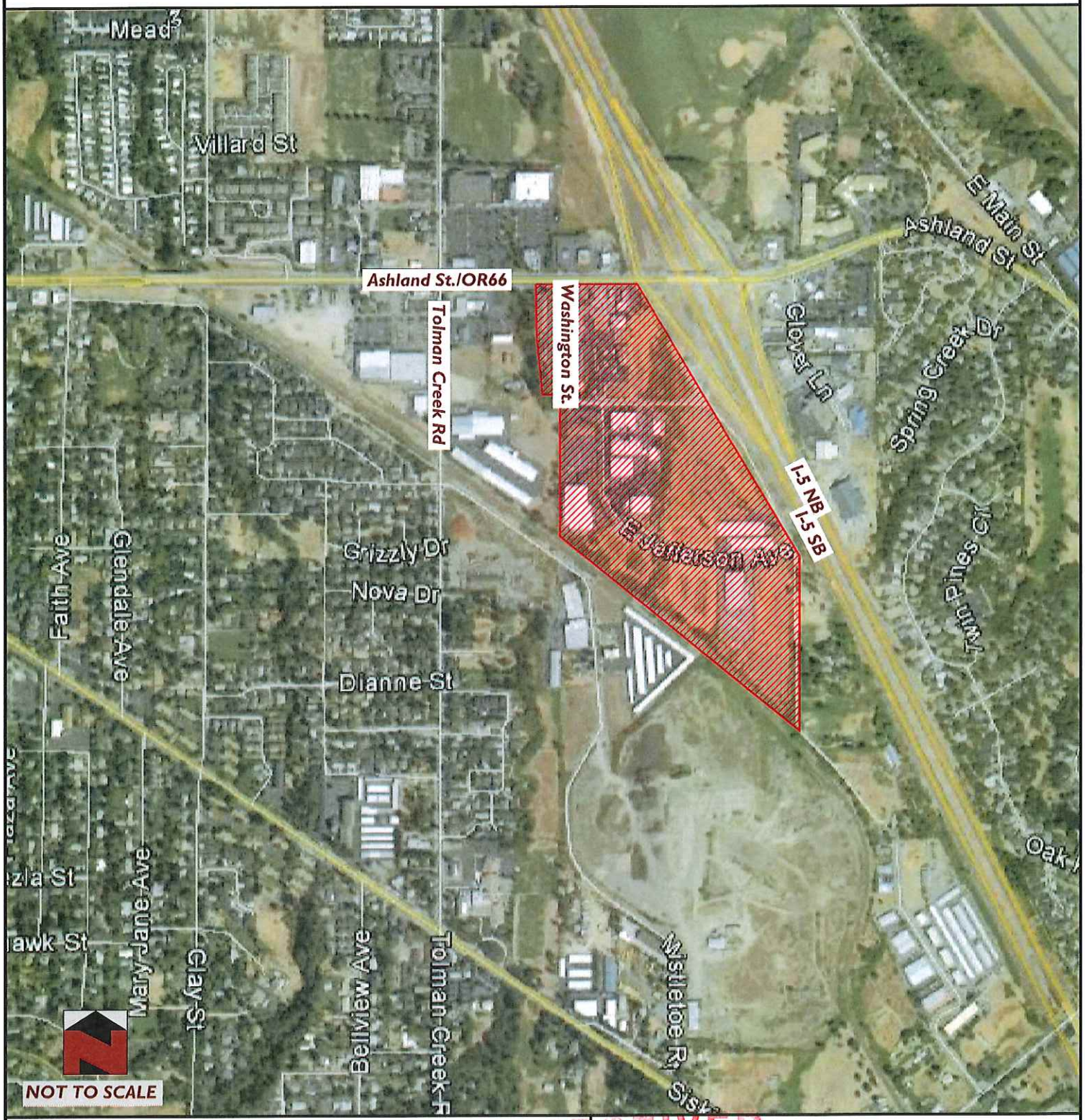
The proposed IPCO site is bounded by Tolman Creek Road to the west, Washington Street to the east, railroad tracks to the south, and the proposed Independent Way street connection to the north. Refer to Figure 1 for a vicinity map.

## Project Description

The property for the proposed IPCO expansion currently contains three buildings with plans to add four additional buildings on vacant tax lots. The proposed year 2015 phase 1 expansion of the existing IPCO site includes the addition of a new 26,677 square foot (SF) building and an existing warehouse expansion of 4,970 SF. Proposed phase 1 development will take access from either existing driveways or the proposed Independent Way street connection. A future year 2034 build-out of the IPCO site includes approximately 77,560 SF of new building area. Both phases of development are illustrated in Figure 2A.

Background growth on Washington Street and the proposed Independent Way includes infill from approximately 20 acres of vacant land within a 41.4 acre Jefferson/Washington employment area. Vacant and buildable land within the Jefferson/Washington employment area is illustrated in Figure 2B. Site plans showing buildable areas and square footages within this area are included in Appendix A.

# Figure 1 : Vicinity Map & Study Area

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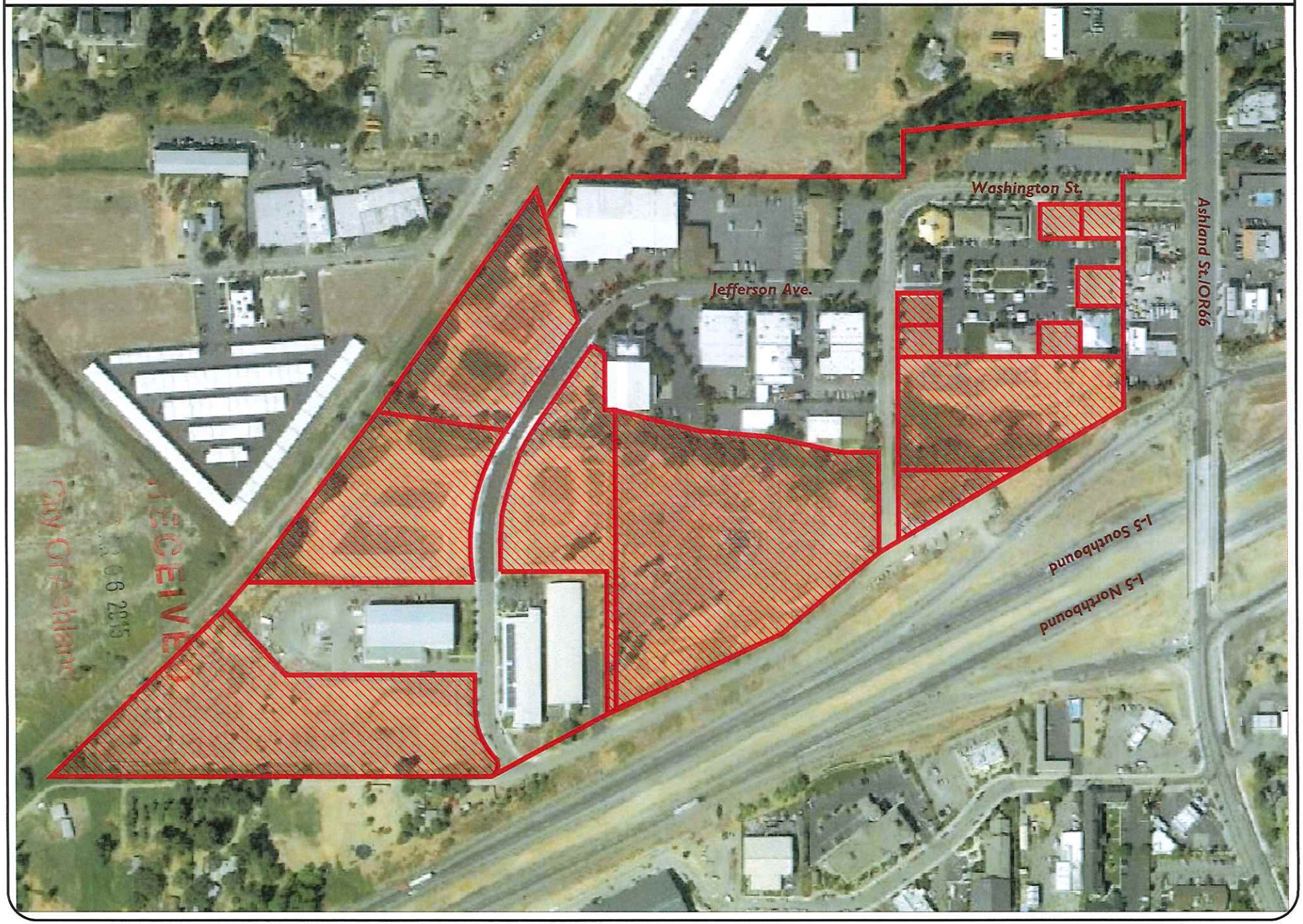
## *Figure 2A : Independent Way and IPCO Site Plan*

## *Figure 2B : Buildable Land Within Jefferson/Washington Employment Area*



# III. EXISTING YEAR 2013 CONDITIONS

## Site Conditions

The proposed IPCO site is located along the east side of Tolman Creek Road, south of Ashland Street (OR 66) on Township 39 Range 1E Section 14BA, including tax lots 500, 600,700, 800, and 900. Access to the site is provided from three existing driveways on Tolman Creek Road approximately 500', 725', and 860' south of Ashland Street (OR 66). Tolman Creek Road is developed to urban standards with one lane in each direction, bike lanes, and sidewalks. The property for the proposed IPCO expansion currently contains three buildings with plans to add four additional buildings on vacant tax lots.

Background growth on Washington Street and the proposed Independent Way is estimated to come from infill of approximately 20 acres of vacant land contained within a 41.4 acre Jefferson/Washington employment area east of IPCO. The infill area includes 35 parcels within Township 39 Range 1E Section 14AB and Section 14AC. Thirteen of the lots are vacant and considered to be buildable by the end of the year 2034 planning horizon. These parcels are currently accessed exclusively by Washington Street, which is partially developed to urban standards with sidewalks along the eastern edge, but no bike lanes.

## Roadway Characteristics

Major roadways included in this study are Ashland Street (OR 66), Tolman Creek Road, and Washington Street. Table 1 provides a summary of existing roadway classifications and descriptions in the study area. The study area roadways, intersection configurations, and intersection controls are illustrated in Figure 3.

**Table 1 - Roadway Classifications and Descriptions**

| Roadway | Cross Section (Lanes) | Functional Classification | Sidewalks | Bike Lanes | Posted Speed |
|---|---|---|---|---|---|
| Ashland Street (OR 66) | 5 | District Highway (ODOT) Boulevard (Ashland) | Yes | Yes | 35 MPH |
| Tolman Creek Road | 2 | Avenue | Yes | Yes | 25 MPH |
| Washington Street | 2 | Avenue | East Side to Jefferson Ave | No | 25 MPH |

## Traffic Counts

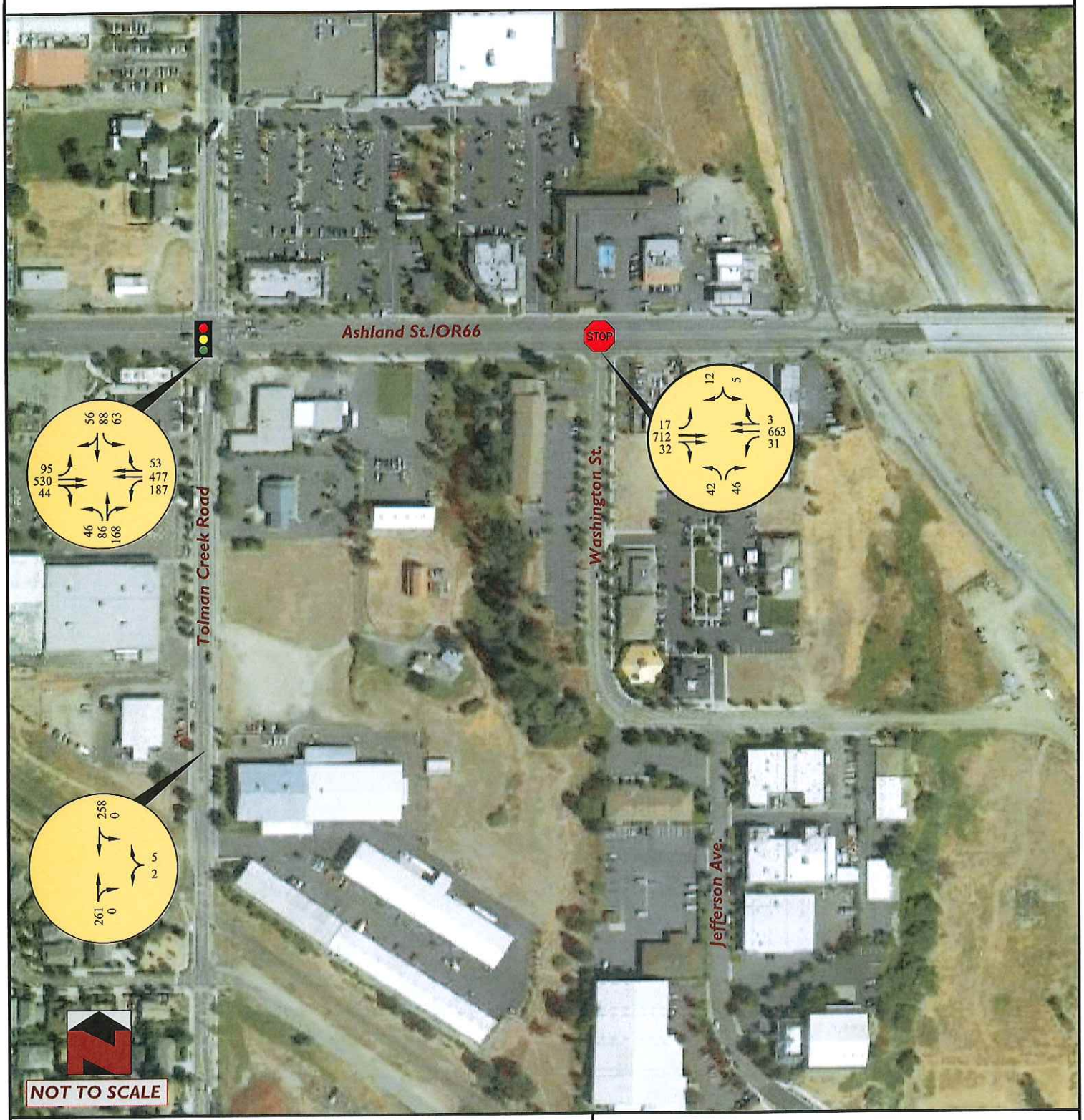
Manual traffic counts were gathered by Southern Oregon Transportation, LLC in July and August of year 2013 at Tolman Creek / IPCO and Washington Street / Ashland Street (OR 66), and in July of 2012 at Tolman Creek/ Ashland Street (OR 66). The location and duration of traffic counts are summarized in Table 2. The global p.m. peak hour was shown to occur from 4:45-5:45 p.m. Refer to Appendix A for traffic count data.

| Table 2 – Traffic Count Locations and Dates | | |
|---|---|---|
| **Location** | **Date** | **Count Time** |
| Tolman Creek Road / Ashland Street (OR 66) | July 2012 | 6:30AM-8:30PM |
| Washington Street / Ashland Street (OR 66) | July 2013 | 3:30PM-6:30PM |
| IPCO driveways / Tolman Creek Road | August 2013 | 4:00PM-6:00PM |

## Seasonal Volume Adjustment

The peak period of the year for traffic within the study area occurs in August. Traffic data gathered in July was seasonally adjusted using ODOT's 2012 Seasonal Trend Table for commuter and summer traffic to develop peak period traffic volumes (30th Highest Design Hour Volumes). The average seasonal adjustment using commuter/summer trends was shown to be 2.7%. Existing traffic volumes were adjusted by a factor of 1.027 to reflect peak month no-build traffic volumes. Refer to Appendix B for seasonal trend information.

