

Technical Memorandum

To: Mark Handris, Icon Construction & Development
From: Daniel Stumpf, EI
Todd Mobley, PE
Date: April 9, 2018
Subject: Park Place Annexation:
Transportation Impact Study Addendum #2



RENEWS: 12/31/2018



**LANCASTER
ENGINEERING**

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Introduction

This memorandum is written as an addendum to the original *Park Place Annexation Transportation Impact Study* (TIS), dated August 2nd, 2017. Comments on the TIS were received from Clackamas County dated April 3, 2018. Lancaster Engineering then issued a response dated April 5, 2018, which precipitated updated comments from the County dated April 6, 2018. For reference, all three of those documents are attached to this addendum.

There is one outstanding item requested by Clackamas County as a result of these comments and responses, and that is analysis at the intersection of Redland Road and Anchor Way. That analysis is provided in this addendum.

Traffic Volumes

Manual turning movement counts during the morning and evening peak hours were conducted at the intersection from 7:00 to 9:00 AM on Thursday, April 5th and from 4:00 to 6:00 PM on Wednesday, April 5th. A growth rate was then applied to these volumes to estimate 2035 conditions without the proposed annexation using the same methodology for future volume forecasting that was implemented in the original TIS. Site trips were then added to the 2035 traffic volumes to show conditions with the annexation area at full build out.

Updated figures showing existing volumes, the assignment of site trips, and 2035 conditions both with and without the annexation area are attached to this memorandum.

Planned Intersection Improvements

The City of Oregon City Transportation System Plan (TSP) calls for the installation of a traffic signal at this location. Because warrants are clearly satisfied for a left-turn lane at this location even without the proposed annexation, to achieve safe operation, a future improvement project at this location would have to either A)



install a left-turn lane and a traffic signal, or B) install a three-phase traffic signal with a separate exclusive phase for each leg of the intersection. With this configuration, a left-turn lane would not be necessary.

Operational Analysis

An examination of left-turn lane warrants and traffic signal warrants was done to determine when these improvements would be necessary. Details are included in the attached to this addendum, but the analysis shows that a left-turn lane is presently warranted during both the morning and evening peak hours for existing conditions. By 2035 a traffic signal will be warranted even without the proposed annexation. The table below shows a summary of when warrants are satisfied for a left-turn lane and for a traffic signal. As shown in the table, improvements are needed at the intersection, even without the proposed annexation.

Table 1: Left-Turn Lane & Traffic Signal Warrant Summary

| | Left-Turn Lane Needed? | | |
|--|------------------------|--------------|------------------------|
| | AM Peak Hour | PM Peak Hour | Traffic Signal Needed? |
| A. Redland Road at Anchor Way | | | |
| Existing Conditions | Yes | Yes | No |
| 2035 Planning Horizon (w/o Annexation Trips) | Yes | Yes | Yes |
| 2035 Planning Horizon (w/ Annexation Trips) | Yes | Yes | Yes |

In addition, a capacity analysis was conducted to determine the level of service, delay, and volume-to-capacity (v/c) ratio for all the scenarios examined. Detailed capacity analysis output is attached to this addendum, but the analysis shows that the intersection currently meets Clackamas County operational standards, but experiences long delays on the stop-controlled Anchor Way approach during the evening peak hour.

By 2035 the intersection will fail during both peak hours, even without trips from the annexation area. The addition of a traffic signal and a left-turn lane on Redland Road will result in acceptable operation at the planning horizon with the annexation area at full build out.

A summary of the results of the capacity analysis are shown in the following table.



Table 2: Capacity Analysis Summary

| | Morning Peak Hour | | | Evening Peak Hour | | |
|--|-------------------|-------|-------------|-------------------|-------|--------------|
| | LOS | Delay | v/c | LOS | Delay | v/c |
| A. Redland Road at Anchor Way | | | | | | |
| Existing Conditions | D | 33 | 0.54 | F | 89 | 0.95 |
| 2035 Planning Horizon (w/o Annexation Trips) | F | >99 | 0.98 | F | >99 | 1.65 |
| 2035 Planning Horizon (w/ Annexation Trips) | F | >99 | 1.56 | F | >99 | >2 |
| 2035 w/ Annexation, w/ left-turn lane & signal | B | 13 | 0.81 | D | 40 | 0.96 |
| BOLDED results exceed Clackamas County operational standard | | | | | | |

Transportation Planning Rule

This analysis shows that the infrastructure considered in the TSP will provide acceptable operation at the planning horizon with the annexation area in place. As such, the Transportation Planning Rule is satisfied, provided the improvement is reasonably likely to be constructed. It is recommended that this intersection be monitored during the Master Plan stage for projects within the Park Place Concept Plan area to determine when mitigation is necessary.



DAN JOHNSON
DIRECTOR

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

DEVELOPMENT SERVICES BUILDING
150 BEAVERCREEK ROAD OREGON CITY, OR 97045

Date: April 3, 2018
To: Pete Walter, City of Oregon City
From: Christian Snuffin, P.E., PTOE, Clackamas County
Rick Nys, P.E., Clackamas County
Subject: AN 17-0004 / ZC 17-0005: Park Place Annexation and Rezoning of 92 acres

Mr. Walter,

We have the following comments about this project:

- Clackamas County has jurisdiction over several of the study intersections and roadways including a portion of Redland Road, Livesay Road, a portion of Holcomb Boulevard, and Holly Lane.
- The County was not contacted by the applicant to participate in the traffic impact analysis (TIA) scoping process.
- The zone change has a significant effect on the Redland Road/Holly Lane intersection per the TIA. The proposed mitigation suggested by Replinger & Associates for a proportional share contribution is agreeable to Clackamas County. We question the assumption that both the Holly Lane extension and the Redland Road/Holly Lane intersection improvement projects can be considered as planned per the Transportation Planning Rule without a more defined funding plan. We have concerns about the Redland Road/Holly Lane operations without the provision of a roundabout or other intersection improvement when the Holly Lane extension is constructed. Alternatively, additional study should be conducted that establishes compliance with the Transportation Planning Rule as well as compliance with County safety criteria to determine the appropriate intersection improvement at the Redland Road/Holly Lane intersection with the construction of the extension. This can be accomplished as part of a Master Plan TIA.
- Either with or without a connection to Redland Road via a Holly Lane extension, the County has concerns about the impact to Livesay Road and its intersection with Redland Road, which would directly serve a future development. The TIA assumes no site traffic on Livesay Road, which we think is not realistic without further analysis. The Oregon City Transportation System Plan assumes no planned improvements for the Redland Road/Livesay Road intersection. The TIA should evaluate the Redland Road/Livesay Road intersection and the need for a westbound left turn lane. This analysis should be conducted prior to approval of the zone change.
- The intersection of Redland Road/Anchor Way should be analyzed as part of a revised TIA. With the Holly Lane connection, this intersection will experience a substantial increase in traffic. That evaluation should include evaluating the need for a westbound left turn lane on Redland Road. This analysis should be conducted prior to approval of the zone change.

Should you have any questions or comments, please contact Christian Snuffin at 503-742-4716.

Technical Memorandum



LANCASTER
ENGINEERING

To: Christian Snuffin, PE, PTOE & Rick Nys, PE
Clackamas County Department of Transportation & Development

From: Todd Mobley, PE

Date: April 5, 2018

Subject: Park Place Annexation in Oregon City, AN 17-0004/ZC 17-0005

321 SW 4th Ave., Suite 400
Portland, OR 97204
phone: 503.248.0313
fax: 503.248.9251
lancasterengineering.com

Introduction

This memorandum is written in response to comments on the subject application received from Clackamas County, dated April 3, 2018. Our response focuses on the last three bulleted items in the County comments.

Redland Road at Holly Lane & Holly Lane Extension

The Holly Lane extension and any necessary intersection improvements are planned in the City of Oregon City Transportation System Plan (TSP) and development within the Park Place area will rely on these improvements. Development on the subject site will be consistent with that considered in the Concept Plan, and thereby the TSP. Therefore, the future Holly Lane extension and the intersection with Redland Road considered in the TSP will be sufficient to serve the Park Place area, including the subject site.

Still, as noted in the third bullet of the County comments, specific intersection designs that will be needed to support development and to satisfy the standards that will be applicable can be considered at the time of the Transportation Impact Study (TIS) for the future Master Plan application.

Livesay Road Traffic Impacts

The intent of development in the annexation area is not to rely on Livesay Road west of the project site. The roadway is generally narrow and unimproved. For this reason, the original TIS did not assign trips to the roadway or rely on it for access. The Park Place Concept Plan considers a functional upgrade to Livesay Road to a Neighborhood Collector classification between the planned Swan Avenue and Holly Lane extensions. This is shown in Figure 1 below, which is the Functional Classification Map from the Concept Plan. Consistent with the Concept Plan, development on the site is intended to rely on streets other than Livesay Road.

Traffic impacts to Livesay Road should be carefully monitored and controlled during the Master Plan process. This can be accomplished through the thoughtful timing and configuration of new street connections to development in the Park Place area, which can be done strategically to emphasize the use of new higher-classification facilities such as the Swan Avenue and Holly Lane extensions.



April 5, 2018
Page 2 of 3

For these reasons, the evaluation of the intersection of Livesay Road and Redland Road is not necessary at this time. Rather, impacts to Livesay Road should be carefully examined and minimized as development occurs through the Master Plan process.

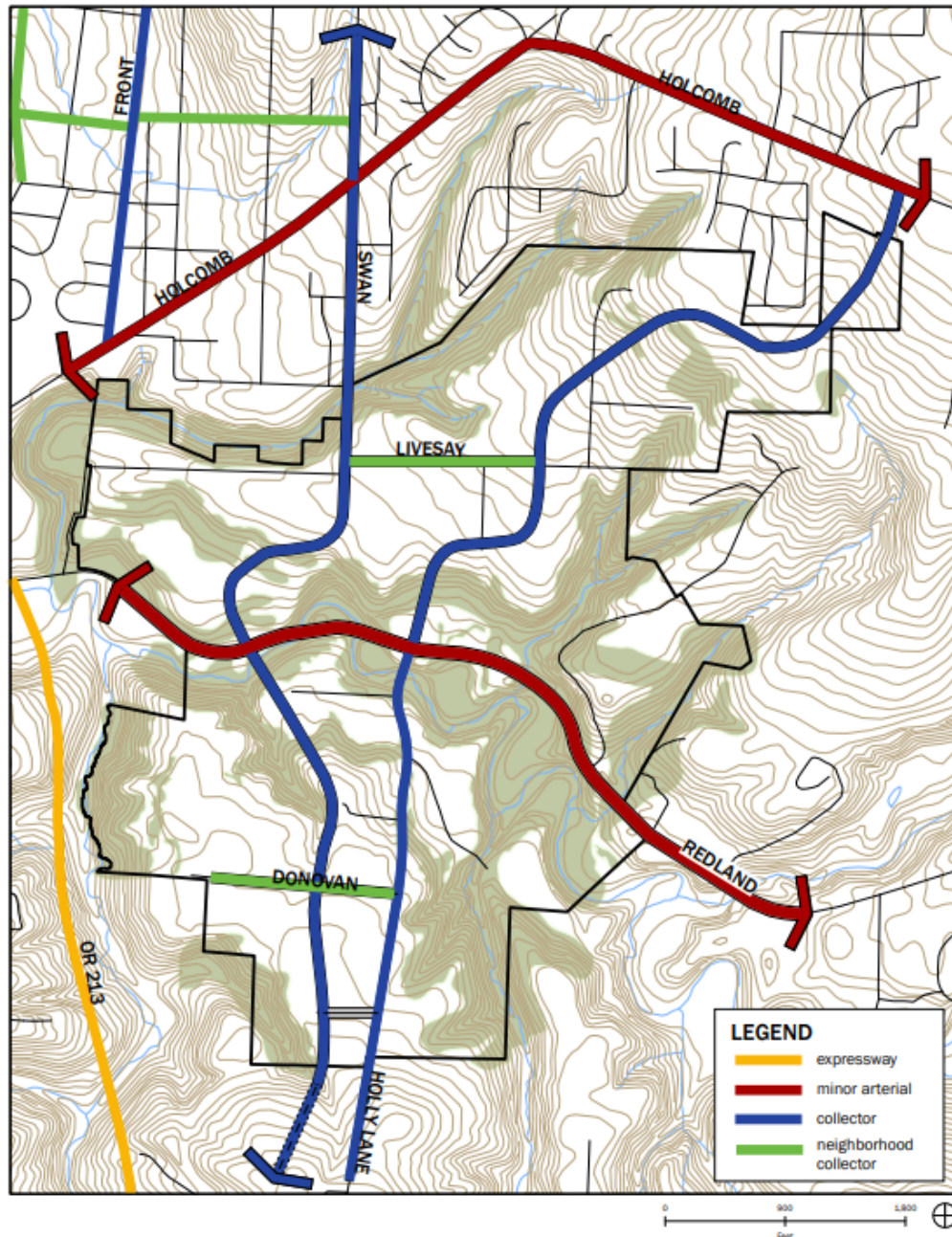


Figure 1 - Functional Classification Map from Park Place Concept Plan



April 5, 2018
Page 3 of 3

Redland Road at Anchor Way

The intersection of Redland Road at Anchor Way was not included in the study since only three percent of the site traffic is expected to use Anchor Way. While through traffic will be added, trips to and from Anchor Way will be minor. In fact, the trip assignment shows that only 11 morning peak hour trips and 8 evening peak hour trips will be added to the westbound left-turning movement that was raised as a concern in the County comments.

Further, the intersection is planned for signalization in the TSP. This intersection could be selected for further study as part of future Master Plan applications for development within the Park Place area but based on the trip generation and distribution analysis in this report, minor-street impacts will be very small.

If you have any questions regarding the responses and information in this memo, please don't hesitate to contact me directly.



DAN JOHNSON
DIRECTOR

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
DEVELOPMENT SERVICES BUILDING
150 BEAVERCREEK ROAD OREGON CITY, OR 97045

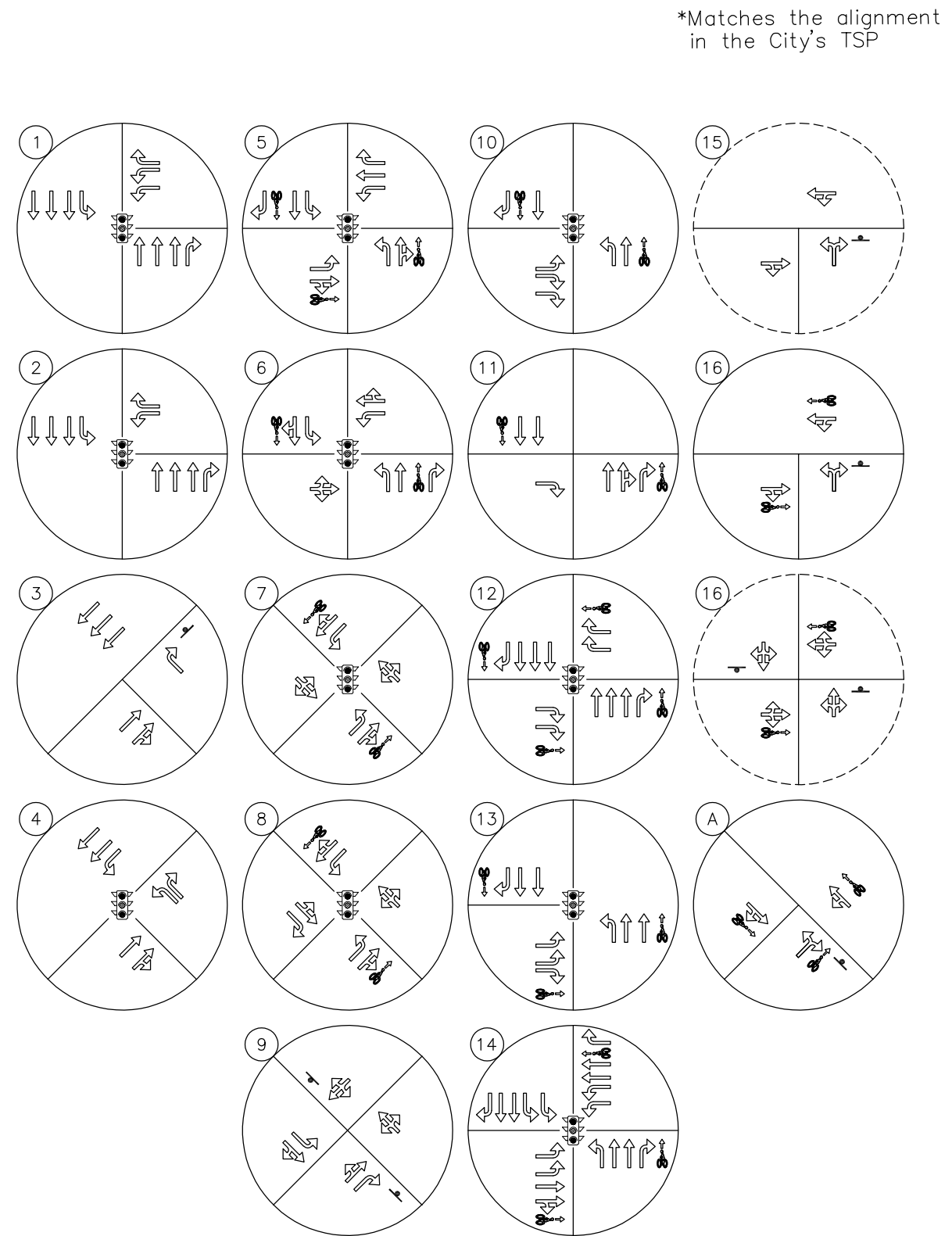
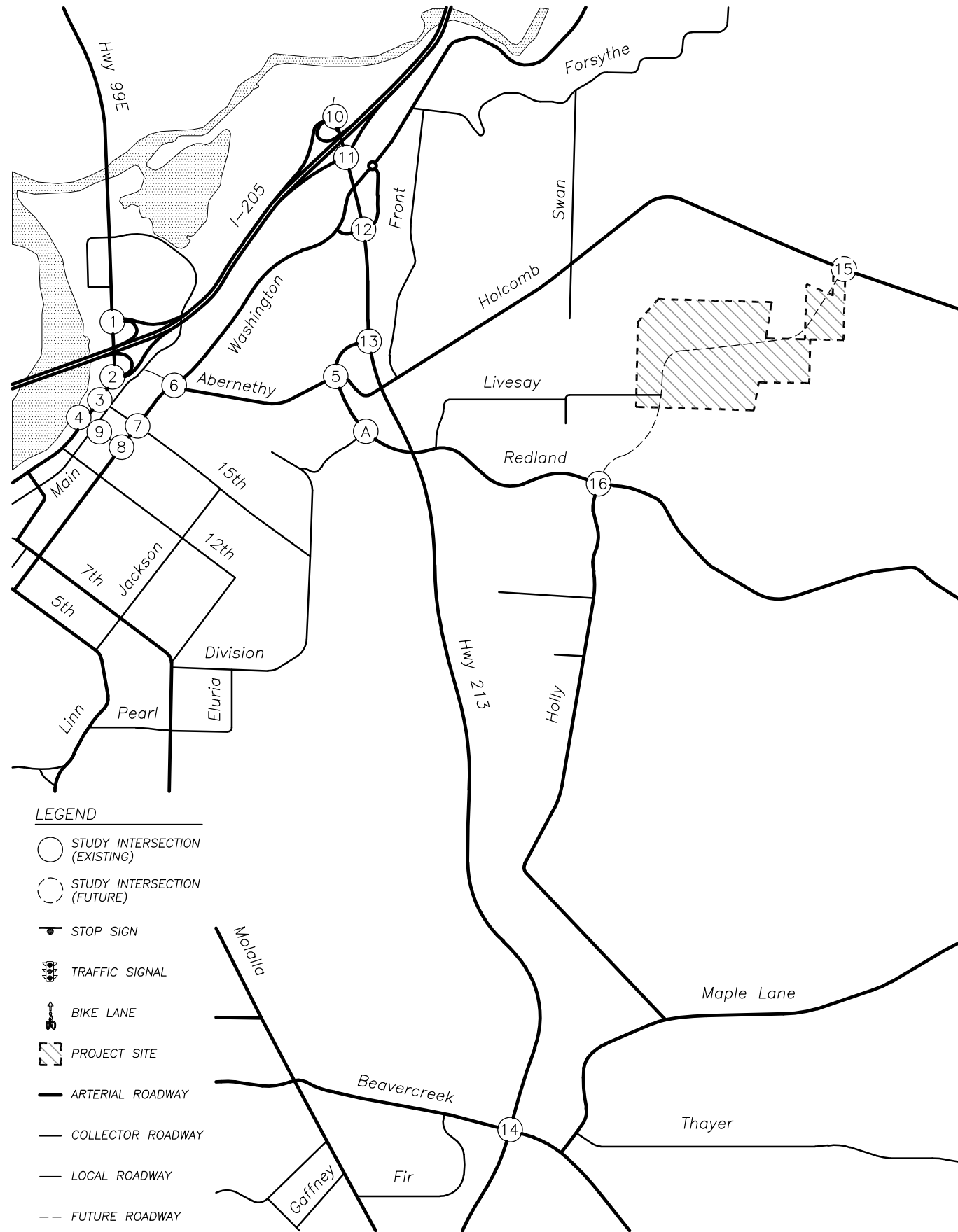
Date: April 6, 2018
To: Pete Walter, City of Oregon City
From: Christian Snuffin, P.E., PTOE, Clackamas County
Rick Nys, P.E., Clackamas County
Subject: AN 17-0004 / ZC 17-0005: Park Place Annexation and Rezoning of 92 acres

