Bigham Drive R-3 to E-C Comprehensive Plan Amendment Zone Change

Traffic Impact Study

March 14, 2018

Prepared By:

Southern Oregon Transportation Engineering, LLC

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RENEWS 12/31/18

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY **5**

II. INTRODUCTION **6**
- Background 6
- Project Location 6
- Project Description 6

III. EXISTING CONDITIONS **8**
- Site Condition 8
- Roadway Characteristics 8
- Traffic Counts 8
- Background Growth 8
- Intersection Capacity and Level of Service 10
- Year 2018 No-Build Intersection Operations 11
- Year 2018 No-Build 95th Percentile Queuing 11
- Crash History 12

IV. SITE TRAFFIC **13**
- Trip Generation 13
- Trip Distribution and Assignment 13

V. YEAR 2018 BUILD CONDITIONS **15**
- Year 2018 Build Description 15
- Year 2018 Build Intersection Operations 15
- Year 2018 Build 95th Percentile Queuing 15
- Year 2018 Build Turn Lanes 16

VI. FUTURE YEAR 2038 NO-BUILD AND BUILD CONDITIONS **18**
- Future Year 2038 No-Build Description 18
- Future Year 2038 Build Description 18
- Future Year 2038 No-Build and Build Intersection Operations 18
- Future Year 2038 No-Build and Build 95th Percentile Queuing 19

VII. CONCLUSIONS **22**

LIST OF TABLES

Table 1: Roadway Classifications and Descriptions....8
Table 2: HCM Level of Service Designations for Stop-Controlled Intersections....10
Table 3: HCM Level of Service Designations for Signalized Intersections....10
Table 4: Year 2018 No-Build Intersection Operations, PM Peak Hour....11
Table 5: Year 2018 No-Build 95th Percentile Queue Lengths, PM Peak Hour....11
Table 6: Development Trip Generations....13
Table 7: Year 2018 Build Intersection Operations, PM Peak Hour....15
Table 8: Year 2018 Build 95th Percentile Queue Lengths, PM Peak Hour....15
Table 9: Future Year 2038 No-Build and Build Intersection Operations, PM Peak Hour....18
Table10: Future Year 2038 No-Build and Build 95th Percentile Queue Lengths, PM Peak Hour....19

FIGURES

Figure 1: Vicinity Map....7
Figure 2: Year 2018 No-Build Traffic Volumes, PM Peak Hour....9
Figure 3: Development Trip Distributions, PM Peak Hour....14
Figure 4: Year 2018 Build Traffic Volumes, PM Peak Hour....17
Figure 5 Future Year 2038 No-Build Traffic Volumes, PM Peak Hour....20
Figure 6: Future Year 2038 Build Traffic Volumes, PM Peak Hour....21

APPENDICES

Appendix A: Traffic Count Data, Seasonal Adjustment Information
Appendix B: ITE Trip Generation Data, Background Growth
Appendix C: Year 2018 No-Build and Build Synchro Output
Appendix D: Year 2018 No-Build and Build SimTraffic Output
Appendix E: Future Year 2038 No-Build and Build Synchro Output
Appendix F: Future Year 2038 No-Build and Build SimTraffic Output
Appendix G: Agency Requirements

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I. EXECUTIVE SUMMARY

Summary

Southern Oregon Transportation Engineering, LLC prepared a traffic impact analysis for a proposed comprehensive plan map amendment and zone change from High Density Residential (R-3) to Employment Commercial (E-C) on Township 37S Range 1W Section 2CD, tax lots 600, 700 and 1000 in Central Point, Oregon. The subject property is located along the east side of Bigham Drive south of Freeman Road. Access is provided from Bigham Drive.

A traffic impact analysis is required by the City to address issues of compliance with the City of Central Point Comprehensive Plan, Land Development Code, and Transportation Planning Rule (TPR). Potential development impacts were based on 0.43 acres of E-C zoning under existing year 2018 and future year 2038 conditions. Development impacts were analyzed during the p.m. peak hour, which was shown to be the peak period of the day in the study area.

Two study area intersections were identified as key intersection for the analysis. These included:

1. Freeman Road & Bigham Drive
2. Oak Street & Bigham Drive

Conclusions

The findings of the traffic impact analysis conclude that the proposed comprehensive plan map amendment and zone change from R-3 to E-C on 37S1W02CD tax lots 600, 700 and 1000 can be accommodated on the existing transportation system with planned improvements without creating adverse impacts. Intersection operations, roadway classifications, and safety conditions were evaluated to address potential impacts to the transportation system. Results of the analysis show the following:

- Key intersections were evaluated operationally under year 2018 and future year 2038 no-build and build conditions. Results of the analysis show the intersection of Bigham Drive and Freeman Road exceeding the City's level of service (LOS) "D" performance standard and operating at a LOS "E" under existing year 2018 no-build conditions. A planned improvement identified in the Interchange Area Management Plan (IAMP) for Exit 33 included a center median along Freeman Road in the future, which will limit traffic movements to and from Bigham Drive to right-in, right-out only. With this improvement in place, the intersection will be adequately mitigated through future year 2038 build conditions.
- 95th percentile queue lengths are not shown to exceed link distances nor create safety concerns at key intersections under any of the analysis scenarios.
- An evaluation of crash history in the site vicinity showed no crashes within the most recent five year period at either key intersection.

This analysis was undertaken to address issues of compliance with the City of Central Point Comprehensive Plan, Land Development Code, and Oregon Transportation Planning Rule (TPR) in Oregon Administrative Rules (OAR) Chapter 660, Division 012. Based upon our analysis, it is concluded that streets and intersections that serve the subject property will accommodate projected p.m. peak hour traffic volumes from permitted uses under proposed E-C zoning without requiring a change in the functional classification of any existing or planned facility, or degrade the performance of an existing or planned facility such that it would not meet the performance standard identified in the City's Transportation System Plan (TSP) or Comprehensive Plan.

II. INTRODUCTION

Background

Southern Oregon Transportation Engineering, LLC prepared a traffic impact analysis for a proposed comprehensive plan map amendment and zone change from High Density Residential (R-3) to Employment Commercial (E-C) on Township 37S Range 1W Section 2CD, tax lots 600, 700 and 1000 in Central Point, Oregon. The subject property is located along the east side of Bigham Drive south of Freeman Road.

Under E-C zoning, the site is assumed to have the potential to generate 273 average daily trips (ADT) with 27 trips occurring during the p.m. peak hour based on a 7,840 square foot (SF) medical office building. It was our assumption that a medical office would be the worst case land use based on parcel constraints (shape and size), parking requirements, and location.

Two study area intersections were identified as key intersection for the analysis. These included:

1. Freeman Road & Bigham Drive
2. Oak Street & Bigham Drive

Study area intersections were evaluated under existing year 2018 and future year 2038 no-build and build conditions during the p.m. peak hour to determine what impacts the proposed plan amendment and zone change will have on the transportation system.

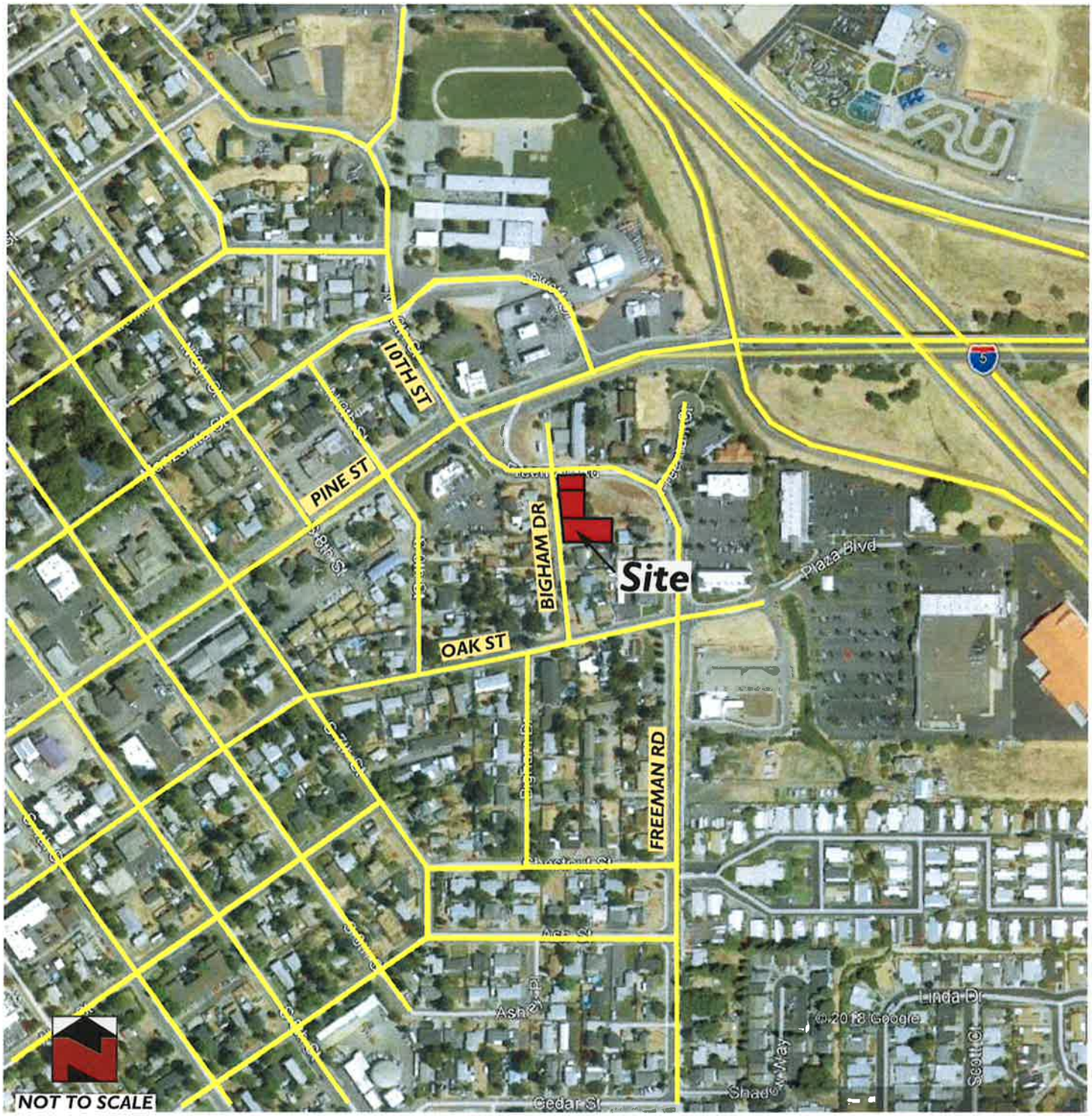
Project Location

The subject parcels are located along the east side of Bigham Drive south side of Freeman Road on Township 37S Range 1W Section 2CD, tax lots 600, 700 and 1000 in Central Point, Oregon. Refer to Figure 1 for a vicinity map.

Project Description

The subject property is currently zoned High Density Residential (R-3) and is proposed as Employment Commercial (E-C). The change in land use is estimated to generate 273 ADT to the transportation system with 27 trips occurring during the p.m. peak hour. Access to the site is provided from Bigham Drive.

Figure 1 : Vicinity Map



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III. EXISTING CONDITIONS

Site Conditions

The proposed site is located on Township 37S Range 1W Section 2CD, tax lots 600, 700 and 1000. The two tax lots total 0.43 acres.

Roadway Characteristics

Table 1 provides a summary of existing roadway classifications and descriptions in the study area.

Table 1 - Roadway Classifications and Descriptions

Roadway	Jurisdiction	Functional Classification	Lanes	City Operational Standard	Posted Speed
Freeman Road	City of Central Point	Minor Arterial	2	LOS D	35
Bigham Drive	City of Central Point	Local	2	LOS D	25
Oak Street	City of Central Point	Local	2	LOS D	25

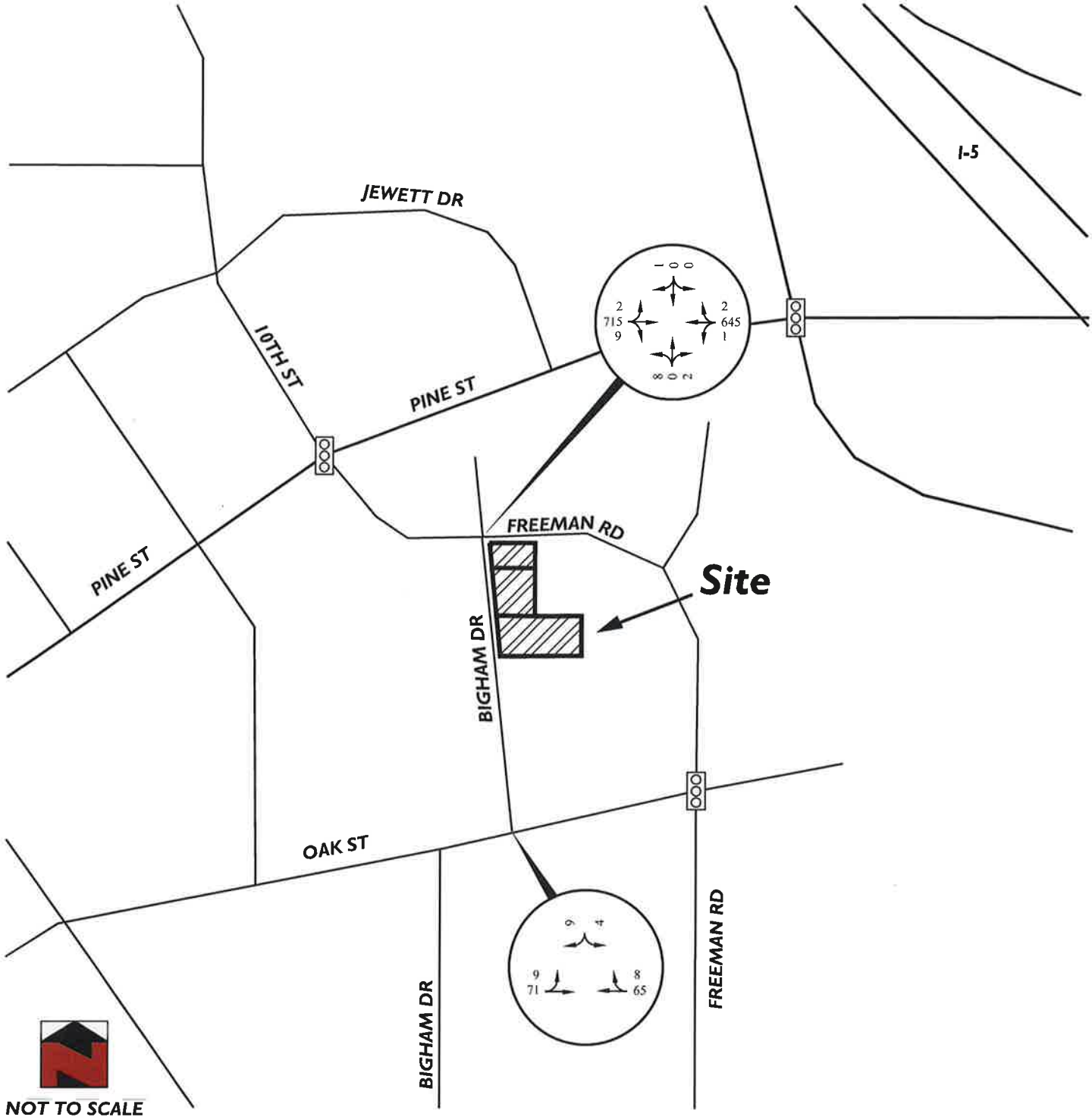
Traffic Counts

Manual traffic counts were collected from 3:00-6:00 p.m. at key intersections in February of 2018. Counts were seasonally adjusted and balanced to reflect peak conditions. The p.m. peak hour was shown to occur from 4:45-5:45 p.m. in the surrounding area. Refer to Appendix A for count data. Refer to Figure 2 for year 2018 no-build traffic volumes during the p.m. peak hour.

