East Idaho Avenue Traffic Study

Prepared for

Oregon Department of Transportation
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1. INTRODUCTION

1.1 STUDY BACKGROUND AND PURPOSE

The Oregon Department of Transportation (ODOT) commissioned a study to review the critical intersections along East Idaho Avenue for build out of develop-ready lands located north and south of the roadway. Through the evaluation of existing and future conditions, the study will identify mitigation measures needed to meet the required ODOT intersection operational standards related to highways/local streets and access near the I-84 freeway interchange. Under the direction of ODOT, the City of Ontario, local business owners and community members, this study was commissioned to identify short-term and long-range solutions that address safety and congestion concerns along and adjacent to this busy corridor. Parametrix, Inc., a local transportation engineering firm, was selected to complete this study.

East Idaho Avenue and the surrounding area is a significant, developing area with vacant/develop-ready parcels connected by a major arterial/truck route and street system within the City of Ontario and ODOT Region 5. Issues and key questions have surfaced as to how the current infrastructure can best serve this thriving area while maintaining consistency with the goals and objectives of Ontario's Transportation System Plan (TSP) and ODOT's *1999 Oregon Highway Plan* (OHP). A raised median is currently located along East Idaho Avenue between NE/SE 2nd Street and Interstate 84 (I-84). This study addresses concerns related to the median's impact on business access and overall circulation since its installation in May 2003.

Specific questions to be addressed in this study include:

- For the properties south of East Idaho Avenue between SE 5th Street and SE 1st Avenue:
    1. In terms of traffic operations, how would existing intersections (specifically, SE 5th Avenue at SE 2nd Street; East Idaho Avenue at NE/SE 2nd Street; East Idaho Avenue at NE/SE 3rd Street; and East Idaho Avenue at NE/SE 4th Street) be impacted? Note: Impacts should be identified as v/c ratios, lane restrictions and or movement limitations.

    2. If properties in this area develop, what should be the recommended added street system that would connect between SE 5th Avenue and East Idaho Avenue east of SE 4th Street?
- For the properties north of East Idaho Avenue between NE 2nd Street and I-84:

    1. What would be the traffic impacts to the intersections of East Idaho Avenue at NE/SE 2nd Street, East Idaho Avenue at NE/SE 3rd Street, and East Idaho Avenue at NE/SE 4th Street? Note: Impacts should be identified as v/c ratios, lane restrictions and or limitations.

    2. If properties in this area develop, what should be the recommended added and/or modified street system configurations and locations?

3. What should be the recommended mitigation measures to address intersections that are adversely impacted?

1.2 STUDY AREA LOCATION

The boundaries of the East Idaho Avenue traffic study area included SE 5th Avenue to the south, NE/SE 2nd Street to the west, NE 6th Avenue to the north (which marks the northern boundary of the undeveloped properties), and I-84 to the east (see Figure 1). Traffic operations analysis was conducted at 12 intersections, including:

- SE 5th Avenue at SE 2nd Street
- SE 5th Avenue at SE 10th Avenue
- SE 1st Avenue at SE 2nd Street
- SE 1st Avenue at SE 4th Street
- East Idaho Avenue at NE/SE 2nd Street
- East Idaho Avenue at NE/SE 3rd Street
- East Idaho Avenue at NE/SE 4th Street
- East Idaho Avenue at Pilot Station Entrance Road
- NE 1st Avenue at NE 2nd Street
- NE 1st Avenue at NE 3rd Street
- NE 1st Avenue at NE 4th Street

Figure 1. Project Study Boundary in Ontario, OR

The intersections of East Idaho Avenue at NE/SE 2nd Street and East Idaho Avenue at NE/SE 4th Street are signalized and the remaining study area intersections are unsignalized. The study evaluated circulation and access from which pedestrian, bicycle and vehicular traffic travels in the area shown in Figure 1. Figure 2 shows the project area, key intersections and some businesses.

Figure 2 Project Area Map

2. EXISTING CONDITIONS

2.1 REVIEW OF EXISTING REPORTS AND STUDIES

A preliminary step in establishing the existing and future conditions included a cursory review of ODOT and City of Ontario documents and public reports. This review provided an understanding of what standards and policies exist that influence the study process and ultimate goals. This review established the baseline conditions for the rest of the study. Table 1 identifies the resources available for review.