Mr. Walter,

We've reviewed the April 5, 2018 memorandum from Lancaster Engineering. We have the following updated comments about this project:

- We are satisfied with the assertion that the intent of the development is not to rely on Livesay Road to the west of the project site, and that planned improvements to the eastern portion of Livesay, as well as the Swan Avenue connector, will address future transportation needs.
- In our previous memo, dated April 3, 2018, we asked for additional analysis at the Redland Road/Anchor Way intersection. Mr. Mobley's memo does describe the additional site trips on Redland Rd, and it indicates that the number of additional site trips are not significant. However, a capacity analysis that addresses requirements of the Transportation Planning Rule and a westbound left turn lane analysis is still needed. This analysis should be conducted prior to approval of the zone change.

Should you have any questions or comments, please contact Christian Snuffin at 503-742-4716.



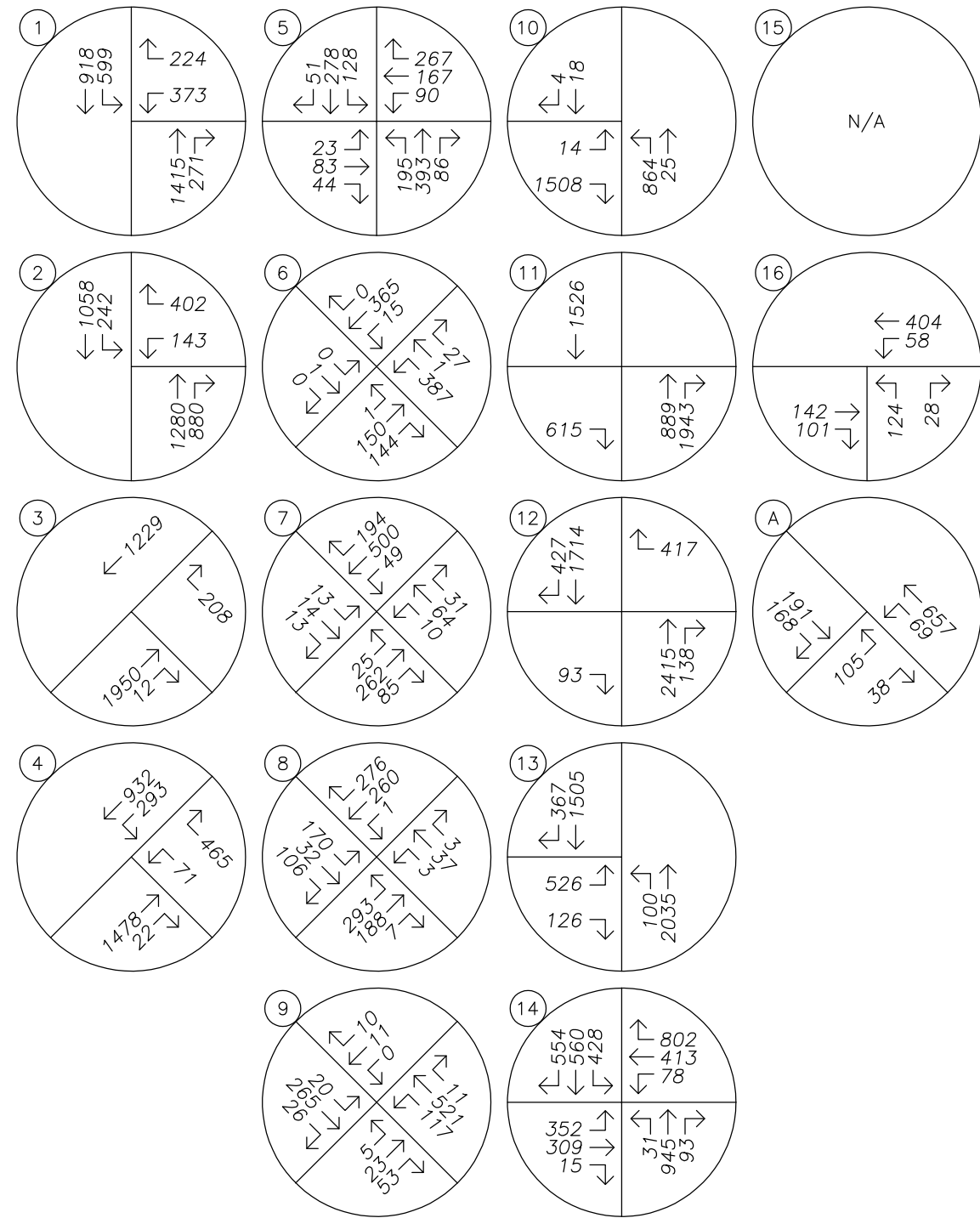
VICINITY MAP

Intersection Configurations

Traffic Control Devices and Lane Configurations

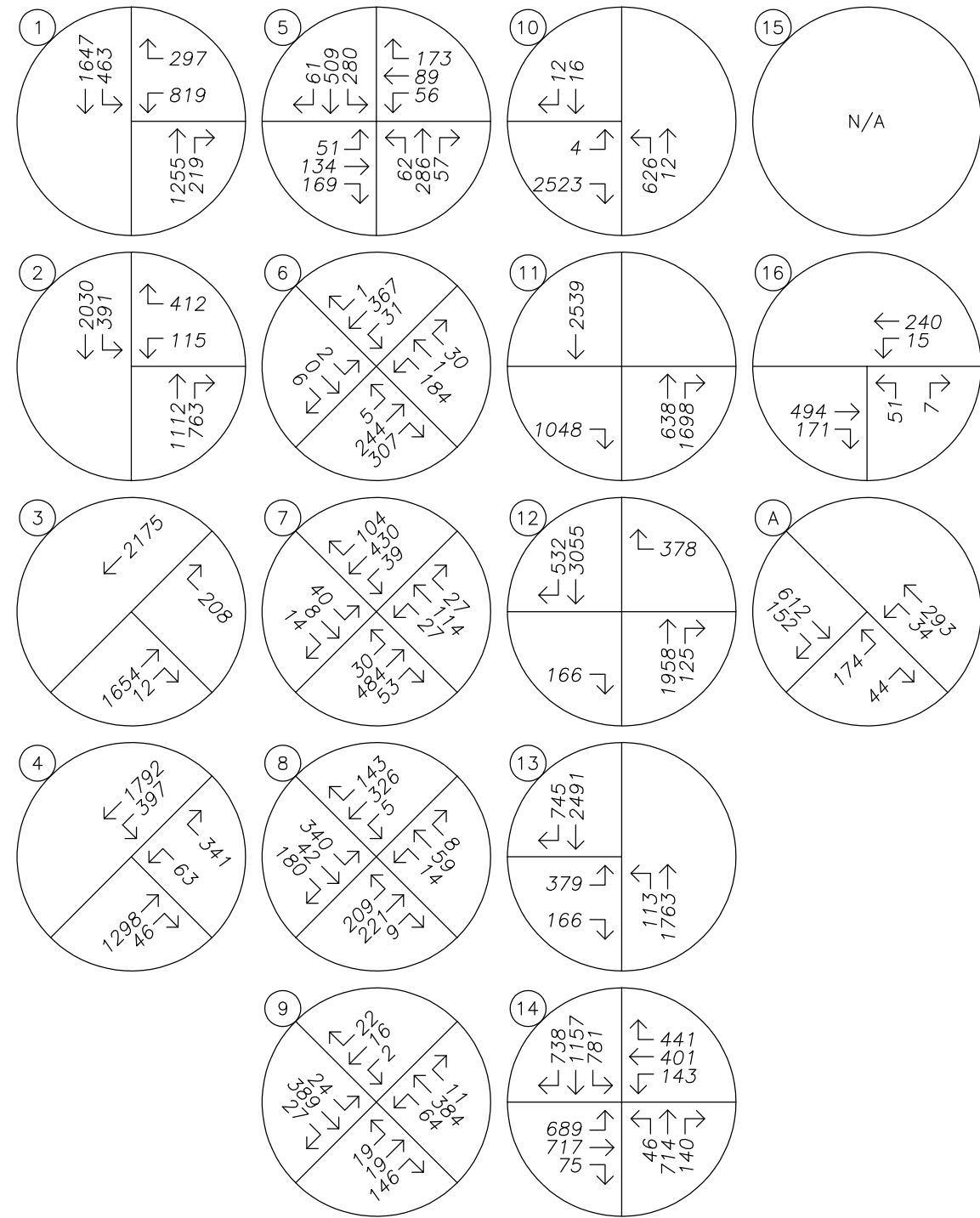
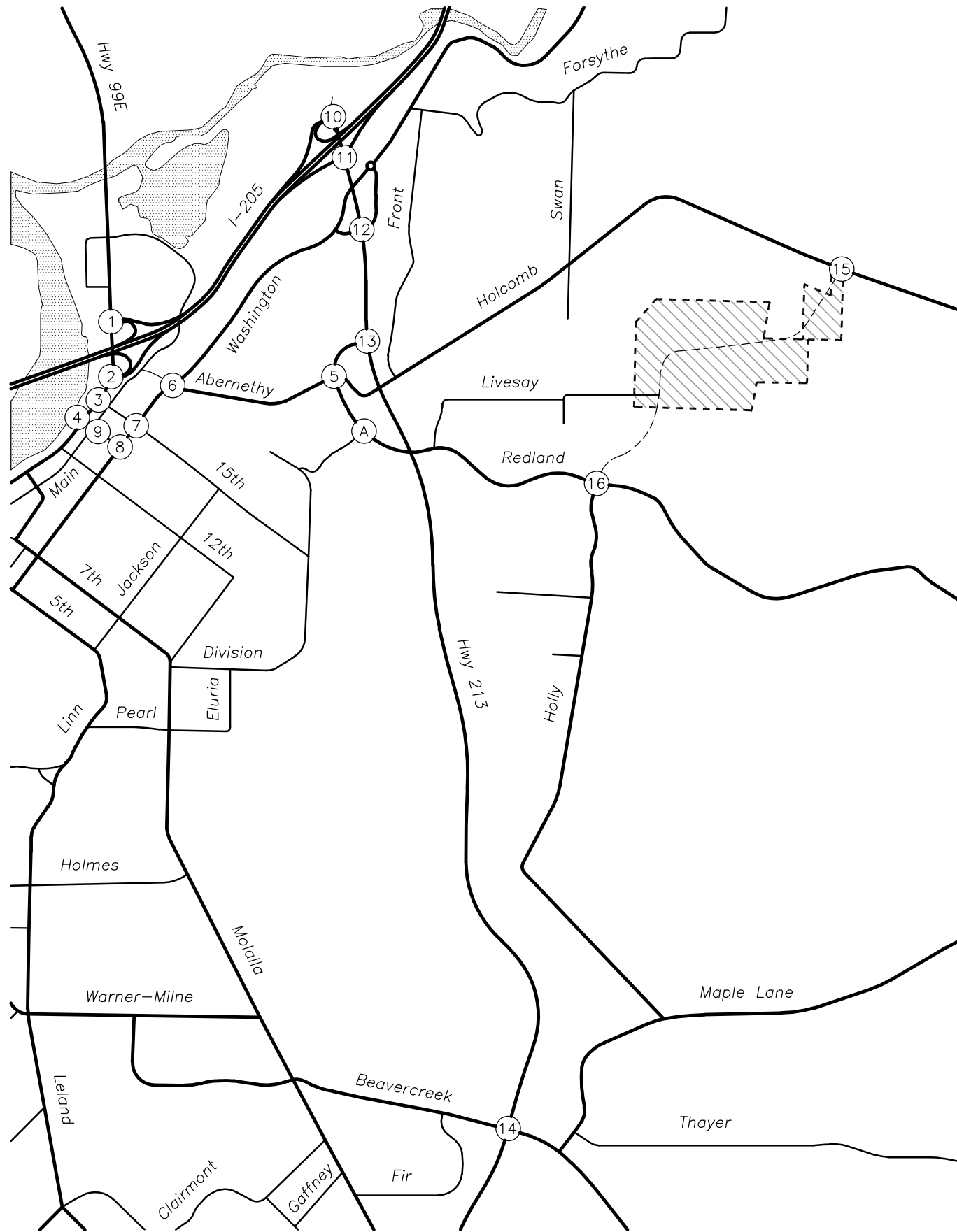
FIGURE 1