# Figure 3: Year 2013 Design Hour Volumes, PM Peak Hour

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## Intersection Capacity and Level of Service

Intersection capacity calculations were conducted utilizing the methodologies presented in the Year 2000 *Highway Capacity Manual*. Intersection capacity and level of service calculations were prepared using "SYNCHRO" timing software.

Intersections were evaluated based upon level of service (LOS) and volume-to-capacity ratio (v/c) standard criteria. Level of service quantifies the degree of comfort afforded to drivers as they travel through an intersection or along a roadway section. The level of service methodology was developed to quantify the quality of service of transportation facilities. Level of service is based upon total delay, defined as the total elapsed time from when a vehicle stops at the end of a queue until the vehicle departs from the stop line. Level of service ranges from "A" to "F", with "A" indicating the most desirable condition and "F" indicating an unsatisfactory condition. The HCM LOS designations for intersections are provided in Table 3.

**Table 3 – HCM Level of Service Designations for Intersections**

| Level of Service | Delay Range for Unsignalized Intersections | Delay Range for Signalized Intersections |
|---|---|---|
| A | < 10 | < 10 |
| B | >10 – 15 | >10 – 20 |
| C | >15 – 25 | >20 – 35 |
| D | >25 – 35 | >35 – 55 |
| E | >35 – 50 | >55 – 80 |
| F | > 50 | > 80 |

The City of Ashland requires study area intersections to operate at acceptable levels of service (LOS) throughout the design build year. The minimum acceptable level of service for intersections is LOS "D". Mitigation is required at intersections operating below LOS "D".

Volume-to-capacity ratio (v/c) describes the capability of an intersection to meet the volume demand based upon the maximum number of vehicles that can be served within an hour. V/C is the criteria in which ODOT evaluates intersections within their jurisdiction. V/C standards are set according to criteria defined within the Oregon Highway Plan and are based upon roadway classification and speed. OR 66 (Ashland Street) is within ODOT jurisdiction from Interstate 5 west to the railroad tracks and classified as a District Highway. The v/c thresholds for OR 66 (Ashland Street) are summarized in Table 4.

**Table 4 – OR 66 (Ashland Street) V/C Thresholds**

| Location | Characteristics | v/c threshold |
|---|---|---|
| OR 66 (Ashland Street) / Tolman Creek Road | Signalized, 35 mph | 0.90 |
| OR 66 (Ashland Street) / Washington Street | Unsignalized, 35 mph | Side-street 0.90<br>Mainline 0.90 |

## Year 2013 No-Build Intersection Operations

Intersection operations for year 2013 no-build conditions were evaluated during the p.m. peak hour. Results are summarized in Table 5.

**Table 5 – Year 2013 No-Build Intersection Operations, PM Peak Hour**

| Intersection | Performance Standard | Traffic Control | Year 2013 No-Build PM Peak Hour |
|---|---|---|---|
| **Ashland Street (OR 66) / Tolman Creek Road** | v/c 0.90, LOS D | Signalized | 0.66, C |
| **Ashland Street (OR 66) / Washington Street** | v/c 0.90, LOS D | Stop Control | NBL: 0.13, B |
| **IPCO / Tolman Creek** | LOS D | Stop Control | B |

Note: Exceeded performance standards are shown in bold, italic
LOS = Level of Service, v/c = volume-to-capacity

As shown in Table 5, all study area intersections are shown to operate within performance standard minimums under year 2013 no-build conditions during the p.m. peak hour. Synchro output sheets are provided in Appendix D.

## Year 2013 No-Build 95$^{th}$ Percentile Queuing

Queuing is the stacking up of vehicles for a given lane movement, and it can have a significant effect on roadway safety and the overall operation of a transportation system. Long queue lengths in through lanes can block access to turn lanes, driveways, and minor street approaches, as well as spill back into upstream intersections. As a result of this, the estimation of queue lengths is an important aspect of the analysis process for determining how a transportation corridor operates.

Queue lengths are reported as the average, maximum, or 95$^{th}$ percentile queue length. The 95$^{th}$ percentile queue length is used for design purposes and is the queue length reported in this analysis. Five simulations were run and averaged in SimTraffic to determine 95$^{th}$ percentile queue lengths. Queues were evaluated at study area intersections under year 2013 no-build conditions. Queue lengths were rounded up to the nearest 25 feet (single vehicle length) and summarized in Table 6 for the p.m. peak hour.

| Table 6 – Year 2013 No-Build 95th Percentile Queue Lengths, PM Peak Hour | | | |
|---|---|---|---|
| **Intersection** | **Movement** | **Available Link Distance (feet)** | **95th Percentile Queue Lengths PM Peak Hour** |
| **Ashland Street (OR 66) / Tolman Creek Road** | EBL, EBTR | TWLTL 700, (200*)700** | 150, 250 |
| | WBL, WBTR | TWLTL 700, (175*)700** | 225, 225 |
| | NBL, NBTR | 100, (100*)1000+** | 75, 225 |
| | SBL, SBTR | 100, (150*)1600+** | 100, 175 |
| **Ashland Street (OR 66) / Washington Street** | EBL | TWLTL (200) | 50 |
| | WBL | TWLTL (200) | 50 |
| | NBL, NBR | 500, 75 | 75, 75 |
| | SBLTR | 100 | 50 |
| **IPCO / Tolman Creek** | WBLR | 100 | 25 |
| | NBTR | 400 | 25 |
| | SBTL | 100 | 0 |

Note: Exceeded performance standards are shown in bold, italic
* Denotes distance to nearest driveway
** Denotes distance to nearest roadway or median

As shown in Table 6, the southbound left turn 95th percentile queue length on Tolman Creek Road at Ashland Street (OR 66) is at, but not yet exceeding its storage length under existing conditions. Other queue lengths are shown to block driveways, but none are shown to spillback and block any roadways under existing conditions. Refer to Appendix D for a full queuing and blocking report.

## Crash History

The existing study area intersections were evaluated for safety. Intersection safety is generally evaluated by determining the crash rate in terms of crashes per Million Entering Vehicles (MEV) at intersections. The details of crash data are examined to identify any patterns that could be attributable to geometric or operational deficiencies. A crash rate higher than 1.0 crash/MEV or trends of a specific type of crash may indicate the need for further investigation at an intersection. Tables 7 and 8 provide intersection crash rates and types of collisions at study area intersections. The section of Ashland Street (OR 66) within the study area is not identified as a SPIS site by ODOT. Refer to Appendix A for all crash data.

Crash history of Ashland Street (OR 66) between M.P. 0.75 and M.P. 1.25 was obtained from ODOT for the most recent 5 year period; January 1, 2008 through December 31st, 2012.

| Table 7 – Study Area Intersection Crash Rates, 2008-2012 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Intersection** | **2008** | **2009** | **2010** | **2011** | **2012** | **Total Crashes** | **ADT** | **Crash Rate** |
| Ashland Street (OR 66) / Tolman Creek | 0 | 3 | 1 | 4 | 1 | 9 | 18,930 | 0.26 |
| Ashland Street (OR 66) / Washington Street | 1 | 6 | 0 | 0 | 0 | 0 | 15,260 | 0.04 |

| Table 8 - Crash History by Type, 2008-2012 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Intersection** | **Collision Type** | | | | **Severity** | | |
| | **Rear-End** | **Turning /Backing** | **Fixed Object /Other** | **Pedestrian** | **Non-Injury** | **Injury** | **Fatal** |
| Ashland Street (OR 66) / Tolman Creek | 4 | 2 | 3 | 0 | 4 | 5 | 0 |
| Ashland Street (OR 66) / Washington Street | 0 | 1 | 0 | 0 | 0 | 1 | 0 |

As illustrated in Tables 7 and 8, intersection crash rates along Ashland Street (OR 66) within the study area are all below the threshold for warranting further investigation. An evaluation of crash patterns show that the majority of crashes involve rear-end and turning collisions. There is no apparent pattern to the crashes that would indicate a particular geometric safety concern. The types of turning collisions (i.e. eastbound left, southbound through) are typical collisions that occur from vehicles moving through an intersection at the end of a yellow phase and colliding with vehicles moving through at the beginning of the next phase. These types of collisions can be reduced by re-evaluating the red and yellow clearance interval times.

# IV. YEAR 2015 AND 2034 NO-BUILD DEVELOPMENT

## Year 2015 and 2034 No-Build Description

No-build conditions represent future conditions for a study area without consideration of proposed development trips. This condition is evaluated to determine how a study area will operate with background growth but no traffic from proposed development trips. Comparing build conditions to no-build conditions indicates what kind of impacts will result from proposed development.

## Year 2015 and 2034 No-Build Background Growth

For this study, the estimation of background growth for both the design year 2015 and future year 2034 was determined from a combination of ODOT's *Future Volume Table* on Ashland Street (OR 66) and infill from the Jefferson/Washington employment area. The amount of growth expected to occur within the study area by the design year 2015 and future year 2034 was determined from ODOT's *Future Volume Table*. Base year traffic volumes at two locations on Ashland Street (OR 66) were compared to future year traffic volumes to determine an annual growth rate. This annual growth rate was then used to determine what the projected growth would be at any given point over a 20-year planning horizon. The growth projected to occur by the future year 2034 was then compared to the Jefferson/Washington employment area to determine what type of growth (which land uses) would likely occur specifically on Washington Street from vacant parcels within a 41.4 acre area.

The annual growth rate from the ODOT *Future Volume Table* was determined to be 2.07% per year. This growth rate was applied to seasonally adjusted year 2013 traffic volumes to develop design year 2015 and future year 2034 no-build traffic volumes. The amount of overall growth in the area over the planning horizon was then compared to the 41.4 acre Jefferson/Washington employment area to determine the type and amount of development that would be expected to occur within the planning horizon specifically to/from Washington Street.

Trip generation calculations for the infill of approximately 20 vacant acres of the Jefferson/Washington employment area were prepared utilizing the Institute of Transportation Engineers (ITE) *Trip Generation*, 9th Edition. Traffic counts at the Washington Street / Ashland Street (OR 66) intersection were evaluated to determine existing traffic generations and distributions for current Washington Street generators. This information was then used to select the closest ITE land use match for projected traffic growth from the Jefferson/Washington employment area. A combination of land uses 110 – General Light Industrial and 710 – General Office was determined to be the best fit for estimating growth in the Jefferson/Washington employment area. Parcels bordering the existing medical/dental office complex were assumed to continue to be built out as office space. Vacant parcels adjacent to Jefferson Street were larger and estimated to be built out as light industrial uses. These uses were consistent with existing traffic on Washington Street and projected traffic from future growth tables.

Traffic was generated for the development based on the following assumptions:

Commercial Parcels:

- Assume 35% of the parcel size is building square footage
- Use ITE Land Use Code 710 – General Office's average rate of 1.49 trips/1000 SF to develop 22.7 trips/acre rate

- Apply 22.7 trips/acre rate to vacant parcels within 41.4 acre growth area

Light Industrial Parcels:

- Use ITE Land Use 110 – General Light Industrial's average rate of 7.26 trips/acre

Table 9 below summarizes trip generations for the Jefferson/Washington employment area.