Table 1. Documents and Reports Available for Review

Study No.	Reports Received	Year	Study Location	Study Completed by	Pertinent Content to E. Idaho Traffic Study
1	City of Ontario Transportation System Plan	2001	City of Ontario	David Evans & Assoc	Historic counts, zoning, land use, standards and typical sections
2	Supplemental Handout 5-A	2000	City of Ontario	City of Ontario	Implementation plan
3	City of Ontario Comprehensive Plan - Title 10	1992	City of Ontario	City of Ontario	Plan classifications, citizen involvement, demographics
4	Aikins/Comprehensive Traffic Study	2003	East Idaho Ave - East of I-84	MMA	recent counts on ramp and adjacent roadways, growth trends, travel patterns
5	Wal-Mart Expansion Traffic Impact Analysis (TIA)	2000	Wal-Mart Building Site	Keller Assoc	Business trends
6	Oregon Highway Plan	1999	State of Oregon	ODOT	Policies, Standards, and Procedures
7	Reele Theatre Traffic Impact Analysis (TIA)	1999	SE 13th Ave/Goodfellow Ext	Keller Assoc	Plans and connections to adjacent streets

From this review, key background information was obtained for the study area including roadway functional classification, zoning classification, transportation analysis zones, historic traffic volumes, and growth rate trends. The background information also identified design standards and goals, which will guide the selection and design of conceptual improvements.

2.2 EXISTING PROJECT AREA CHARACTERISTICS

East Idaho Avenue (U.S. 30) is classified as a principal arterial by the City of Ontario and carries the greatest traffic volumes (ranging from 20,800 to 28,000 Average Daily Traffic – ADT) among city streets. Existing functional classification for streets within the study area are shown in Figure 3. East Idaho Avenue provides direct access to I-84 on the east end of the study area, and to an underpass crossing of the Union Pacific Railroad to the west as it connects to the central downtown and western regions of the city. Truck freight plays an important role in Ontario's economy. Truck volume percentages ranged from 30 to 50 percent on I-84 and 12 to 15 percent on East Idaho Avenue.

Undeveloped parcels within the study area are zoned for Heavy Industrial (I-2), General Commercial (C-2), and Heavy General Commercial (C-2-H) as shown in Figure 4. Issues and key questions have surfaced as to how the current infrastructure can best serve this thriving area while maintaining consistency with the goals and objectives of Ontario's Transportation System Plan (TSP), as well as, ODOT's Oregon Highway Plan (OHP). For this purpose, ODOT and the City of Ontario recognize the importance of this study.