TRAFFIC VOLUMES
Existing Conditions
AM Peak Hour

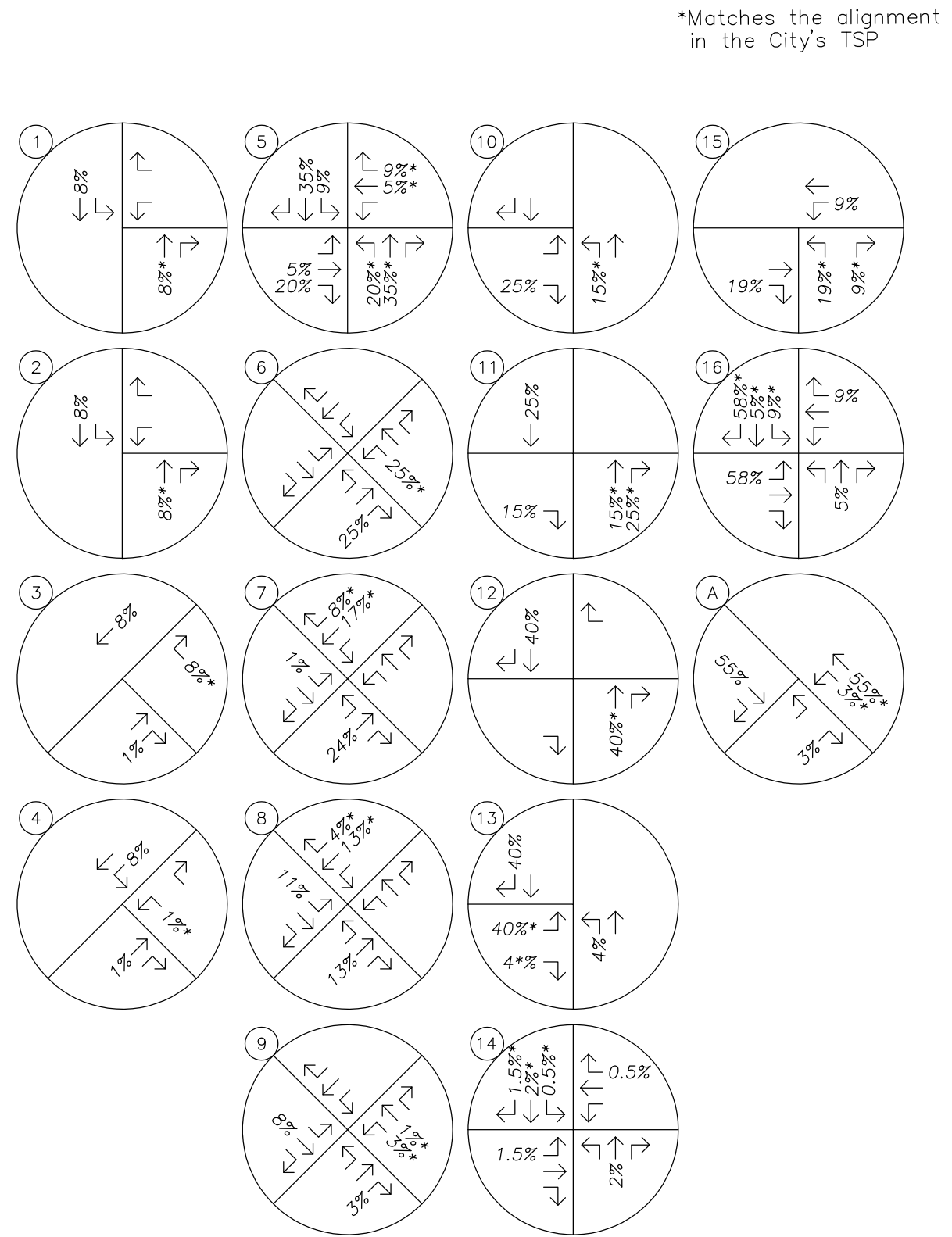
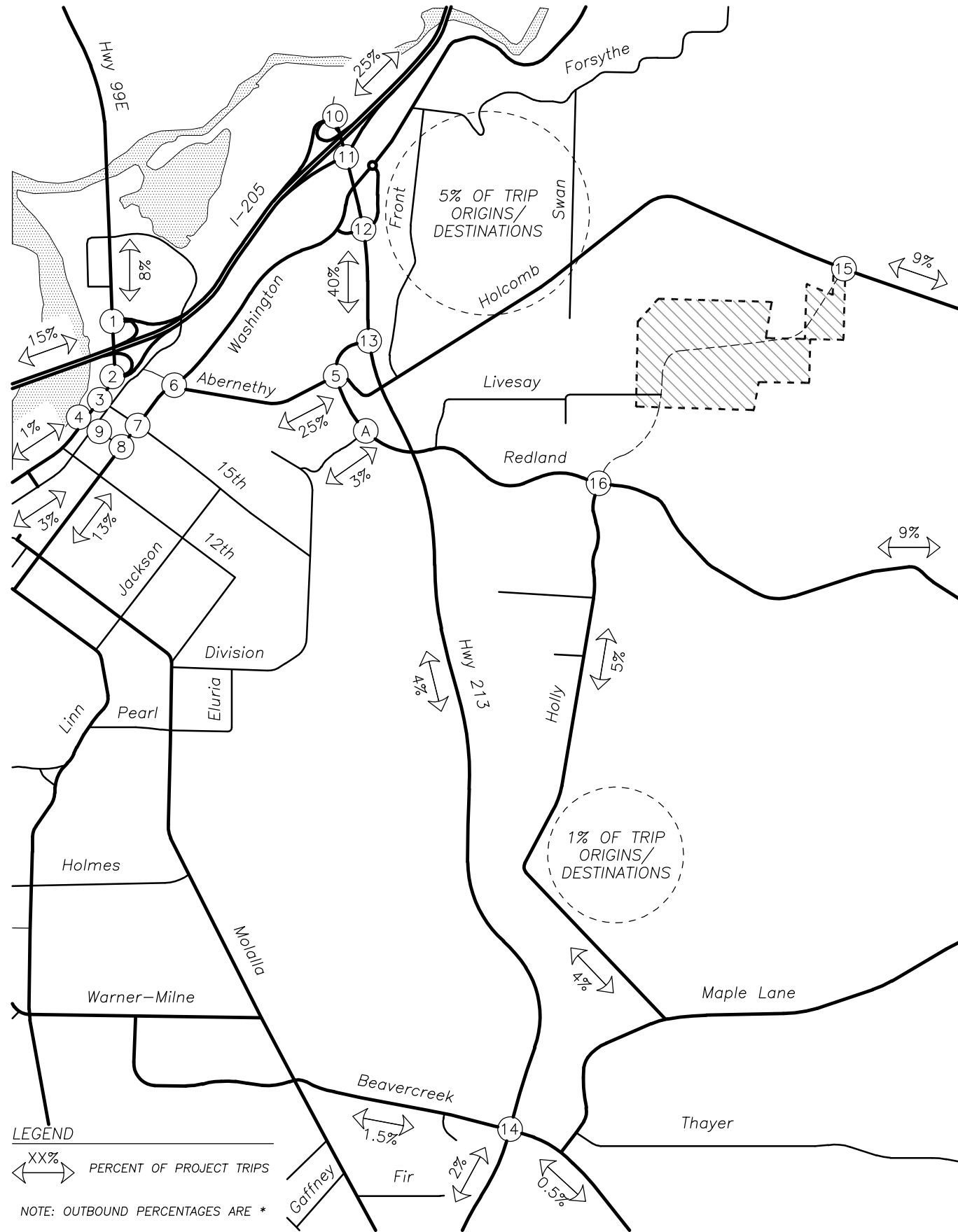
FIGURE 2



12

TRAFFIC VOLUMES
Existing Conditions
PM Peak Hour

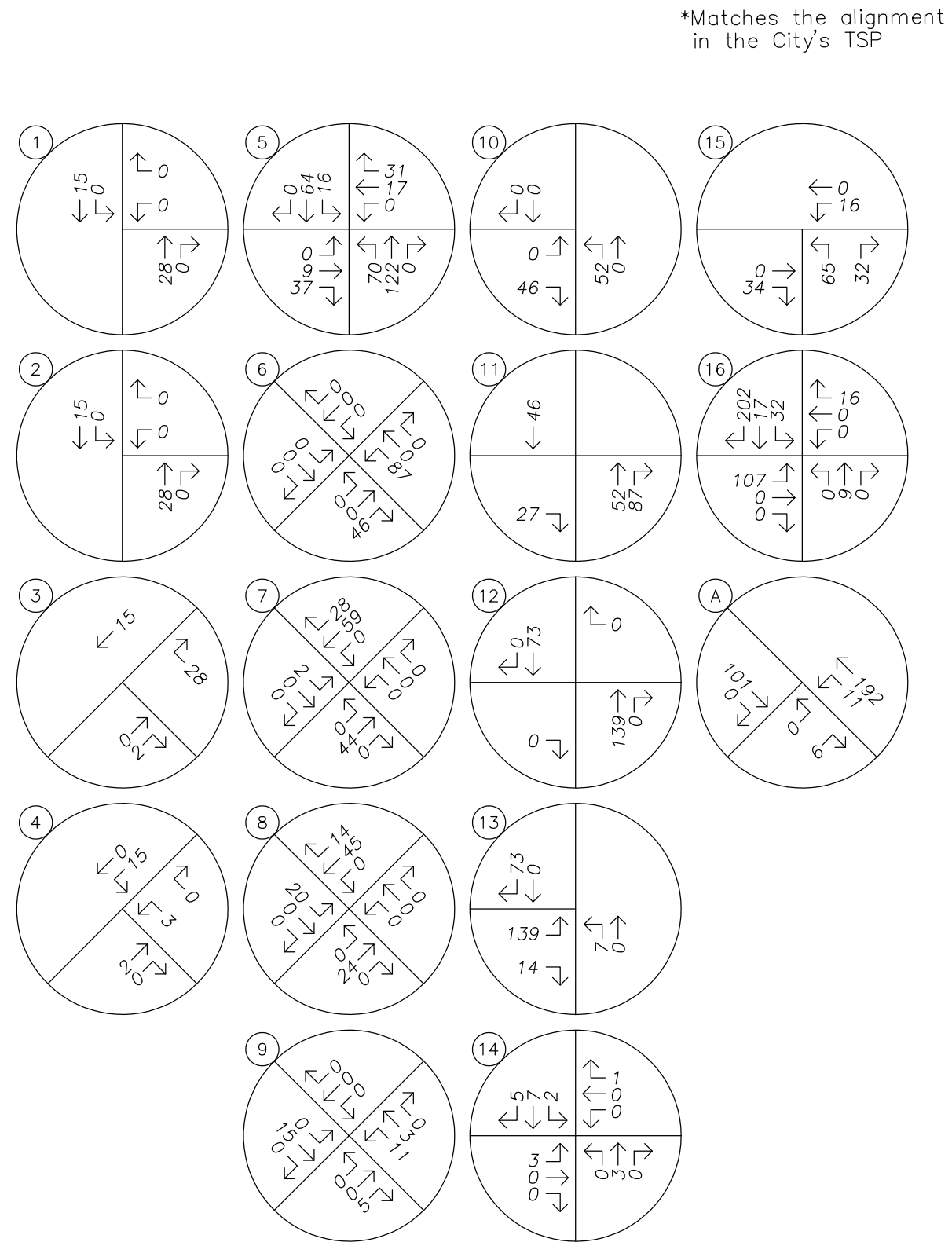
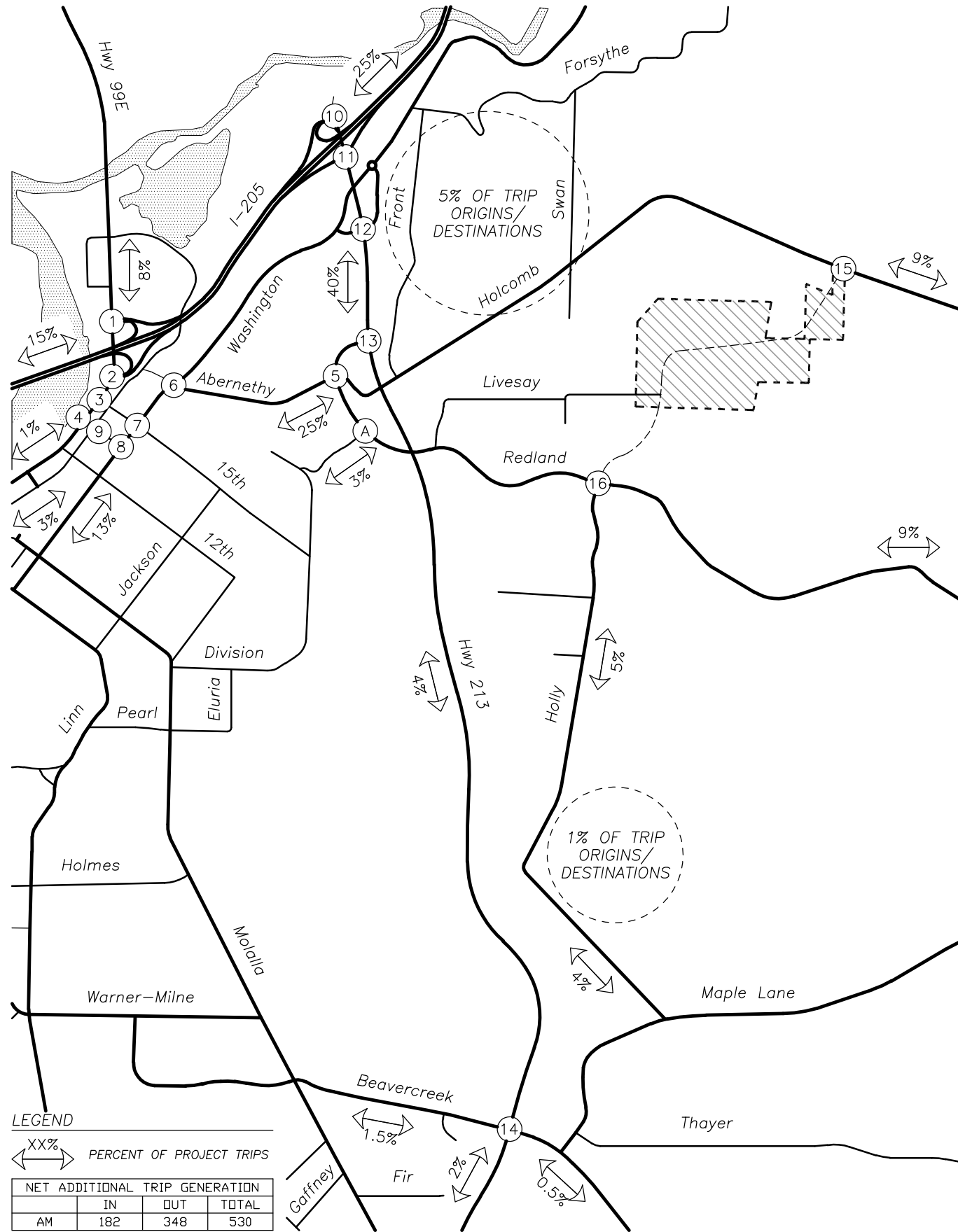
FIGURE 3



12

SITE TRIP DISTRIBUTION
Inbound & Outbound Percentages – Site Trips
AM & PM Peak Hours

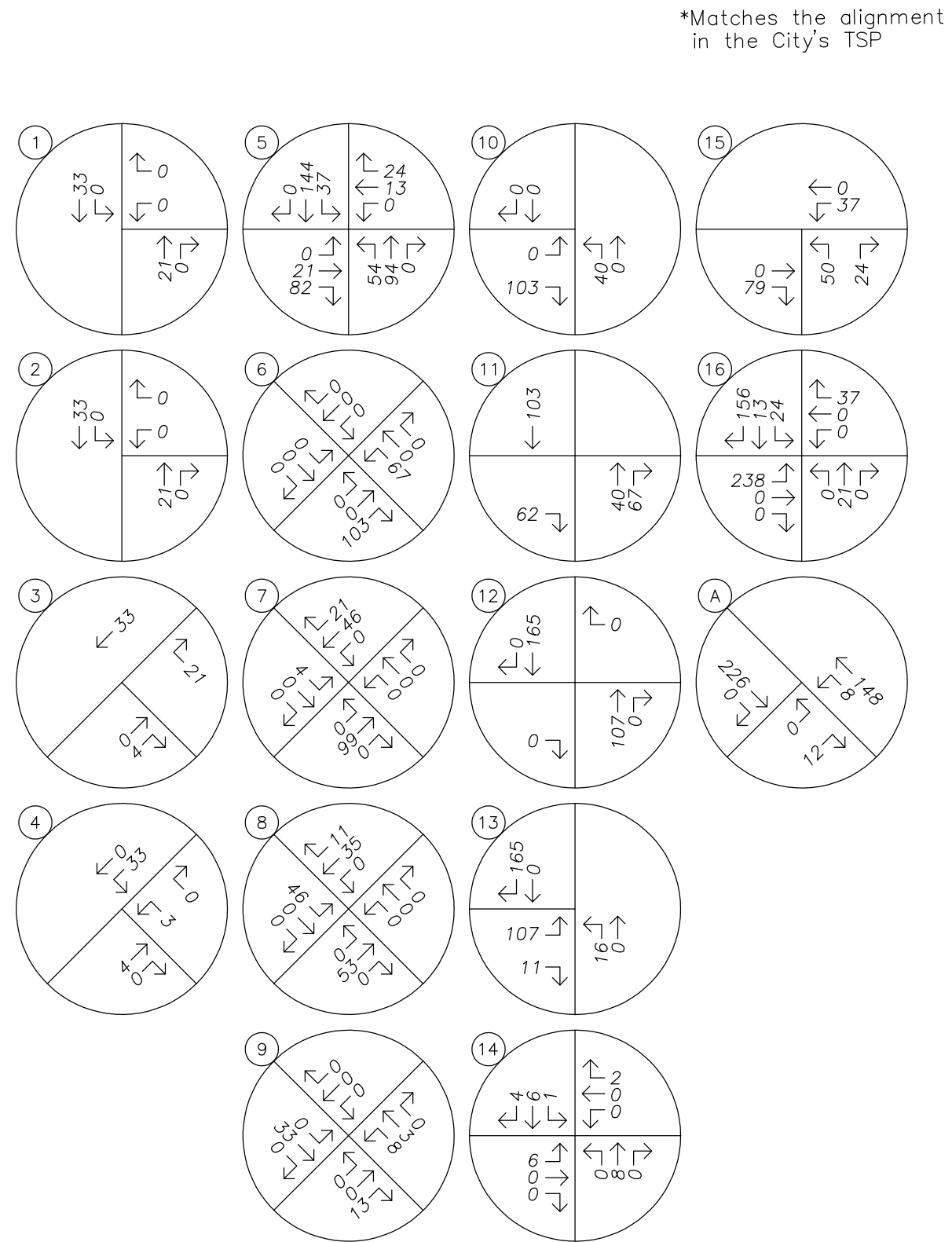
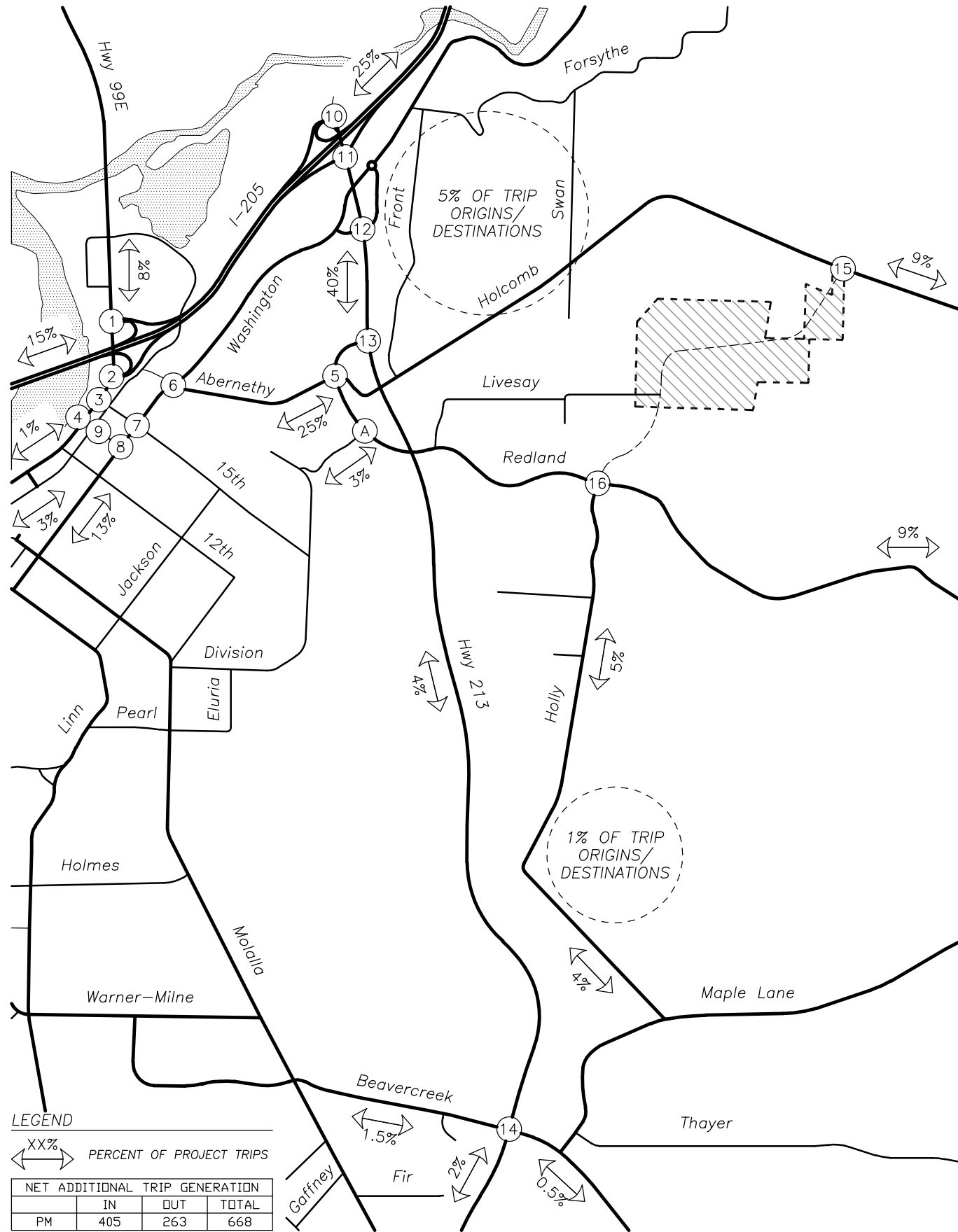
FIGURE 4