Background Growth

Background growth was derived using growth rates from the Interchange Area Management Plan (IAMP) for Exit 33 as well as traffic volume comparisons between counts in 2010 and 2018. The IAMP estimated approximately 0.53% per year of growth on Freeman Road between 2010 and future year 2034. In comparing baseline year 2010 traffic volumes to current year 2018 traffic volumes, however, traffic movements had varying growth rates of 0.25% to 2% depending on the movement. Based on this, growth rates for determining future 2038 no-build conditions varied and were chosen to be as consistent as possible with those in the IAMP.

Figure 2 : Year 2018 No-Build Traffic 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*. Capacity and level of service calculations for signalized and unsignalized intersections were prepared using "SYNCHRO" timing software.

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 on 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 stop-controlled intersections are provided in Table 2. The HCM LOS designations for signalized intersections are provided in Table 3.

Table 2 – HCM Level of Service Designations for Stop-Controlled Intersections

Level of Service	Delay Range
A	< 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F	> 50

Table 3 – HCM Level of Service Designations for Signalized Intersections

Level of Service	Delay Range
A	< 10
B	>10 – 20
C	>20 – 35
D	>35 – 55
E	>55 – 80
F	> 80

Key intersections are under City of Central Point jurisdiction. The City of Central Point requires all study area intersections to operate at acceptable levels of service (LOS). The minimum acceptable level of service for signalized intersections and unsignalized intersection movements is LOS "D". Mitigation is required at key intersections operating below a LOS "D".

Year 2018 No-Build Intersection Operations

Key intersections were evaluated under year 2018 no-build conditions during the p.m. peak hour. Results are summarized in Table 4.

Table 4 - Year 2018 No-Build Intersection Operations, PM Peak Hour

Intersection	Performance Standard	Traffic Control	Year 2018 No-Build
Freeman Road / Bigham Drive	LOS D	TWSC	***E***, (NB)
Oak Street / Bigham Drive	LOS D	TWSC	A, (SB)

LOS=Level of Service, TWSC=Two-way stop controlled, NB=northbound, SB=southbound
Note: Exceeded performance standards are shown in bold, italic

Results of the analysis show the intersection of Bigham Drive and Freeman Road operating at a level of service (LOS) "E" under year 2018 no-build conditions, which is failing. The critical movement is the northbound left turn movement, which drives the failing LOS. This movement will eventually be restricted to right-out only when City plans for a median along Freeman Road moves forward, but until then it will remain a potentially difficult movement during peak conditions. The remaining key intersection is shown to operate acceptably under year 2018 no-build conditions. Refer to Appendix C for synchro output sheets.

Year 2018 No-Build 95th 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 95th percentile queue length. The 95th 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 95th percentile queue lengths at study area intersections under existing conditions. Queue lengths were then rounded up to the nearest 25 feet (single vehicle length) and reported in Table 5 for the p.m. peak hour.

Table 5 – Year 2018 No-Build 95th Percentile Queue Lengths, PM Peak Hour

Intersection / Movement	Available Link Distance (Ft)	95th Percentile Queue Lengths	Exceeded or Blocked Roadway
Freeman Road / Bigham Drive			
Eastbound Left/Through/Right	250	50	-
Westbound Left/Through/Right	325	50	-
Northbound Left/Through/Right	425	50	-
Southbound Left/Through/Right	100	25	-
Oak Street / Bigham Drive			
Eastbound Left/Through	125	25	-
Westbound Through/Right	250	0	-
Southbound Left/Right	425	25	-

Note: Exceeded performance standards are shown in bold, italic

Results of the queuing analysis show that no link distances at key intersections are exceeded under year 2018 no-build conditions during the p.m. peak hour. The northbound movement on Bigham Drive at Freeman Road is shown to have two vehicles waiting at any one time during the p.m. peak hour, which is consistent with the LOS analysis, which showed that this movement might be difficult to maneuver during peak conditions. Refer to Appendix D for a full queuing and blocking report.

Crash History

Crash data for the most recent five year period was gathered from ODOT's crash analysis unit. Results were gathered for the period of January 1, 2012 through December 31st, 2016. Crash data is gathered to identify crash patterns that could be attributable to geometric or operational deficiencies, or crash trends of a specific type that would indicate the need for further investigation at an intersection. Results, however, showed that there were no reported crashes at either key intersection within a five year period. No further investigation is shown to be necessary.

IV. SITE TRAFFIC

Trip Generation

Trip generation calculations for the proposed plan amendment and zone change to E-C were prepared utilizing the Institute of Transportation Engineers (ITE) *Trip Generation*, 10th Edition. An ITE rate was used for land use code 720 – Medical/Dental Office Building. No pass-by or internal trip reductions were taken. Proposed development trips were based on a 7,840 SF medical office building. Table 6 provides a summary of trip generations. ITE descriptions and graphs are provided in Appendix B.

Table 6 – Development Trip Generations

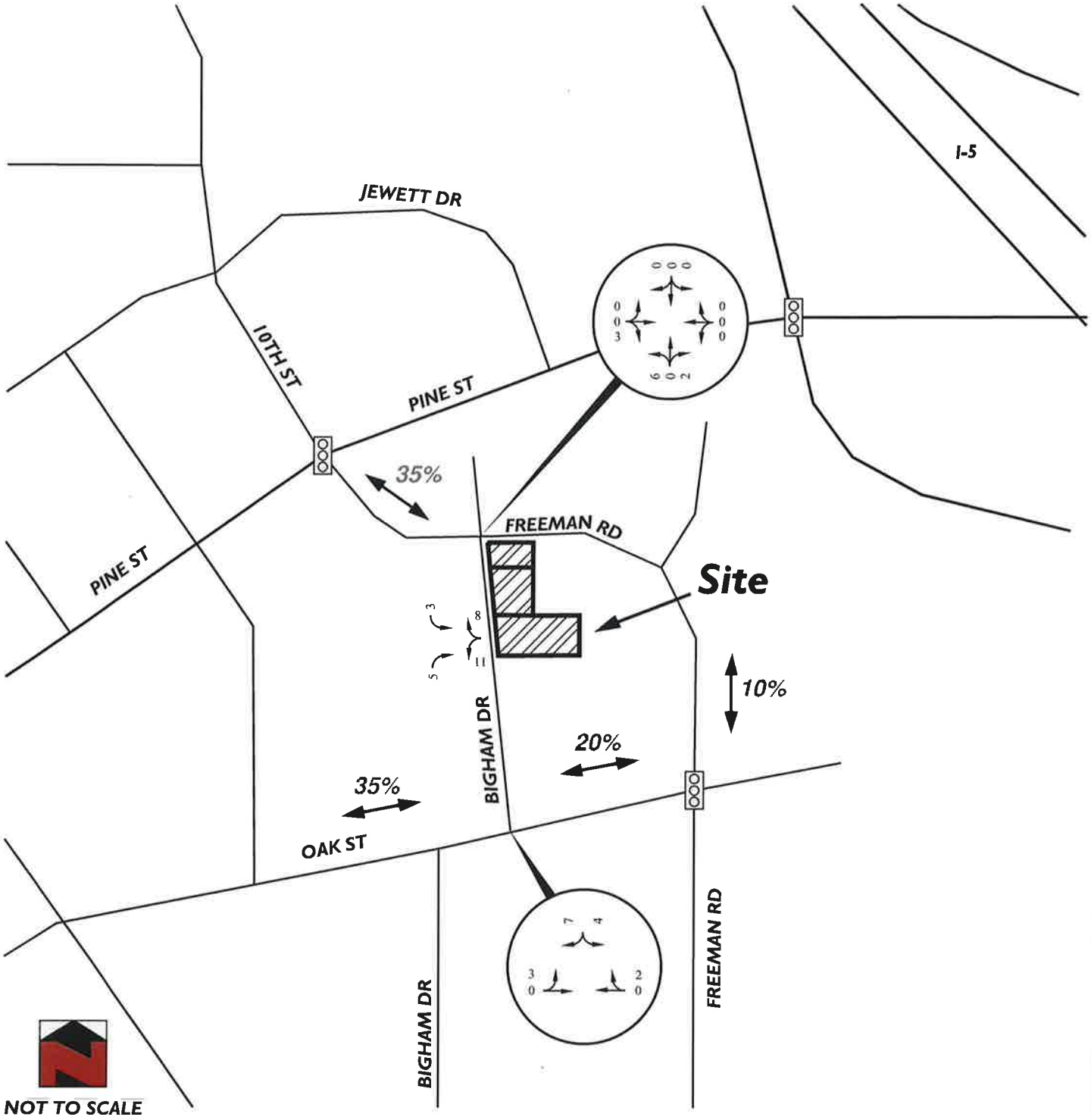
Land Use	Unit	Size	Daily Rate	Daily Trips	PM Peak Rate	PM Peak Hour Trips		
						Total	In	Out
720 – Medical/Dental Office	1000 SF	7.84	34.8	273	3.46	27	8	19
Total Trips				**273**		**27**	**8**	**19**

SF = Square Feet

Trip Distribution and Assignment

Development trips were distributed based on traffic distributions from the existing site. Trip percentages to and from the north and south were based on existing splits along Bigham Drive. Once trips reached key intersections, development trips were then distributed in the same manner, which followed that of existing splits. Refer to Figure 3 for development distribution percentages and trip assignments.

Figure 3 : Development Trip Distributions, PM Peak Hour



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V. YEAR 2018 BUILD CONDITIONS

Year 2018 Build Description

Build conditions represent no-build conditions for a study area with the addition of proposed development trips considered. Build conditions are compared to no-build conditions to determine what impacts and/or mitigation measures will result from proposed development. Build conditions are evaluated in this analysis for the year 2018. Year 2018 build traffic volumes during the p.m. peak hour are provided in Figure 4.

Year 2018 Build Intersection Operations

Year 2018 build traffic volumes were evaluated at key intersections under p.m. peak hour conditions. Results are summarized in Table 7.

Table 7 - Year 2018 Build Intersection Operations, PM Peak Hour

Intersection	Performance Standard	Traffic Control	Year 2018 Build
Freeman Road / Bigham Drive	LOS D	TWSC	***E***, (NB)
Oak Street / Bigham Drive	LOS D	TWSC	A, (SB)

LOS=Level of Service, TWSC=Two-way stop controlled, NBL=northbound left, SBL=southbound left
Note: Exceeded performance standards are shown in bold, italic

Results of the analysis show the intersection of Bigham Drive at Freeman Road continues to have a failing northbound traffic movement under year 2018 build conditions during the p.m. peak hour. This is unchanged from existing year 2018 no-build conditions and fails as a result of high traffic volumes on Freeman Road. Refer to Appendix C for synchro output sheets.

Year 2018 Build 95th Percentile Queuing

Five simulations were run and averaged in SimTraffic to determine 95th percentile queue lengths at study area intersections under year 2018 build conditions. Queue lengths were then rounded up to the nearest 25 feet (single vehicle length) and reported in Table 8 for the p.m peak hour.