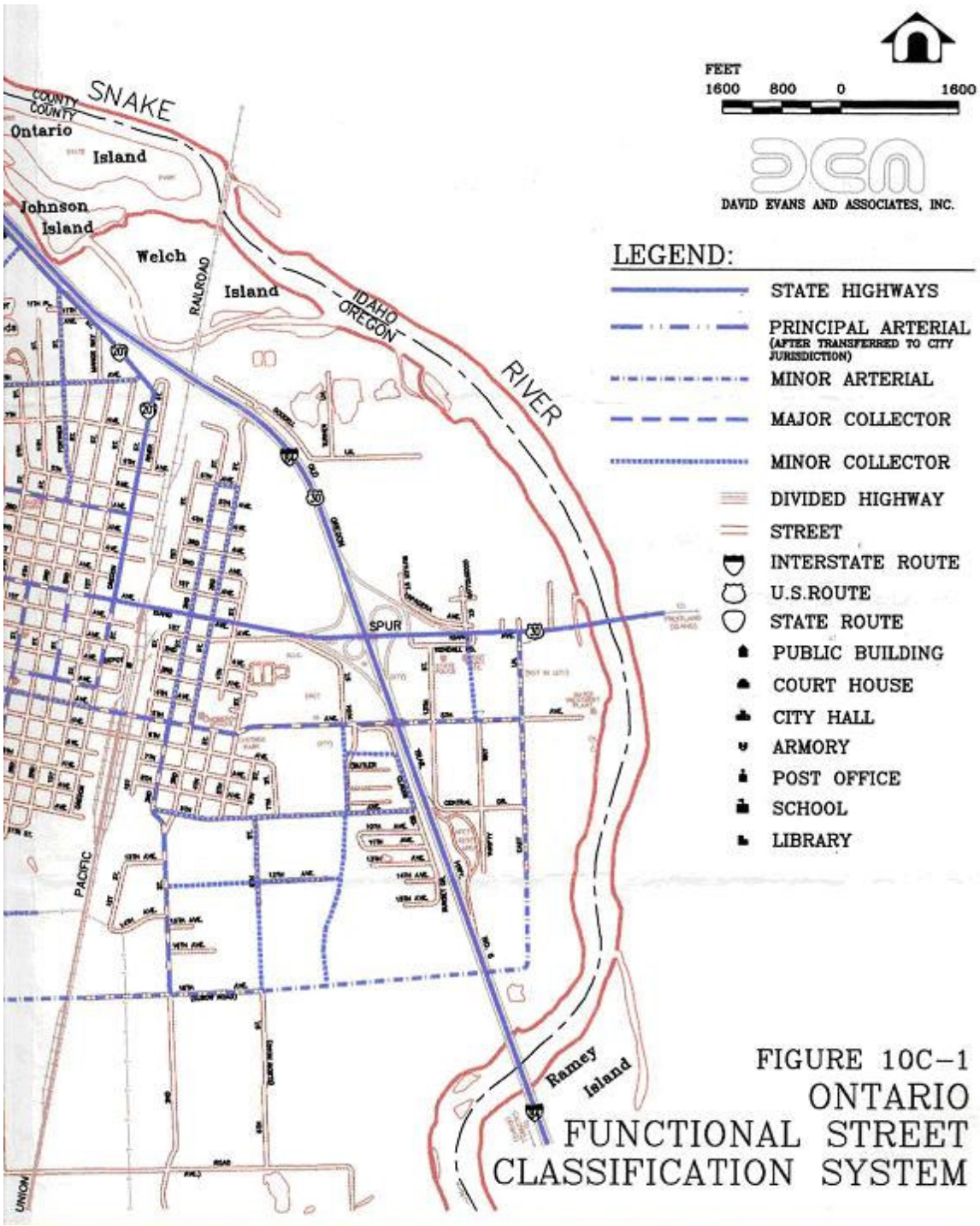


Figure 3. Existing Functional Classification (Figure 10C-1; Ontario TSP)