12

SITE TRIP ASSIGNMENT
Proposed Zone Change – Net Additional Site Trips
AM Peak Hour

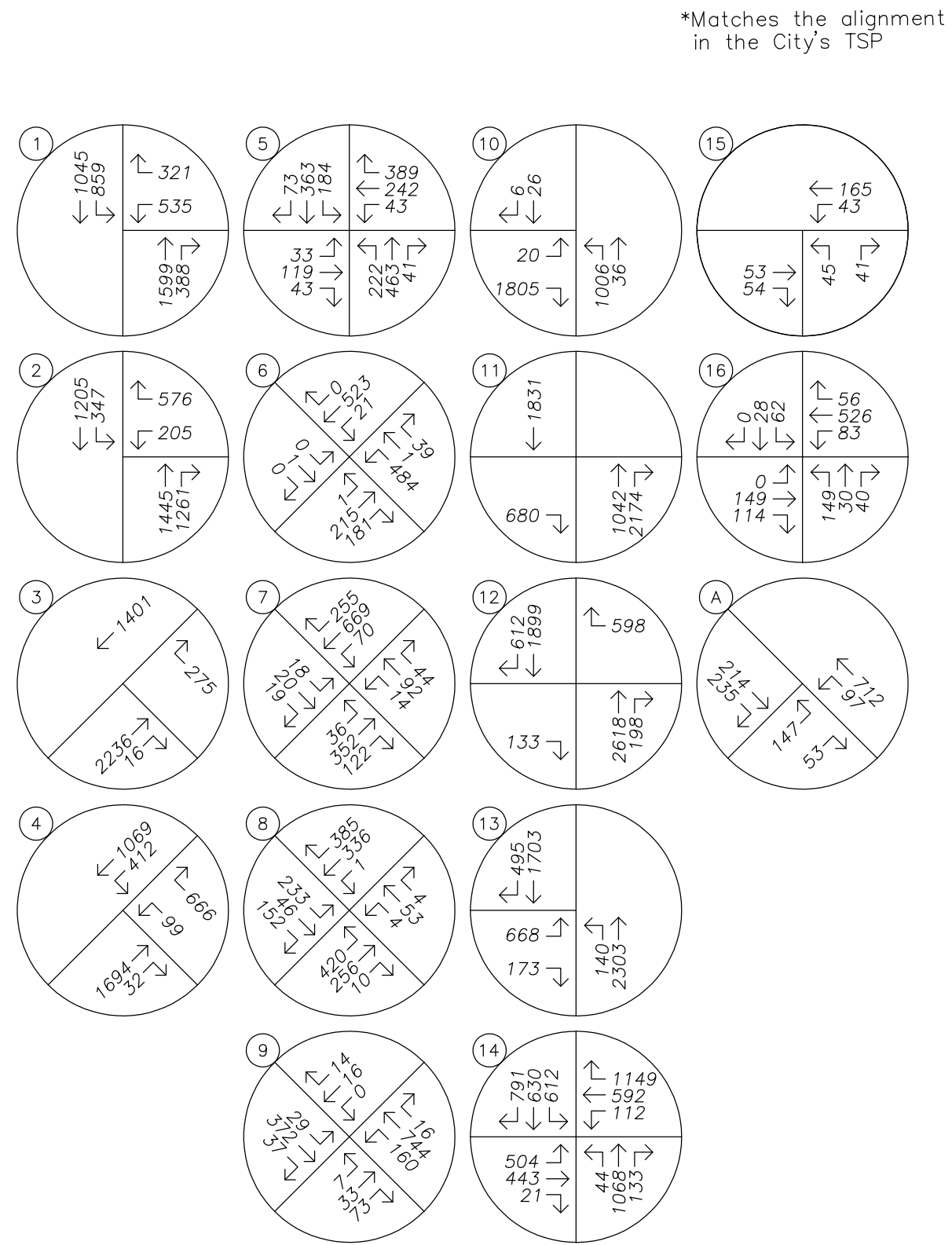
FIGURE 5



12

SITE TRIP ASSIGNMENT
Proposed Zone Change – Net Additional Site Trips
PM Peak Hour

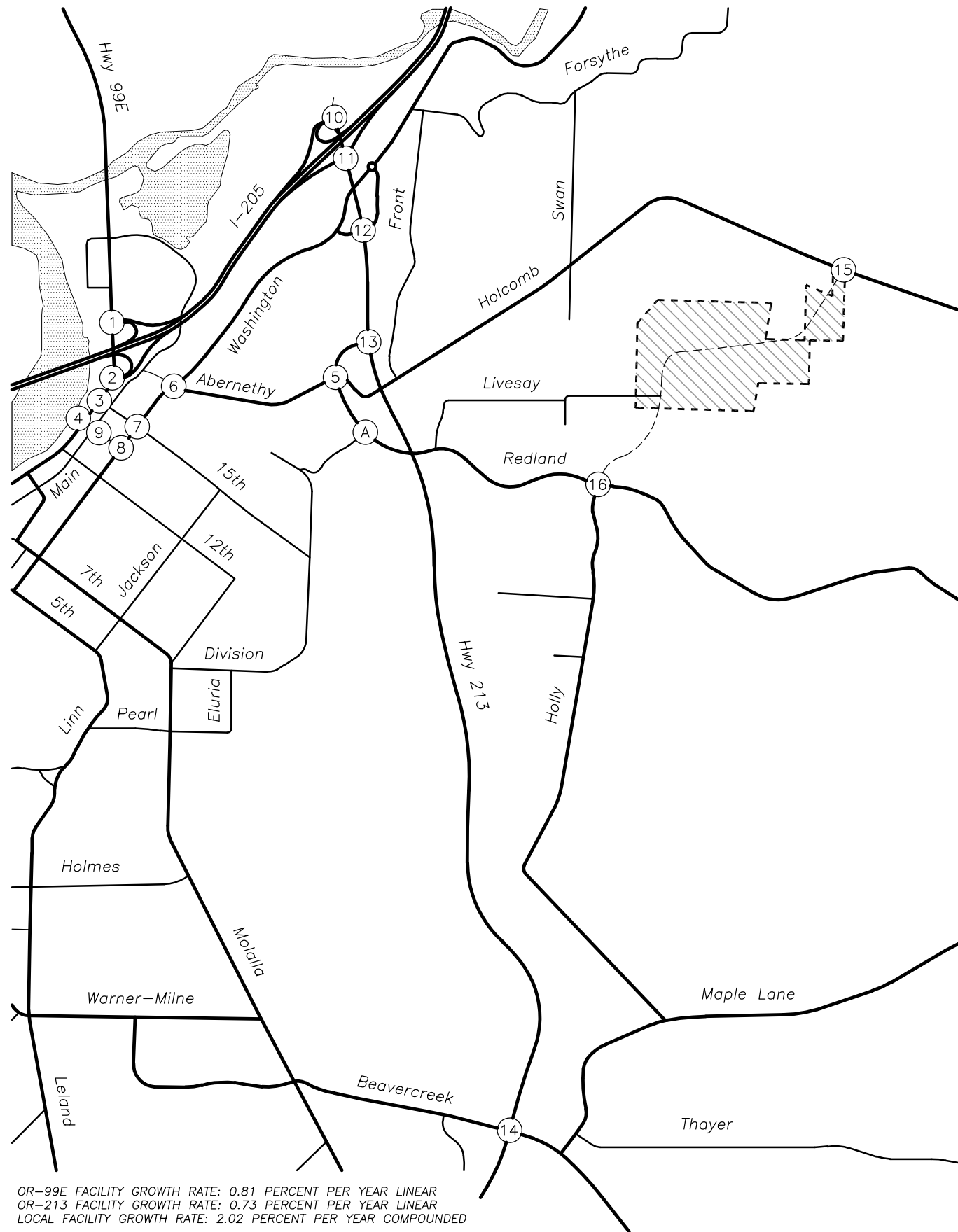
FIGURE 6



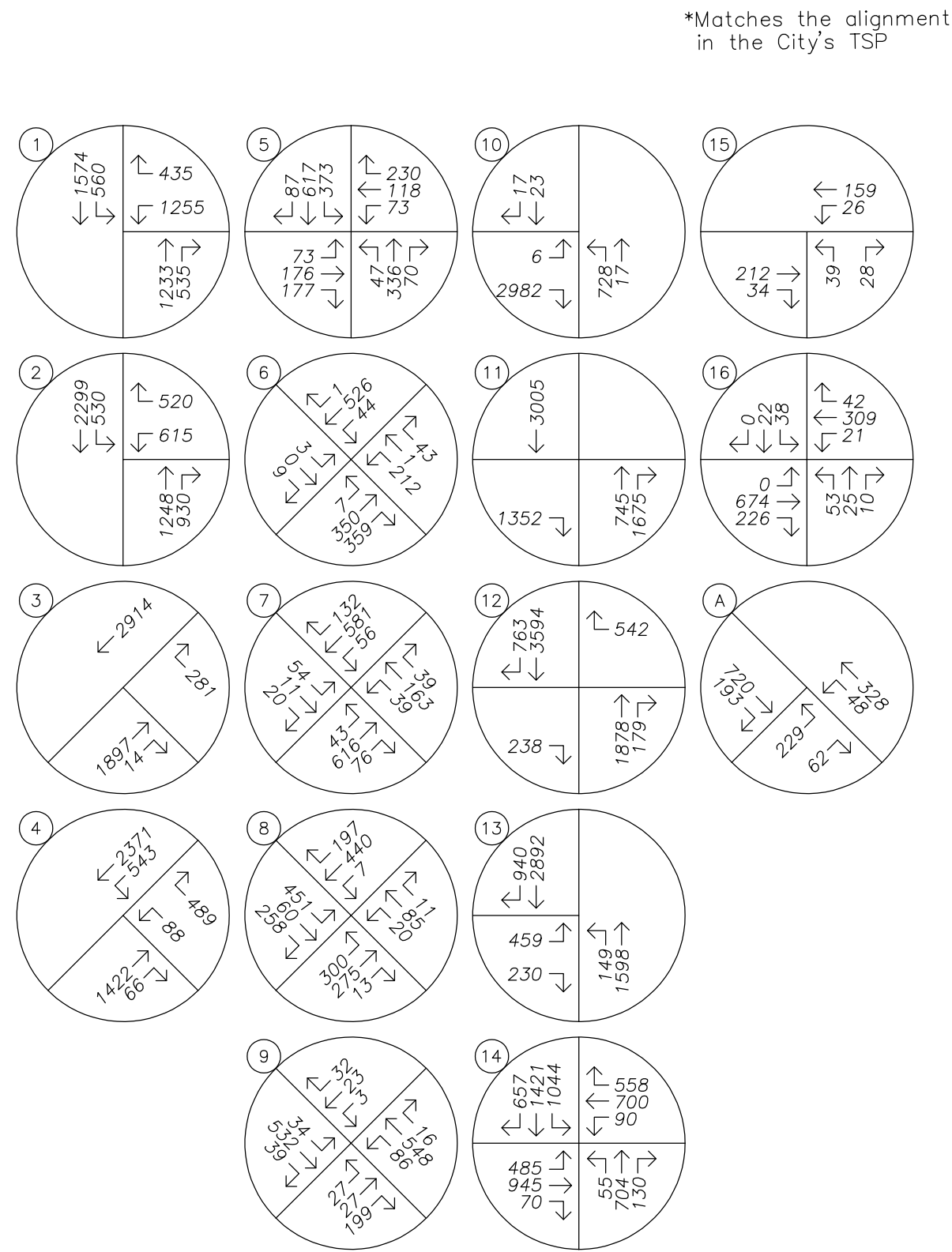
12

TRAFFIC VOLUMES
 Year 2035 Planning Horizon – w/ Holly Extension
 AM Peak Hour

FIGURE 7



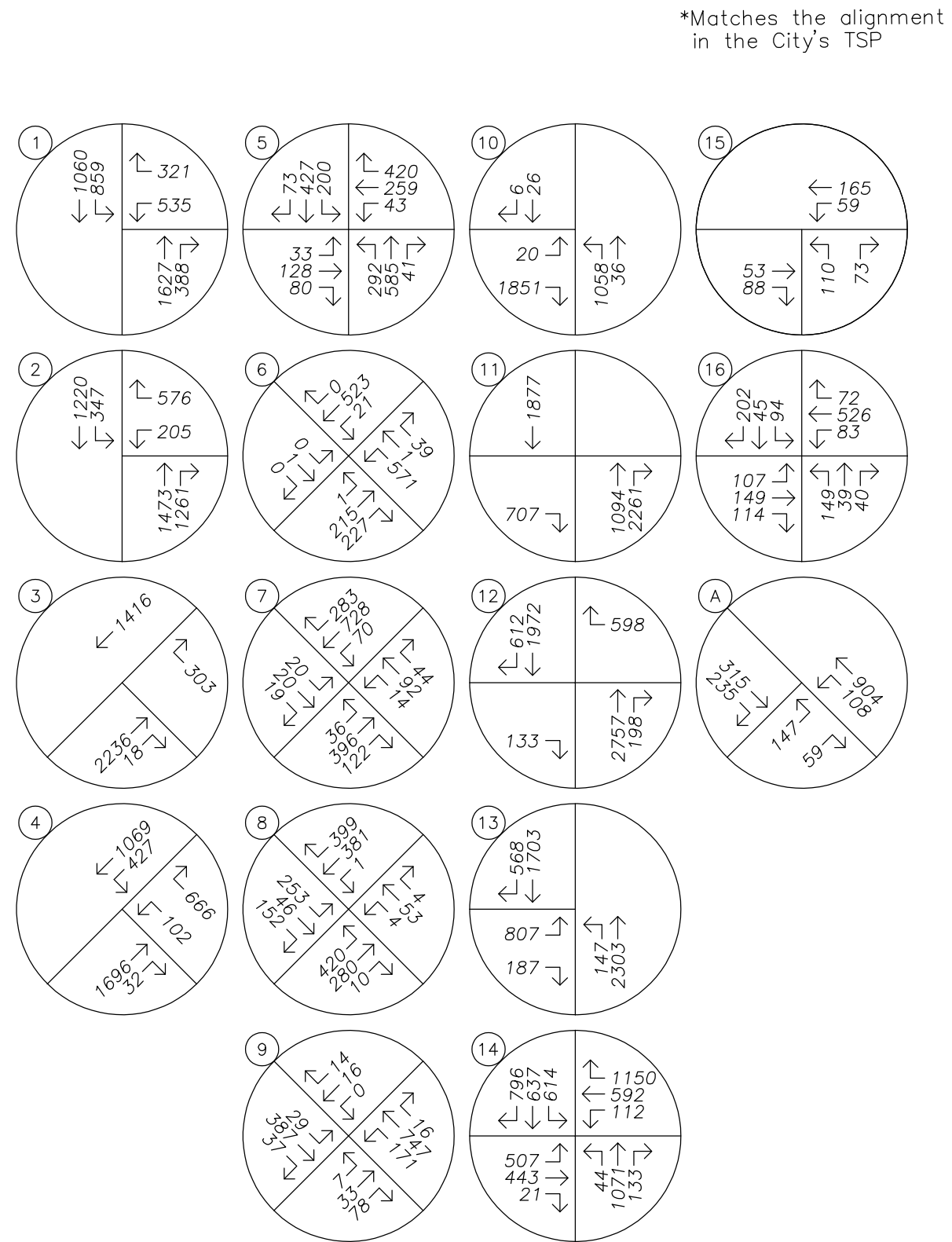
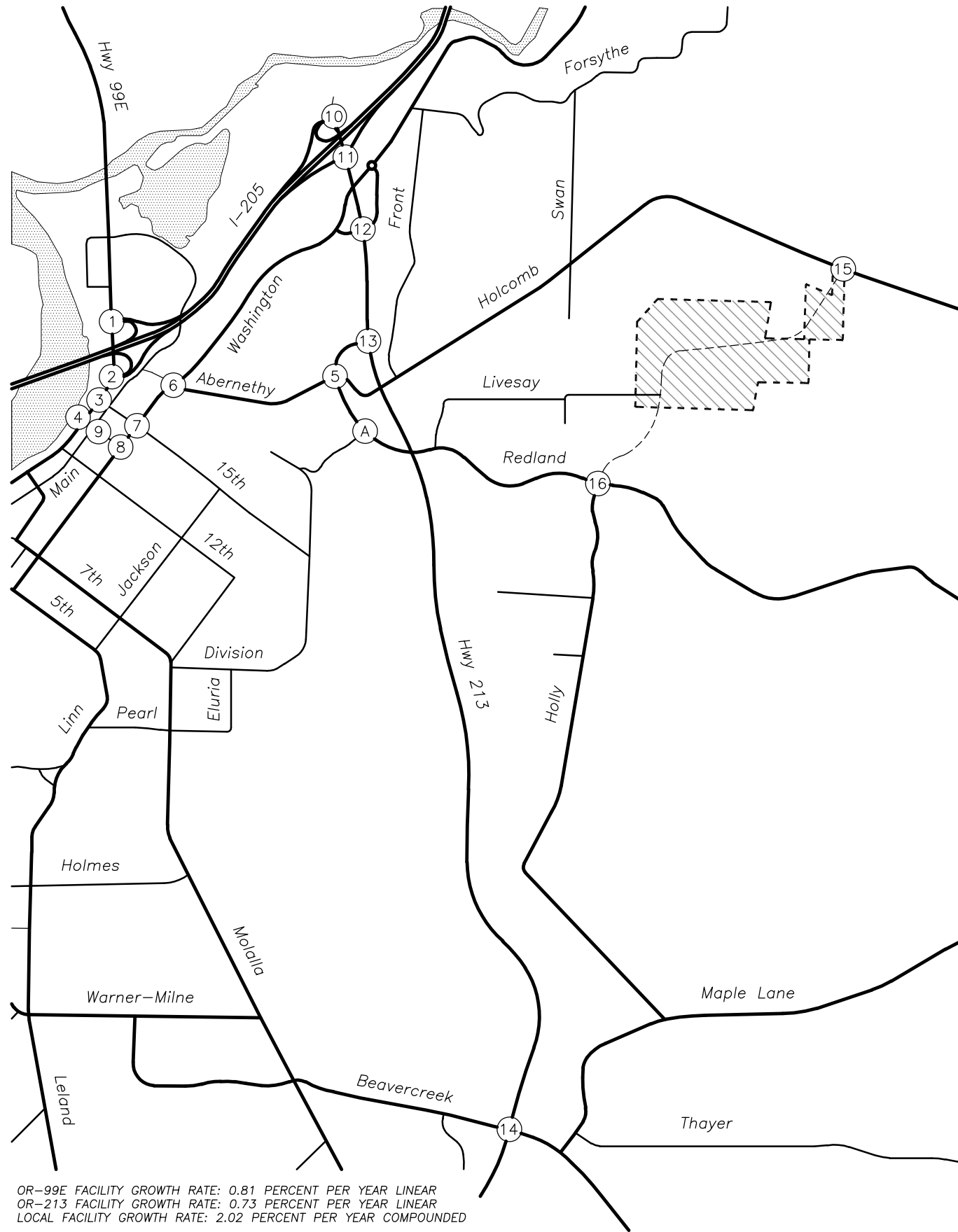
OR-99E FACILITY GROWTH RATE: 0.81 PERCENT PER YEAR LINEAR
 OR-213 FACILITY GROWTH RATE: 0.73 PERCENT PER YEAR LINEAR
 LOCAL FACILITY GROWTH RATE: 2.02 PERCENT PER YEAR COMPOUNDED