**Table 9 – Jefferson/Washington Employment Area Trip Generations**

| Land Use | Description | Unit | Trip Rate | Size | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | | Trips/ksf | Acres | Total | (In) | (Out) |
| 710-General Office | Tax Lot 700 | Acre | 22.72 | 0.14 | 3 | 1 | 2 |
| 710-General Office | Tax Lot 800 | Acre | 22.72 | 0.14 | 3 | 1 | 2 |
| 710-General Office | Tax Lot 1300 | Acre | 22.72 | 0.12 | 3 | 1 | 2 |
| 710-General Office | Tax Lot 1400 | Acre | 22.72 | 0.12 | 3 | 1 | 2 |
| 710-General Office | Tax Lot 1700 | Acre | 22.72 | 0.14 | 3 | 1 | 2 |
| 710-General Office | Tax Lot 1900 | Acre | 22.72 | 0.18 | 4 | 1 | 3 |
| 710-General Office | Tax Lot 200 | Acre | 22.72 | 2.39 | 54 | 9 | 45 |
| 710-General Office | Tax Lot 100 | Acre | 22.72 | 0.10 | 2 | 0 | 2 |
| 110-General Light Industrial | Tax Lot 2800 | Acre | 7.26 | 5.38 | 39 | 7 | 32 |
| 110-General Light Industrial | Tax Lot 100 | Acre | 7.26 | 2.59 | 19 | 3 | 16 |
| 110-General Light Industrial | Tax Lot 101 | Acre | 7.26 | 2.34 | 17 | 3 | 14 |
| 110-General Light Industrial | Tax Lot 102 | Acre | 7.26 | 2.84 | 21 | 4 | 17 |
| 110-General Light Industrial | Tax Lot 700 | Acre | 7.26 | 3.57 | 26 | 4 | 22 |
| **TOTAL INFILL TRIPS** | | | | | **197** | **36** | **161** |

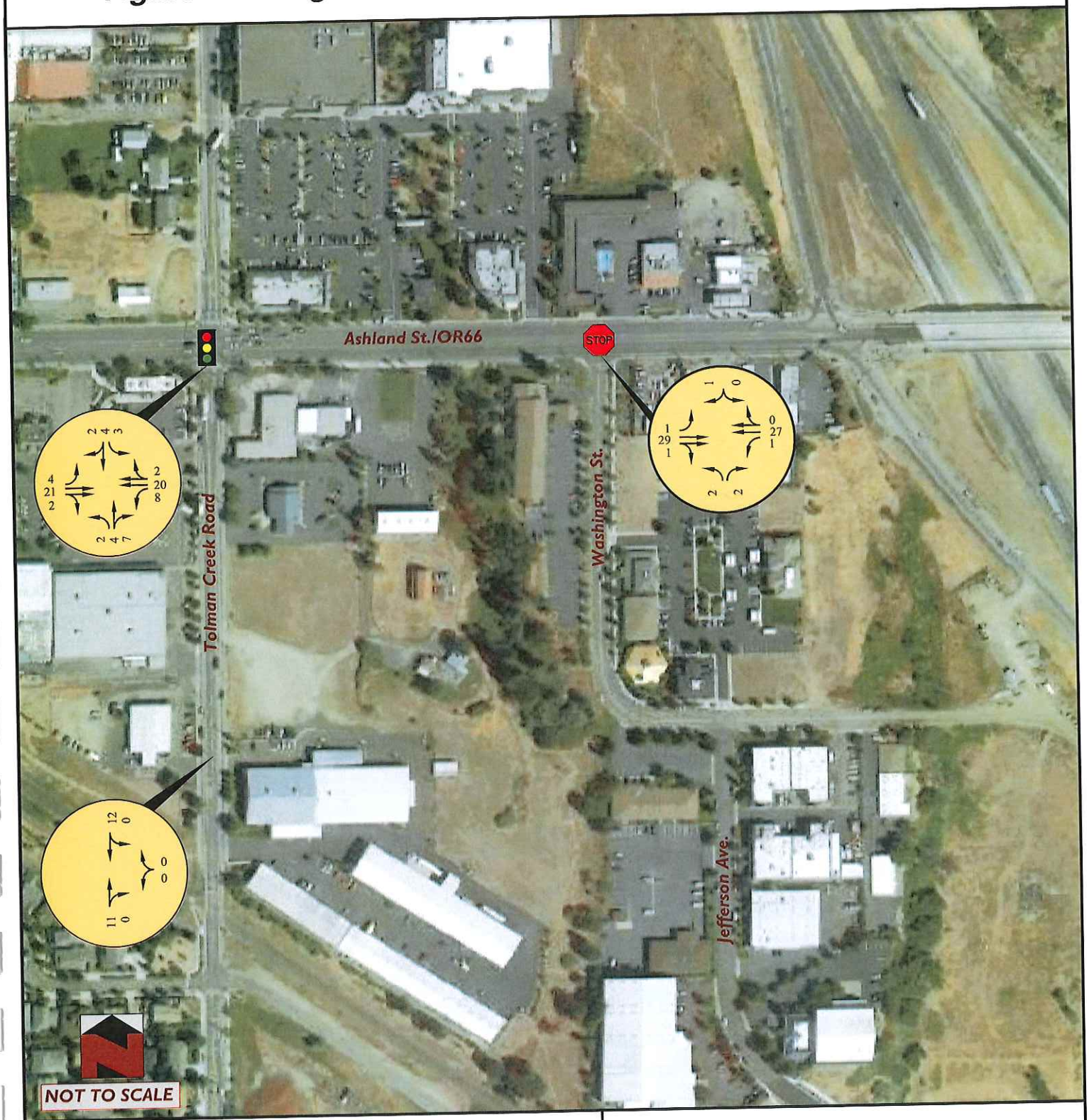
Design year 2015 and future year 2034 no-build conditions were evaluated with and without an Independent Way street connection to Tolman Creek Road to compare impacts associated with Washington Street traffic having an alternate route choice and the effect of the reduced reliance on Washington Street at Ashland Street (OR 66). Traffic volumes with an Independent Way street connection were re-routed within the study area based upon origin/destination assumptions and route choices, taking into consideration travel distance, travel time, and impediments caused by traffic control devices and traffic congestion. Traffic pattern changes are provided in Appendix C.

Development trips were distributed to and from the study area in accordance with local traffic patterns and modifications made for reasonable origins and destinations within the City. The percentage split breakdown is as follows:

- 5% to and from North of Ashland Street via Tolman Creek Road
- 20% to and from South via Tolman Creek Road
- 45% to and from East (Interstate-5) via Ashland Street (OR 66)
- 30% to and from west via Ashland Street (OR 66)

Figures 4 and 5 show projected growth in the study area between the existing year 2013 and design year 2015 and future year 2034. Year 2015 and 2034 no-build traffic volumes are shown in Figures 6 and 7.

# Figure 4: Background Growth Year 2013-2015, PM Peak Hour

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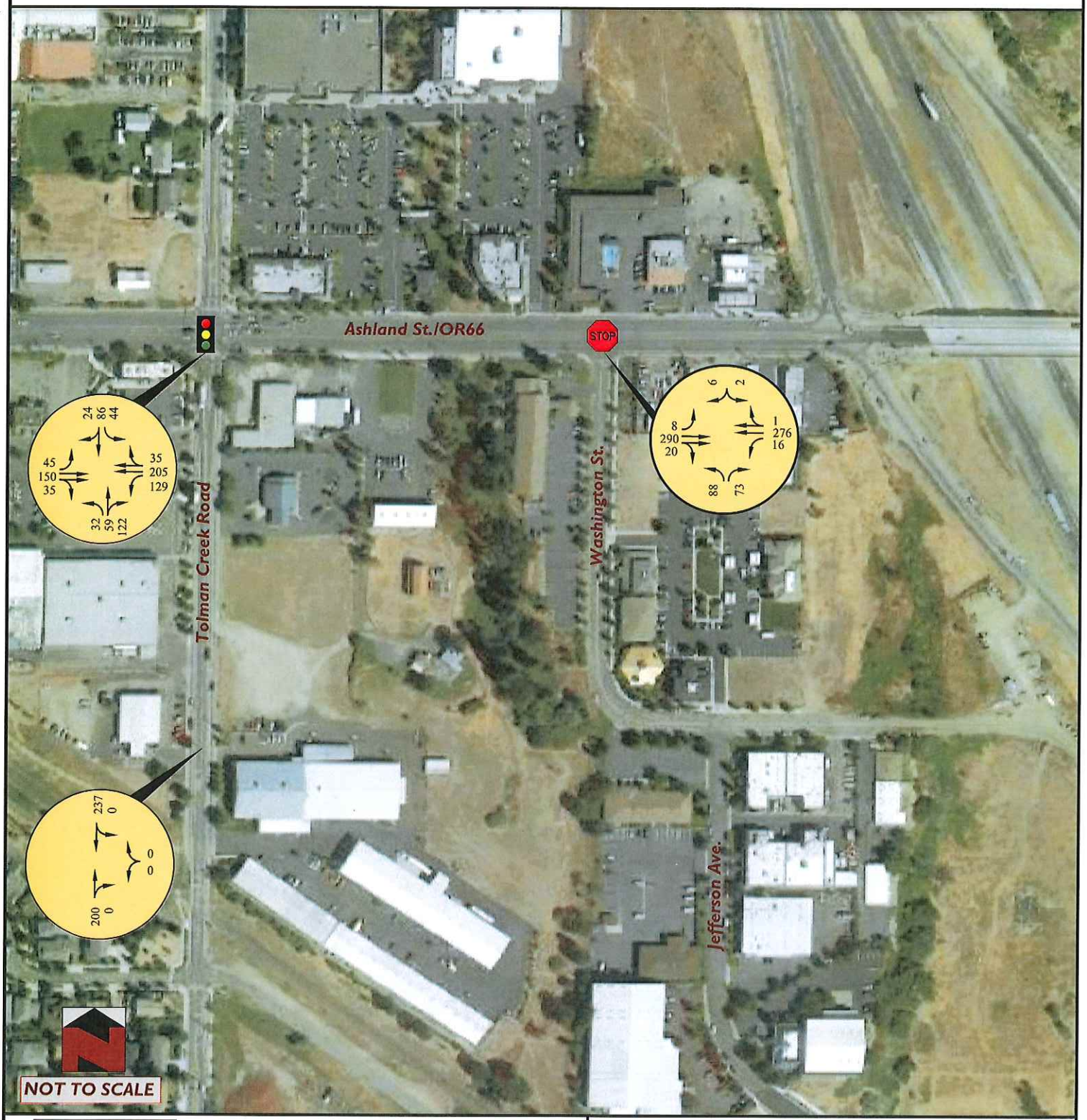
# Figure 5: Background Growth Year 2013-2034, PM Peak Hour

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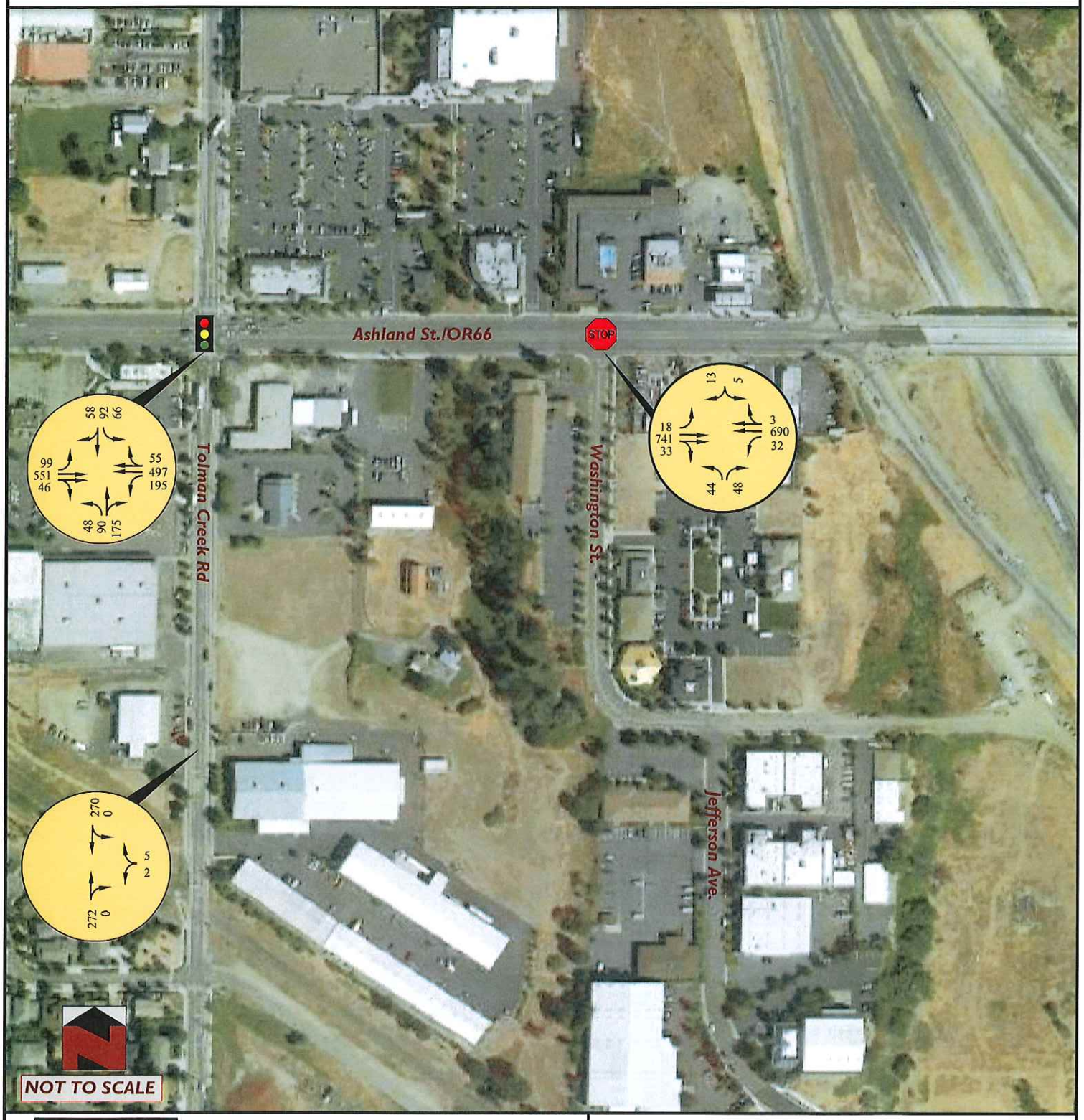
# Figure 6: Year 2015 No-Build Traffic Volumes, PM Peak Hour