Table 8 – Year 2018 Build 95th Percentile Queue Lengths, PM Peak Hour

Intersection / Movement	Available Link Distance (Ft)	95th Percentile Queue Lengths	Exceeded or Blocked Roadway
Freeman Road / Bigham Drive			
Eastbound Left/Through/Right	250	50	-
Westbound Left/Through/Right	325	50	-
Northbound Left/Through/Right	425	50	-
Southbound Left/Through/Right	100	25	-
Oak Street / Bigham Drive			
Eastbound Left/Through	125	25	-
Westbound Through/Right	250	0	-
Southbound Left/Right	425	25	-

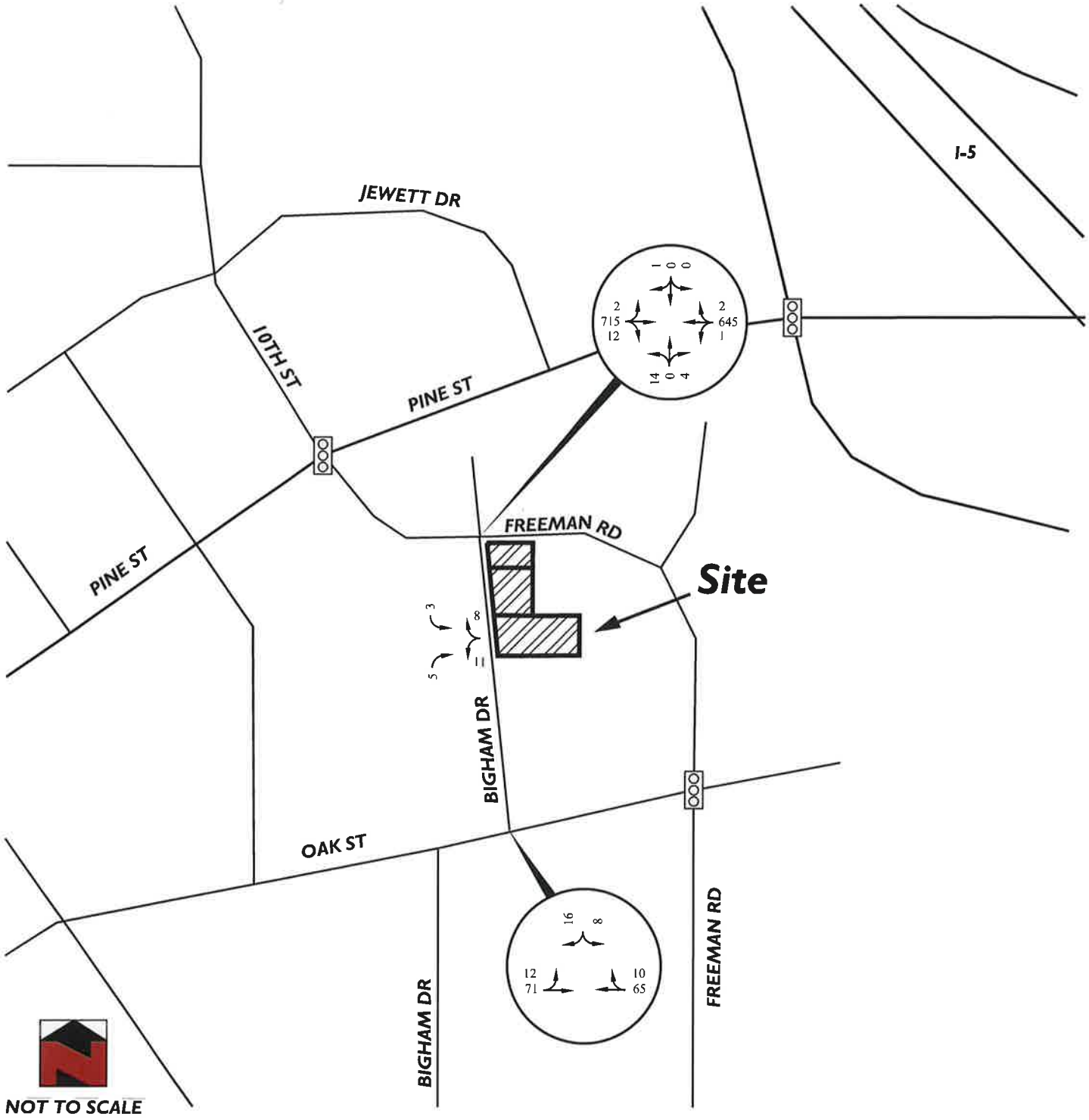
Note: Exceeded performance standards are shown in bold, italic

Results of the queuing analysis show that queue lengths at key intersections remain the same under year 2018 build conditions during the p.m. peak hour. Refer to Appendix D for a full queuing and blocking report.

Year 2018 Build Turn Lanes

Turns lanes are not evaluated at the time of plan map amendment or zone change because exact development details are not known at that time, but they will be evaluated at the time of development. Additionally, a median along Freeman Road is planned by the City of Central Point, which will mitigate any need for a center turn lane requirement.

Figure 4 : Year 2018 Build Traffic Volumes, PM Peak Hour



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VI. FUTURE YEAR 2038 NO-BUILD AND BUILD CONDITIONS

Future Year 2038 No-Build Description

Future year 2038 no-build conditions represent future year conditions for a study area without consideration of proposed development trips. This condition is evaluated to determine how a study area will be impacted by future background growth but no traffic from proposed development trips. Background growth was determined based on projections in the Interchange Area Management Plan (IAMP) at exit 33 and from comparisons between 2010 traffic volumes and 2018 manual counts gathered for this analysis. Growth rates varied between 0.025% and 2% per year depending upon the traffic movement, in an effort to be as consistent as possible with traffic projections in the IAMP. Refer to Figure 5 for future year 2038 no-build traffic volumes during the p.m. peak hour.

Future Year 2038 Build Description

Future year 2038 build conditions represent future conditions for a study area with background growth and proposed development trips considered. Build conditions are compared to no-build conditions to determine what kind of impacts will result from proposed development under future conditions. Future build conditions are evaluated in this analysis for the planning year of 2038. Refer to Figure 6 for future year 2038 build traffic volumes during the p.m. peak hour.

Future Year 2038 No-Build and Build Intersection Operations

Future year 2038 no-build and build traffic volumes were evaluated at key intersections during the p.m. peak hour to determine how background growth and proposed development trips impact the transportation system. Results of the analysis are summarized in Table 9.

Table 9 – Future Year 2038 No-Build and Build Intersection Operations, PM Peak Hour

Intersection	Performance Standard	Traffic Control	Future Year 2038 No-Build	Future Year 2038 Build
Freeman Road / Bigham Drive	LOS D	TWSC	***E***, (NB)	***E***, (NB)
Oak Street / Bigham Drive	LOS D	TWSC	A, (SB)	A, (SB)

LOS=Level of Service, TWSC=Two-way stop controlled, NBL=northbound left, SBL=southbound left
Note: Exceeded performance standards are shown in bold, italic

Results of the analysis show that key intersections continue to operate the same under future year 2038 no-build and build conditions as they were shown to operate under year 2018 no-build and build conditions. The intersection of Bigham Drive and Freeman Road continues to have a failing northbound traffic movement, which will be re-routed as a result of a center median planned along Freeman Road. This improvement is shown to adequately mitigate any safety concerns relating to the northbound left turn movement. The remaining key intersection is shown to continue to operate at a LOS "A", which is well within performance standards. Synchro output sheets are provided in Appendix E.

Future Year 2038 No-Build and Build 95th Percentile Queuing

Five simulations were run and averaged in SimTraffic to determine 95th percentile queue lengths at study area intersections under future year 2038 no-build and build conditions. Queue lengths were then rounded up to the nearest 25 feet (single vehicle length) and reported for p.m. peak hour conditions in Table 10.

Table 10 – Future Year 2038 No-Build and Build 95th Percentile Queue Lengths, PM Peak Hour

Intersection / Movement	Available Link Distance (Ft)	95th Percentile Queue Lengths No-Build	95th Percentile Queue Lengths Build	Exceeded or Blocked Roadway
Freeman Road / Bigham Drive				
Eastbound Left/Through/Right	250	75	75	-
Westbound Left/Through/Right	325	50	50	-
Northbound Left/Through/Right	425	50	50	-
Southbound Left/Through/Right	100	25	25	-
Oak Street / Bigham Drive				
Eastbound Left/Through	125	25	25	-
Westbound Through/Right	250	0	0	-
Southbound Left/Right	425	25	25	-

Note: Exceeded performance standards are shown in bold, italic

Results of the queuing analysis show that queue lengths at key intersections continue to remain similar under future year 2038 no-build and build conditions as were shown in year 2018 no-build and build conditions. The only queue length shown to increase is the eastbound left turn queue on Freeman Road at Bigham Drive, and this increases to 75 feet under both no-build and build conditions. All other queue lengths at key intersections are shown to remain the same. It can also be noted that the planned center median along Freeman Road in the future will limit traffic movements to and from Bigham Drive to right-in, right-out movements so queue lengths along Freeman Road resulting from left turning movements will no longer exist. Refer to Appendix F for a full queuing report.

Figure 5 : Future Year 2038 No-Build Traffic Volumes, PM Peak Hour

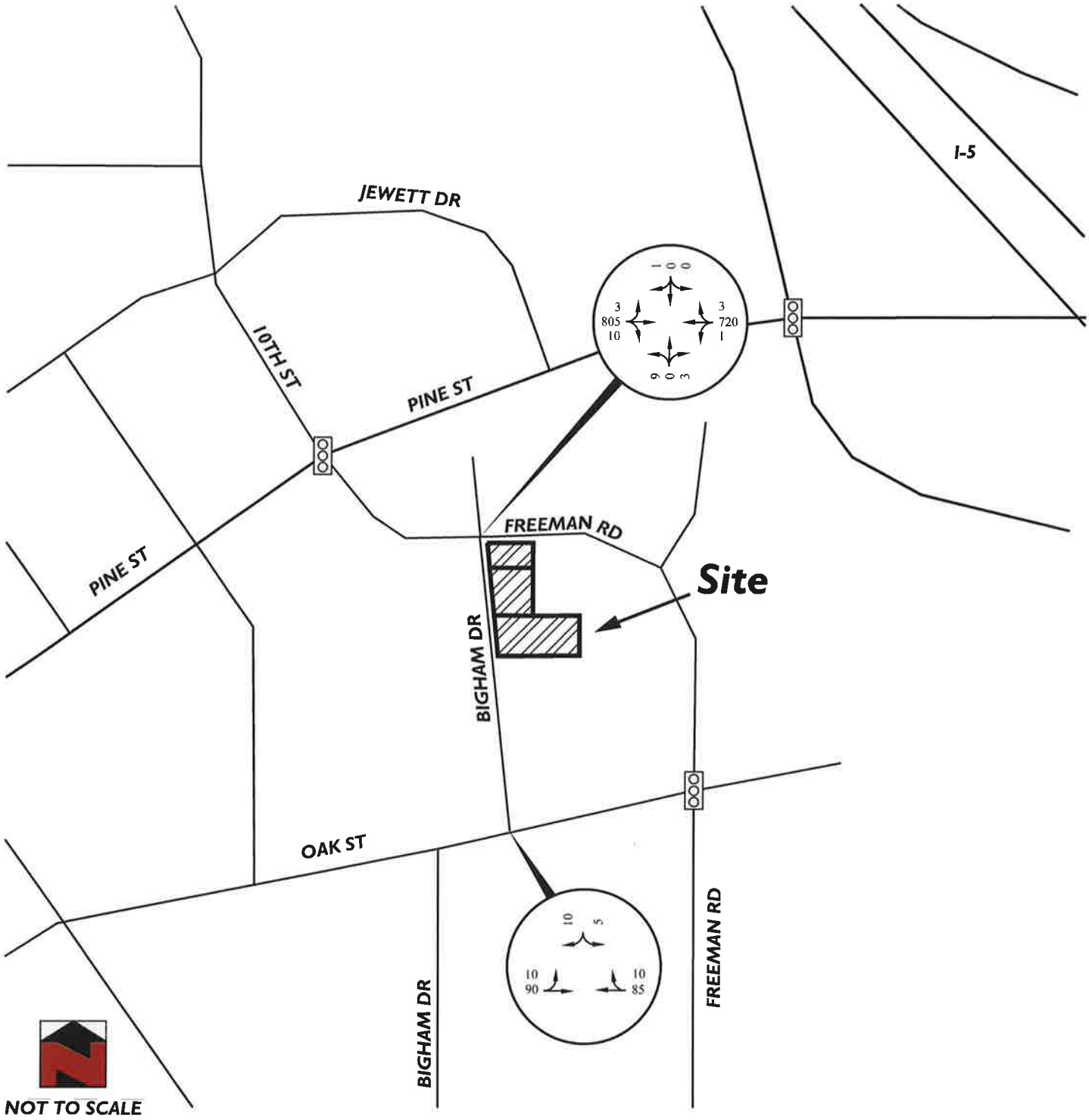

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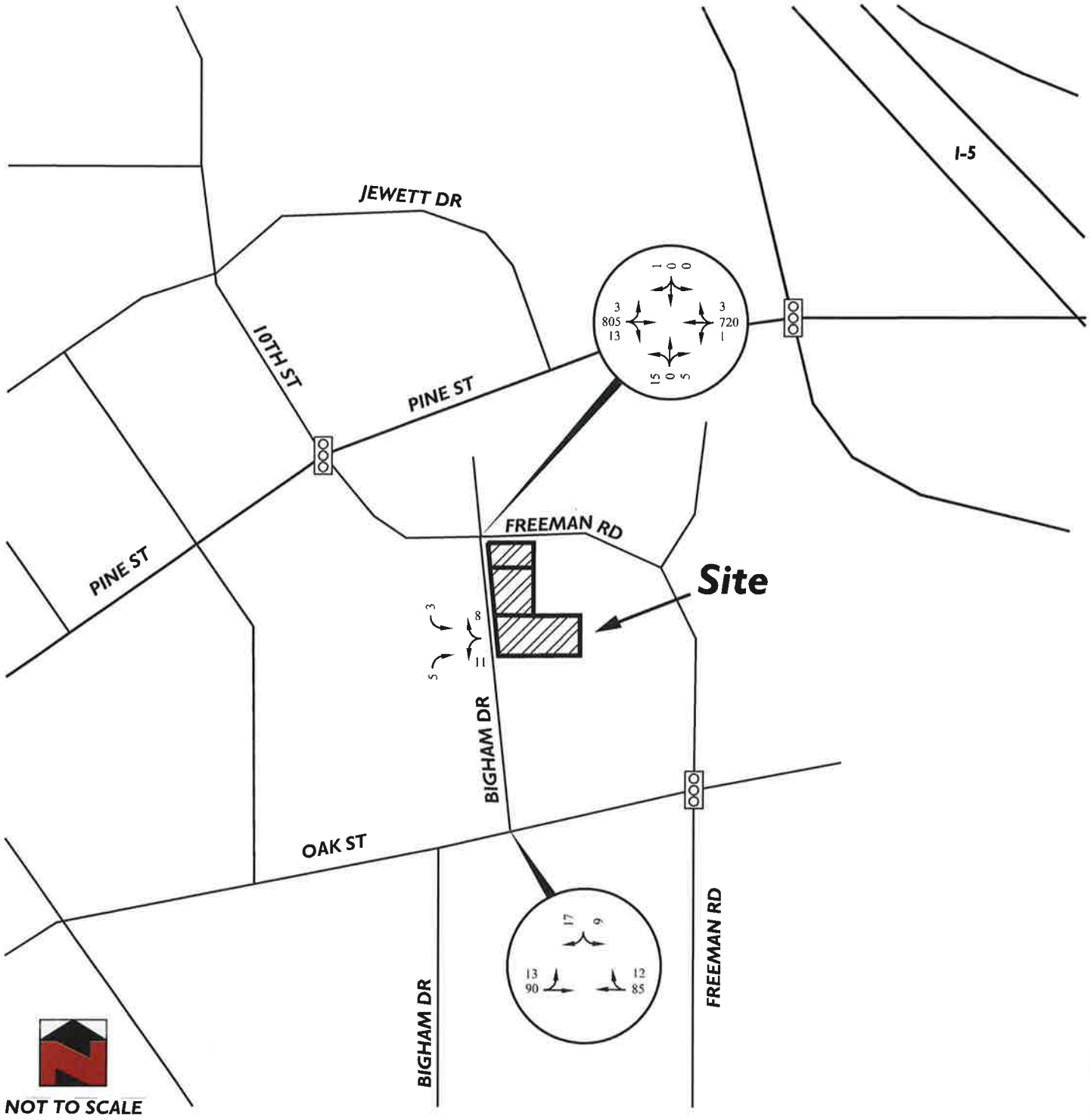
Figure 6 : Future Year 2038 Build Traffic Volumes, PM Peak Hour