12

TRAFFIC VOLUMES
 Year 2035 Planning Horizon – w/ Holly Extension
 PM Peak Hour

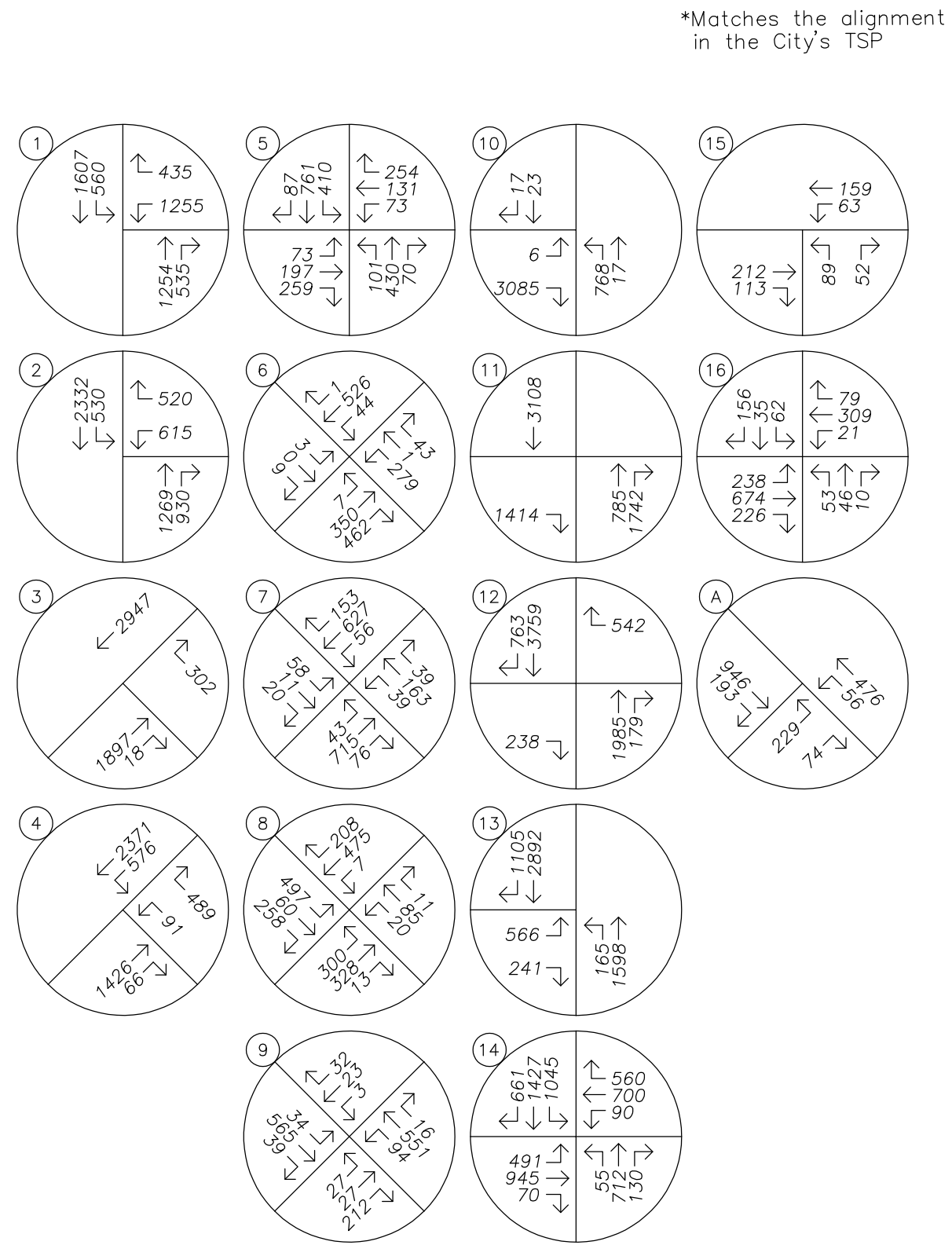
FIGURE 8



12

TRAFFIC VOLUMES
 Year 2035 Planning Horizon plus Annexation
 AM Peak Hour

FIGURE 9



TRAFFIC VOLUMES
 Year 2035 Planning Horizon plus Annexation
 PM Peak Hour

FIGURE 10



Total Vehicle Summary

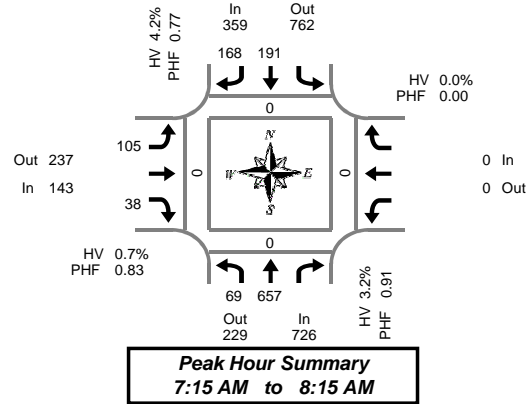


Clay Carney
(503) 833-2740

Redland Rd & S Anchor Way

Thursday, April 05, 2018

7:00 AM to 9:00 AM



Peak Hour Summary
7:15 AM to 8:15 AM

5-Minute Interval Summary

7:00 AM to 9:00 AM

| Interval Start Time | Northbound Redland Rd | | | Southbound Redland Rd | | | Eastbound S Anchor Way | | | Westbound S Anchor Way | | | Interval Total | Pedestrians Crosswalk | | | |
|---------------------------|--------------------------|-------|-------|--------------------------|-----|-------|---------------------------|----|-------|---------------------------|--|-------|-------------------|--------------------------|-------|------|------|
| | L | T | Bikes | T | R | Bikes | L | R | Bikes | | | Bikes | | North | South | East | West |
| 7:00 AM | 1 | 43 | 0 | 11 | 7 | 0 | 1 | 4 | 0 | | | 0 | 67 | 0 | 0 | 0 | 0 |
| 7:05 AM | 0 | 60 | 0 | 10 | 9 | 0 | 6 | 3 | 0 | | | 0 | 88 | 0 | 0 | 0 | 0 |
| 7:10 AM | 1 | 38 | 0 | 13 | 4 | 0 | 5 | 3 | 0 | | | 0 | 64 | 0 | 0 | 0 | 0 |
| 7:15 AM | 6 | 60 | 0 | 17 | 11 | 0 | 4 | 4 | 0 | | | 0 | 102 | 0 | 0 | 0 | 0 |
| 7:20 AM | 3 | 52 | 0 | 9 | 7 | 0 | 13 | 6 | 0 | | | 0 | 90 | 0 | 0 | 0 | 0 |
| 7:25 AM | 6 | 73 | 0 | 18 | 13 | 0 | 8 | 4 | 0 | | | 0 | 122 | 0 | 0 | 0 | 0 |
| 7:30 AM | 8 | 43 | 0 | 19 | 14 | 0 | 8 | 3 | 0 | | | 0 | 95 | 0 | 0 | 0 | 0 |
| 7:35 AM | 6 | 54 | 0 | 13 | 5 | 0 | 17 | 3 | 0 | | | 0 | 98 | 0 | 0 | 0 | 0 |
| 7:40 AM | 7 | 68 | 0 | 12 | 8 | 0 | 8 | 2 | 0 | | | 0 | 105 | 0 | 0 | 0 | 0 |
| 7:45 AM | 7 | 48 | 0 | 18 | 18 | 0 | 7 | 2 | 0 | | | 0 | 100 | 0 | 0 | 0 | 0 |
| 7:50 AM | 9 | 58 | 0 | 14 | 17 | 0 | 12 | 3 | 0 | | | 0 | 113 | 0 | 0 | 0 | 0 |
| 7:55 AM | 4 | 44 | 0 | 18 | 23 | 0 | 7 | 1 | 0 | | | 0 | 97 | 0 | 0 | 0 | 0 |
| 8:00 AM | 3 | 56 | 0 | 14 | 20 | 0 | 6 | 4 | 0 | | | 0 | 103 | 0 | 0 | 0 | 0 |
| 8:05 AM | 5 | 49 | 0 | 24 | 17 | 0 | 6 | 4 | 0 | | | 0 | 105 | 0 | 0 | 0 | 0 |
| 8:10 AM | 5 | 52 | 0 | 15 | 15 | 0 | 9 | 2 | 0 | | | 0 | 98 | 0 | 0 | 0 | 0 |
| 8:15 AM | 3 | 38 | 0 | 15 | 11 | 0 | 4 | 3 | 0 | | | 0 | 74 | 0 | 0 | 0 | 0 |
| 8:20 AM | 3 | 51 | 0 | 14 | 13 | 0 | 4 | 2 | 0 | | | 0 | 87 | 0 | 0 | 0 | 0 |
| 8:25 AM | 6 | 37 | 0 | 20 | 12 | 0 | 4 | 7 | 0 | | | 0 | 86 | 0 | 0 | 0 | 0 |
| 8:30 AM | 4 | 41 | 0 | 25 | 12 | 0 | 7 | 2 | 0 | | | 0 | 91 | 0 | 0 | 0 | 0 |
| 8:35 AM | 8 | 41 | 0 | 26 | 14 | 0 | 5 | 7 | 0 | | | 0 | 101 | 0 | 0 | 0 | 0 |
| 8:40 AM | 8 | 53 | 0 | 22 | 19 | 0 | 5 | 3 | 0 | | | 0 | 110 | 0 | 0 | 0 | 0 |
| 8:45 AM | 8 | 57 | 0 | 17 | 16 | 0 | 8 | 2 | 0 | | | 0 | 108 | 0 | 0 | 0 | 0 |
| 8:50 AM | 3 | 56 | 0 | 17 | 8 | 0 | 13 | 0 | 0 | | | 0 | 97 | 0 | 0 | 0 | 0 |
| 8:55 AM | 3 | 37 | 0 | 17 | 14 | 0 | 5 | 1 | 0 | | | 0 | 77 | 0 | 0 | 0 | 0 |
| Total Survey | 117 | 1,209 | 0 | 398 | 307 | 0 | 172 | 75 | 0 | | | 0 | 2,278 | 0 | 0 | 0 | 0 |

15-Minute Interval Summary

7:00 AM to 9:00 AM

| Interval Start Time | Northbound Redland Rd | | | Southbound Redland Rd | | | Eastbound S Anchor Way | | | Westbound S Anchor Way | | | Interval Total | Pedestrians Crosswalk | | | |
|---------------------------|--------------------------|-------|-------|--------------------------|-----|-------|---------------------------|----|-------|---------------------------|--|-------|-------------------|--------------------------|-------|------|------|
| | L | T | Bikes | T | R | Bikes | L | R | Bikes | | | Bikes | | North | South | East | West |
| 7:00 AM | 2 | 141 | 0 | 34 | 20 | 0 | 12 | 10 | 0 | | | 0 | 219 | 0 | 0 | 0 | 0 |
| 7:15 AM | 15 | 185 | 0 | 44 | 31 | 0 | 25 | 14 | 0 | | | 0 | 314 | 0 | 0 | 0 | 0 |
| 7:30 AM | 21 | 165 | 0 | 44 | 27 | 0 | 33 | 8 | 0 | | | 0 | 298 | 0 | 0 | 0 | 0 |
| 7:45 AM | 20 | 150 | 0 | 50 | 58 | 0 | 26 | 6 | 0 | | | 0 | 310 | 0 | 0 | 0 | 0 |
| 8:00 AM | 13 | 157 | 0 | 53 | 52 | 0 | 21 | 10 | 0 | | | 0 | 306 | 0 | 0 | 0 | 0 |
| 8:15 AM | 12 | 126 | 0 | 49 | 36 | 0 | 12 | 12 | 0 | | | 0 | 247 | 0 | 0 | 0 | 0 |
| 8:30 AM | 20 | 135 | 0 | 73 | 45 | 0 | 17 | 12 | 0 | | | 0 | 302 | 0 | 0 | 0 | 0 |
| 8:45 AM | 14 | 150 | 0 | 51 | 38 | 0 | 26 | 3 | 0 | | | 0 | 282 | 0 | 0 | 0 | 0 |
| Total Survey | 117 | 1,209 | 0 | 398 | 307 | 0 | 172 | 75 | 0 | | | 0 | 2,278 | 0 | 0 | 0 | 0 |

Peak Hour Summary

7:15 AM to 8:15 AM

| By Approach | Northbound Redland Rd | | | | Southbound Redland Rd | | | | Eastbound S Anchor Way | | | | Westbound S Anchor Way | | | | Total | Pedestrians Crosswalk | | | |
|----------------|--------------------------|-----|-------|-------|--------------------------|-----|-------|-------|---------------------------|-----|-------|-------|---------------------------|-----|-------|-------|-------|--------------------------|-------|------|------|
| | In | Out | Total | Bikes | In | Out | Total | Bikes | In | Out | Total | Bikes | In | Out | Total | Bikes | | North | South | East | West |
| Volume | 726 | 229 | 955 | 0 | 359 | 762 | 1,121 | 0 | 143 | 237 | 380 | 0 | 0 | 0 | 0 | 0 | 1,228 | 0 | 0 | 0 | 0 |
| %HV | 3.2% | | | | 4.2% | | | | 0.7% | | | | 0.0% | | | | 3.2% | | | | |
| PHF | 0.91 | | | | 0.77 | | | | 0.83 | | | | 0.00 | | | | 0.97 | | | | |

| By Movement | Northbound Redland Rd | | | | Southbound Redland Rd | | | | Eastbound S Anchor Way | | | | Westbound S Anchor Way | | | | Total |
|----------------|--------------------------|------|-------|------|--------------------------|------|-------|------|---------------------------|------|-------|------|---------------------------|----|-------|------|-------|
| | L | T | Total | | T | R | Total | | L | R | Total | | | | Total | | |
| Volume | 69 | 657 | 726 | | 191 | 168 | 359 | | 105 | 38 | 143 | | | | 0 | | 1,228 |
| %HV | 4.3% | 3.0% | NA | 3.2% | NA | 6.8% | 1.2% | 4.2% | 0.0% | NA | 2.6% | 0.7% | NA | NA | NA | 0.0% | 3.2% |
| PHF | 0.75 | 0.89 | 0.91 | | 0.85 | 0.70 | 0.77 | | 0.80 | 0.68 | 0.83 | | | | 0.00 | | 0.97 |

Rolling Hour Summary

7:00 AM to 9:00 AM

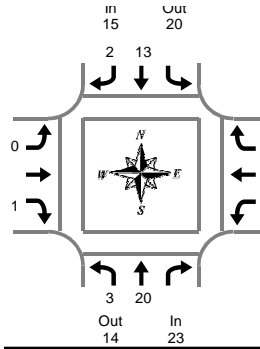
| Interval Start Time | Northbound Redland Rd | | | Southbound Redland Rd | | | Eastbound S Anchor Way | | | Westbound S Anchor Way | | | Interval Total | Pedestrians Crosswalk | | | |
|---------------------------|--------------------------|-----|-------|--------------------------|-----|-------|---------------------------|----|-------|---------------------------|--|-------|-------------------|--------------------------|-------|------|------|
| | L | T | Bikes | T | R | Bikes | L | R | Bikes | | | Bikes | | North | South | East | West |
| 7:00 AM | 58 | 641 | 0 | 172 | 136 | 0 | 96 | 38 | 0 | | | 0 | 1,141 | 0 | 0 | 0 | 0 |
| 7:15 AM | 69 | 657 | 0 | 191 | 168 | 0 | 105 | 38 | 0 | | | 0 | 1,228 | 0 | 0 | 0 | 0 |
| 7:30 AM | 66 | 598 | 0 | 196 | 173 | 0 | 92 | 36 | 0 | | | 0 | 1,161 | 0 | 0 | 0 | 0 |
| 7:45 AM | 65 | 568 | 0 | 225 | 191 | 0 | 76 | 40 | 0 | | | 0 | 1,165 | 0 | 0 | 0 | 0 |
| 8:00 AM | 59 | 568 | 0 | 226 | 171 | 0 | 76 | 37 | 0 | | | 0 | 1,137 | 0 | 0 | 0 | 0 |