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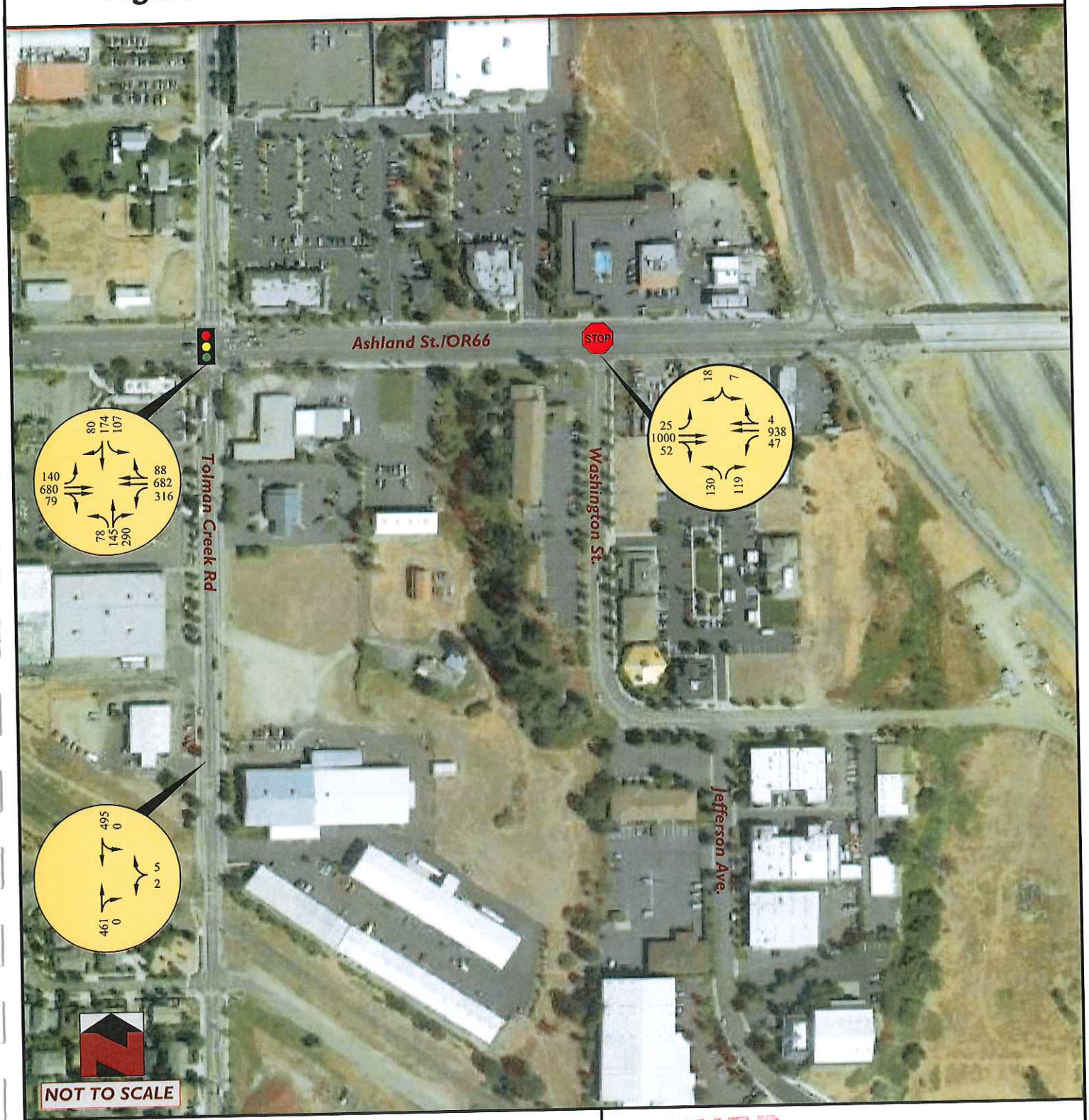
# Figure 7: Year 2034 No-Build Traffic Volumes, PM Peak Hour





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## Year 2015 and 2034 No-Build Intersection Operations

Design year 2015 and future year 2034 no-build traffic volumes were evaluated at study area intersections with and without an Independent Way street connection during the p.m. peak hour. Table 10 summarizes intersection operations under no-build conditions.

**Table 10 – Year 2015 and 2034 No-Build Intersection Operations, PM Peak Hour**

| Intersection | Performance Standard | Traffic Control | Year 2015 No-Build | | Year 2034 No-Build | |
|---|---|---|---|---|---|---|
| | | | Without Independent Way | With Independent Way | Without Independent Way | With Independent Way |
| **Ashland Street (OR 66) / Tolman Creek Road** | v/c 0.90, LOS D | Signalized | 0.69, C | 0.68, C | ***0.98, E*** | ***0.91, E*** |
| **Ashland Street (OR 66) / Washington Street** | v/c 0.90, LOS D | Stop Control | NBL: 0.14, B | NBL: 0.06 A | NBL: 0.57, C | NBL: 0.26, B |
| **IPCO / Tolman Creek** | LOS D | Stop Control | WBLR: B | WBLR: B | WBLR: B | WBLR: C |

Note: Exceeded performance standards are shown in bold, italic
LOS = Level of Service, v/c = volume-to-capacity

As shown in Table 10, all study intersections are shown to operate within performance standards under design year 2015 no-build conditions, but the signalized intersection of Tolman Creek Road / Ashland Street (OR 66) exceeds its volume-to-capacity performance standard under future year 2034 no-build conditions. This intersection is shown to exceed its performance standard with or without an Independent Way street connection, but operates slightly better with the street connection. Synchro output sheets are provided in Appendix E.

## Year 2015 and 2034 No-Build 95th Percentile Queuing

Five simulations were run and averaged in SimTraffic to determine 95th percentile queue lengths at study area intersections under year 2015 and 2034 no-build conditions. Queue lengths were then rounded up to the nearest 25 feet (single vehicle length) and summarized in Table 11 for the p.m. peak hour.

| Table 11 – Year 2015 and 2034 No-Build 95th Percentile Queue Lengths | | | | | | |
|---|---|---|---|---|---|---|
| **Intersection** | **Movement** | **Available Link Distance (feet)** | **95th Percentile Queue Lengths (Feet) PM Peak Hour** | | | |
| | | | **2015 No-Build** | | **2034 No-Build** | |
| | | | **Without** | **With** | **Without** | **With** |
| **Ashland Street (OR 66) / Tolman Creek Road** | EBL, EBTR | TWLTL 700, 200* 700** | 175, 250 | 175, 250 | 225, 475 | 225, 450 |
| | WBL, WBTR | TWLTL 700, 175* 700** | 225, 200 | 225, 200 | 550, 425 | 475, 400 |
| | NBL, NBTR | 100, 100* 1000** | 100, 325 | ***125***, 275 | ***375***, 850 | ***350***, 800 |
| | SBL, SBTR | 100, 150* 1600** | ***125***, 175 | 100, 175 | ***175***, 300 | ***150***, 300 |
| **Ashland Street (OR 66) / Washington Street** | EBL | TWLTL (200) | 50 | 50 | 50 | 50 |
| | WBL | TWLTL (200) | 50 | 50 | 50 | 50 |
| | NBTL, NBR | 500, 75 | 75, 75 | 25, 50 | 400, ***225*** | 150, ***125*** |
| | SBLTR | 100 | 50 | 50 | 50 | 50 |
| **IPCO / Tolman Creek Road** | WBLR | 100, 700 with | 50 | 50 | 50 | 100 |
| | NBTR | 400 | 50 | 25 | ***300*** | 175 |
| | SBTL | 100 | 0 | 25 | 0 | 50 |

Note: Exceeded performance standards are shown in bold, italic
With/Without refer to with and without the Independent Way street connection
* Denotes distance to nearest driveway
** Denotes distance to nearest roadway or median

As can be seen in Table 11, 95th percentile queue lengths exceed available link distances primarily in the northbound direction on Tolman Creek Road under future year 2034 no-build conditions with or without an Independent Way street connection. The southbound left turn movement on Tolman Creek Road also exceeds its storage bay and spills into the adjacent through lane, but the queuing is significantly less southbound than northbound. Under the future year 2034 no-build condition, northbound queue lengths on Tolman Creek Road are shown to spill back past the proposed Independent Way street connection, which supports the need for Independent Way to be located as far south as possible to maximize stacking distance. This queue length is improved with an Independent Way street connection, but is still excessive. Refer to Appendix E for a full queuing and blocking report.

# V. DEVELOPMENT DESCRIPTIONS AND TRIP GENERATIONS

## Development Descriptions

Development scenarios considered in this report included the following:

- IPCO Site Expansion
- Independent Way Street Connection

Development scenarios were assumed to be phased in over a period of time with completion by the end of the City of Ashland's planning horizon, which is year 2034.

**IPCO Site Expansion**

The first phase of the IPCO site expansion is proposed to occur by the design year 2015. During this phase of development, Independent Way may or may not be constructed. Phase 1 development includes an additional 26,677 square foot (SF) building (labeled building C on the site plan) and a 4,970 SF warehouse addition to an existing building (labeled building F on the site plan). The second phase of the IPCO site expansion is assumed to be completed by the future year 2034. Phase 2 development includes approximately 77,560 SF of new building space (labeled buildings A, B, and D on the site plan). As is the case with Phase 1, Phase 2 was evaluated with and without an Independent Way street connection. ITE trip generation sheets are provided in Appendix B.

IPCO proposes to maintain and utilize their existing accesses onto Tolman Creek Road. Once Independent Way is connected, IPCO will have additional access to Independent Way.

**Independent Way Street Connection**

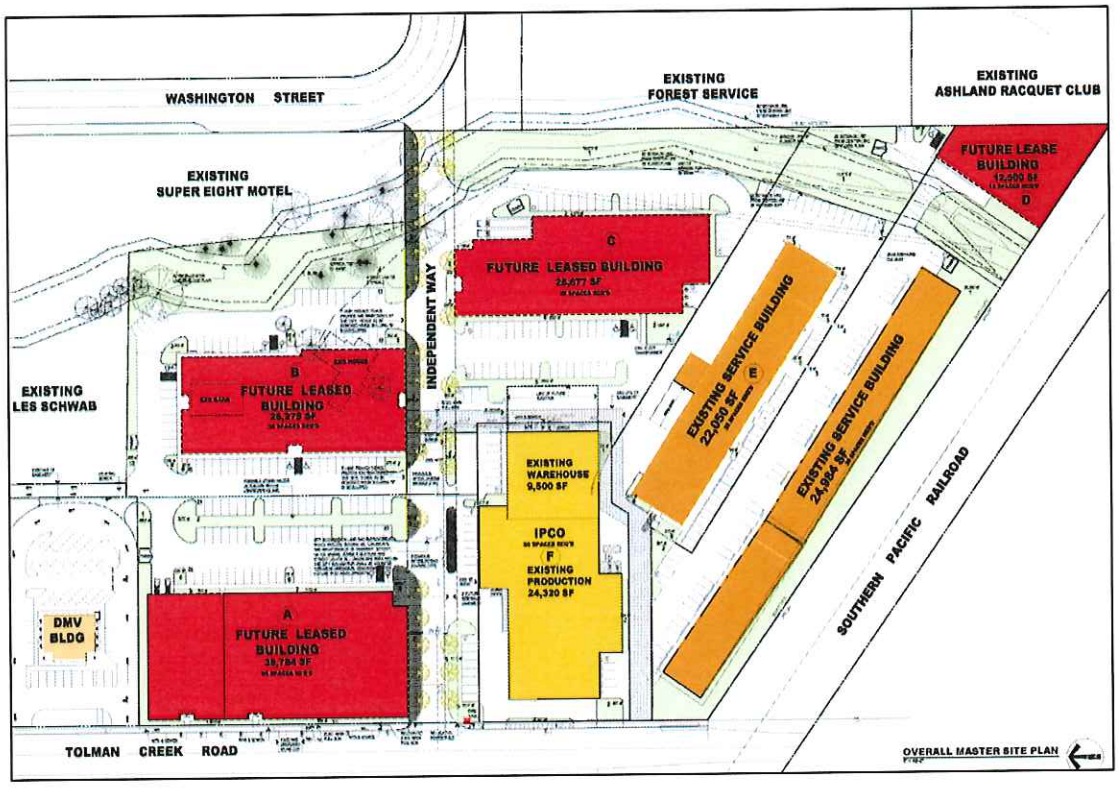
A proposed Independent Way street connection will provide a link between Washington Street and Tolman Creek Road approximately 725' south of Ashland Street (OR 66). The proposed connection will serve as an access to the IPCO site as well as an alternative route for Washington Street traffic. Currently, the only outlet for Washington Street traffic is the intersection of Washington Street/Ashland Street (OR 66).

Independent Way is proposed to function as a "Commercial Neighborhood Collector Street". The standard for this roadway includes two 10-foot travel lanes, 8-foot parking bays on one or both sides, 5-foot planter strips on both sides, and 8-10 foot sidewalks on both sides. An exception to the street standard is proposed that eliminates a sidewalk on the south side of Independent Way and instead includes a hardscape 12-foot sidewalk/pathway on the north side of Independent Way that can serve as a multi-use path based on its width. Parking bays are also not proposed on either side of Independent Way as part of the initial build. If the southern side were to redevelop in the future parking may be incorporated along the north side of Independent Way at specific location. This will offset some of the parking spaces removed from Tolman Creek Road in the future. Design exceptions are discussed further in Section IIV of the report.

Independent Way will connect from Washington Street to Tolman Creek Road as a stop controlled intersection at both end points, with Independent Way being the stopped approach. At the connection of Independent Way to Washington Street, an existing access to the National Forest Ranger Station is in close proximity along the south side of Washington Street and may or may not create concerns. It is recommended that this be monitored once the street connection is made. If

safety concerns occur as a result of the close proximity then this access could be closed and trips rerouted to an additional site access further to the east.

A conceptual site plan and roadway layout is provided below.



## Trip Generations – IPCO Site Expansion

Trip generation calculations for the proposed IPCO site expansion were prepared utilizing the Institute of Transportation Engineers (ITE) *Trip Generation*, 9th Edition. Several scenarios were compared with various land use combinations, but because there were no known uses yet for the site, ITE land use 710 – General Office was chosen as the best land use to represent what would be expected overall from the site at build out. This land use allows a mix of industrial, professional, and service retail uses, and should provide some latitude for different development scenarios.

Table 12 below summarizes trip generations for the proposed IPCO site expansion.