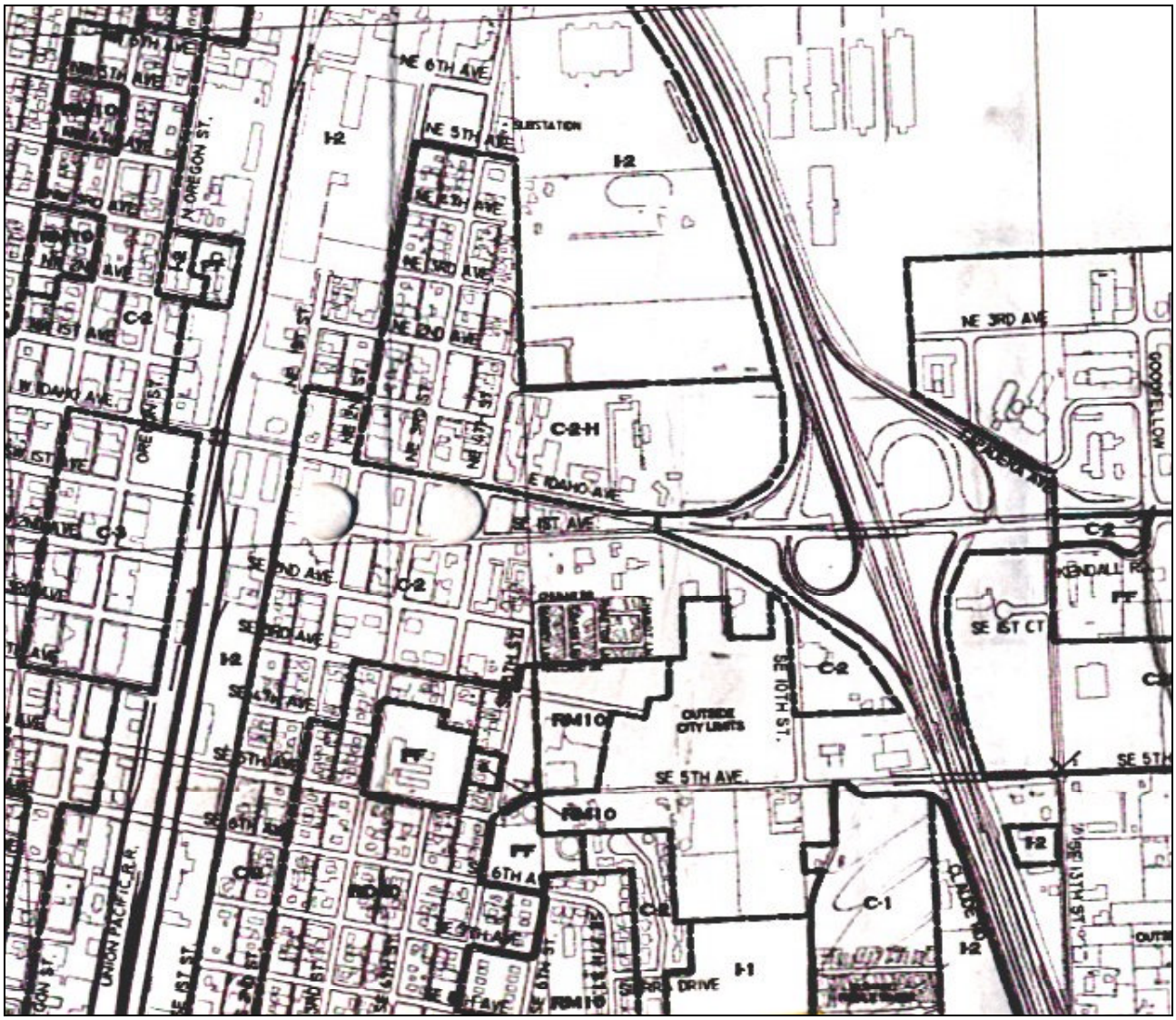


Figure 4. Existing Study Area Zoning Designations (Figure 5-1; Ontario TSP)

2.3 EXISTING TRAFFIC CONDITIONS

Based on as-built drawings, aerial mapping and field reviews, geometric data was gathered to gain an understanding of lane widths, street segment lengths and lane configurations. The data served as inputs to the models that were used to evaluate traffic conditions at study area intersections. Also, as input to the model, peak hour AM, noon, and PM counts were taken at the 12 identified study intersections by Bowen Counting Services, Parametrix, Inc., and City Staff (see Appendix A). They include:

- SE 5th Avenue at SE 2nd Street
- SE 5th Avenue at SE 10th Avenue
- SE 1st Avenue at SE 2nd Street
- SE 1st Avenue at SE 4th Street
- East Idaho Avenue at NE/SE 2nd Street
- East Idaho Avenue at NE/SE 3rd Street
- East Idaho Avenue at NE/SE 4th Street
- East Idaho Avenue at Pilot Station Entrance Road
- NE 1st Avenue at NE 2nd Street
- NE 1st Avenue at NE 3rd Street
- NE 1st Avenue at NE 4th Street

From peak hour counts and through collaboration with the project team, it was determined that the afternoon PM peak hour resulted in the highest volumes. Although analysis of the AM peak hour was completed, it was recognized that the PM peak hour would yield the most conservative results.

Peak hour analysis was completed using the nationally accepted HCM (Highway Capacity Manual) methodology through HCS (Highway Capacity Software) and Synchro (an analysis and simulation package). Existing traffic operations were evaluated using capacity/level of service techniques described in the Highway Capacity Manual. The primary measure of effectiveness for signalized and unsignalized intersections is average delay, or Level of Service (LOS). LOS ranges from "A" to "F" and is used to describe traffic flow conditions, as shown in Table 2. Figure 5 shows the PM peak hour turning movement volumes and the analysis results.

Figure 5. Existing Conditions

Table 2. Intersection Level of Service Criteria

Level of Service (LOS)	Description	Signalized Intersection Average Delay per Vehicle	Unsignalized Intersection Average Delay per Vehicle
A	Traffic moves freely. The free flow condition is accompanied by low volumes. All waiting vehicles clear on the first green. The major movements have a low percentage of stops.	0 – 10 sec.	0 – 10 sec.
B	Traffic moves fairly freely. Volumes are somewhat low. Waiting vehicles will still probably clear on the first green. Traffic on a major movement can expect less than a 50 percent chance of stopping.	>10 – 20 sec.	> 10 – 15 sec.
C	Traffic moves smoothly. Volumes are beginning to increase. Some minor movements may clear on the first green. Traffic on major movements can expect a greater than 50 percent chance of stopping.	>20 – 35 sec.	> 15 – 25 sec.
D	Traffic approaching unstable flow. Acceptable intersection operation for peak periods. Many intersection movements may not clear on the first green. Traffic on major movements can expect a greater than 50 percent chance of stopping.	> 35 – 55 sec.	> 25 – 35 sec.
E	Unstable traffic flow. Volumes at or near capacity. No vehicles are able to go through the intersection without having to stop first.	> 55 – 80 sec.	> 35 – 50 sec.
F	Saturation. Demand is higher than capacity. All vehicles will stop and probably will not make it through the first green.	> 80 sec.	> 50 sec.

Source: *Highway Capacity Manual*. Transportation Research Board, 2000.