Heavy Vehicle Summary



Clay Carney
(503) 833-2740

Out 5
In 1



Redland Rd & S Anchor Way

Thursday, April 05, 2018

7:00 AM to 9:00 AM

Peak Hour Summary
7:15 AM to 8:15 AM

Heavy Vehicle 5-Minute Interval Summary

7:00 AM to 9:00 AM

| Interval Start Time | Northbound Redland Rd | | | Total | Southbound Redland Rd | | | Total | Eastbound S Anchor Way | | | Total | Westbound S Anchor Way | | | Total | Interval Total |
|---------------------------|--------------------------|----|--|-------|--------------------------|---|----|-------|---------------------------|--|---|-------|---------------------------|--|--|-------|-------------------|
| | L | T | | | T | R | | | L | | R | | | | | | |
| 7:00 AM | 0 | 4 | | 4 | 1 | 0 | 1 | 0 | | | 1 | 1 | | | | 0 | 6 |
| 7:05 AM | 0 | 1 | | 1 | 1 | 0 | 1 | 0 | | | 1 | 1 | | | | 0 | 3 |
| 7:10 AM | 0 | 4 | | 4 | 2 | 0 | 2 | 0 | | | 0 | 0 | | | | 0 | 6 |
| 7:15 AM | 0 | 3 | | 3 | 0 | 0 | 0 | 0 | | | 0 | 0 | | | | 0 | 3 |
| 7:20 AM | 0 | 1 | | 1 | 1 | 0 | 1 | 0 | | | 0 | 0 | | | | 0 | 2 |
| 7:25 AM | 1 | 3 | | 4 | 1 | 0 | 1 | 0 | | | 0 | 0 | | | | 0 | 5 |
| 7:30 AM | 0 | 0 | | 0 | 1 | 0 | 1 | 0 | | | 0 | 0 | | | | 0 | 1 |
| 7:35 AM | 1 | 1 | | 2 | 2 | 0 | 2 | 0 | | | 0 | 0 | | | | 0 | 4 |
| 7:40 AM | 0 | 2 | | 2 | 0 | 0 | 0 | 0 | | | 0 | 0 | | | | 0 | 2 |
| 7:45 AM | 0 | 1 | | 1 | 0 | 0 | 0 | 0 | | | 0 | 0 | | | | 0 | 1 |
| 7:50 AM | 0 | 0 | | 0 | 1 | 2 | 3 | 0 | | | 0 | 0 | | | | 0 | 3 |
| 7:55 AM | 0 | 2 | | 2 | 1 | 0 | 1 | 0 | | | 0 | 0 | | | | 0 | 3 |
| 8:00 AM | 0 | 2 | | 2 | 1 | 0 | 1 | 0 | | | 1 | 1 | | | | 0 | 4 |
| 8:05 AM | 1 | 4 | | 5 | 5 | 0 | 5 | 0 | | | 0 | 0 | | | | 0 | 10 |
| 8:10 AM | 0 | 1 | | 1 | 0 | 0 | 0 | 0 | | | 0 | 0 | | | | 0 | 1 |
| 8:15 AM | 0 | 2 | | 2 | 1 | 0 | 1 | 0 | | | 0 | 0 | | | | 0 | 3 |
| 8:20 AM | 0 | 1 | | 1 | 1 | 1 | 2 | 0 | | | 0 | 0 | | | | 0 | 3 |
| 8:25 AM | 0 | 1 | | 1 | 3 | 0 | 3 | 0 | | | 1 | 1 | | | | 0 | 5 |
| 8:30 AM | 0 | 4 | | 4 | 3 | 0 | 3 | 0 | | | 1 | 1 | | | | 0 | 8 |
| 8:35 AM | 0 | 3 | | 3 | 2 | 0 | 2 | 0 | | | 0 | 0 | | | | 0 | 5 |
| 8:40 AM | 0 | 1 | | 1 | 2 | 2 | 4 | 0 | | | 1 | 1 | | | | 0 | 6 |
| 8:45 AM | 0 | 0 | | 0 | 2 | 0 | 2 | 0 | | | 0 | 0 | | | | 0 | 2 |
| 8:50 AM | 0 | 2 | | 2 | 0 | 1 | 1 | 0 | | | 0 | 0 | | | | 0 | 3 |
| 8:55 AM | 0 | 0 | | 0 | 1 | 2 | 3 | 0 | | | 0 | 0 | | | | 0 | 3 |
| Total Survey | 3 | 43 | | 46 | 32 | 8 | 40 | 0 | | | 6 | 6 | | | | 0 | 92 |

Heavy Vehicle 15-Minute Interval Summary

7:00 AM to 9:00 AM

| Interval Start Time | Northbound Redland Rd | | | Total | Southbound Redland Rd | | | Total | Eastbound S Anchor Way | | | Total | Westbound S Anchor Way | | | Total | Interval Total |
|---------------------------|--------------------------|----|--|-------|--------------------------|---|----|-------|---------------------------|--|---|-------|---------------------------|--|--|-------|-------------------|
| | L | T | | | T | R | | | L | | R | | | | | | |
| 7:00 AM | 0 | 9 | | 9 | 4 | 0 | 4 | 0 | | | 2 | 2 | | | | 0 | 15 |
| 7:15 AM | 1 | 7 | | 8 | 2 | 0 | 2 | 0 | | | 0 | 0 | | | | 0 | 10 |
| 7:30 AM | 1 | 3 | | 4 | 3 | 0 | 3 | 0 | | | 0 | 0 | | | | 0 | 7 |
| 7:45 AM | 0 | 3 | | 3 | 2 | 2 | 4 | 0 | | | 0 | 0 | | | | 0 | 7 |
| 8:00 AM | 1 | 7 | | 8 | 6 | 0 | 6 | 0 | | | 1 | 1 | | | | 0 | 15 |
| 8:15 AM | 0 | 4 | | 4 | 5 | 1 | 6 | 0 | | | 1 | 1 | | | | 0 | 11 |
| 8:30 AM | 0 | 8 | | 8 | 7 | 2 | 9 | 0 | | | 2 | 2 | | | | 0 | 19 |
| 8:45 AM | 0 | 2 | | 2 | 3 | 3 | 6 | 0 | | | 0 | 0 | | | | 0 | 8 |
| Total Survey | 3 | 43 | | 46 | 32 | 8 | 40 | 0 | | | 6 | 6 | | | | 0 | 92 |

Heavy Vehicle Peak Hour Summary

7:15 AM to 8:15 AM

| By Approach | Northbound Redland Rd | | | Total | Southbound Redland Rd | | | Total | Eastbound S Anchor Way | | | Total | Westbound S Anchor Way | | | Total |
|----------------|--------------------------|-----|--|-------|--------------------------|-----|--|-------|---------------------------|-----|--|-------|---------------------------|-----|--|-------|
| | In | Out | | | In | Out | | | In | Out | | | In | Out | | |
| Volume | 23 | 14 | | 37 | 15 | 20 | | 35 | 1 | 5 | | 6 | 0 | 0 | | 0 |
| PHF | 0.64 | | | | 0.54 | | | | 0.25 | | | | 0.00 | | | |

| By Movement | Northbound Redland Rd | | | Total | Southbound Redland Rd | | | Total | Eastbound S Anchor Way | | | Total | Westbound S Anchor Way | | | Total |
|----------------|--------------------------|------|--|-------|--------------------------|------|--|-------|---------------------------|--|------|-------|---------------------------|--|--|-------|
| | L | T | | | T | R | | | L | | R | | | | | |
| Volume | 3 | 20 | | 23 | 13 | 2 | | 15 | 0 | | 1 | 1 | | | | 0 |
| PHF | 0.38 | 0.63 | | 0.64 | 0.46 | 0.25 | | 0.54 | 0.00 | | 0.25 | 0.25 | | | | 0.00 |

Heavy Vehicle Rolling Hour Summary

7:00 AM to 9:00 AM

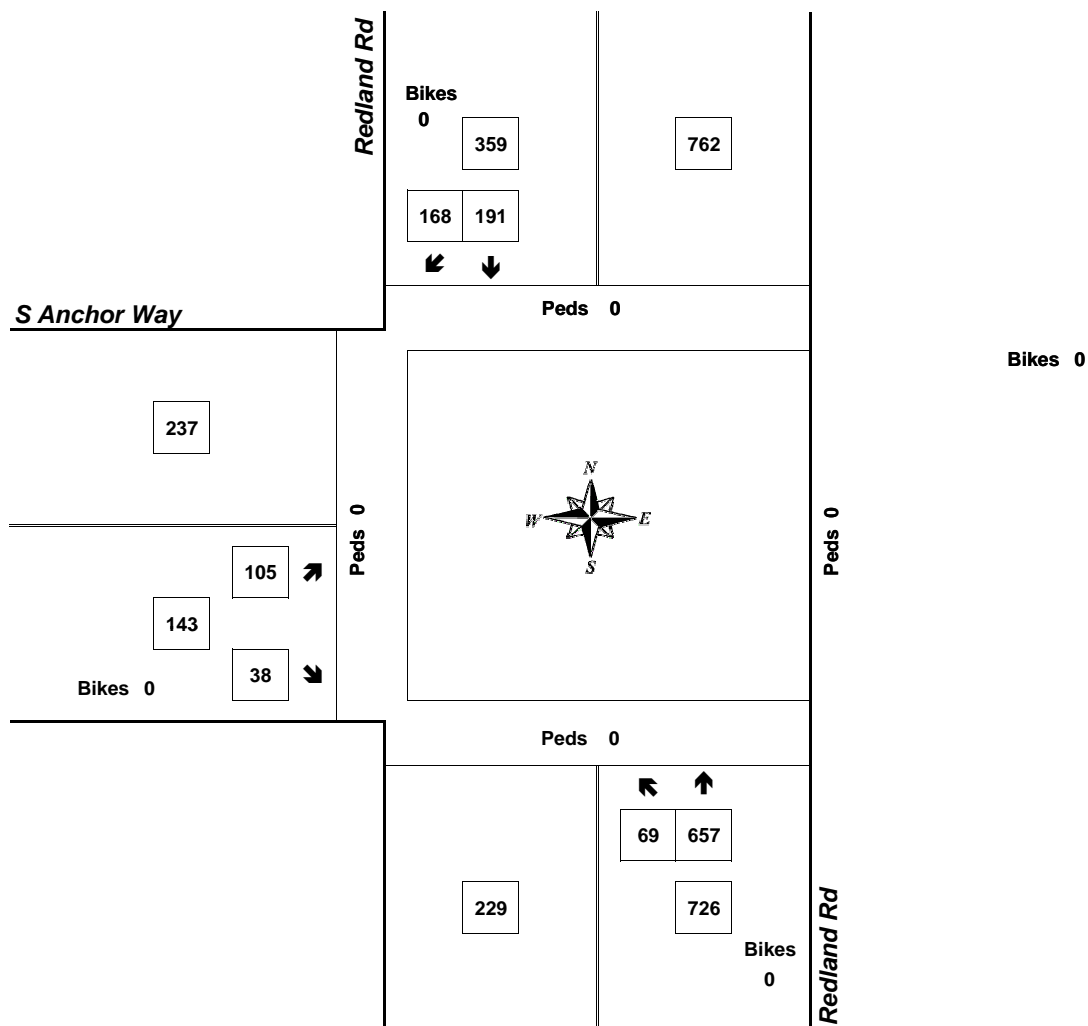
| Interval Start Time | Northbound Redland Rd | | | Total | Southbound Redland Rd | | | Total | Eastbound S Anchor Way | | | Total | Westbound S Anchor Way | | | Total | Interval Total |
|---------------------------|--------------------------|----|--|-------|--------------------------|---|--|-------|---------------------------|--|---|-------|---------------------------|--|--|-------|-------------------|
| | L | T | | | T | R | | | L | | R | | | | | | |
| 7:00 AM | 2 | 22 | | 24 | 11 | 2 | | 13 | 0 | | 2 | 2 | | | | 0 | 39 |
| 7:15 AM | 3 | 20 | | 23 | 13 | 2 | | 15 | 0 | | 1 | 1 | | | | 0 | 39 |
| 7:30 AM | 2 | 17 | | 19 | 16 | 3 | | 19 | 0 | | 2 | 2 | | | | 0 | 40 |
| 7:45 AM | 1 | 22 | | 23 | 20 | 5 | | 25 | 0 | | 4 | 4 | | | | 0 | 52 |
| 8:00 AM | 1 | 21 | | 22 | 21 | 6 | | 27 | 0 | | 4 | 4 | | | | 0 | 53 |

All Traffic Data
Services Inc.

Clay Carney
(503) 833-2740

7:15 AM to 8:15 AM

Thursday, April 05, 2018



| Approach | PHF | HV% | Volume |
|--------------|------|------|--------|
| EB | 0.83 | 0.7% | 143 |
| WB | 0.00 | 0.0% | 0 |
| NB | 0.91 | 3.2% | 726 |
| SB | 0.77 | 4.2% | 359 |
| Intersection | 0.97 | 3.2% | 1,228 |

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

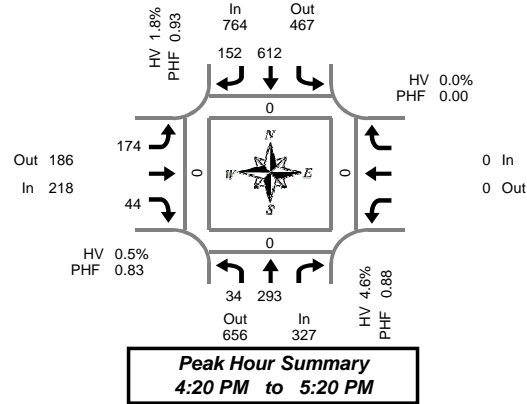


Clay Carney
(503) 833-2740

Redland Rd & S Anchor Way

Wednesday, April 04, 2018

4:00 PM to 6:00 PM



5-Minute Interval Summary

4:00 PM to 6:00 PM

| Interval Start Time | Northbound Redland Rd | | | | Southbound Redland Rd | | | | Eastbound S Anchor Way | | | | Westbound S Anchor Way | | | | Interval Total | Pedestrians Crosswalk | | | |
|---------------------------|--------------------------|-----|--|-------|--------------------------|-------|-----|-------|---------------------------|--|----|-------|---------------------------|--|--|-------|-------------------|--------------------------|-------|------|------|
| | L | T | | Bikes | | T | R | Bikes | L | | R | Bikes | | | | Bikes | | North | South | East | West |
| 4:00 PM | 5 | 31 | | 0 | | 64 | 22 | 0 | 10 | | 6 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:05 PM | 3 | 33 | | 0 | | 51 | 16 | 0 | 15 | | 6 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:10 PM | 5 | 20 | | 0 | | 39 | 9 | 0 | 15 | | 7 | 1 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:15 PM | 0 | 19 | | 0 | | 44 | 10 | 0 | 9 | | 3 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:20 PM | 5 | 24 | | 0 | | 57 | 12 | 0 | 11 | | 1 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:25 PM | 5 | 25 | | 0 | | 42 | 13 | 0 | 15 | | 5 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:30 PM | 2 | 21 | | 0 | | 53 | 14 | 0 | 13 | | 1 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:35 PM | 2 | 30 | | 0 | | 52 | 11 | 0 | 13 | | 5 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:40 PM | 1 | 30 | | 0 | | 29 | 15 | 0 | 15 | | 3 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:45 PM | 2 | 28 | | 0 | | 45 | 11 | 0 | 14 | | 4 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:50 PM | 5 | 22 | | 0 | | 57 | 15 | 0 | 10 | | 5 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 4:55 PM | 1 | 23 | | 0 | | 47 | 12 | 0 | 16 | | 3 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:00 PM | 2 | 22 | | 0 | | 59 | 15 | 0 | 14 | | 4 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:05 PM | 0 | 23 | | 0 | | 47 | 20 | 0 | 19 | | 6 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:10 PM | 8 | 21 | | 0 | | 54 | 5 | 0 | 18 | | 2 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:15 PM | 1 | 24 | | 0 | | 70 | 9 | 0 | 16 | | 5 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:20 PM | 2 | 15 | | 0 | | 58 | 13 | 0 | 17 | | 4 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:25 PM | 1 | 22 | | 0 | | 46 | 14 | 0 | 9 | | 5 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:30 PM | 2 | 23 | | 0 | | 57 | 9 | 0 | 13 | | 2 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:35 PM | 2 | 20 | | 0 | | 50 | 8 | 0 | 6 | | 4 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:40 PM | 2 | 21 | | 0 | | 69 | 16 | 0 | 5 | | 3 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:45 PM | 7 | 15 | | 0 | | 48 | 14 | 0 | 5 | | 6 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:50 PM | 4 | 23 | | 0 | | 58 | 14 | 0 | 8 | | 4 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| 5:55 PM | 3 | 19 | | 0 | | 42 | 6 | 0 | 5 | | 2 | 0 | | | | 0 | 0 | 0 | 0 | 0 | |
| Total Survey | 70 | 554 | | 0 | | 1,238 | 303 | 0 | 291 | | 96 | 1 | | | | 0 | 2,552 | 0 | 0 | 0 | 0 |