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VII. CONCLUSIONS

The findings of the traffic impact analysis conclude that the proposed comprehensive plan map amendment and zone change from R-3 to E-C on 37S1W02CD tax lots 600, 700 and 1000 can be accommodated on the existing transportation system with planned improvements without creating adverse impacts. Intersection operations, roadway classifications, and safety conditions were evaluated to address potential impacts to the transportation system. Results of the analysis show the following:

- Key intersections were evaluated operationally under year 2018 and future year 2038 no-build and build conditions. Results of the analysis show the intersection of Bigham Drive and Freeman Road exceeding the City's level of service (LOS) "D" performance standard and operating at a LOS "E" under existing year 2018 no-build conditions. A planned improvement identified in the Interchange Area Management Plan (IAMP) for Exit 33 included a center median along Freeman Road in the future, which will limit traffic movements to and from Bigham Drive to right-in, right-out only. With this improvement in place, the intersection will be adequately mitigated through future year 2038 build conditions.
- 95th percentile queue lengths are not shown to exceed link distances nor create safety concerns at key intersections under any of the analysis scenarios.
- An evaluation of crash history in the site vicinity showed no crashes within the most recent five year period at either key intersection.

This analysis was undertaken to address issues of compliance with the City of Central Point Comprehensive Plan, Land Development Code, and Oregon Transportation Planning Rule (TPR) in Oregon Administrative Rules (OAR) Chapter 660, Division 012. Based upon our analysis, it is concluded that streets and intersections that serve the subject property will accommodate projected p.m. peak hour traffic volumes from permitted uses under proposed E-C zoning without requiring a change in the functional classification of any existing or planned facility, or degrade the performance of an existing or planned facility such that it would not meet the performance standard identified in the City's Transportation System Plan (TSP) or Comprehensive Plan.

Bigham Drive R-3 to E-C Comprehensive Plan Amendment / Zone Change

APPENDICES A-G

March 14, 2018

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Appendix A

Traffic Count Data, Seasonal Adjustments

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North-South: Bigham Drive
East-West: Freeman Road
Weather: Sunny, 55 deg
Veh Type: All Vehicles

File Name : Bigham-Freeman
Site Code : 00000001
Start Date : 2/13/2018
Page No : 1

Groups Printed- Unshifted

	Apartments From North					Freeman Rd From East					Bigham Dr From South					Freeman Rd From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	0	0	2	0	2	1	122	0	0	123	2	0	2	0	4	1	129	2	0	132	261
03:15 PM	0	0	0	0	0	0	148	0	0	148	1	0	0	1	2	0	136	4	0	140	290
03:30 PM	0	1	0	0	1	0	138	0	0	138	2	0	1	3	6	1	176	2	3	182	327
03:45 PM	0	0	0	1	1	0	117	1	0	118	2	0	1	1	4	0	167	4	1	172	295
Total	0	1	2	1	4	1	525	1	0	527	7	0	4	5	16	2	608	12	4	626	1173
04:00 PM	0	0	1	1	2	1	153	0	0	154	1	0	0	0	1	1	165	3	2	171	328
04:15 PM	0	0	0	0	0	0	159	1	0	160	1	1	0	1	3	0	157	4	1	162	325
04:30 PM	0	0	0	0	0	2	158	0	0	160	1	1	1	0	3	0	169	3	0	172	335
04:45 PM	0	0	0	0	0	0	146	0	0	146	2	0	1	1	4	0	154	3	0	157	307
Total	0	0	1	1	2	3	616	1	0	620	5	2	2	2	11	1	645	13	3	662	1295
05:00 PM	0	0	1	0	1	0	151	0	1	152	1	0	0	0	1	1	135	2	2	140	294
05:15 PM	0	0	0	2	2	1	150	1	2	154	3	0	0	2	5	0	129	2	0	131	292
05:30 PM	0	0	0	0	0	0	131	1	0	132	1	0	1	1	3	1	149	1	2	153	288
05:45 PM	2	0	2	1	5	0	147	2	1	150	0	0	0	1	1	1	130	1	0	132	288
Total	2	0	3	3	8	1	579	4	4	588	5	0	1	4	10	3	543	6	4	556	1162
Grand Total	2	1	6	5	14	5	1720	6	4	1735	17	2	7	11	37	6	1796	31	11	1844	3630
Apprch %	14.3	7.1	42.9	35.7		0.3	99.1	0.3	0.2		45.9	5.4	18.9	29.7		0.3	97.4	1.7	0.6		
Total %	0.1	0	0.2	0.1	0.4	0.1	47.4	0.2	0.1	47.8	0.5	0.1	0.2	0.3	1	0.2	49.5	0.9	0.3	50.8	

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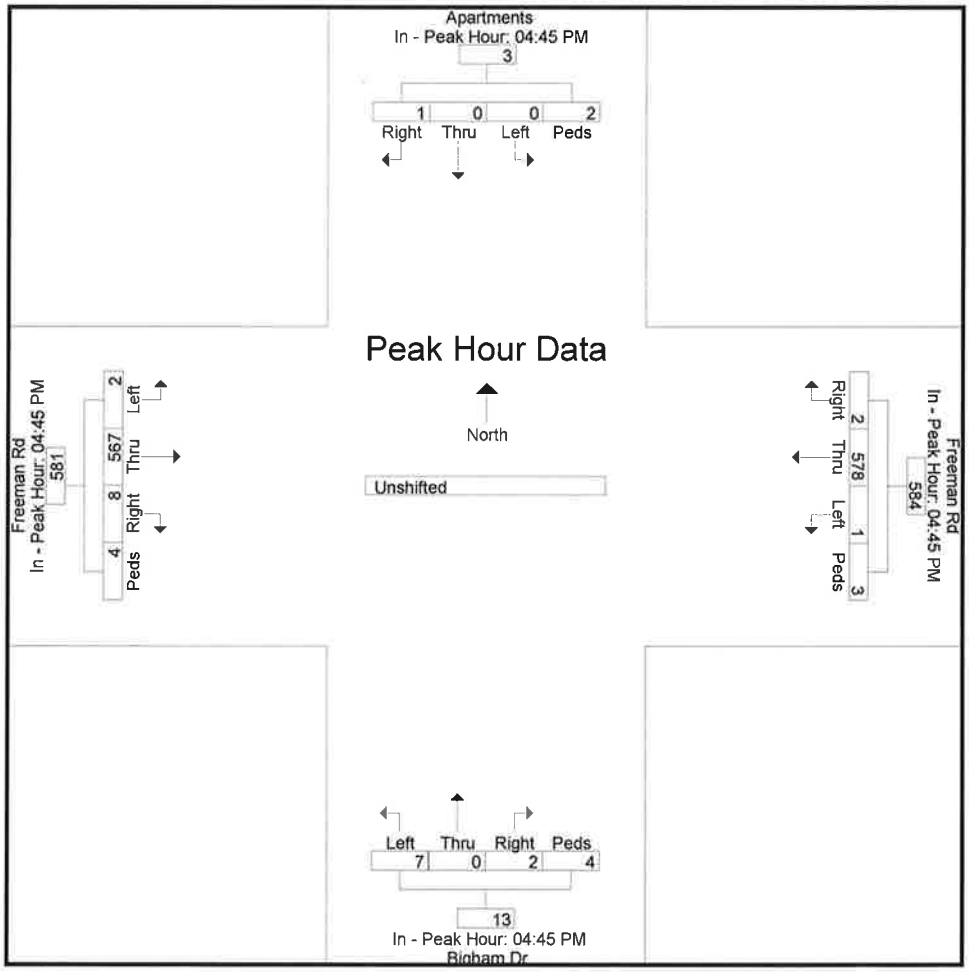
North-South: Bigham Drive
East-West: Freeman Road
Weather: Sunny, 55 deg
Veh Type: All Vehicles

File Name : Bigham-Freeman
Site Code : 00000001
Start Date : 2/13/2018
Page No : 3

	Apartments From North					Freeman Rd From East					Bigham Dr From South					Freeman Rd From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:45 PM to 05:30 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	04:45 PM					04:45 PM					04:45 PM					04:45 PM					
+0 mins.	0	0	0	0	0	0	146	0	0	146	2	0	1	1	4	0	154	3	0	157	
+15 mins.	0	0	1	0	1	0	151	0	1	152	1	0	0	0	1	1	135	2	2	140	
+30 mins.	0	0	0	2	2	1	150	1	2	154	3	0	0	2	5	0	129	2	0	131	
+45 mins.	0	0	0	0	0	0	131	1	0	132	1	0	1	1	3	1	149	1	2	153	
Total Volume	0	0	1	2	3	1	578	2	3	584	7	0	2	4	13	2	567	8	4	581	
% App. Total	0	0	33.3	66.7		0.2	99	0.3	0.5		53.8	0	15.4	30.8		0.3	97.6	1.4	0.7		
PHF	.000	.000	.250	.250	.375	.250	.957	.500	.375	.948	.583	.000	.500	.500	.650	.500	.920	.667	.500	.925	



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North-South: Bigham Drive
East-West: Oak Street
Weather: Sunny, 55 deg
Veh Type: All Vehicles

File Name : Bigham-Oak
Site Code : 00000002
Start Date : 2/13/2018
Page No : 1

Groups Printed- Unshifted

	Bigham Dr From North					Oak St From East					From South					Oak St From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
03:00 PM	1	0	2	0	3	0	22	0	0	22	0	0	0	0	0	2	18	0	0	20	45
03:15 PM	1	0	2	0	3	0	16	1	0	17	0	0	0	0	0	0	22	0	0	22	42
03:30 PM	0	0	3	0	3	0	32	0	0	32	0	0	0	0	0	1	22	0	0	23	58
03:45 PM	0	0	1	0	1	0	13	1	0	14	0	0	0	0	0	1	21	0	0	22	37
Total	2	0	8	0	10	0	83	2	0	85	0	0	0	0	0	4	83	0	0	87	182
04:00 PM	1	0	3	0	4	0	16	1	1	18	0	0	0	0	0	1	18	0	0	19	41
04:15 PM	0	0	3	0	3	0	21	1	2	24	0	0	0	0	0	1	26	0	0	27	54
04:30 PM	0	0	5	0	5	0	19	1	1	21	0	0	0	0	0	1	18	0	0	19	45
04:45 PM	2	0	2	0	4	0	19	1	2	22	0	0	0	0	0	3	26	0	0	29	55
Total	3	0	13	0	16	0	75	4	6	85	0	0	0	0	0	6	88	0	0	94	195
05:00 PM	0	0	1	0	1	0	20	1	0	21	0	0	0	0	0	1	38	0	0	39	61
05:15 PM	0	0	3	0	3	0	15	4	0	19	0	0	0	0	0	3	35	0	0	38	60
05:30 PM	2	0	2	0	4	0	16	1	2	19	0	0	0	0	0	1	25	0	0	26	49
05:45 PM	0	0	1	0	1	0	12	0	0	12	0	0	0	0	0	0	24	0	0	24	37
Total	2	0	7	0	9	0	63	6	2	71	0	0	0	0	0	5	122	0	0	127	207
Grand Total	7	0	28	0	35	0	221	12	8	241	0	0	0	0	0	15	293	0	0	308	584
Apprch %	20	0	80	0		0	91.7	5	3.3		0	0	0	0		4.9	95.1	0	0		
Total %	1.2	0	4.8	0	6	0	37.8	2.1	1.4	41.3	0	0	0	0	0	2.6	50.2	0	0	52.7	

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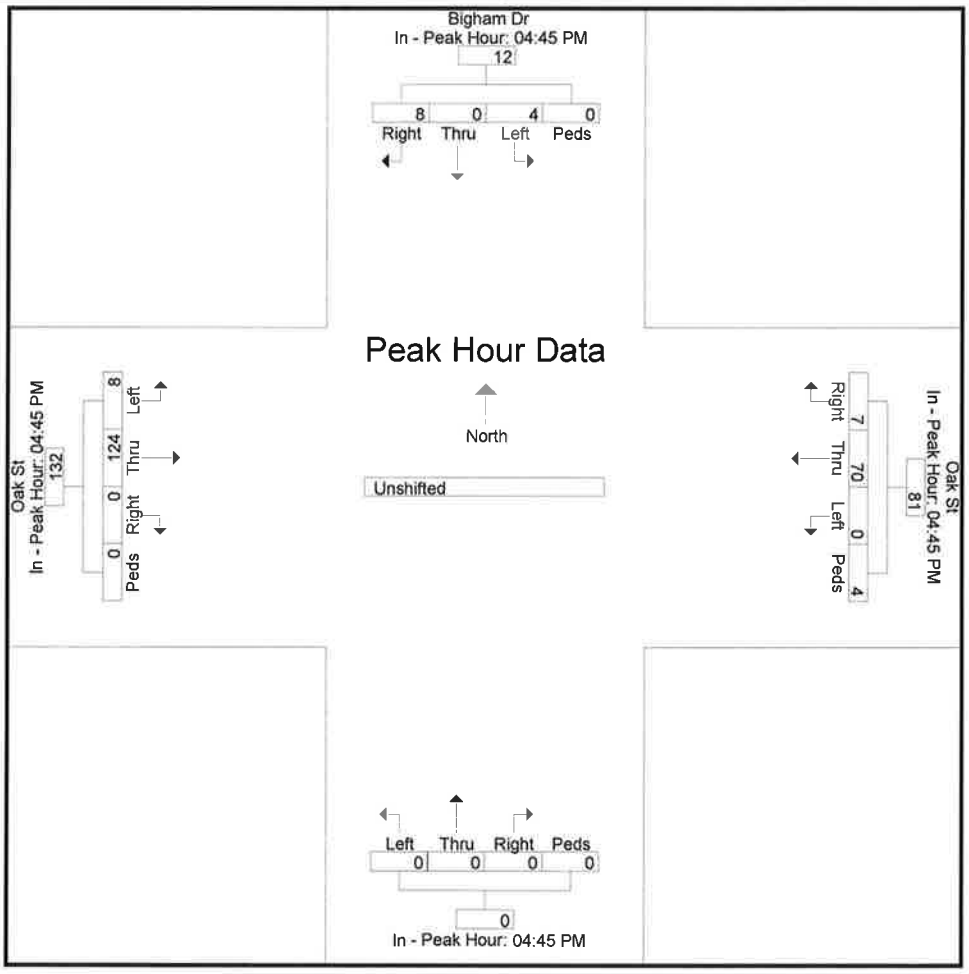
North-South: Bigham Drive
East-West: Oak Street
Weather: Sunny, 55 deg
Veh Type: All Vehicles