**Table 12 – IPCO Development Trip Generations**

| Land Use | Description | Unit | Size | Trip Rate | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | | | Trips/KSF | Total | (In) | (Out) |
| *Phase 1 Development* | | | | | | | |
| 710-General Light Industrial | Building C | Square Feet | 26,677 | 1.49 | 40 | 7 | 33 |
| 710-General Light Industrial | Expansion F | Square Feet | 4,970 | 1.49 | 7 | 1 | 6 |
| ***Total Phase 1 IPCO Trips*** | | | | | ***47*** | ***8*** | ***39*** |
| *Phase 2 Development* | | | | | | | |
| 710-General Light Industrial | Building A | Square Feet | 38,784 | 1.49 | 58 | 10 | 48 |
| 710-General Light Industrial | Building B | Square Feet | 26,278 | 1.49 | 39 | 7 | 32 |
| 710-General Light Industrial | Building D | Square Feet | 12,500 | 1.49 | 19 | 3 | 16 |
| ***Total Phase 2 IPCO Trips*** | | | | | ***116*** | ***20*** | ***96*** |
| **TOTAL IPCO TRIPS** | | | | | **163** | **28** | **135** |

## Trip Distribution and Assignment

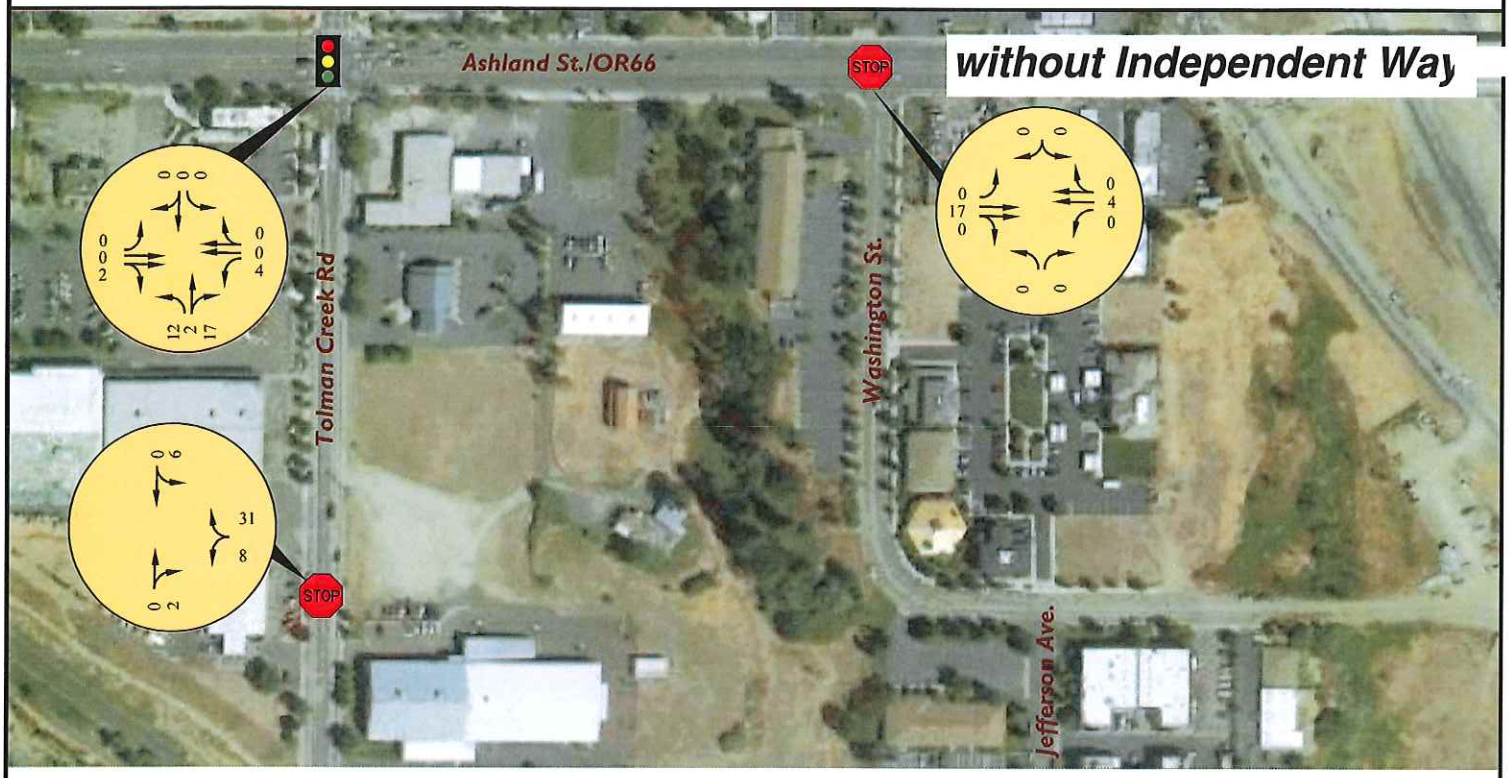
Development trips were distributed to and from the study area in accordance with local traffic patterns. For scenarios with an Independent Way street connection, traffic volumes were re-routed based upon origin/destination assumptions and route choices, taking into consideration travel distance, travel time, and impediments caused by traffic control devices and traffic congestion. The percentage split breakdown is as follows:



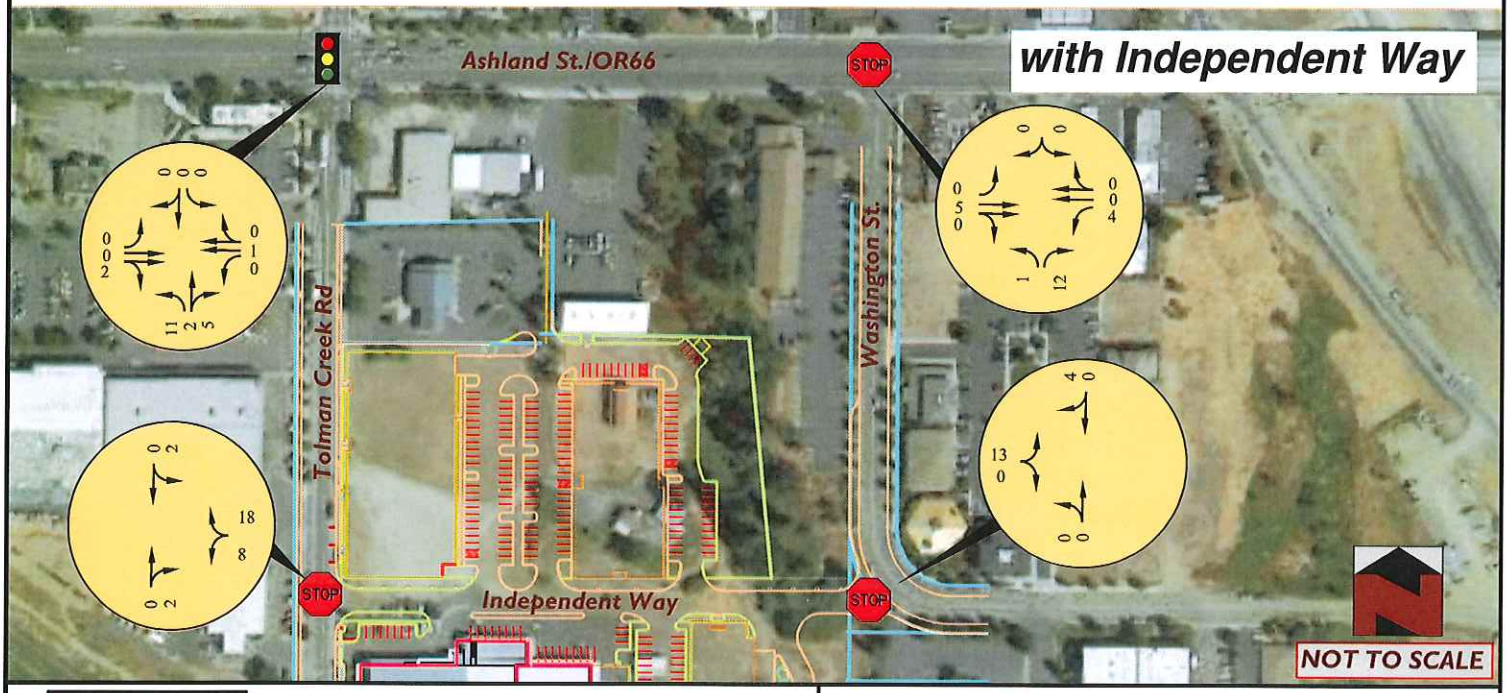
- 5% to and from North of Ashland Street via Tolman Creek Road
- 20% to and from South via Tolman Creek Road
- 45% to and from East (Interstate-5) via Ashland Street (OR 66)
- 30% to and from west via Ashland Street (OR 66)

Refer to Figures 8A and 8B for IPCO Phase 1 and 2 development trip assignments. Design year 2015 and future year 2034 build traffic volumes are shown in Figures 9 and 10.

## Figure 8A: IPCO Phase 1 Development Traffic Volumes, PM Peak Hour




## IPCO Phase 1 Development Traffic Volumes, PM Peak Hour

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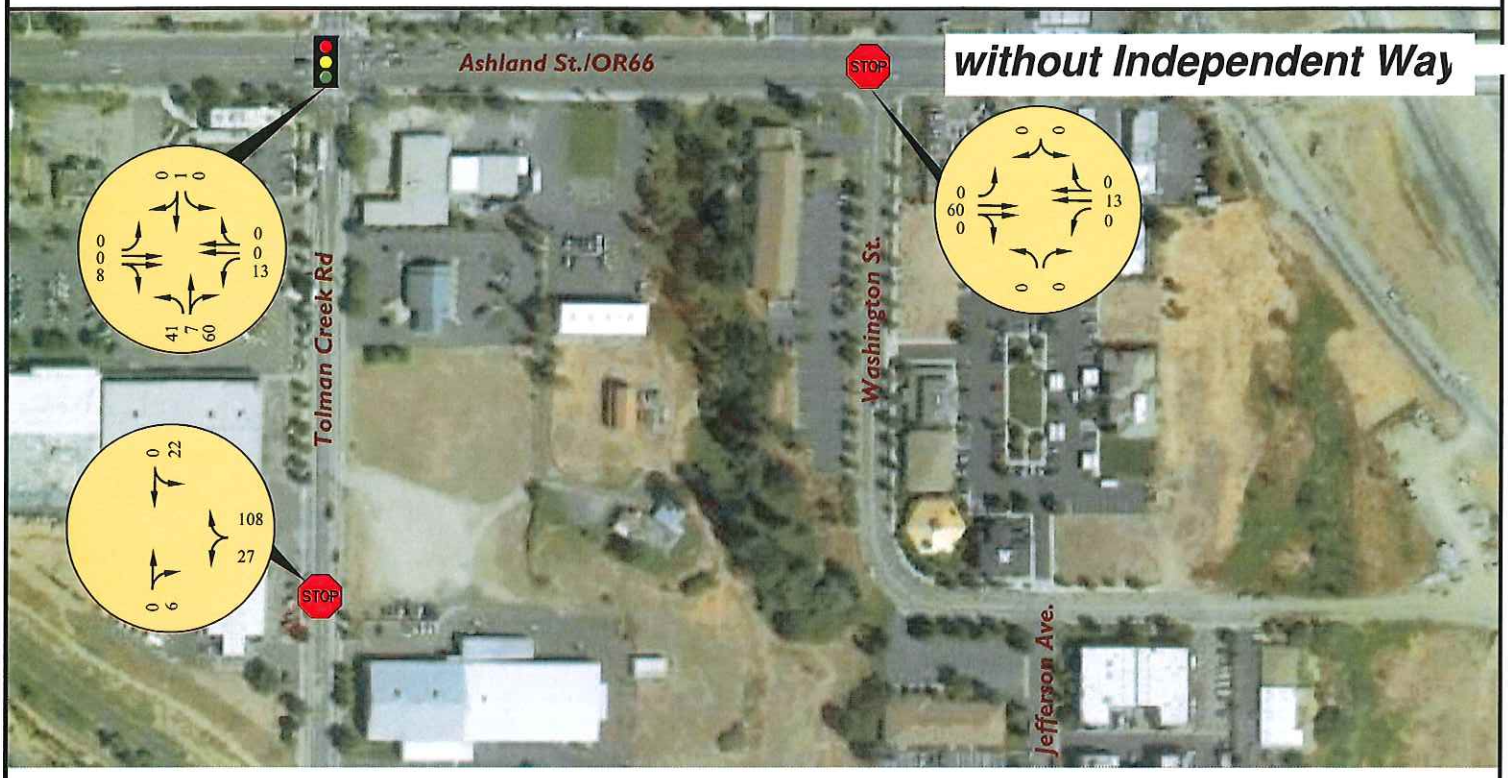
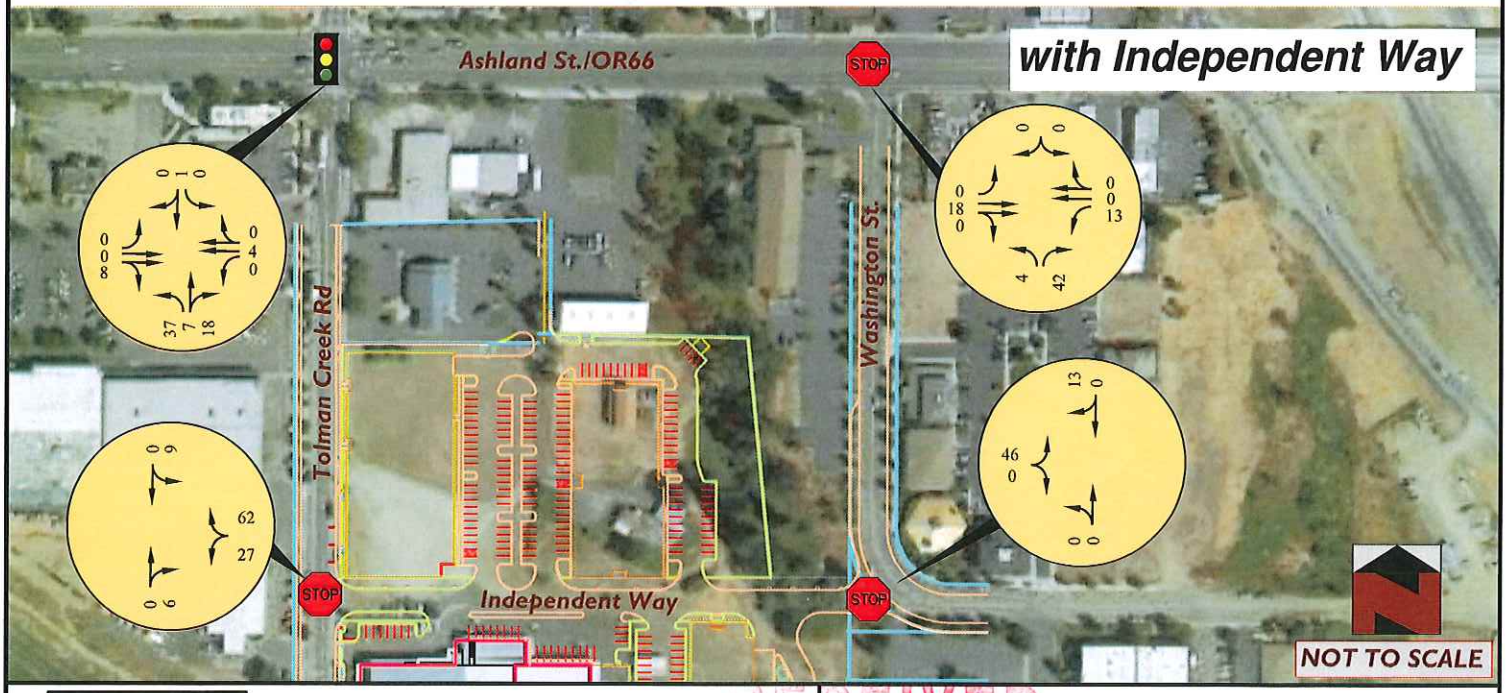
**Ashland, Oregon**