15-Minute Interval Summary

4:00 PM to 6:00 PM

| Interval Start Time | Northbound Redland Rd | | | | Southbound Redland Rd | | | | Eastbound S Anchor Way | | | | Westbound S Anchor Way | | | | Interval Total | Pedestrians Crosswalk | | | |
|---------------------------|--------------------------|-----|--|-------|--------------------------|-----|-------|-----|---------------------------|-------|--|--|---------------------------|-------|-------|-------|-------------------|--------------------------|------|--|--|
| | L | T | | Bikes | T | R | Bikes | L | R | Bikes | | | | Bikes | North | South | | East | West | | |
| 4:00 PM | 13 | 84 | | 0 | 154 | 47 | 0 | 40 | 19 | 1 | | | | 0 | 357 | 0 | 0 | 0 | 0 | | |
| 4:15 PM | 10 | 68 | | 0 | 143 | 35 | 0 | 35 | 9 | 0 | | | | 0 | 300 | 0 | 0 | 0 | 0 | | |
| 4:30 PM | 5 | 81 | | 0 | 134 | 40 | 0 | 41 | 9 | 0 | | | | 0 | 310 | 0 | 0 | 0 | 0 | | |
| 4:45 PM | 8 | 73 | | 0 | 149 | 38 | 0 | 40 | 12 | 0 | | | | 0 | 320 | 0 | 0 | 0 | 0 | | |
| 5:00 PM | 10 | 66 | | 0 | 160 | 40 | 0 | 51 | 12 | 0 | | | | 0 | 339 | 0 | 0 | 0 | 0 | | |
| 5:15 PM | 4 | 61 | | 0 | 174 | 36 | 0 | 42 | 14 | 0 | | | | 0 | 331 | 0 | 0 | 0 | 0 | | |
| 5:30 PM | 6 | 64 | | 0 | 176 | 33 | 0 | 24 | 9 | 0 | | | | 0 | 312 | 0 | 0 | 0 | 0 | | |
| 5:45 PM | 14 | 57 | | 0 | 148 | 34 | 0 | 18 | 12 | 0 | | | | 0 | 283 | 0 | 0 | 0 | 0 | | |
| Total Survey | 70 | 554 | | 0 | 1,238 | 303 | 0 | 291 | 96 | 1 | | | | 0 | 2,552 | 0 | 0 | 0 | 0 | | |

Peak Hour Summary

4:20 PM to 5:20 PM

| By Approach | Northbound Redland Rd | | | | Southbound Redland Rd | | | | Eastbound S Anchor Way | | | | Westbound S Anchor Way | | | | Total | Pedestrians Crosswalk | | | |
|----------------|--------------------------|------|-------|-------|--------------------------|------|-------|-------|---------------------------|------|-------|-------|---------------------------|------|-------|-------|-------|--------------------------|-------|------|------|
| | In | Out | Total | Bikes | In | Out | Total | Bikes | In | Out | Total | Bikes | In | Out | Total | Bikes | | North | South | East | West |
| Volume | 327 | 656 | 983 | 0 | 764 | 467 | 1,231 | 0 | 218 | 186 | 404 | 0 | 0 | 0 | 0 | 0 | 1,309 | 0 | 0 | 0 | 0 |
| %HV | | 4.6% | | | | 1.8% | | | | 0.5% | | | | 0.0% | | | 2.3% | | | | |
| PHF | | 0.88 | | | | 0.93 | | | | 0.83 | | | | 0.00 | | | 0.94 | | | | |

| By Movement | Northbound Redland Rd | | | | Southbound Redland Rd | | | | Eastbound S Anchor Way | | | | Westbound S Anchor Way | | | | Total |
|----------------|--------------------------|------|----|-------|--------------------------|------|-------|------|---------------------------|------|-------|------|---------------------------|----|----|-------|-------|
| | L | T | | Total | T | R | Total | | L | R | Total | | | | | Total | |
| Volume | 34 | 293 | | 327 | 612 | 152 | 764 | 174 | 44 | 218 | | | | | | 0 | 1,309 |
| %HV | 0.0% | 5.1% | NA | 4.6% | NA | 2.0% | 1.3% | 1.8% | 0.6% | NA | 0.0% | 0.5% | NA | NA | NA | 0.0% | 2.3% |
| PHF | 0.71 | 0.83 | | 0.88 | 0.89 | 0.81 | 0.93 | 0.82 | 0.85 | 0.83 | | | | | | 0.00 | 0.94 |

Rolling Hour Summary

4:00 PM to 6:00 PM

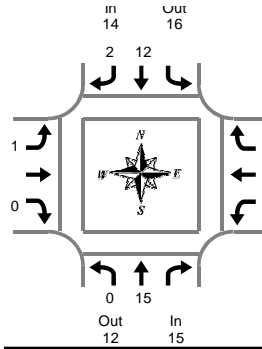
| Interval Start Time | Northbound Redland Rd | | | Bikes | Southbound Redland Rd | | | Bikes | Eastbound S Anchor Way | | | Bikes | Westbound S Anchor Way | | | Interval Total | Pedestrians Crosswalk | | | |
|---------------------------|--------------------------|-----|--|-------|--------------------------|-----|---|-------|---------------------------|---|--|-------|---------------------------|--|--|-------------------|--------------------------|-------|------|------|
| | L | T | | | T | R | | | L | R | | | | | | | North | South | East | West |
| 4:00 PM | 36 | 306 | | 0 | 580 | 160 | 0 | 156 | 49 | 1 | | 0 | | | | 0 | 0 | 0 | 0 | 0 |
| 4:15 PM | 33 | 288 | | 0 | 586 | 153 | 0 | 167 | 42 | 0 | | 0 | | | | 0 | 0 | 0 | 0 | 0 |
| 4:30 PM | 27 | 281 | | 0 | 617 | 154 | 0 | 174 | 47 | 0 | | 0 | | | | 0 | 0 | 0 | 0 | 0 |
| 4:45 PM | 28 | 264 | | 0 | 659 | 147 | 0 | 157 | 47 | 0 | | 0 | | | | 0 | 0 | 0 | 0 | 0 |
| 5:00 PM | 34 | 248 | | 0 | 658 | 143 | 0 | 135 | 47 | 0 | | 0 | | | | 0 | 0 | 0 | 0 | 0 |

Heavy Vehicle Summary



Clay Carney
(503) 833-2740

Out 2
In 1



Redland Rd & S Anchor Way

Wednesday, April 04, 2018

4:00 PM to 6:00 PM

Peak Hour Summary
4:20 PM to 5:20 PM

Heavy Vehicle 5-Minute Interval Summary

4:00 PM to 6:00 PM

| Interval Start Time | Northbound Redland Rd | | | Southbound Redland Rd | | | Eastbound S Anchor Way | | | Westbound S Anchor Way | | | Interval Total |
|---------------------------|--------------------------|----|-------|--------------------------|---|-------|---------------------------|---|-------|---------------------------|--|-------|-------------------|
| | L | T | Total | T | R | Total | L | R | Total | | | Total | |
| 4:00 PM | 0 | 2 | 2 | 4 | 0 | 4 | 0 | 0 | 0 | | | 0 | 6 |
| 4:05 PM | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | | | 0 | 3 |
| 4:10 PM | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 2 |
| 4:15 PM | 0 | 0 | 0 | 4 | 0 | 4 | 1 | 0 | 1 | | | 0 | 5 |
| 4:20 PM | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | 1 |
| 4:25 PM | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | | | 0 | 2 |
| 4:30 PM | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | 1 |
| 4:35 PM | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 1 |
| 4:40 PM | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | 2 |
| 4:45 PM | 0 | 2 | 2 | 2 | 0 | 2 | 0 | 0 | 0 | | | 0 | 4 |
| 4:50 PM | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | | | 0 | 3 |
| 4:55 PM | 0 | 3 | 3 | 1 | 0 | 1 | 1 | 0 | 1 | | | 0 | 5 |
| 5:00 PM | 0 | 0 | 0 | 1 | 2 | 3 | 0 | 0 | 0 | | | 0 | 3 |
| 5:05 PM | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 2 |
| 5:10 PM | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 1 |
| 5:15 PM | 0 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | 5 |
| 5:20 PM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | 0 |
| 5:25 PM | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 2 |
| 5:30 PM | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | 3 |
| 5:35 PM | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 2 |
| 5:40 PM | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 1 |
| 5:45 PM | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | | | 0 | 2 |
| 5:50 PM | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 | 1 |
| 5:55 PM | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | | | 0 | 3 |
| Total Survey | 0 | 24 | 24 | 32 | 2 | 34 | 2 | 0 | 2 | | | 0 | 60 |

Heavy Vehicle 15-Minute Interval Summary

4:00 PM to 6:00 PM

| Interval Start Time | Northbound Redland Rd | | | Southbound Redland Rd | | | Eastbound S Anchor Way | | | Westbound S Anchor Way | | | Interval Total |
|---------------------------|--------------------------|----|-------|--------------------------|---|-------|---------------------------|---|-------|---------------------------|--|-------|-------------------|
| | L | T | Total | T | R | Total | L | R | Total | | | Total | |
| 4:00 PM | 0 | 3 | 3 | 8 | 0 | 8 | 0 | 0 | 0 | | | 0 | 11 |
| 4:15 PM | 0 | 1 | 1 | 6 | 0 | 6 | 1 | 0 | 1 | | | 0 | 8 |
| 4:30 PM | 0 | 3 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 4 |
| 4:45 PM | 0 | 5 | 5 | 6 | 0 | 6 | 1 | 0 | 1 | | | 0 | 12 |
| 5:00 PM | 0 | 1 | 1 | 3 | 2 | 5 | 0 | 0 | 0 | | | 0 | 6 |
| 5:15 PM | 0 | 6 | 6 | 1 | 0 | 1 | 0 | 0 | 0 | | | 0 | 7 |
| 5:30 PM | 0 | 4 | 4 | 2 | 0 | 2 | 0 | 0 | 0 | | | 0 | 6 |
| 5:45 PM | 0 | 1 | 1 | 5 | 0 | 5 | 0 | 0 | 0 | | | 0 | 6 |
| Total Survey | 0 | 24 | 24 | 32 | 2 | 34 | 2 | 0 | 2 | | | 0 | 60 |

Heavy Vehicle Peak Hour Summary

4:20 PM to 5:20 PM

| By Approach | Northbound Redland Rd | | | Southbound Redland Rd | | | Eastbound S Anchor Way | | | Westbound S Anchor Way | | | Total |
|----------------|--------------------------|-----|-------|--------------------------|-----|-------|---------------------------|-----|-------|---------------------------|-----|-------|-------|
| | In | Out | Total | In | Out | Total | In | Out | Total | In | Out | Total | |
| Volume | 15 | 12 | 27 | 14 | 16 | 30 | 1 | 2 | 3 | 0 | 0 | 0 | 30 |
| PHF | 0.63 | | | 0.50 | | | 0.25 | | | 0.00 | | | 0.63 |

| By Movement | Northbound Redland Rd | | | Southbound Redland Rd | | | Eastbound S Anchor Way | | | Westbound S Anchor Way | | | Total |
|----------------|--------------------------|------|-------|--------------------------|------|-------|---------------------------|------|-------|---------------------------|--|-------|-------|
| | L | T | Total | T | R | Total | L | R | Total | | | Total | |
| Volume | 0 | 15 | 15 | 12 | 2 | 14 | 1 | 0 | 1 | | | 0 | 30 |
| PHF | 0.00 | 0.63 | 0.63 | 0.50 | 0.25 | 0.50 | 0.25 | 0.00 | 0.25 | | | 0.00 | 0.63 |

Heavy Vehicle Rolling Hour Summary

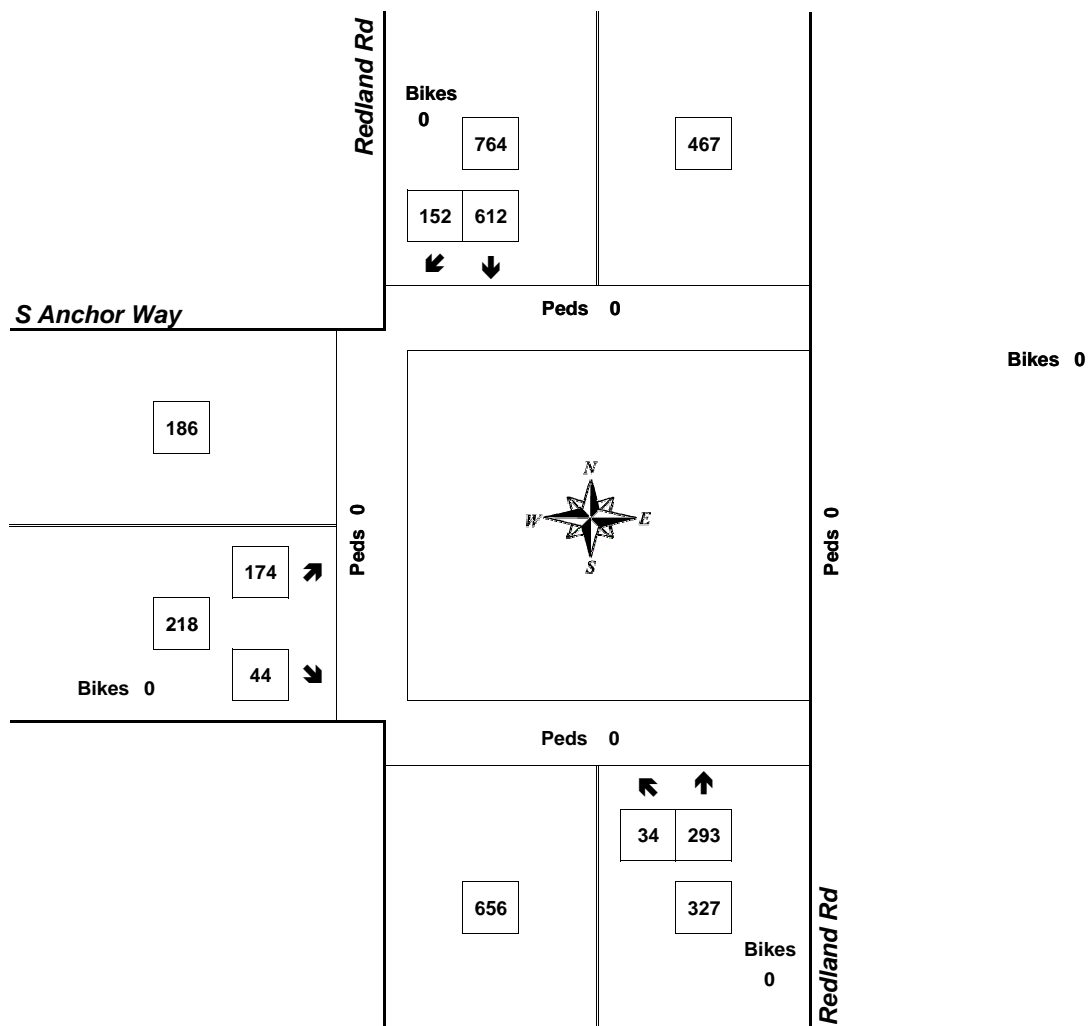
4:00 PM to 6:00 PM

| Interval Start Time | Northbound Redland Rd | | | Southbound Redland Rd | | | Eastbound S Anchor Way | | | Westbound S Anchor Way | | | Interval Total |
|---------------------------|--------------------------|----|-------|--------------------------|---|-------|---------------------------|---|-------|---------------------------|--|-------|-------------------|
| | L | T | Total | T | R | Total | L | R | Total | | | Total | |
| 4:00 PM | 0 | 12 | 12 | 21 | 0 | 21 | 2 | 0 | 2 | | | 0 | 35 |
| 4:15 PM | 0 | 10 | 10 | 16 | 2 | 18 | 2 | 0 | 2 | | | 0 | 30 |
| 4:30 PM | 0 | 15 | 15 | 11 | 2 | 13 | 1 | 0 | 1 | | | 0 | 29 |
| 4:45 PM | 0 | 16 | 16 | 12 | 2 | 14 | 1 | 0 | 1 | | | 0 | 31 |
| 5:00 PM | 0 | 12 | 12 | 11 | 2 | 13 | 0 | 0 | 0 | | | 0 | 25 |

All Traffic Data
Services Inc.