File Name : Bigham-Oak
Site Code : 00000002
Start Date : 2/13/2018
Page No : 3

	Bigham Dr From North					Oak St From East					From South					Oak St From West					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:45 PM to 05:30 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	04:45 PM					04:45 PM					04:45 PM					04:45 PM					
+0 mins.	2	0	2	0	4	0	19	1	2	22	0	0	0	0	0	3	26	0	0	29	
+15 mins.	0	0	1	0	1	0	20	1	0	21	0	0	0	0	0	1	38	0	0	39	
+30 mins.	0	0	3	0	3	0	15	4	0	19	0	0	0	0	0	3	35	0	0	38	
+45 mins.	2	0	2	0	4	0	16	1	2	19	0	0	0	0	0	1	25	0	0	26	
Total Volume	4	0	8	0	12	0	70	7	4	81	0	0	0	0	0	8	124	0	0	132	
% App. Total	33.3	0	66.7	0		0	86.4	8.6	4.9		0	0	0	0		6.1	93.9	0	0		
PHF	.500	.000	.667	.000	.750	.000	.875	.438	.500	.920	.000	.000	.000	.000	.000	.667	.816	.000	.000	.846	



SEASONAL TREND TABLE (Updated: 9/19/2017)																										
TREND	1-Jan	15-Jan	1-Feb	15-Feb	1-Mar	15-Mar	1-Apr	15-Apr	1-May	15-May	1-Jun	15-Jun	1-Jul	15-Jul	1-Aug	15-Aug	1-Sep	15-Sep	1-Oct	15-Oct	1-Nov	15-Nov	1-Dec	15-Dec	Seasonal Trend Peak Period Factor	Seasonal Trend K30 Value
INTERSTATE URBANIZED	1.0505	1.0659	1.0360	1.0061	0.9881	0.9701	0.9616	0.9530	0.9544	0.9558	0.9339	0.9120	0.9127	0.9154	0.9116	0.9078	0.9279	0.9481	0.9536	0.9592	0.9789	0.9986	1.0210	1.0434	0.9078	0.0824
INTERSTATE NONURBANIZED	1.2276	1.2860	1.2343	1.1825	1.1244	1.0662	1.0562	1.0461	1.0221	0.9981	0.9532	0.9082	0.8850	0.8575	0.8569	0.8564	0.9011	0.9458	0.9833	1.0207	1.0429	1.0650	1.1128	1.1605	0.8564	0.1225
COMMUTER	1.0578	1.0635	1.0337	1.0038	0.9943	0.9849	0.9693	0.9538	0.9488	0.9439	0.9491	0.9543	0.9321	0.9107	0.9072	0.9037	0.9198	0.9359	0.9431	0.9504	0.9808	1.0113	1.0375	1.0637	0.9037	0.0997
COASTAL DESTINATION	1.2144	1.2255	1.1807	1.1359	1.1048	1.0737	1.0729	1.0721	1.0473	1.0224	0.9805	0.9385	0.8853	0.8206	0.8204	0.8202	0.8726	0.9251	0.9862	1.0474	1.1053	1.1632	1.1911	1.2190	0.8202	0.1216
COASTAL DESTINATION ROUTE	1.4648	1.5007	1.4182	1.3357	1.2719	1.2080	1.1972	1.1864	1.1258	1.0652	1.0058	0.9464	0.8673	0.7660	0.7661	0.7703	0.8383	0.9063	1.0104	1.1145	1.1996	1.2848	1.3566	1.4284	0.7660	0.1630
AGRICULTURE	1.2660	1.2884	1.2341	1.1798	1.1400	1.1002	1.0624	1.0246	0.9798	0.9351	0.9038	0.8725	0.8538	0.8319	0.8317	0.8315	0.8397	0.8479	0.8844	0.9208	0.9936	1.0664	1.1632	1.2600	0.8315	0.1407
RECREATIONAL SUMMER	1.6772	1.7234	1.6678	1.6122	1.5251	1.4380	1.3855	1.3330	1.1823	1.0317	0.9473	0.8628	0.8028	0.7303	0.7449	0.7596	0.8179	0.8763	0.9888	1.1013	1.2469	1.3925	1.4752	1.5579	0.7303	0.1954
RECREATIONAL SUMMER WINTE	1.1733	1.2256	1.2446	1.2635	1.2945	1.3255	1.4481	1.5706	1.5411	1.5115	1.3013	1.0911	0.9793	0.8307	0.8687	0.9068	1.0479	1.1889	1.4188	1.6270	1.7098	1.7710	1.4135	1.0562	0.8307	0.2260
RECREATIONAL WINTER	1.0031	0.9909	0.9956	1.0002	1.0165	1.0328	1.2614	1.4899	1.8635	2.2372	1.9344	1.6317	1.4383	1.1339	1.1597	1.1855	1.3222	1.4588	1.7558	2.0525	2.3741	2.6957	1.8795	1.0634	0.9909	0.3314
SUMMER	1.2125	1.2424	1.1995	1.1567	1.1212	1.0858	1.0561	1.0265	0.9929	0.9593	0.9241	0.8888	0.8648	0.8350	0.8395	0.8440	0.8775	0.9110	0.9452	0.9794	1.0363	1.0933	1.1408	1.1884	0.8350	0.1147
SUMMER < 2500	1.2969	1.3292	1.2825	1.2359	1.1786	1.1213	1.0719	1.0225	0.9721	0.9217	0.8901	0.8584	0.8391	0.8154	0.8234	0.8314	0.8460	0.8606	0.9004	0.9401	1.0138	1.0875	1.1758	1.2642	0.8154	0.1371

*Seasonal Trend Table factors are based on previous year ATR data. The table is updated yearly.
*Grey shading indicates months were seasonal factor is greater than 30%

	Commuter
15-Feb	1.0038
Peak	0.9037
Adj	1.111

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Appendix B

ITE Trip Generation Data, Background Growth

Land Use: 720
Medical-Dental Office Building

Description

A medical-dental office building is a facility that provides diagnoses and outpatient care on a routine basis but is unable to provide prolonged in-house medical and surgical care. One or more private physicians or dentists generally operate this type of facility. Clinic (Land Use 630) is a related use.

Additional Data

Time-of-day distribution data for this land use for a weekday, Saturday, and Sunday are presented in Appendix A. For the 19 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 9:30 and 10:30 a.m. and 2:15 and 3:15 p.m., respectively.

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Alberta (CAN), California, Connecticut, Kentucky, Maryland, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania, South Dakota, Texas, Virginia, Washington, and Wisconsin.

Source Numbers

104, 109, 120, 157, 184, 209, 211, 253, 287, 294, 295, 304, 357, 384, 404, 407, 423, 444, 509, 601, 715, 867, 879, 901, 902, 908, 959, 972

Medical-Dental Office Building
(720)

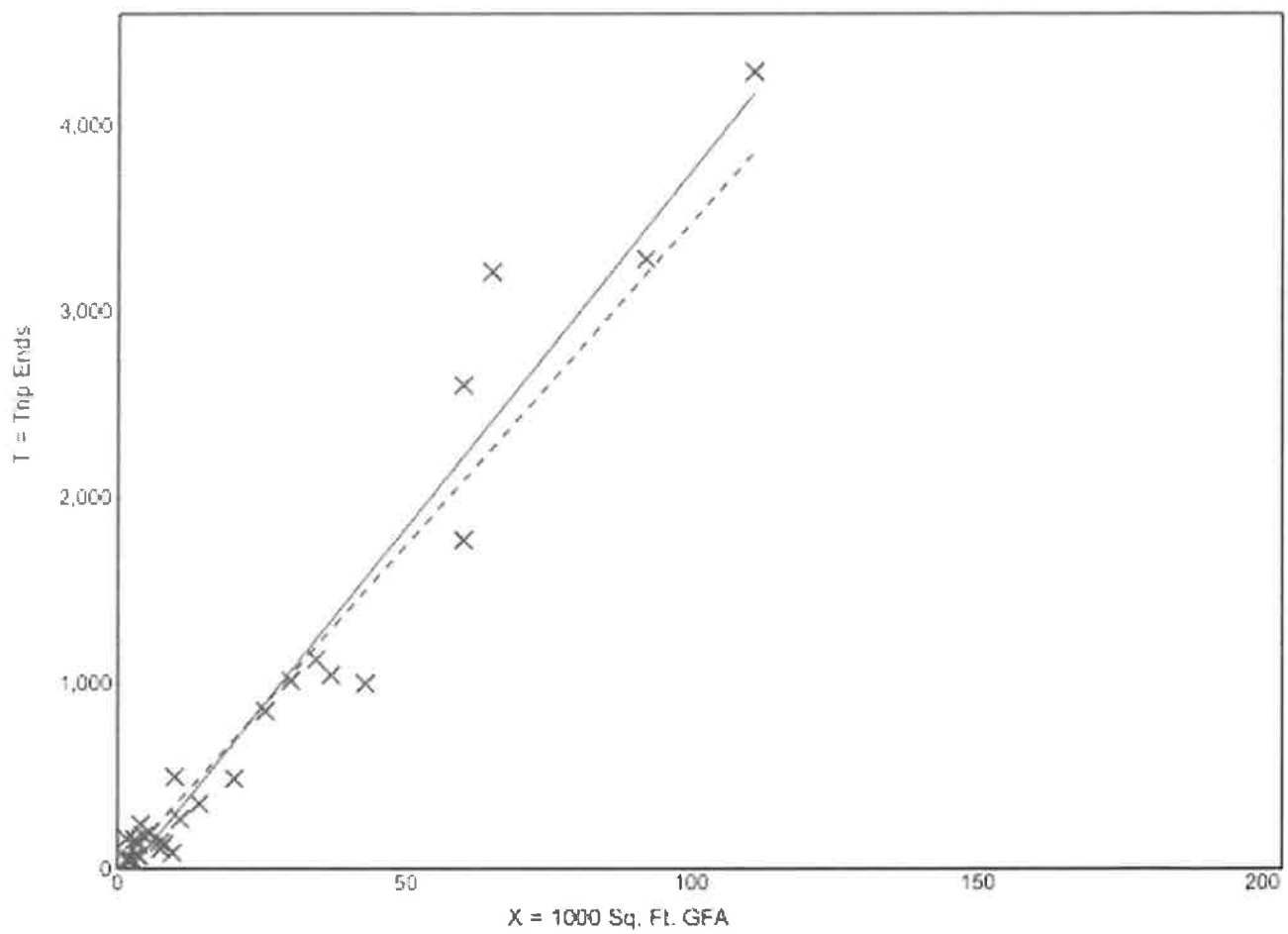
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 28
1000 Sq. Ft. GFA: 24
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
34.80	9.14 - 100.75	9.79

Data Plot and Equation



× Study Site ——— Fitted Curve - - - - Average Rate

Fitted Curve Equation: T = 38.42(X) - 87.62 **R^2= 0.95**

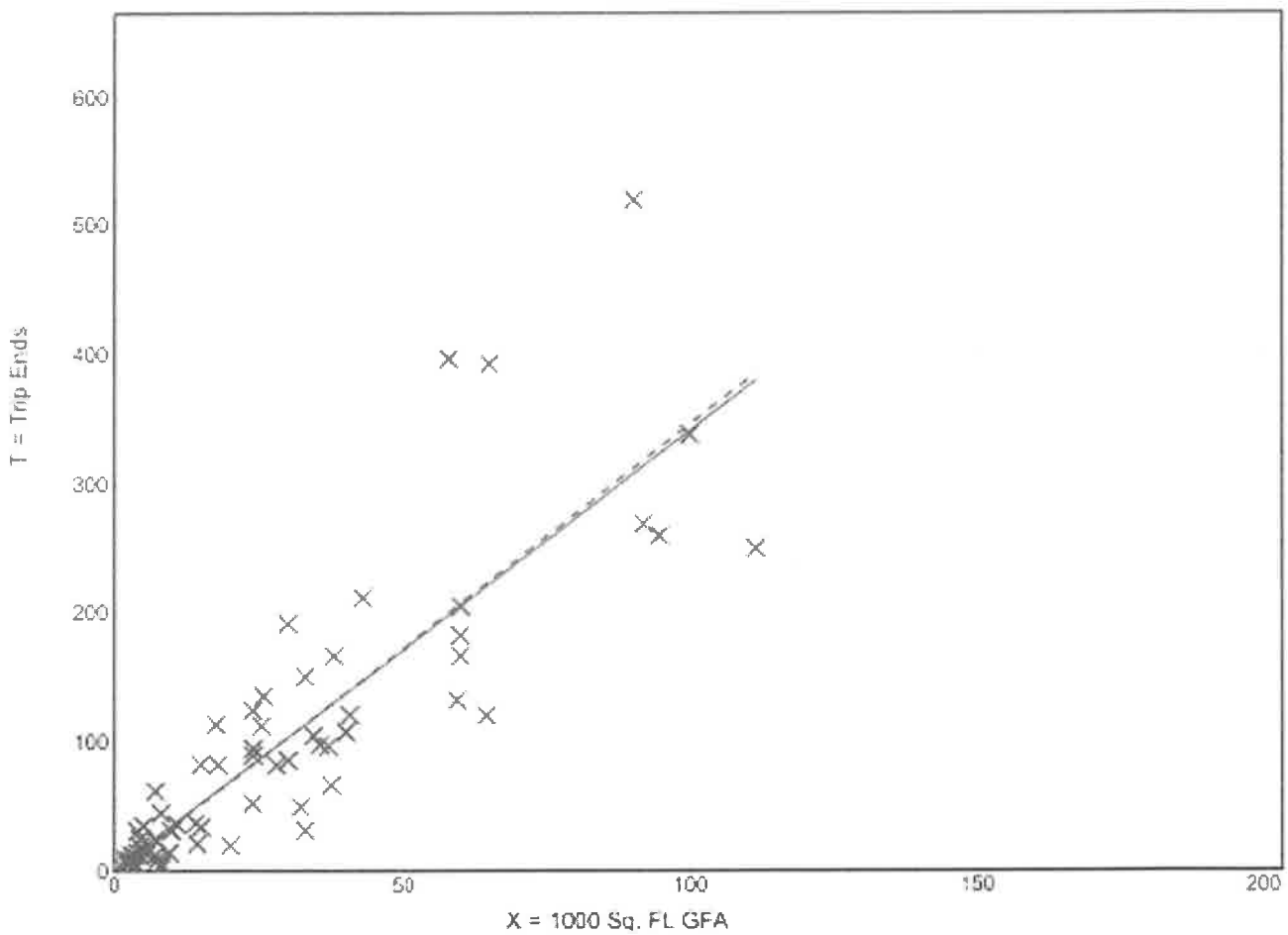
Medical-Dental Office Building
(720)