## Figure 8B: IPCO Phase 1-2 Development Traffic Volumes, PM Peak Hour




## IPCO Phase 1-2 Development Traffic Volumes, PM Peak Hour

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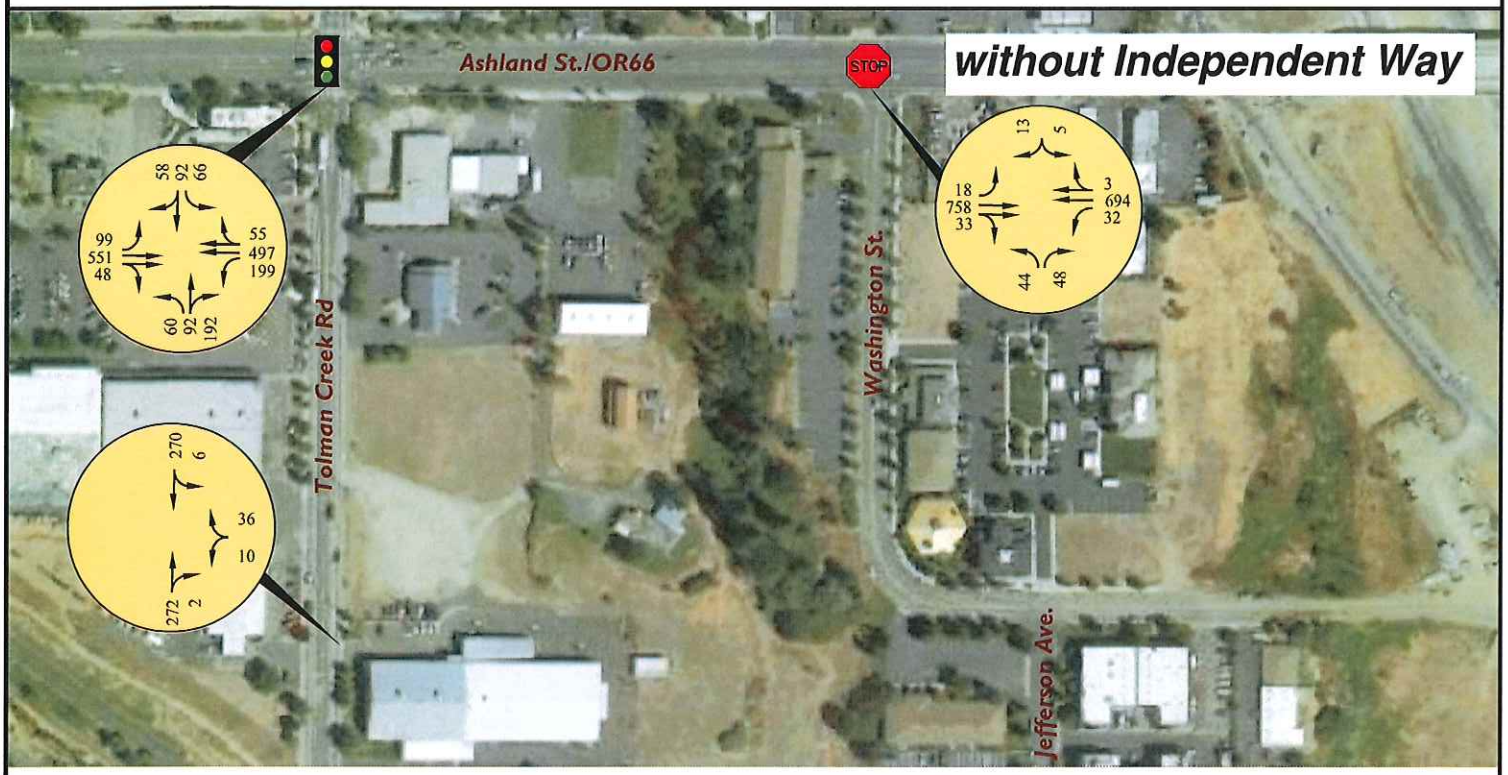
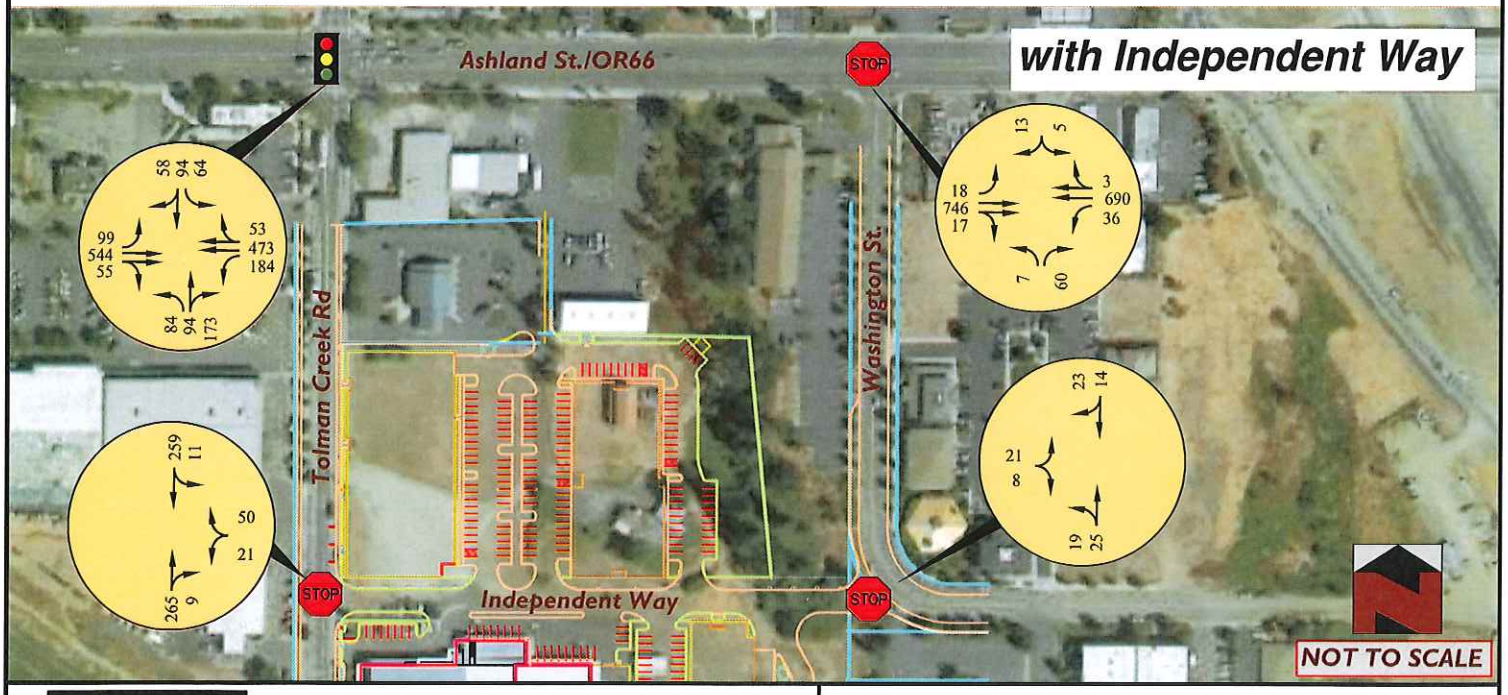
## Figure 9: Year 2015 Phase 1 Build Traffic Volumes, PM Peak Hour




## Year 2015 Phase 1 Build Traffic Volumes, PM Peak Hour

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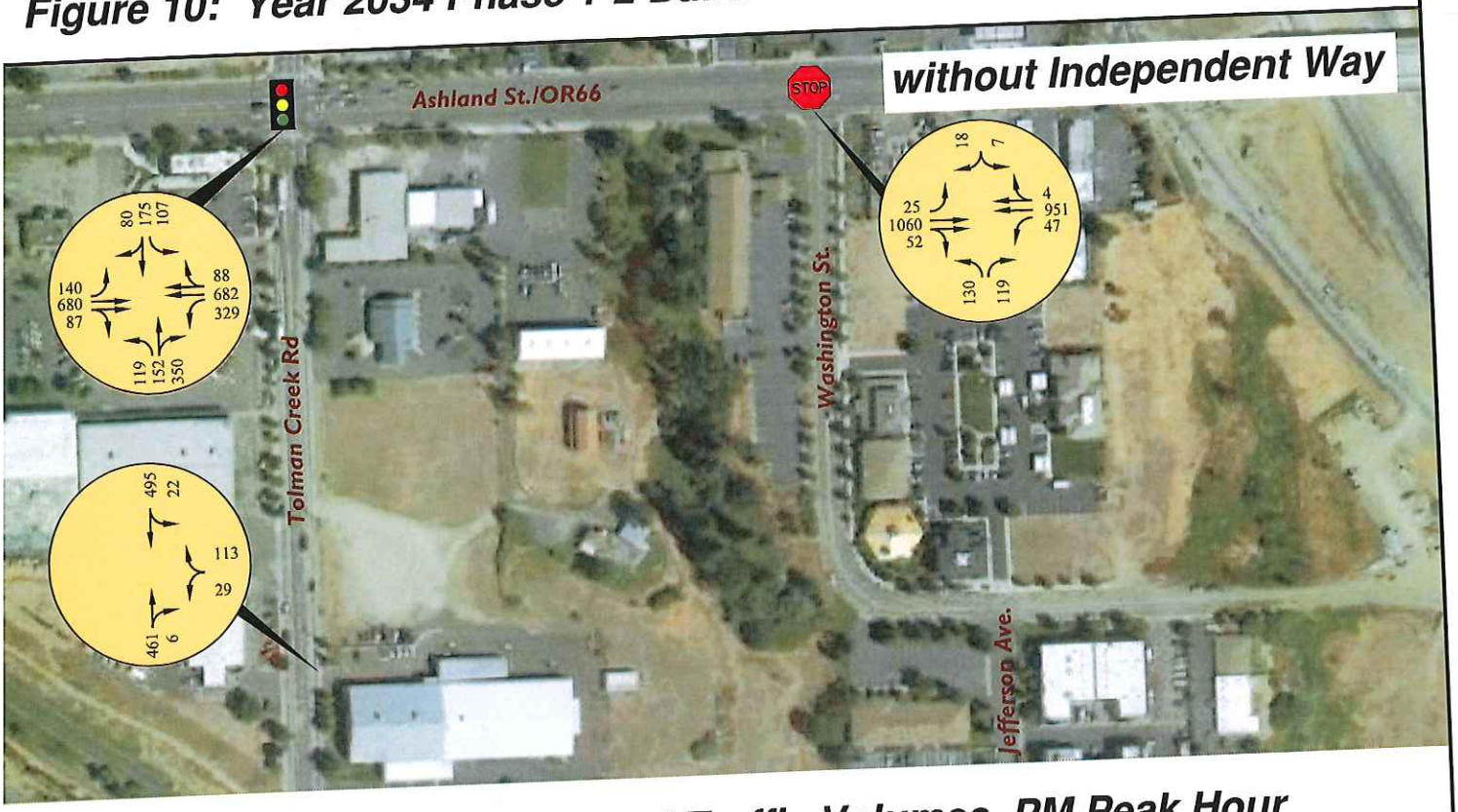
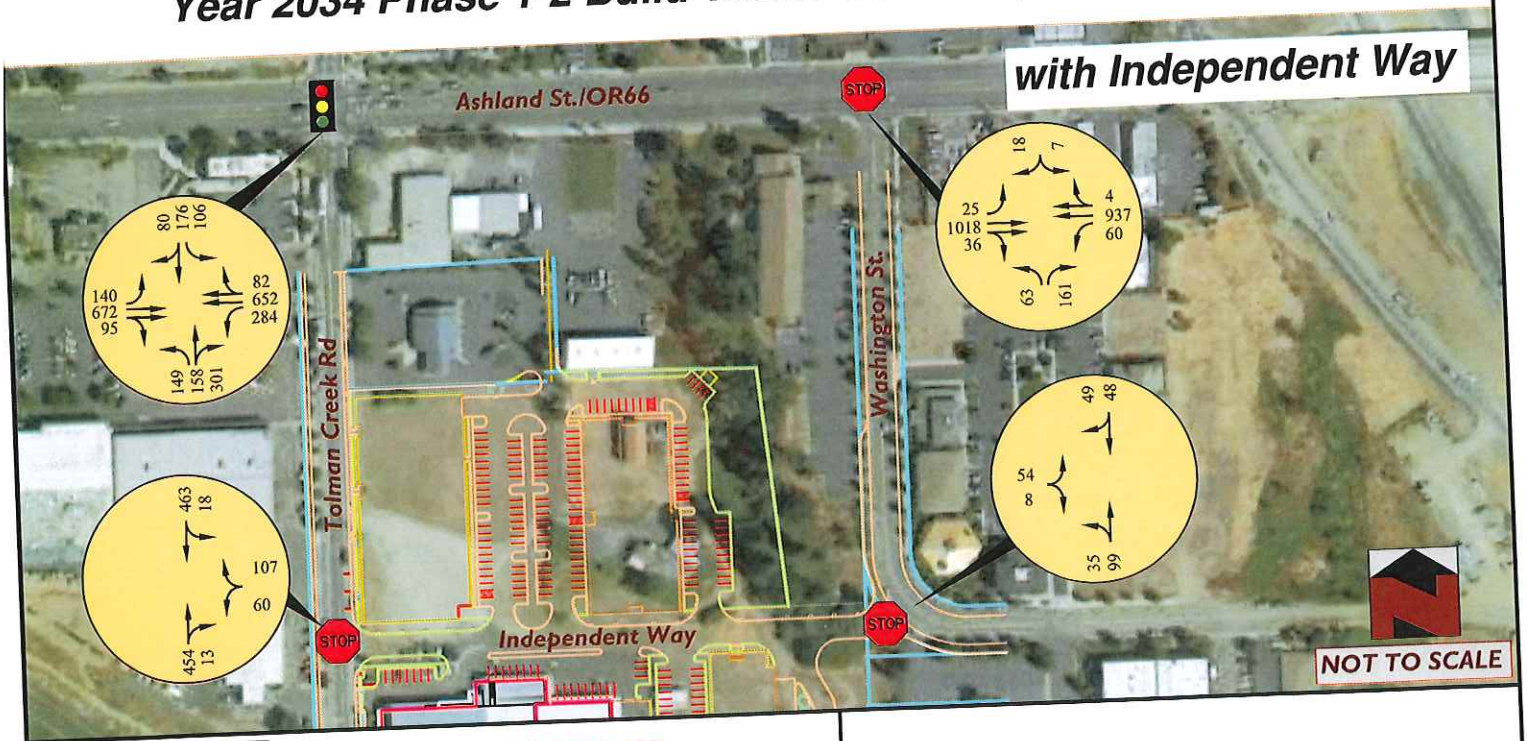
## Figure 10: Year 2034 Phase 1-2 Build Traffic Volumes, PM Peak Hour