Redland Rd & S Anchor Way

Wednesday, April 04, 2018



| Approach | PHF | HV% | Volume |
|--------------|------|------|--------|
| EB | 0.83 | 0.5% | 218 |
| WB | 0.00 | 0.0% | 0 |
| NB | 0.88 | 4.6% | 327 |
| SB | 0.93 | 1.8% | 764 |
| Intersection | 0.94 | 2.3% | 1,309 |

Count Period: 4:00 PM to 6:00 PM

Left-Turn Lane Warrant Analysis

Le

Project: 17038 - Park Place Annexation
Intersection: S Redland Road at S Anchor Way
Date: 4/9/2018
Scenario: Existing Conditions - AM Peak Hour

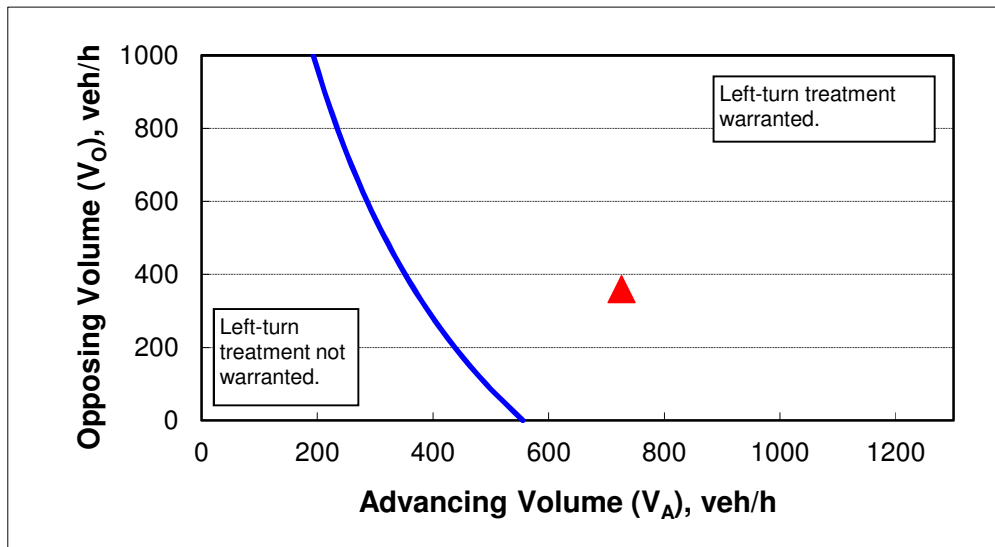
2-lane roadway (English)

INPUT

| Variable | Value |
|--|-------|
| 85 th percentile speed, mph: | 45 |
| Number of left-turns in advancing volume (V_A), veh/h: | 69 |
| Advancing volume (V_A), veh/h: | 726 |
| Opposing volume (V_O), veh/h: | 359 |

OUTPUT

| Variable | Value |
|--|-------|
| Limiting advancing volume (V_A), veh/h: | 368 |
| Guidance for determining the need for a major-road left-turn bay: | |
| Left-turn treatment warranted. | |



CALIBRATION CONSTANTS

| Variable | Value |
|--|-------|
| Average time for making left-turn, s: | 3.0 |
| Critical headway, s: | 5.0 |
| Average time for left-turn vehicle to clear the advancing lane, s: | 1.9 |

Left-Turn Lane Warrant Analysis

Le

Project: 17038 - Park Place Annexation
Intersection: S Redland Road at S Anchor Way
Date: 4/9/2018
Scenario: Existing Conditions - PM Peak Hour

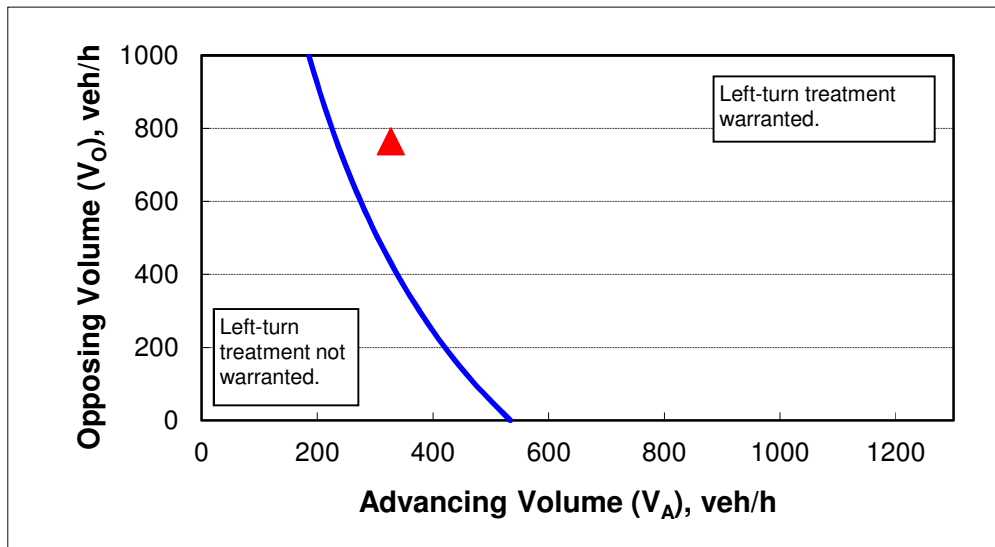
2-lane roadway (English)

INPUT

| Variable | Value |
|--|-------|
| 85 th percentile speed, mph: | 45 |
| Number of left-turns in advancing volume (V_A), veh/h: | 34 |
| Advancing volume (V_A), veh/h: | 327 |
| Opposing volume (V_O), veh/h: | 764 |

OUTPUT

| Variable | Value |
|--|-------|
| Limiting advancing volume (V_A), veh/h: | 233 |
| Guidance for determining the need for a major-road left-turn bay: | |
| Left-turn treatment warranted. | |



CALIBRATION CONSTANTS

| Variable | Value |
|--|-------|
| Average time for making left-turn, s: | 3.0 |
| Critical headway, s: | 5.0 |
| Average time for left-turn vehicle to clear the advancing lane, s: | 1.9 |

Traffic Signal Warrant Analysis

Project: 17038 - Park Place Annexation
 Date: 4/9/2018
 Scenario: Year 2035 Planning Horizon

| | | | |
|-----------------------|----------------|-----------------------|--------------|
| Major Street: | S Redland Road | Minor Street: | S Anchor Way |
| Number of Lanes: | 1 | Number of Lanes: | 1 |
| PM Peak Hour Volumes: | 1289 | PM Peak Hour Volumes: | 276 |

Warrant Used:

X 100 percent of standard warrants used
 70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

| Number of Lanes for Moving Traffic on Each Approach: | | ADT on Major St. (total of both approaches) | | ADT on Minor St. (higher-volume approach) | |
|--|------------------|--|-----------------|--|-----------------|
| | | 100% Warrants | 70% Warrants | 100% Warrants | 70% Warrants |
| <u>WARRANT 1, CONDITION A</u> | | | | | |
| <u>Major St.</u> | <u>Minor St.</u> | | | | |
| 1 | 1 | 8,850 | 6,200 | 2,650 | 1,850 |
| 2 or more | 1 | 10,600 | 7,400 | 2,650 | 1,850 |
| 2 or more | 2 or more | 10,600 | 7,400 | 3,550 | 2,500 |
| 1 | 2 or more | 8,850 | 6,200 | 3,550 | 2,500 |
| <u>WARRANT 1, CONDITION B</u> | | | | | |
| 1 | 1 | 13,300 | 9,300 | 1,350 | 950 |
| 2 or more | 1 | 15,900 | 11,100 | 1,350 | 950 |
| 2 or more | 2 or more | 15,900 | 11,100 | 1,750 | 1,250 |
| 1 | 2 or more | 13,300 | 9,300 | 1,750 | 1,250 |

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume










| | Approach Volumes | Minimum Volumes | Is Signal Warrant Met? |
|--|------------------|-----------------|------------------------|
| <i>Warrant 1</i> | | | |
| <i>Condition A: Minimum Vehicular Volume</i> | | | |
| Major Street | 12,890 | 8,850 | |
| Minor Street* | 2,760 | 2,650 | Yes |
| <i>Condition B: Interruption of Continuous Traffic</i> | | | |
| Major Street | 12,890 | 13,300 | |
| Minor Street* | 2,760 | 1,350 | No |
| <i>Combination Warrant</i> | | | |
| Major Street | 12,890 | 10,640 | |
| Minor Street* | 2,760 | 2,120 | Yes |

* Minor street right-turning traffic volumes reduced by 25%.

HCM Unsignalized Intersection Capacity Analysis

1: S Redland Road & S Anchor Way










04/09/2018

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 105 | 38 | 69 | 657 | 191 | 168 |
| Future Volume (Veh/h) | 105 | 38 | 69 | 657 | 191 | 168 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Hourly flow rate (vph) | 108 | 39 | 71 | 677 | 197 | 173 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1102 | 284 | 370 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1102 | 284 | 370 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 51 | 95 | 94 | | | |
| cM capacity (veh/h) | 221 | 758 | 1183 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 147 | 748 | 370 | | | |
| Volume Left | 108 | 71 | 0 | | | |
| Volume Right | 39 | 0 | 173 | | | |
| cSH | 272 | 1183 | 1700 | | | |
| Volume to Capacity | 0.54 | 0.06 | 0.22 | | | |
| Queue Length 95th (ft) | 74 | 5 | 0 | | | |
| Control Delay (s) | 32.8 | 1.5 | 0.0 | | | |
| Lane LOS | D | A | | | | |
| Approach Delay (s) | 32.8 | 1.5 | 0.0 | | | |
| Approach LOS | D | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 4.7 | | | | |
| Intersection Capacity Utilization | | 76.9% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

1: S Redland Road & S Anchor Way










04/09/2018

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 174 | 44 | 34 | 293 | 612 | 152 |
| Future Volume (Veh/h) | 174 | 44 | 34 | 293 | 612 | 152 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Hourly flow rate (vph) | 185 | 47 | 36 | 312 | 651 | 162 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1116 | 732 | 813 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1116 | 732 | 813 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 16 | 89 | 96 | | | |
| cM capacity (veh/h) | 220 | 423 | 801 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 232 | 348 | 813 | | | |
| Volume Left | 185 | 36 | 0 | | | |
| Volume Right | 47 | 0 | 162 | | | |
| cSH | 244 | 801 | 1700 | | | |
| Volume to Capacity | 0.95 | 0.04 | 0.48 | | | |
| Queue Length 95th (ft) | 215 | 4 | 0 | | | |
| Control Delay (s) | 88.9 | 1.5 | 0.0 | | | |
| Lane LOS | F | A | | | | |
| Approach Delay (s) | 88.9 | 1.5 | 0.0 | | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 15.2 | | | | |
| Intersection Capacity Utilization | | 62.8% | | ICU Level of Service | | B |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

1: S Redland Road & S Anchor Way










04/09/2018

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 147 | 53 | 97 | 712 | 214 | 235 |
| Future Volume (Veh/h) | 147 | 53 | 97 | 712 | 214 | 235 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Hourly flow rate (vph) | 152 | 55 | 100 | 734 | 221 | 242 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1276 | 342 | 463 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1276 | 342 | 463 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 9 | 92 | 91 | | | |
| cM capacity (veh/h) | 168 | 703 | 1093 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 207 | 834 | 463 | | | |
| Volume Left | 152 | 100 | 0 | | | |
| Volume Right | 55 | 0 | 242 | | | |
| cSH | 211 | 1093 | 1700 | | | |
| Volume to Capacity | 0.98 | 0.09 | 0.27 | | | |
| Queue Length 95th (ft) | 215 | 8 | 0 | | | |
| Control Delay (s) | 105.4 | 2.3 | 0.0 | | | |
| Lane LOS | F | A | | | | |
| Approach Delay (s) | 105.4 | 2.3 | 0.0 | | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 15.8 | | | | |
| Intersection Capacity Utilization | | 89.9% | | ICU Level of Service | | E |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

1: S Redland Road & S Anchor Way

04/09/2018

| |  |  |  |  |  |  |
|-----------------------------------|---|---|---|---|---|---|
| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
| Lane Configurations |  | | |  |  | |
| Traffic Volume (veh/h) | 229 | 62 | 48 | 328 | 720 | 193 |
| Future Volume (Veh/h) | 229 | 62 | 48 | 328 | 720 | 193 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Hourly flow rate (vph) | 241 | 65 | 51 | 345 | 758 | 203 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1306 | 860 | 961 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1306 | 860 | 961 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 0 | 82 | 93 | | | |
| cM capacity (veh/h) | 164 | 357 | 704 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 306 | 396 | 961 | | | |
| Volume Left | 241 | 51 | 0 | | | |
| Volume Right | 65 | 0 | 203 | | | |
| cSH | 186 | 704 | 1700 | | | |
| Volume to Capacity | 1.65 | 0.07 | 0.57 | | | |
| Queue Length 95th (ft) | 515 | 6 | 0 | | | |
| Control Delay (s) | 359.2 | 2.2 | 0.0 | | | |
| Lane LOS | F | A | | | | |
| Approach Delay (s) | 359.2 | 2.2 | 0.0 | | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 66.6 | | | | |
| Intersection Capacity Utilization | | 80.9% | | ICU Level of Service | | D |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

1: S Redland Road & S Anchor Way

04/09/2018



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|--------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 147 | 59 | 108 | 904 | 315 | 235 |
| Future Volume (Veh/h) | 147 | 59 | 108 | 904 | 315 | 235 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Hourly flow rate (vph) | 152 | 61 | 111 | 932 | 325 | 242 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1600 | 446 | 567 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1600 | 446 | 567 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 0 | 90 | 89 | | | |
| cM capacity (veh/h) | 104 | 614 | 1000 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 213 | 1043 | 567 | | | |
| Volume Left | 152 | 111 | 0 | | | |
| Volume Right | 61 | 0 | 242 | | | |
| cSH | 137 | 1000 | 1700 | | | |
| Volume to Capacity | 1.56 | 0.11 | 0.33 | | | |
| Queue Length 95th (ft) | 372 | 9 | 0 | | | |
| Control Delay (s) | 341.3 | 2.9 | 0.0 | | | |
| Lane LOS | F | A | | | | |
| Approach Delay (s) | 341.3 | 2.9 | 0.0 | | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 41.6 | | | | |
| Intersection Capacity Utilization | | 106.2% | | ICU Level of Service | | G |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

1: S Redland Road & S Anchor Way

04/09/2018



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|------|--------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 229 | 74 | 56 | 476 | 946 | 193 |
| Future Volume (Veh/h) | 229 | 74 | 56 | 476 | 946 | 193 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Hourly flow rate (vph) | 241 | 78 | 59 | 501 | 996 | 203 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 1716 | 1098 | 1199 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1716 | 1098 | 1199 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 0 | 70 | 90 | | | |
| cM capacity (veh/h) | 89 | 260 | 572 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 319 | 560 | 1199 | | | |
| Volume Left | 241 | 59 | 0 | | | |
| Volume Right | 78 | 0 | 203 | | | |
| cSH | 106 | 572 | 1700 | | | |
| Volume to Capacity | 3.00 | 0.10 | 0.71 | | | |
| Queue Length 95th (ft) | Err | 9 | 0 | | | |
| Control Delay (s) | Err | 2.8 | 0.0 | | | |
| Lane LOS | F | A | | | | |
| Approach Delay (s) | Err | 2.8 | 0.0 | | | |
| Approach LOS | F | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | 1535.7 | | | | |
| Intersection Capacity Utilization | | 95.8% | | ICU Level of Service | | F |
| Analysis Period (min) | | 15 | | | | |

HCM Signalized Intersection Capacity Analysis

1: S Redland Road & S Anchor Way

04/09/2018



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|------------------------|-------|------|-------|-------|------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 147 | 59 | 108 | 904 | 315 | 235 |
| Future Volume (vph) | 147 | 59 | 108 | 904 | 315 | 235 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | | 4.5 | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.96 | | 1.00 | 1.00 | 0.94 | |
| Flt Protected | 0.97 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1746 | | 1752 | 1845 | 1722 | |
| Flt Permitted | 0.97 | | 0.26 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1746 | | 474 | 1845 | 1722 | |
| Peak-hour factor, PHF | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Adj. Flow (vph) | 152 | 61 | 111 | 932 | 325 | 242 |
| RTOR Reduction (vph) | 25 | 0 | 0 | 0 | 38 | 0 |
| Lane Group Flow (vph) | 188 | 0 | 111 | 932 | 529 | 0 |
| Heavy Vehicles (%) | 1% | 1% | 3% | 3% | 4% | 4% |
| Turn Type | Prot | | pm+pt | NA | NA | |
| Protected Phases | 4 | | 5 | 2 | 6 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 11.3 | | 35.0 | 35.0 | 26.4 | |
| Effective Green, g (s) | 11.3 | | 35.0 | 35.0 | 26.4 | |
| Actuated g/C Ratio | 0.20 | | 0.63 | 0.63 | 0.48 | |
| Clearance Time (s) | 4.5 | | 4.5 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 356 | | 394 | 1167 | 822 | |
| v/s Ratio Prot | c0.11 | | 0.02 | c0.51 | 0.31 | |
| v/s Ratio Perm | | | 0.16 | | | |
| v/c Ratio | 0.53 | | 0.28 | 0.80 | 0.64 | |
| Uniform Delay, d1 | 19.6 | | 5.8 | 7.5 | 10.9 | |
| Progression Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.4 | | 0.4 | 3.9 | 1.7 | |
| Delay (s) | 21.0 | | 6.2 | 11.4 | 12.6 | |
| Level of Service | C | | A | B | B | |
| Approach Delay (s) | 21.0 | | | 10.9 | 12.6 | |
| Approach LOS | C | | | B | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 12.6 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.81 | | |
| Actuated Cycle Length (s) | 55.3 | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | 66.8% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Signalized Intersection Capacity Analysis

1: S Redland Road & S Anchor Way

04/09/2018



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------|------|-------|-------|---------------------------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 229 | 74 | 56 | 476 | 946 | 193 |
| Future Volume (vph) | 229 | 74 | 56 | 476 | 946 | 193 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 4.5 | | 4.5 | 4.5 | 4.5 | |
| Lane Util. Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 0.99 | | 1.00 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Frt | 0.97 | | 1.00 | 1.00 | 0.98 | |
| Flt Protected | 0.96 | | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1743 | | 1719 | 1810 | 1820 | |
| Flt Permitted | 0.96 | | 0.05 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1743 | | 87 | 1810 | 1820 | |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 241 | 78 | 59 | 501 | 996 | 203 |
| RTOR Reduction (vph) | 10 | 0 | 0 | 0 | 6 | 0 |
| Lane Group Flow (vph) | 309 | 0 | 59 | 501 | 1193 | 0 |
| Confl. Bikes (#/hr) | | 1 | | | | |
| Heavy Vehicles (%) | 1% | 1% | 5% | 5% | 2% | 2% |
| Turn Type | Prot | | pm+pt | NA | NA | |
| Protected Phases | 4 | | 5 | 2 | 6 | |
| Permitted Phases | | | 2 | | | |
| Actuated Green, G (s) | 21.6 | | 86.9 | 86.9 | 78.3 | |
| Effective Green, g (s) | 21.6 | | 86.9 | 86.9 | 78.3 | |
| Actuated g/C Ratio | 0.18 | | 0.74 | 0.74 | 0.67 | |
| Clearance Time (s) | 4.5 | | 4.5 | 4.5 | 4.5 | |
| Vehicle Extension (s) | 3.0 | | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 320 | | 121 | 1338 | 1212 | |
| v/s Ratio Prot | c0.18 | | 0.02 | c0.28 | c0.66 | |
| v/s Ratio Perm | | | 0.34 | | | |
| v/c Ratio | 0.97 | | 0.49 | 0.37 | 0.98 | |
| Uniform Delay, d1 | 47.6 | | 31.2 | 5.5 | 19.0 | |
| Progression Factor | 1.00 | | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 40.9 | | 3.1 | 0.2 | 22.0 | |
| Delay (s) | 88.4 | | 34.2 | 5.7 | 41.0 | |
| Level of Service | F | | C | A | D | |
| Approach Delay (s) | 88.4 | | | 8.7 | 41.0 | |
| Approach LOS | F | | | A | D | |
| Intersection Summary | | | | | | |
| HCM 2000 Control Delay | | | 39.6 | | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | | | 0.96 | | | |
| Actuated Cycle Length (s) | | | 117.5 | | Sum of lost time (s) | 13.5 |
| Intersection Capacity Utilization | | | 86.2% | | ICU Level of Service | E |
| Analysis Period (min) | | | 15 | | | |
| c Critical Lane Group | | | | | | |