Vehicle Trip Ends vs:	**1000 Sq. Ft. GFA**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	65
1000 Sq. Ft. GFA:	28
Directional Distribution:	28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

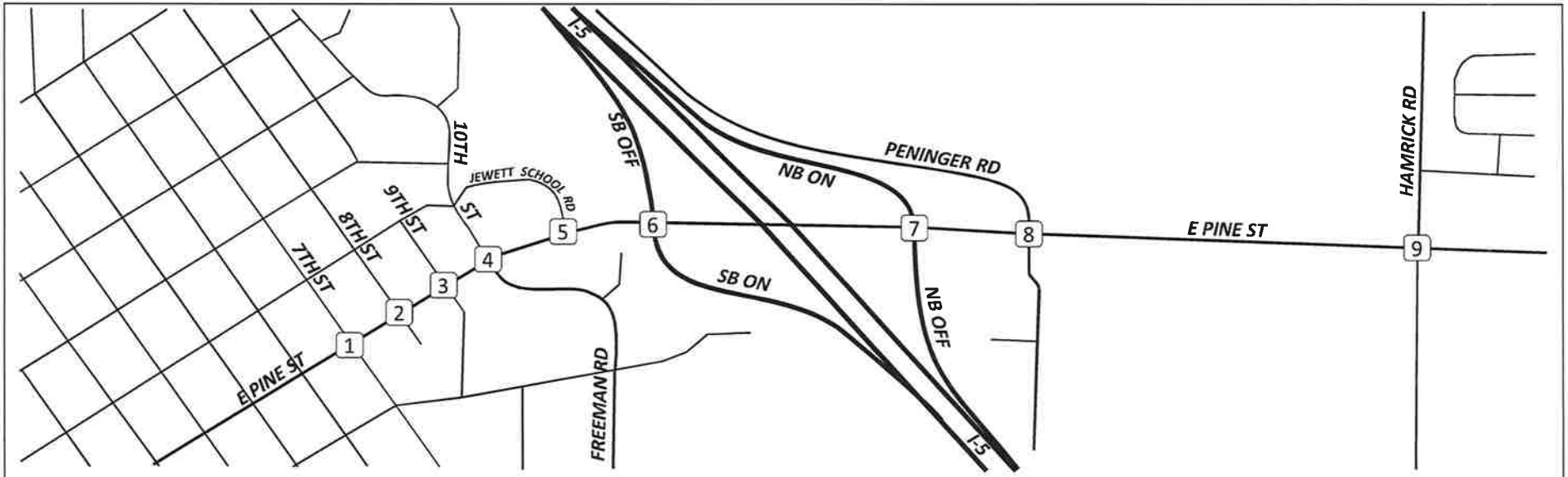
Average Rate	Range of Rates	Standard Deviation
3.46	0.25 - 8.86	1.58

Data Plot and Equation

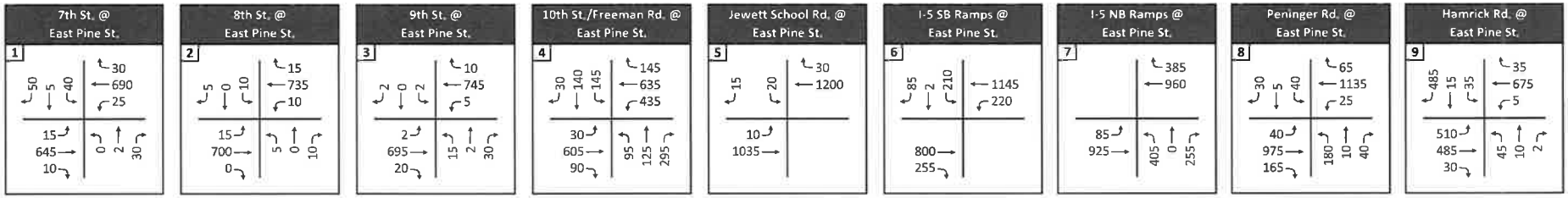


× **Study Site** ——— **Fitted Curve** - - - - **Average Rate**

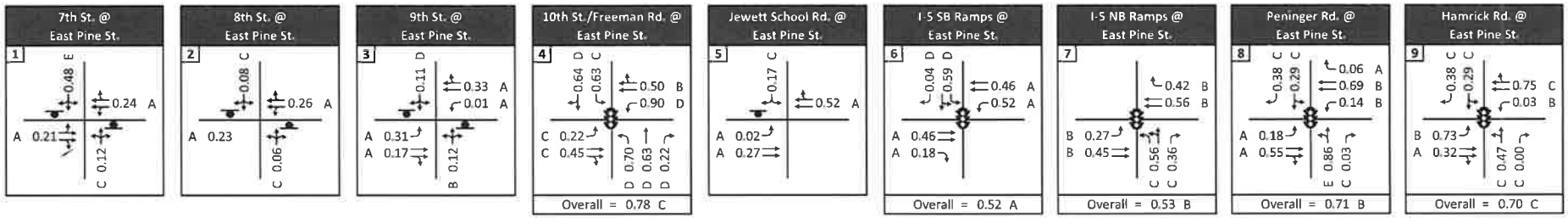
Fitted Curve Equation: T = 3.39(X) + 2.02 **R^2= 0.73**



Existing (2010) Design Hourly Volumes



Existing (2010) Traffic Operations



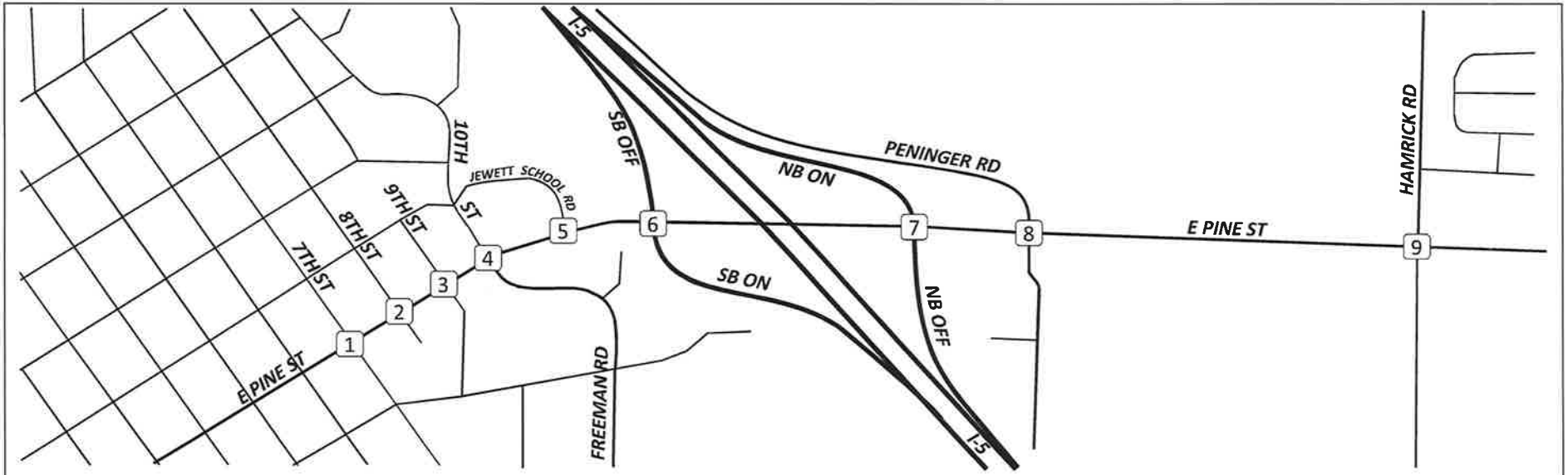
Legend

- Turning Movement
- 00 Turning Movement Volume
- Lane Group
- 0.00 Volume-to-Capacity (V/C) Ratio
- A Level of Service (LOS)
- Traffic Signal
- STOP Sign

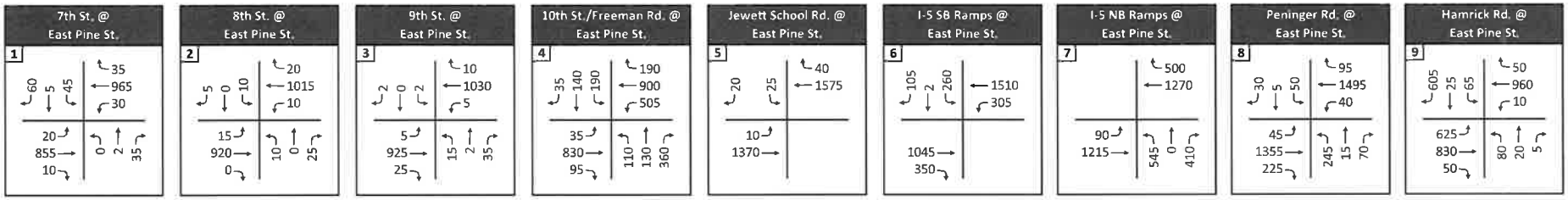
N

DRAFT Figure 2-1
Existing (2010) Design Hour Traffic Volumes and Operations

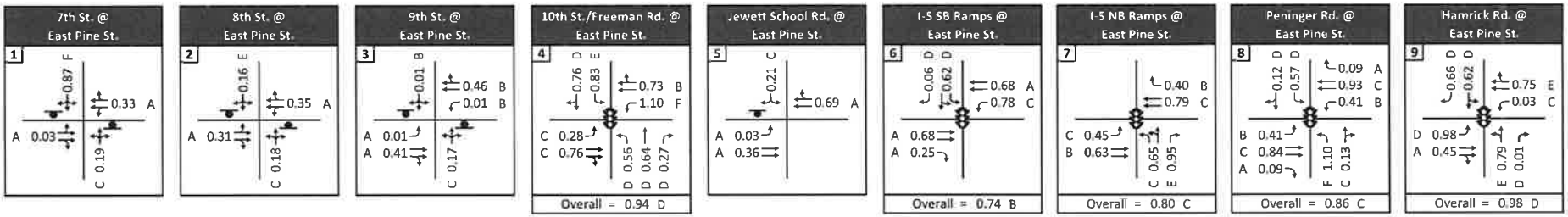
I-5 Interchange 33 (Central Point)
Interchange Area Management Plan
Jackson County



Existing (2034) Design Hourly Volumes



Existing (2034) Traffic Operations



Legend

- Turning Movement
- 00 Turning Movement Volume
- Lane Group
- 0.00 Volume-to-Capacity (V/C) Ratio
- A Level of Service (LOS)
- Traffic Signal
- STOP Sign

DRAFT Figure 3-2

Future Baseline Conditions
2034 RTP Scenario Design Hour
Traffic Volumes and Operations

I-5 Interchange 33 (Central Point)
Interchange Area Management Plan
Jackson County

Southern
Oregon
Transportation
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Appendix C