## Year 2034 Phase 1-2 Build Traffic Volumes, PM Peak Hour

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# VI. YEAR 2015 and 2034 BUILD CONDITIONS

## Year 2015 and 2034 Build Traffic Descriptions

Build conditions represent no-build conditions for a study area with proposed development trips considered. Build conditions are compared to no-build conditions to determine what kind of impacts will result from proposed development. Figures 9 and 10 illustrate design year 2015 and future year 2034 build traffic volumes at study area intersections during the p.m. peak hour.

## Year 2015 and 2034 Intersection Operations

Intersection operations for design year 2015 and future year 2034 build conditions with and without an Independent Way street connection were evaluated during the p.m. peak hour. Results are summarized in Table 13. The intersection operations are compared to the mobility standard to determine future deficiencies within the study area. Build conditions are compared to no-build conditions to determine development impacts to the transportation system.

**Table 13 – Year 2015 and 2034 Build Intersection Operations, PM Peak Hour**

| Intersection | Performance Standard | Traffic Control | Year 2015 Phase 1 Build | | Year 2034 Phase 1-2 Build | |
|---|---|---|---|---|---|---|
| | | | Without Independent Way | With Independent Way | Without Independent Way | With Independent Way |
| **Ashland Street(OR 66)/ Tolman Creek Road** | v/c 0.90, LOS D | Signalized | 0.70, C | 0.65, C | ***0.99, E*** | ***0.92, E*** |
| **Ashland Street(OR 66)/ Washington Street** | v/c 0.90, LOS D | Stop Control | NBL 0.14, B | NBL: 0.07, A | NBL: 0.62, D | NBL: 0.29, B |
| **IPCO/ Tolman Creek** | LOS D | Stop Control | WBLR: B | WBLR: B | WBLR: C | WBLR: C |

Note: Exceeded performance standards are shown in bold, italic
LOS = Level of Service, v/c = volume-to-capacity

As shown in Table 13, all study area intersections operate within performance standard minimums under year 2015 and 2034 build conditions during the p.m. peak hour with the exception of the signalized intersection of Tolman Creek Road / Ashland Street (OR 66). This intersection continues to exceed its performance standard under build conditions with or without an Independent Way street connection under future year 2034 conditions. Possible mitigation measures include the addition of a second westbound left turn lane or an exclusive northbound right turn lane. Mitigation results are discussed further in Section IIIV of the report. Synchro output sheets for year 2015 and 2034 build conditions are provided in Appendix H.

## Year 2015 and 2034 Build 95th Percentile Queuing

Five simulations were run and averaged in SimTraffic to determine 95th percentile queue lengths at study area intersections under year 2015 and 2034 build conditions. Queue lengths were then rounded up to the nearest 25 feet (single vehicle length) and summarized in Table 14 for the p.m. peak hour.

**Table 14 – Year 2015 and 2034 Build 95th Percentile Queue Lengths**

| Intersection | Movement | Available Link Distance (feet) | 95th Percentile Queue Lengths (Feet) PM Peak Hour | | | |
|---|---|---|---|---|---|---|
| | | | 2015 Build | | 2034 Build | |
| | | | Without | With | Without | With |
| **Ashland Street (OR 66) / Tolman Creek Road** | EBL, EBTR | TWLTL 700, 200* 700** | 175, 250 | 175, 250 | 225, 475 | 225, 450 |
| | WBL, WBTR | TWLTL 700, 175* 700** | 250, 225 | 225, 200 | ***725, 750*** | 575, 475 |
| | NBL, NBTR | 100, 100* 1000** | ***125***, 325 | ***125***, 275 | ***450***, 900 | ***425***, 800 |
| | SBL, SBTR | 100, 150* 1600** | ***125***, 175 | ***125***, 175 | ***200***, 425 | ***150***, 325 |
| **Ashland Street (OR 66) / Washington Street** | EBL | TWLTL (200) | 50 | 50 | 50 | 50 |
| | WBL | TWLTL (200) | 50 | 50 | 50 | 50 |
| | NBL, NBR | 500, 75 | 75, 75 | 50, 50 | 400, ***225*** | 200, ***150*** |
| | SBLTR | 100 | 50 | 50 | 50 | 50 |
| **IPCO / Tolman Creek** | WBLR | 100, 700 with | 75 | 75 | ***400*** | 200 |
| | NBTR | 400 | 50 | 25 | 400 | 200 |
| | SBTL | 100 | 25 | 25 | 100 | 75 |

Note: Exceeded performance standards are shown in bold, italic
With/Without refer to with and without the Independent Way street connection
* Denotes distance to nearest driveway
** Denotes distance to nearest roadway or median

As seen in Table 14, 95th percentile queue lengths continue to exceed link distances on Tolman Creek Road and block downstream driveways under design year 2015 and future year 2034 build conditions. Queue lengths in the northbound direction continue to spill back past the proposed Independent Way street connection. As was the case under future no-build conditions, the northbound queue is improved with an Independent Way street connection under future build conditions, but it continues to be excessive. The westbound 95th percentile queue length at IPCO also becomes excessive in the future year 2034 full build condition without an Independent Way street connection. This queue length improves significantly with the street connection. Possible improvements include extending the northbound left turn storage length at the intersection of Tolman Creek Road / Ashland Street (OR 66) to support its demand, and striping a center TWLTL from the end of the northbound left turn pocket to a point south of the proposed Independent Way street connection. If no other mitigation (by means of widening to increase capacity) occurs at the signalized intersection of Tolman Creek Road / Ashland Street (OR 66), then these improvements will help alleviate some of the queuing and potential conflicts with driveways along Tolman Creek Road. Improvement results are discussed further in Section IIIV. A full queuing and blocking report for year 2015 and 2034 build conditions is provided in Appendix H.

## Year 2015 and 2034 Build Turn Lane Criterion

### Left Turn Lane Criterion

The need for a southbound left turn lane on Tolman Creek Road at IPCO (or the new Independent Way street connection) was evaluated to determine whether a turn lane is required as a result of the proposed IPCO site expansion and/or re-routed Washington Street traffic. Results of the analysis show that left turn lane criterion is met southbound on Tolman Creek Road in the future year 2034 with or without an Independent Way street connection under build conditions (with Phases 1-2 of IPCO development) and with the street connection under no-build conditions. A center turn lane is, therefore, shown to be necessary with either the Independent Way street connection or IPCO full build out condition by the future year 2034. Criterion for a northbound left turn lane on Washington Street at Independent Way was not shown to be met under any scenarios through the future year 2034. Refer to turn lane graphs in Appendix J for supporting data.

### Right Turn Lane Criterion

The need for a northbound right turn deceleration lane on Tolman Creek Road at IPCO (or the new Independent Way street connection) was evaluated to determine whether a turn lane is required as a result of the proposed IPCO site expansion and/or re-routed Washington Street traffic. Results of the analysis show that right turn lane criterion is not met under any scenarios through the future year 2034. Similarly, criterion for a southbound right turn lane on Washington Street at Independent Way was not shown to be met under any scenarios through the future year 2034. Refer to turn lane graphs in Appendix J for supporting data.

# VII. SITE EVALUATION

The IPCO site and Independent Way street connection was evaluated for vehicle and pedestrian access and circulation. The evaluation considered sight distance, bike and pedestrian connectivity, and truck access and circulation to/from the new Independent Way street connection and IPCO expanded site. Discussions are provided in the follow paragraphs.

## Site Distance from Independent Way Street Connection

The Independent Way street connection to Tolman Creek Road was evaluated to ensure that adequate departure sight distance will be available. The departure sight triangle is an area at the intersection that is clear of any visibility obstructions. The departure sight distance is provided at intersections to allow stopped vehicles a sufficient view of the intersecting roadway to decide when to enter or cross without colliding with on-coming vehicles. Minimum sight distances are provided by the American Association of State Highways and Transportation Officials (AASHTO) in what is referred to as the AASHTO handbook.

Departure sight triangles for intersections with stop control on the minor road should be considered for the following situations:

1. Case B1 – Left turns from the minor road
2. Case B2 – Right turns from the minor road

The length of the leg of the departure sight triangle along the major road for all stop-controlled movements is dependent upon the speed of the major roadway and perception reaction times of drivers. The speed used in the analysis for Independent Way at Tolman Creek Road is 25 mph, which is the posted speed along Tolman Creek Road.

Based on a speed of 25 mph, the desirable sight distance for left and right turning vehicles is 280 feet and 240 feet, respectively. The minimum sight distance for left and right turning vehicles is 155 feet. A vehicle stopped at Independent Way, measured 14.5 feet back from the edge of roadway, can see over 500 feet in both directions under full build conditions (according to the proposed site plan). Sight distance is, therefore, shown to be acceptable when Independent Way is connected to Tolman Creek Road. To keep the departure sight triangle clear, the placement of any sight obstructions within this area should be prohibited. Refer to Appendix K for sight triangles for the proposed new intersection.

## Bike/Pedestrian Circulation and Connectivity

The City of Ashland's Transportation System Plan identifies the intersection of Tolman Creek Road/Ashland Street (OR 66) as a location for creating walkable nodes or "Pedestrian Places". These areas are identified as locations that, as the surrounding areas develop, consideration should be given to providing pedestrian-oriented designs and connectivity to the Central Ashland Bike Path. The conceptual Pedestrian Place plan for the Tolman Creek Road/Ashland Street (OR 66) Pedestrian Place and Central Ashland Bike Path are included in Appendix K.

**Connectivity to Central Ashland Bike Path**: The Central Ashland Bike Path parallels the railroad tracks that run through Ashland. The bike path is provided between Tolman Creek Road and the Railroad Park. Independent Way is proposed to be located approximately 185 feet north

of the beginning of the Central Ashland Bike Path. There are currently bike lanes and sidewalks along Tolman Creek Road that will connect to a hardscape sidewalk/path along the north side of Independent Way. This path will provide connectivity for pedestrians and bicyclists to the Central Ashland Bike Path. It will also reduce out of direction travel for users south of Ashland Street to/from businesses along Washington Street, and discourage cut-through routes such as one shown by aerial photography to exist across the railroad tracks from the railroad bikeway to Jefferson Avenue south of the Ashland Tennis and Fitness Club. Routes such as this develop when sufficient connectivity does not exit.

**Pedestrian Places**: The City of Ashland has provided guidance within the Transportation System Plan for providing a "Pedestrian Place" at the intersection of Tolman Creek Road/Ashland Street (OR 66). This plan encourages mixed-use development near the intersection with pedestrian connectivity to nearby parcels. The proposed "Pedestrian Place" plan identifies Independent Way as a pedestrian connection between Tolman Creek Road and Washington Street. Additionally, there is a pedestrian connection proposed at the north end of the IPCO site, between IPCO and the DMV, which will also connect Tolman Creek Road and Washington Street.

**IPCO Site Pedestrian Connectivity:** Independent Way is proposed as a typical Commercial Neighborhood Collector Street, which includes two 10-foot travel lanes, 8-foot parking bays on one or both sides, 5-foot planter strips on both sides, and 8-10 foot sidewalks on both sides. An exception to the street standard is proposed that eliminates a sidewalk on the south side of Independent Way and instead includes a hardscape 12-foot sidewalk/pathway that can also serve as a multi-use path based on its width on the north side of Independent Way to accommodate heavy truck traffic to/from the southern portion of IPCO's proposed site expansion and reduce safety concerns. Parking bays are also not proposed on either side of Independent Way similarly to accommodate truck turning movements to/from the site along the south side. If the south side were to redevelop, parking could be incorporated along the north side of Independent Way. This will offset some of the on-street parking loss if spaces are removed from Tolman Creek Road in the future. Removing on-street parking from the south side of Independent Way reduces the potential conflict between truck traffic, automobiles, and pedestrians to/from their vehicles, which in turn improves safety in this particular situation.

The southern portion of IPCO's site has a significant amount of daily business operations that utilize semi-trucks for deliveries and does not attract foot traffic. This is expected to continue to be the case when the site expands in the future. The expanded portion of the IPCO site along the north side of Independent Way differs in that it's expected to have uses less reliant on semi-truck traffic with more attraction for pedestrians and bicyclists. Because of this, it was determined that one hardscape 12-foot sidewalk that can serve as a multi-use path along the north side of Independent Way is better suited to meet the goals and policies of pedestrian and bicyclist connectivity without creating adverse safety concerns with heavy truck traffic and pedestrians/cyclist conflicts along Independent Way. Providing a pedestrian/bicyclist connection is vital to meeting the goals and policies of creating a multi-modal system, but the system also needs to be safe and functional, and a safe and functional system can be achieved with a proposed 12-foot sidewalk/path along the north side of Independent Way. The 12-foot sidewalk/path will provide opportunities for both pedestrians and bicyclists with the intent that the bicyclist using the path will likely be a recreational cyclist and that more experienced cyclists using the Independent Way connection for commuting purposes will share the roadway with vehicles. The conflict between pedestrians and cyclists on the sidewalk/path are anticipated to be low based upon the type of cyclist likely to use it. A case can be made that improving safety for pedestrians and

bicyclists or reducing safety concerns demonstrates a superior facility for them. The removal of the sidewalk on the south side does not negatively affect the ability of pedestrians or bicyclists to travel along Independent Way, get to/from transit stops, or connect to other pedestrian places.

Tolman Creek Road currently has bike lanes and sidewalks on both sides from Ashland Street (OR 66) to Siskiyou Boulevard. Pedestrians and bicyclists have adequate facilities on roadways adjacent to the site to provide connectivity to the Central Ashland Bike Path and surrounding areas.

## Truck Circulation

The proposed IPCO site expansion will have semi-trucks accessing existing and future buildings on the southern portion of the site. Each building has a delivery dock that has been laid out to maximize the efficiency of trucks entering and exiting the site. A turning analysis was performed that evaluated the swept path of a WB-50 (50-foot single unit semi-truck) entering the site traveling to/from the loading docks. Driveway widths and locations along Independent Way were designed to accommodate truck turning movements in a safe and efficient manner without creating on-street conflicts between trucks and other vehicular traffic. A variance will be required between the driveways for buildings A and B and the driveways between parking areas for buildings C and F. A variance is sought to provide adequate truck turning movements and circulation through the site without creating conflicts on Independent Way between trucks and other vehicular traffic. Appendix K contains the truck turning analysis.

# VIII. REPORT SUMMARY AND PROPOSED MITIGATION

Analysis summaries for all scenarios evaluated in this report are provided in Tables 15 and 16. Synchro and SimTraffic output sheets are provided in Appendices D-H.

**Table 15 – Study Area Operations Summary, PM Peak Hour**

| Intersection | Performance Standard | Year 2013 No-Build | Year 2015 No-Build | | Year 2015 Phase 1 Build | | Year 2034 No-Build | | Year 2034 Phase 1-2 Build | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Without | With | Without | With | Without | With | Without | With |
| **Ashland Street (OR 66) / Tolman Creek Road** | v/c 0.90, LOS D | 0.66, C | 0.69, C | 0.68, C | 0.70, C | 0.65, C | ***0.98, E*** | ***0.91, E*** | ***0.99, E*** | ***0.92, E*** |
| **Ashland Street (OR 66) / Washington Street** | v/c 0.90, LOS D | NBL: 0.13, B | NBL: 0.14, B | NBL: 0.06, A | NBL 0.14, B | NBL: 0.07, A | NBL: 0.57, C | NBL: 0.26, B | NBL: 0.62, D | NBL: 0.29, B |
| **IPCO / Tolman Creek Road** | LOS D | WB: B | WB: B | WB: B | WB: B | WB: B | WB: B | WB: C | WB: C | WB: C |

Note: Exceeded performance standards are shown in bold, italic
LOS = Level of Service, v/c = volume-to-capacity

| Table 16 – Study Area 95th Percentile Queue Lengths Summary, PM Peak Hour | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intersection | Movement | Available Distance | Year 2013 No-Build | Year 2015 No-Build | | Year 2015 Phase 1 Build | | Year 2034 No-Build | | Year 2034 Phase 1-2 Build | |
| | | | | Without | With | Without | With | Without | With | Without | With |
| **Ashland Street (OR 66)/ Tolman Creek** | EBL | 700 | 150 | 175 | 175 | 175 | 175 | 225 | 225 | 225 | 225 |
| | EBTR | 200* 700** | 250 | 250 | 250 | 250 | 250 | 475 | 450 | 475 | 450 |
| | WBL | 700 | 225 | 225 | 225 | 250 | 225 | 550 | 475 | ***725*** | 575 |
| | WBTR | 175* 700** | 225 | 200 | 200 | 225 | 200 | 425 | 400 | ***750*** | 475 |
| | NBL | 100 | 75 | 100 | ***125*** | ***125*** | ***125*** | ***375*** | ***350*** | ***450*** | ***425*** |
| | NBTR | 100* 1000** | 225 | 325 | 275 | 325 | 275 | 850 | 800 | 900 | 800 |
| | SBL | 100 | 100 | ***125*** | 100 | ***125*** | ***125*** | ***175*** | ***150*** | ***200*** | ***150*** |
| | SBTR | 150* 1600** | 175 | 175 | 175 | 175 | 175 | 300 | 300 | 425 | 325 |
| **Ashland Street (OR 66)/ Washington Street** | EBL | 200 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | WBL | 200 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | NBTL | 500 | 75 | 75 | 25 | 75 | 50 | 400 | 150 | 400 | 200 |
| | NBR | 75 | 75 | 75 | 50 | 75 | 50 | ***225*** | ***125*** | ***225*** | ***150*** |
| | SBLTR | 100 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| **IPCO/ Tolman Creek** | WBLR | 100, 700 with | 25 | 50 | 50 | 75 | 75 | 50 | 100 | ***400*** | 200 |
| | NBTR | 400 | 25 | 50 | 25 | 50 | 25 | 300 | 175 | 400 | 200 |
| | SBTL | 100 | 0 | 0 | 25 | 25 | 25 | 0 | 50 | 100 | 75 |

Note: Exceeded performance standards are shown in bold, italic
With/Without refer to with and without the Independent Way street connection
* Denotes distance to nearest driveway
** Denotes distance to nearest roadway or median

When comparing all of the analysis results side by side, the benefit of an Independent Way street connection can be seen. The signalized intersection of Tolman Creek Road / Ashland Street (OR 66) is shown to operate acceptably in design year 2015 conditions with or without an Independent Way street connection and with or without an IPCO site expansion, but intersection operations and 95th percentile queue lengths are better with the street connection. This continues to be the case under future year 2034 conditions, but the main difference in this condition is that the signalized intersection of Tolman Creek Road / Ashland Street (OR 66) exceeds performance standards, and 95th percentile queue lengths on Tolman Creek Road become excessive by the end of the planning horizon. This occurs with or without an Independent Way street connection and with or without an IPCO site expansion.

Previously completed traffic studies, including the IAMP for the Interstate 5/OR 66 Interchange and Croman-Mill Plan, have also identified the intersection of Tolman Creek Road / Ashland Street (OR 66) as failing under future conditions. Previously proposed mitigations for this intersection included the addition of a second westbound left turn pocket on Ashland Street and/or an exclusive northbound right turn lane on Tolman Creek Road. Both improvements were evaluated in this report and shown to adequately mitigate the intersection. Additional mitigations to address queuing were considered that included extending the northbound left turn lane on Tolman Creek Road at Ashland Street (OR 66) to support its demand, and striping a TWLTL from the end of the turn lane to a point south of the Independent Way street connection to help alleviate queuing and potential conflicts with driveways along Tolman Creek Road. The turn lane

extension and transition into a center TWLTL can be accommodated with restriping on Tolman Creek Road if on-street parking is removed. This mitigation will also serve to improve sight distance from driveways along Tolman Creek Road. Some of the loss of on-street parking may be offset with additional parking along the north side of Independent Way if determined to work for truck traffic. Mitigation results are provided in Tables 17 and 18. Synchro and SimTraffic output sheets are provided in Appendix I.

**Table 17 –Year 2034 Build Intersection Operations with Proposed Mitigations, PM Peak Hour**

| Mitigation Scenarios | Performance Standard | Year 2034 P.M. Peak Hour | |
|---|---|---|---|
| | | Without Independent | With Independent |
| Second Westbound Left Turn Pocket | v/c 0.90, LOS D | 0.80, D | 0.82, D |
| Northbound Right Turn Pocket | v/c 0.90, LOS D | 0.80, D | 0.84, D |
| Both Westbound Left and Northbound Right | v/c 0.90, LOS D | 0.69, D | 0.74, D |

Note: Exceeded performance standards are shown in bold, italic
LOS = Level of Service, v/c = volume-to-capacity

**Table 18 – Year 2034 Build 95th Percentile Queue Lengths with Proposed Mitigations, PM Peak Hour**

| Intersection | Movement | Available Link Distance (feet) | 95th Percentile Queue Lengths With TWLTL Mit. PM Peak Hour | 95th Percentile Queue Lengths With NBR Mit. PM Peak Hour |
|---|---|---|---|---|
| **Ashland Street (OR 66) / Tolman Creek Road** | EBL, EBTR | TWLTL 700, 200* 700** | 225, 475 | 225, 425 |
| | WBL, WBTR | TWLTL 700, 175* 700** | 650, 375 | 500, 350 |
| | NBL, NBTR, (NBR) | 400, 700, (200) | 425, 675 | 225, 175, (150) |
| | SBL, SBTR | 100, 150* 1600** | ***175***, 300 | ***175***, 450 |
| **Ashland Street (OR 66) / Washington Street** | EBL | TWLTL (200) | 50 | 50 |
| | WBL | TWLTL (200) | 50 | 50 |
| | NBL, NBR | 500, 75 | 250, ***150*** | 150, ***125*** |
| | SBLTR | 100 | 50 | 50 |
| **IPCO / Tolman Creek** | WBLR | 100, 700 with | 150 | 125 |
| | NBTR | 400 | 100 | 0 |
| | SBTL | 100 | 50 | 50 |

Note: Exceeded performance standards are shown in bold, italic

The extension of the northbound left turn land and center TWLTL improvements will provide a benefit as early as the design year 2015 if IPCO and other projects develop as planned in the vicinity.

# IX. RECOMMENDATIONS AND CONCLUSIONS

The findings of the traffic impact analysis conclude that Phase 1 development of the proposed IPCO site expansion in the design year 2015 can be accommodated on the existing transportation system with or without an Independent Way street connection. By the future year 2034, background growth causes the signalized intersection of Tolman Creek Road/ Ashland Street (OR 66) to exceed its performance standard, with or without the proposed IPCO site expansion and with or without an Independent Way street connection. Full build out of the IPCO site in the future year 2034 is shown to increase the intersection v/c ratio 0.01 more than no-build conditions. The Independent Way street connection is shown to decrease the intersection v/c ratio by 0.07 when compared to no connection. An Independent Way street connection is shown to be beneficial to the surrounding area and provide improvements with increased connectivity and mobility for all transportation modes. The two components evaluated in this traffic analysis included the impacts of an IPCO site expansion and an Independent Way street connection. Results of each are summarized below:

**IPCO Site Expansion**

The IPCO site expansion can be approved with or without an Independent Way street connection in the design year 2015. By the future year 2034, the signalized intersection of Tolman Creek Road / Ashland Street (OR 66) exceeds its performance standard with full build out (phases 1-2) of the IPCO site. This also occurs under year 2034 no-build conditions. The IPCO site is shown to benefit from an Independent Way street connection, but can function adequately with its current access points to Tolman Creek Road with minor improvements by the year 2034. Minor improvements include:

1. Removing on-street parking along Tolman Creek Road and striping a center two-way-left-turn-lane (TWLTL) at the northern IPCO site driveway (or Independent Way street connection) to provide vehicle refuge for the southbound left turn movement. This is recommended based upon 95$^{th}$ percentile queue lengths and turn lane criterion under build conditions. To provide the most benefit along Tolman Creek Road, the TWLTL should transition from the northbound left turn lane at the signalized intersection of Tolman Creek Road / Ashland Street and extend to a point south of the proposed Independent Way street connection. To provide a minimum benefit, the TWLTL should be designed to accommodate a queue length of 100 feet.

**Independent Way Street Connection**

Improvements on Tolman Creek Road and at the signalized intersection of Tolman Creek Road / Ashland Street (OR 66) are recommended as a result of background growth in the surrounding area, with or without an Independent Way street connection. With the Independent Way street connection, traffic from Tolman Creek Road and Washington Street re-routes, which is an overall improvement to the area, but still produces queuing and operational impacts. All study area intersections operate acceptably under existing year 2013 and design year 2015 conditions, but improvements are recommended by future year 2034 conditions to facilitate the expected background growth in the area. These improvements include:

2. The addition of an exclusive northbound right turn lane or second westbound left turn lane at the signalized intersection of Tolman Creek Road / Ashland Street (OR 66). Either one of these improvements adequately mitigates the intersection operationally and will be required under no-build conditions as a result of background growth by the future year 2034.

3. Extend the northbound left turn pocket on Tolman Creek Road at Ashland Street (OR 66) to accommodate existing and future queue lengths. The northbound left turn lane storage is at capacity under existing year 2013 conditions and is exceeded by the design year 2015. The storage length requirement is 125' in the design year 2015 and 375' by the future year 2034. Proposed mitigation includes removing parking on Tolman Creek Road and re-striping to extend the northbound left turn pocket to include 400' of storage and an adequate transition. As was recommended with the IPCO site expansion, a TWLTL is recommended along Tolman Creek Road from the transition of the northbound left turn lane at Ashland Street to a point south of the Independent Way street connection to support future queuing and congestion along Tolman Creek Road.