Year 2018 No-Build and Build, Synchro Output

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	71	65	8	4	9
Future Vol, veh/h	9	71	65	8	4	9
Conflicting Peds, #/hr	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	10	77	71	9	4	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	83	0	-	0	176	79
Stage 1	-	-	-	-	79	-
Stage 2	-	-	-	-	97	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1527	-	-	-	818	987
Stage 1	-	-	-	-	949	-
Stage 2	-	-	-	-	932	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1527	-	-	-	807	984
Mov Cap-2 Maneuver	-	-	-	-	807	-
Stage 1	-	-	-	-	946	-
Stage 2	-	-	-	-	922	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1527	-	-	-	922
HCM Lane V/C Ratio	0.006	-	-	-	0.015
HCM Control Delay (s)	7.4	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	2	715	9	1	645	2	8	0	2	0	0	1
Future Vol, veh/h	2	715	9	1	645	2	8	0	2	0	0	1
Conflicting Peds, #/hr	3	0	4	4	0	3	2	0	4	4	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	2	745	9	1	672	2	8	0	2	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	677	0	0	758	0	0	1436	1437	757	1437	1440	678
Stage 1	-	-	-	-	-	-	758	758	-	678	678	-
Stage 2	-	-	-	-	-	-	678	679	-	759	762	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	924	-	-	862	-	-	112	135	411	112	134	456
Stage 1	-	-	-	-	-	-	402	418	-	445	455	-
Stage 2	-	-	-	-	-	-	445	454	-	402	416	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	922	-	-	859	-	-	111	133	408	110	132	454
Mov Cap-2 Maneuver	-	-	-	-	-	-	111	133	-	110	132	-
Stage 1	-	-	-	-	-	-	399	415	-	442	453	-
Stage 2	-	-	-	-	-	-	442	452	-	397	413	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	35.1	12.9
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	130	922	-	-	859	-	-	454
HCM Lane V/C Ratio	0.08	0.002	-	-	0.001	-	-	0.002
HCM Control Delay (s)	35.1	8.9	0	-	9.2	0	-	12.9
HCM Lane LOS	E	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	71	65	10	8	16
Future Vol, veh/h	12	71	65	10	8	16
Conflicting Peds, #/hr	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	13	77	71	11	9	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	86	0	-	0	183	80
Stage 1	-	-	-	-	80	-
Stage 2	-	-	-	-	103	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1523	-	-	-	811	986
Stage 1	-	-	-	-	948	-
Stage 2	-	-	-	-	926	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1523	-	-	-	798	983
Mov Cap-2 Maneuver	-	-	-	-	798	-
Stage 1	-	-	-	-	945	-
Stage 2	-	-	-	-	915	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1523	-	-	-	912
HCM Lane V/C Ratio	0.009	-	-	-	0.029
HCM Control Delay (s)	7.4	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	715	12	1	645	2	14	0	4	0	0	1
Future Vol, veh/h	2	715	12	1	645	2	14	0	4	0	0	1
Conflicting Peds, #/hr	3	0	4	4	0	3	2	0	4	4	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	2	745	13	1	672	2	15	0	4	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	677	0	0	761	0	0	1437	1438	759	1439	1443	678
Stage 1	-	-	-	-	-	-	759	759	-	678	678	-
Stage 2	-	-	-	-	-	-	678	679	-	761	765	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	924	-	-	860	-	-	112	134	410	112	133	456
Stage 1	-	-	-	-	-	-	402	418	-	445	455	-
Stage 2	-	-	-	-	-	-	445	454	-	401	415	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	922	-	-	857	-	-	111	132	407	110	131	454
Mov Cap-2 Maneuver	-	-	-	-	-	-	111	132	-	110	131	-
Stage 1	-	-	-	-	-	-	399	415	-	442	453	-
Stage 2	-	-	-	-	-	-	442	452	-	394	412	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	36.7	12.9
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	132	922	-	-	857	-	-	454
HCM Lane V/C Ratio	0.142	0.002	-	-	0.001	-	-	0.002
HCM Control Delay (s)	36.7	8.9	0	-	9.2	0	-	12.9
HCM Lane LOS	E	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0

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Appendix D

Year 2018 No-Build and Build, SimTraffic Output

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:35	4:35	4:35	4:35	4:35	4:35
End Time	5:45	5:45	5:45	5:45	5:45	5:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2
Vehs Entered	4065	4169	4171	4136	4052	4115
Vehs Exited	4096	4169	4200	4150	4075	4137
Starting Vehs	130	122	126	97	127	114
Ending Vehs	99	122	97	83	104	99
Travel Distance (mi)	1924	1968	1981	1968	1913	1951
Travel Time (hr)	108.1	113.4	119.4	113.9	112.1	113.4
Total Delay (hr)	43.9	47.7	53.4	47.9	48.1	48.2
Total Stops	4266	4447	4773	4486	4441	4482
Fuel Used (gal)	78.2	81.0	82.4	80.5	79.3	80.3

Interval #0 Information Seeding

Start Time	4:35
End Time	4:45
Total Time (min)	10

Volumes adjusted by PHF, Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1188	1174	1185	1170	1136	1168
Vehs Exited	1182	1158	1163	1136	1156	1158
Starting Vehs	130	122	126	97	127	114
Ending Vehs	136	138	148	131	107	130
Travel Distance (mi)	525	522	531	512	504	519
Travel Time (hr)	29.6	30.4	35.5	31.9	29.6	31.4
Total Delay (hr)	12.1	13.0	17.8	14.8	12.7	14.1
Total Stops	1218	1243	1498	1268	1143	1270
Fuel Used (gal)	21.4	21.5	22.9	21.5	20.8	21.6

Interval #2 Information Recording

Start Time	5:00
End Time	5:45
Total Time (min)	45

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2877	2995	2986	2966	2916	2948
Vehs Exited	2914	3011	3037	3014	2919	2979
Starting Vehs	136	138	148	131	107	130
Ending Vehs	99	122	97	83	104	99
Travel Distance (mi)	1399	1446	1450	1456	1410	1432
Travel Time (hr)	78.5	83.0	84.0	82.0	82.5	82.0
Total Delay (hr)	31.8	34.7	35.7	33.2	35.4	34.1
Total Stops	3048	3204	3275	3218	3298	3213
Fuel Used (gal)	56.7	59.5	59.5	59.0	58.5	58.6

Intersection: 1: Oak St & Bigham Dr

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	30	28
Average Queue (ft)	1	9
95th Queue (ft)	12	31
Link Distance (ft)	347	384
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Bigham Dr/Dw & Freeman Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	109	66	35	18
Average Queue (ft)	9	4	11	1
95th Queue (ft)	52	30	36	10
Link Distance (ft)	226	587	384	108
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

SimTraffic Simulation Summary
Year 2018 Build_PM Peak Hour 03/09/2018

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:35	4:35	4:35	4:35	4:35	4:35
End Time	5:45	5:45	5:45	5:45	5:45	5:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2
Vehs Entered	4125	4122	4132	3992	4079	4091
Vehs Exited	4168	4146	4128	4029	4050	4104
Starting Vehs	121	124	112	119	114	115
Ending Vehs	78	100	116	82	143	103
Travel Distance (mi)	1934	1954	1952	1883	1913	1927
Travel Time (hr)	112.8	112.3	107.0	102.5	105.1	107.9
Total Delay (hr)	48.1	46.9	41.7	39.5	41.2	43.5
Total Stops	4437	4436	4082	3858	3997	4162
Fuel Used (gal)	79.7	79.9	79.1	75.9	77.3	78.4

Interval #0 Information Seeding

Start Time	4:35
End Time	4:45
Total Time (min)	10

Volumes adjusted by PHF, Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1153	1202	1223	1145	1081	1161
Vehs Exited	1156	1207	1216	1173	1120	1174
Starting Vehs	121	124	112	119	114	115
Ending Vehs	118	119	119	91	75	101
Travel Distance (mi)	503	530	550	516	477	515
Travel Time (hr)	28.4	31.7	29.7	27.0	24.9	28.3
Total Delay (hr)	11.6	13.9	11.4	9.8	9.0	11.1
Total Stops	1057	1271	1128	1011	937	1083
Fuel Used (gal)	20.6	22.1	22.0	20.8	19.0	20.9

Interval #2 Information Recording

Start Time	5:00
End Time	5:45
Total Time (min)	45

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	2972	2920	2909	2847	2998	2930
Vehs Exited	3012	2939	2912	2856	2930	2930
Starting Vehs	118	119	119	91	75	101
Ending Vehs	78	100	116	82	143	103
Travel Distance (mi)	1431	1424	1403	1367	1436	1412
Travel Time (hr)	84.4	80.6	77.3	75.5	80.2	79.6
Total Delay (hr)	36.5	33.0	30.4	29.7	32.2	32.4
Total Stops	3380	3165	2954	2847	3060	3082
Fuel Used (gal)	59.2	57.8	57.2	55.2	58.2	57.5

Intersection: 1: Oak St & Bigham Dr

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	18	32
Average Queue (ft)	1	16
95th Queue (ft)	10	39
Link Distance (ft)	347	384
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Bigham Dr/Dw & Freeman Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	108	82	52	24
Average Queue (ft)	7	6	16	1
95th Queue (ft)	50	42	44	11
Link Distance (ft)	226	587	384	108
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 0

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Appendix E

Future Year 2038 No-Build and Build, Synchro Output

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	90	85	10	5	10
Future Vol, veh/h	10	90	85	10	5	10
Conflicting Peds, #/hr	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	11	98	92	11	5	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	107	0	-	0	222	102
Stage 1	-	-	-	-	102	-
Stage 2	-	-	-	-	120	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1497	-	-	-	771	959
Stage 1	-	-	-	-	927	-
Stage 2	-	-	-	-	910	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1497	-	-	-	760	956
Mov Cap-2 Maneuver	-	-	-	-	760	-
Stage 1	-	-	-	-	924	-
Stage 2	-	-	-	-	900	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1497	-	-	-	880
HCM Lane V/C Ratio	0.007	-	-	-	0.019
HCM Control Delay (s)	7.4	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	3	805	10	1	720	3	9	0	3	0	0	1
Future Vol, veh/h	3	805	10	1	720	3	9	0	3	0	0	1
Conflicting Peds, #/hr	3	0	4	4	0	3	2	0	4	4	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	3	839	10	1	750	3	9	0	3	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	756	0	0	853	0	0	1610	1612	852	1613	1616	757
Stage 1	-	-	-	-	-	-	854	854	-	757	757	-
Stage 2	-	-	-	-	-	-	756	758	-	856	859	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	864	-	-	795	-	-	85	105	362	85	105	411
Stage 1	-	-	-	-	-	-	356	378	-	403	419	-
Stage 2	-	-	-	-	-	-	403	418	-	355	376	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	863	-	-	792	-	-	84	103	360	83	103	409
Mov Cap-2 Maneuver	-	-	-	-	-	-	84	103	-	83	103	-
Stage 1	-	-	-	-	-	-	352	374	-	399	417	-
Stage 2	-	-	-	-	-	-	401	416	-	348	372	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	44.3	13.8
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	104	863	-	-	792	-	-	409
HCM Lane V/C Ratio	0.12	0.004	-	-	0.001	-	-	0.003
HCM Control Delay (s)	44.3	9.2	0	-	9.6	0	-	13.8
HCM Lane LOS	E	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	13	90	85	12	9	17
Future Vol, veh/h	13	90	85	12	9	17
Conflicting Peds, #/hr	4	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	14	98	92	13	10	18

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	109	0	-	0	229	103
Stage 1	-	-	-	-	103	-
Stage 2	-	-	-	-	126	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1494	-	-	-	764	957
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	905	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1494	-	-	-	751	954
Mov Cap-2 Maneuver	-	-	-	-	751	-
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	893	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1494	-	-	-	872
HCM Lane V/C Ratio	0.009	-	-	-	0.032
HCM Control Delay (s)	7.4	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	3	805	13	1	720	3	15	0	5	0	0	1
Future Vol, veh/h	3	805	13	1	720	3	15	0	5	0	0	1
Conflicting Peds, #/hr	3	0	4	4	0	3	2	0	4	4	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	3	839	14	1	750	3	16	0	5	0	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	756	0	0	856	0	0	1612	1614	853	1615	1619	757
Stage 1	-	-	-	-	-	-	856	856	-	757	757	-
Stage 2	-	-	-	-	-	-	756	758	-	858	862	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	864	-	-	793	-	-	85	105	362	84	104	411
Stage 1	-	-	-	-	-	-	355	377	-	403	419	-
Stage 2	-	-	-	-	-	-	403	418	-	354	375	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	863	-	-	790	-	-	84	103	360	82	102	409
Mov Cap-2 Maneuver	-	-	-	-	-	-	84	103	-	82	102	-
Stage 1	-	-	-	-	-	-	351	373	-	399	417	-
Stage 2	-	-	-	-	-	-	401	416	-	345	371	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	48.1	13.8
HCM LOS			E	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	104	863	-	-	790	-	-	409
HCM Lane V/C Ratio	0.2	0.004	-	-	0.001	-	-	0.003
HCM Control Delay (s)	48.1	9.2	0	-	9.6	0	-	13.8
HCM Lane LOS	E	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.7	0	-	-	0	-	-	0

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Appendix F

Future Year 2038 No-Build and Build, SimTraffic Output

SimTraffic Simulation Summary
Future Year 2038 No-Build_PM Peak Hour 03/09/2018

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:35	4:35	4:35	4:35	4:35	4:35
End Time	5:45	5:45	5:45	5:45	5:45	5:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2
Vehs Entered	4891	4840	4954	4880	4835	4876
Vehs Exited	4896	4783	4912	4844	4856	4857
Starting Vehs	151	124	129	178	164	147
Ending Vehs	146	181	171	214	143	167
Travel Distance (mi)	2266	2232	2287	2275	2261	2264
Travel Time (hr)	166.9	143.7	180.9	187.0	161.5	168.0
Total Delay (hr)	91.3	69.2	104.4	111.2	86.0	92.4
Total Stops	7442	6076	8142	8040	6882	7318
Fuel Used (gal)	102.1	94.9	106.2	107.2	100.6	102.2

Interval #0 Information Seeding

Start Time	4:35
End Time	4:45
Total Time (min)	10

Volumes adjusted by PHF, Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1503	1362	1417	1347	1289	1382
Vehs Exited	1452	1380	1364	1361	1304	1375
Starting Vehs	151	124	129	178	164	147
Ending Vehs	202	106	182	164	149	156
Travel Distance (mi)	640	604	598	604	559	601
Travel Time (hr)	46.9	35.9	45.3	44.6	39.8	42.5
Total Delay (hr)	25.5	15.8	25.2	24.5	21.0	22.4
Total Stops	2201	1455	2090	1901	1691	1868
Fuel Used (gal)	28.6	25.2	27.2	27.1	24.8	26.6

Interval #2 Information Recording

Start Time	5:00
End Time	5:45
Total Time (min)	45

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	3388	3478	3537	3533	3546	3496
Vehs Exited	3444	3403	3548	3483	3552	3485
Starting Vehs	202	106	182	164	149	156
Ending Vehs	146	181	171	214	143	167
Travel Distance (mi)	1626	1628	1688	1671	1702	1663
Travel Time (hr)	120.0	107.8	135.6	142.4	121.7	125.5
Total Delay (hr)	65.8	53.4	79.2	86.7	65.0	70.0
Total Stops	5241	4621	6052	6139	5191	5446
Fuel Used (gal)	73.5	69.7	79.0	80.1	75.8	75.6

Intersection: 1: Oak St & Bigham Dr

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	12	28
Average Queue (ft)	0	14
95th Queue (ft)	6	36
Link Distance (ft)	347	384
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Bigham Dr/Dw & Freeman Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	117	118	35	24
Average Queue (ft)	11	8	9	1
95th Queue (ft)	68	52	33	11
Link Distance (ft)	226	587	384	108
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	1			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 1

SimTraffic Simulation Summary
Future Year 2038 Build_PM Peak Hour 03/09/2018

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:35	4:35	4:35	4:35	4:35	4:35
End Time	5:45	5:45	5:45	5:45	5:45	5:45
Total Time (min)	70	70	70	70	70	70
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	3	3	3	3	3	3
# of Recorded Intervals	2	2	2	2	2	2
Vehs Entered	4935	5051	4941	4872	4907	4938
Vehs Exited	4938	5063	4922	4895	4856	4932
Starting Vehs	182	225	151	168	170	175
Ending Vehs	179	213	170	145	221	181
Travel Distance (mi)	2281	2338	2288	2269	2242	2283
Travel Time (hr)	185.8	181.6	156.1	164.7	166.6	171.0
Total Delay (hr)	109.4	103.4	79.8	88.8	91.7	94.6
Total Stops	8068	8219	6559	7037	7039	7381
Fuel Used (gal)	107.7	107.8	99.8	101.9	101.3	103.7

Interval #0 Information Seeding

Start Time	4:35
End Time	4:45
Total Time (min)	10

Volumes adjusted by PHF, Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1440	1399	1372	1369	1387	1391
Vehs Exited	1427	1451	1367	1375	1378	1401
Starting Vehs	182	225	151	168	170	175
Ending Vehs	195	173	156	162	179	170
Travel Distance (mi)	617	631	598	604	590	608
Travel Time (hr)	42.2	47.6	36.5	40.6	39.7	41.3
Total Delay (hr)	21.5	26.5	16.5	20.5	20.0	21.0
Total Stops	1823	2278	1430	1774	1691	1799
Fuel Used (gal)	27.1	28.7	25.0	26.4	25.5	26.5

Interval #2 Information Recording

Start Time	5:00
End Time	5:45
Total Time (min)	45

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	3495	3652	3569	3503	3520	3550
Vehs Exited	3511	3612	3555	3520	3478	3536
Starting Vehs	195	173	156	162	179	170
Ending Vehs	179	213	170	145	221	181
Travel Distance (mi)	1664	1707	1690	1665	1652	1676
Travel Time (hr)	143.6	134.0	119.7	124.1	126.9	129.6
Total Delay (hr)	87.9	76.9	63.4	68.4	71.7	73.6
Total Stops	6245	5941	5129	5263	5348	5586
Fuel Used (gal)	80.6	79.1	74.8	75.5	75.7	77.1

Intersection: 1: Oak St & Bigham Dr

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	24	32
Average Queue (ft)	1	17
95th Queue (ft)	11	39
Link Distance (ft)	347	384
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Bigham Dr/Dw & Freeman Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	156	94	52	6
Average Queue (ft)	12	9	17	0
95th Queue (ft)	75	50	46	4
Link Distance (ft)	226	587	384	108
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	2			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Zone Summary

Zone wide Queuing Penalty: 2

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Appendix G

Agency Requirements

320.00.00 – Design

320.10.01 – Design Standards

The purpose of these standards is to provide a consistent policy under which certain physical aspects of street and related design and plan preparation will be observed by the engineer.

The Engineer should be aware that certain alternate street standards for the Transit Oriented District and Transit Oriented Corridor might apply to the design and construction streets in these areas of the city. These alternate standards are fully described in the Central Point TOD Design Requirements and Guidelines. They are also briefly described in lesser detail in these Standards and Specifications.

This section contains design standards to ensure the safe and efficient operation of each facility type for all users and the best use of public space. The requirements in this section are established as minimum standards to follow and apply to both new construction and reconstruction, except as otherwise specified.

Designs shall consider the needs of people with disabilities and the aged, such as visually impaired pedestrians and mobility impaired pedestrians. Every effort should be made to locate street hardware away from pedestrian locations and provide a surface free of bumps and cracks, which create safety and mobility problems. Smooth access ramps shall be provided where required. All designs shall conform to the current American Disabilities Act (ADA) or as adopted by the Oregon Department of Transportation (ODOT), Oregon Bicycle and Pedestrian Plan.

The determination of the pavement width and total right-of-way shall be based on the operational needs for each street as determined by a technical analysis. The technical analysis shall use demand volumes that reflect the maximum number of pedestrians, bicyclists, parked vehicles and motorized vehicle traffic expected when the area using the street is fully developed. Technical analysis shall take into consideration, transportation elements of the Comprehensive Plan, TOD, neighborhood plans, approved tentative plans as well as existing commercial and residential developments. All street designs shall be coordinated with the design of other new or existing infrastructure.

These standards set forth the minimum requirements for materials and street design.
The Public Works Director shall have discretion to require a higher or different standard for materials or design when in his judgment it is in the best interest of the public's health, safety and welfare when considering all aspects and circumstances of the project.

The minimum geometric requirements for all street classifications are defined in Tables 300 – 1 through 300 – 7.

320.10.02 – Traffic Impact Analysis

The purpose of this section is to assist in the determination of which road authorities participate in land use decisions, and to implement Section 660-012-0045(2)(e) of the State Transportation

Planning Rule that requires the city to adopt a process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities.
This chapter establishes the standards for when a proposal must be reviewed for potential traffic impacts; when a traffic impact analysis must be submitted with a development application in order to determine whether conditions are needed to minimize impacts to and protect transportation facilities; what must be in a traffic impact analysis; and who is qualified to prepare the study.

A traffic impact analysis shall be prepared by a traffic engineer or civil engineer licensed to practice in the state of Oregon with special training and experience in traffic engineering. If the road authority is the Oregon Department of Transportation (ODOT), consult ODOT's regional development review planner and OAR 734-051-180. If the road is the authority of Jackson County, consult Jackson County's road design requirements.

The Public Works Director may, at his/her discretion, waive the study of certain intersections when it is concluded that the impacts are not substantial.

320.10.03 – Traffic Impact Analysis Applicability

(1) The level of detail and scope of a traffic impact analysis (TIA) will vary with the size, complexity, and location of the proposed application. Prior to any TIA, the applicant shall submit sufficient information to the City for the Public Works Department to issue a scoping letter. If stipulations to reduce traffic are requested by an applicant, it must first be shown by means of an analysis that an unconditional approval is not possible without some form of mitigation to maintain an adequate LOS. This will determine whether a stipulation is necessary.

(2) Extent of Study Area:
The study area shall be defined by the Public Works Department in the scoping letter and shall address at least the following areas:

a) All proposed site access points;
b) Any intersection where the proposed development can be expected to Contribute 25 or more trips during the analysis peak period. Impacts of less than 25 peak period trips are not substantial and will not be included in the study area. This volume may be adjusted, at the discretion of the Public Works Department, for safety or unusual situations; and
c) Any intersections directly adjacent to the subject property.

(3) When required: TIA shall be required when a land use application involves one or more of the following actions:

a) A change in zoning or a plan amendment designation that generates 300 average daily trips (ADT) more than the current zoning;
b) Any proposed development or land use action that a road authority, including the city, Jackson County or ODOT, states may have operational or safety concerns along its facilities;
c) An increase in site traffic volume generation by 250 average daily trips (ADT) or more, or 25 Peak Hour Trips (PHT);

d) An increase in peak hour volume of a particular movement to and from the State highway by 20 percent or more;
e) An increase in use of adjacent streets by vehicles exceeding twenty thousand pounds gross vehicle weight by 10 vehicles or more per day;
f) The location of the access driveway does not meet minimum sight distance requirements, as determined by the city engineer, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the state highway, creating a safety hazard at the discretion of the community development director; or
g) A change in internal traffic patterns that, at the discretion of the Public Works Director, may cause safety problems, such as back-up onto a street or greater potential for traffic accidents.

(4) Submittals:
Provide two copies of the TIA for Public Works Department to review.

(5) Elements of Analysis:
A TIA shall be prepared by a Traffic Engineer or Civil Engineer licensed to practice in the State of Oregon with special training and experience in traffic engineering. The TIA shall be a thorough review of the effects a proposed use will have on the transportation system. The study area shall include all streets and intersections in the analysis, as defined in subsection (2) above. Traffic generated from a proposed site will be distributed throughout the transportation system using existing count data or the current transportation model used by the City. Any alternate distribution method must be based on data acceptable to the Public Works Department. The following checklist outlines what a TIA shall contain. Incomplete reports shall be returned to the applicant for completion without review:

a) The scoping letter as provided by the Public Works Department;
b) The Final TIA shall be signed and stamped by a Professional Civil or Traffic Engineer registered in the State of Oregon;
c) An executive summary, discussing the development, the major findings of the analysis, and the mitigation measures proposed;
d) A vicinity map of the proposed site and study area;
e) Project characteristics such as zoning, potential trip generations (unless stipulated to less than potential), proposed access(s), and other pertinent factors;
f) Street characteristics within the study area including functional classification, number of travel lanes, lane width, shoulder treatment, bicycle path corridors, and traffic control at intersections;
g) Description of existing transportation conditions including transit accessibility, accident history, pedestrian facilities, bicycle facilities, traffic signals, and overall traffic operations and circulation;
h) Peak period turning movement counts of at least two-hour minimums at study area intersections, less than 2 years old. These counts shall be adjusted to the design year of the project and consider seasonal traffic adjustments when required by the scoping letter;
i) A "Figure" showing existing peak period (AM, noon, or PM, whichever is largest) turning movement volumes at study area intersections, as shown in Example 1. Approved applications obtained from the City that have not built out but will impact study

area intersections shall be included as pipeline traffic. An appropriate adjustment factor shall be applied to existing count data if counts were taken during the off-peak season;
j) Potential "Project" trip generation using the most current edition of the ITE Trip Generation, as required by the Public Works Department at the time of scoping. Variations of trip rates will require the approval of the Public Works Department. Such approval will require submission of adequate supporting data prior to first submittal of the TIA;
k) A "Figure" illustrating project turning movement volumes at study area intersections for peak periods, as shown in Example 2. Adjustments made for pass-by traffic volumes shall follow the methodology outlined in the latest edition of the ITE Trip Generation, and shall not exceed 25% unless approved by the Public Works Director;
l) A "Figure" illustrating the combined traffic of existing, background, and project turning movement volumes at study area intersections for peak periods, as shown in Example 3;
m) Level of Service (LOS) analysis at study area intersections under the following conditions:

(A) Existing plus pipeline traffic
(B) Existing plus pipeline traffic and project traffic.

A table shall be prepared which illustrates all LOS results. The table shall show LOS conditions with corresponding vehicle delays for signalized intersections and the critical movement at unsignalized intersections. If the proposed use is scheduled to be completed in phases, a LOS analysis shall be prepared for each phase;
n) A mitigation plan if impacts to the study area reduce level of service (LOS) below minimums. Mitigation measures may include stipulations and/or construction of necessary transportation improvements. Mitigation measures shall be required to the extent that the transportation facilities, under City jurisdiction, operate at an acceptable level of service (LOS) with the addition of project traffic; and
o) Intersections under jurisdiction of another agency, but still within the City limits, shall be evaluated by either the City's criteria or the other jurisdiction's criteria, or both, whichever is considered applicable by the Public Works Department.

If the TIA is not consistent with the scoping letter (including any amendments) then the TIA will be returned to the applicant without review.

(6) Analysis criteria:

a) All trip distributions into and out of the transportation system must reflect existing traffic count data for consistency or follow the current transportation model used by the City. If alternate splits are used to distribute traffic then justification must be provided and approved by the Public Works Department prior to first submittal of the TIA.
b) If progression analysis is being evaluated or queuing between intersections is a concern, the peak period used in the analysis must be the same for every intersection along the street and reflect that of the most critical intersection being evaluated. If a common peak period is not requested by the Public Works Department, then the actual peak period of every intersection shall be used.
c) Counts performed must be a minimum of two hours and include the peak period for analysis purposes. All documentation shall be included in the TIA.
d) All supporting count data, LOS analyses, pass-by deductions, growth rates, traffic

distributions, or other engineering assumptions must be clearly defined and attached to the TIA when submitted in report form to the City for review.
e) All LOS analyses shall follow operational procedures per the current Highway Capacity Manual. Ideal saturation flow rates greater than 1800 vehicles per hour per lane should not be used unless otherwise measured in the project vicinity. Queue lengths shall be calculated at the 95th percentile where feasible. Actual peak hour factors should be used for each movement or lane grouping in the analysis. Peak hour factors over 0.90 shall not be used unless justified by specific counts at that location.
f) Signal timing used in capacity or progression analysis shall follow City timing plans and account for pedestrian crossing times, unless otherwise noted in the scoping letter.
g) Arrival Type 3 (random arrivals) shall be used unless a coordinated plan is in place during the peak period.

320.10.04 – Maintenance of level of Service D

Whenever level of service is determined to be below level D for arterials or collectors, development is not permitted unless the developer makes the roadway or other improvements necessary to maintain level of service D respectively.

On Feb 9, 2018, at 2:14 PM, WANG Wei * Michael <Wei.WANG@odot.state.or.us> wrote:

Kim,

I have checked this project with RAME.
We agreed that the proposed development will not significantly impact state highway system.
If the city is require a TIA, we would like to take a look at the TIA as well.

Wei (Michael) Wang P.E. & M.S.| Development Review Traffic Engineer
The ODOT Region 3 / District 8 | 100 Antelope Rd. | White City, OR 97503
Phone: (541) 774.6316 | Fax: (541) 774.6349| Email: Wei.Wang@odot.state.or.us

From: Kim Parducci [mailto:kim.parducci@gmail.com]
Sent: Wednesday, February 07, 2018 4:09 PM
To: WANG Wei * Michael
Subject: Central Point ZC

Hi Michael,

I have a zone change in Central Point that I think is going to be too small to reach any ODOT facilities but I'm sending a scoping letter to you just in case you have any comments.

The zone change involves three small residential tax lots on Bigham Drive (off of Freeman) that are surrounded by commercial lots. The City is changing the comprehensive plan on two of the three lots, which will make them non-conforming if they stay residential so the applicant is seeking the new Employment Commercial (E-C) zoning to be consistent with surrounding properties. He plans to build an office building and said he has a dentist interested. I considered the worst case on this site as a medical office building because other commercial uses like restaurants require too much parking to be feasible in my opinion. A fast-food restaurant as an example needs an acre to work. The only thing I wasn't sure of was how big of an office could be constructed and still meet parking requirements so I assumed 50% coverage to hopefully be conservative.

Call me if you have any questions.

-Kim

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KIMBERLY PARDUCCI, PE PTOE

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