LOS A represents free flow conditions with limited delay. At LOS D, some vehicles on certain approaches may have to wait through more than one signal cycle. LOS E represents capacity conditions and LOS F corresponds with jammed traffic. The LOS grading system was used to evaluate operations at all study area intersections, except those along East Idaho Avenue (East Idaho Avenue is a state-operated facility that is governed by different operational standards which are described below). For intersections not along East Idaho Avenue (which are all unsignalized), LOS E was used as the threshold for determining whether an intersection operates sufficiently, as LOS E is typically the standard used for unsignalized intersections.

In addition to the Level of Service grading system, ODOT bases an intersection's performance on its volume-to-capacity (V/C) ratio. The 1999 Oregon Highway Plan (OHP) establishes V/C thresholds for state highways based on their functional classification. According to the OHP, East Idaho Avenue within the study area is classified as a Statewide Freight Route and is designated as part of the National Highway System (NHS). The V/C threshold associated with this classification is 0.75, meaning that intersections exceeding this standard would be considered "deficient" and would need some form of improvements to operate acceptably. It should be noted that the functional classification for East Idaho Avenue would be changing as a result of another roadway project that was recently completed in the area. The Yturri Beltline project was completed in the northern part of the city to provide improved connections for

vehicles and trucks to the North Ontario interchange on I-84. The intent and purpose of the beltline is to accommodate truck traffic, but it may also shift a portion of vehicle and truck traffic away from East Idaho Avenue, which would allow the street to serve more local trips. Completion of the beltline will result in a reclassification of East Idaho Avenue to a "District Highway". The new classification includes a V/C standard of 0.85, meaning that longer intersection delays are acceptable. Since the new classification is still pending, this study evaluates intersection performance based on both the existing and pending V/C standards. Intersections subject to the ODOT V/C standards include East Idaho Avenue/2nd Street, East Idaho Avenue/3rd Street, East Idaho Avenue/4th Street, and East Idaho Avenue/Pilot Station Entrance.

Table 3 summarizes existing PM peak hour intersection operations at study area intersections. Based on both the existing OHP and future classifications for East Idaho Avenue, the four study area intersections along East Idaho Avenue currently operate with acceptable V/C ratios with exception to the East Idaho Ave/ SE and NE 3rd Street intersection. Under existing conditions, the minor street approach of SE and NE 3rd Street are not encountering acceptable gaps to make the left and through movements onto East Idaho. For this reason, motorists are experiencing long delays. Using the LOS E and/or the V/C ratio of 0.75 standard to evaluate the remaining intersections, it appears that all intersections operate at or better than LOS E and 0.75 V/C ratio. There are a couple of intersections that are border-line LOS E due to minor approach delay similar to the SE/NE 3rd Street intersection, and with any additional traffic, conditions will most likely worsen without intersection improvements.

Table 3. Existing (2004) PM Peak Hour Intersection Levels of Service

Intersection	Average Delay (seconds/vehicle)	Maximum V/C ratio	LOS
Signalized Intersections			
E Idaho Avenue @ NE/SE 2nd Street	23.2	0.62	C
E Idaho Avenue @ NE/SE 4th Street	15.6	0.59	B

Intersection	Critical Movement	Critical Delay (seconds/vehicle)	Critical V/C ratio	LOS
Unsignalized Intersections				
NE 1st Avenue @ NE 2nd Street	WB All	10.6	0.08	B
NE 1st Avenue @ NE 3rd Street	WB All	9.8	0.02	A
NE 1st Avenue @ NE 4th Street	EB All	9.8	0.03	A
E Idaho Avenue @ NE/SE 3rd Street	SB All	57.8	0.34	F
E Idaho Avenue @ Pilot Entrance	SB Right	14.6	0.09	B
SE 1st Avenue @ SE 2nd Street	EB All	12.1	0.06	B
SE 1st Avenue @ SE 4th Street	EB All	10.3	0.07	B
SE 5th Avenue @ SE 10th Street	SB All	16.1	0.09	C
SE 5th Avenue @ SE 2nd Street	SB Left	36.5	0.11	E
	NB Left	38.5	0.20	E

2.4 ANALYSIS OF CRASH RECORDS ALONG EAST IDAHO AVENUE

Emphasis was placed on the functionality of East Idaho Avenue and recent implementations of access management control. For this purpose, Parametrix sought crash records for the corridor. The City of Ontario and ODOT provided 7 years of East Idaho Avenue crash data. Off the corridor, crash data was difficult to locate. Little information was available on other roadways off from East Idaho Avenue. Nonetheless, crash totals, location, type, severity and cause were researched to better understand or pinpoint problem areas within the study area. There were a total of 85 crashes from 2nd St east to the I-84 interchange southbound on/off ramps in the past 7 years (1998 – 2004). Figure 6 shows the number of crashes that occurred at the respective intersections.

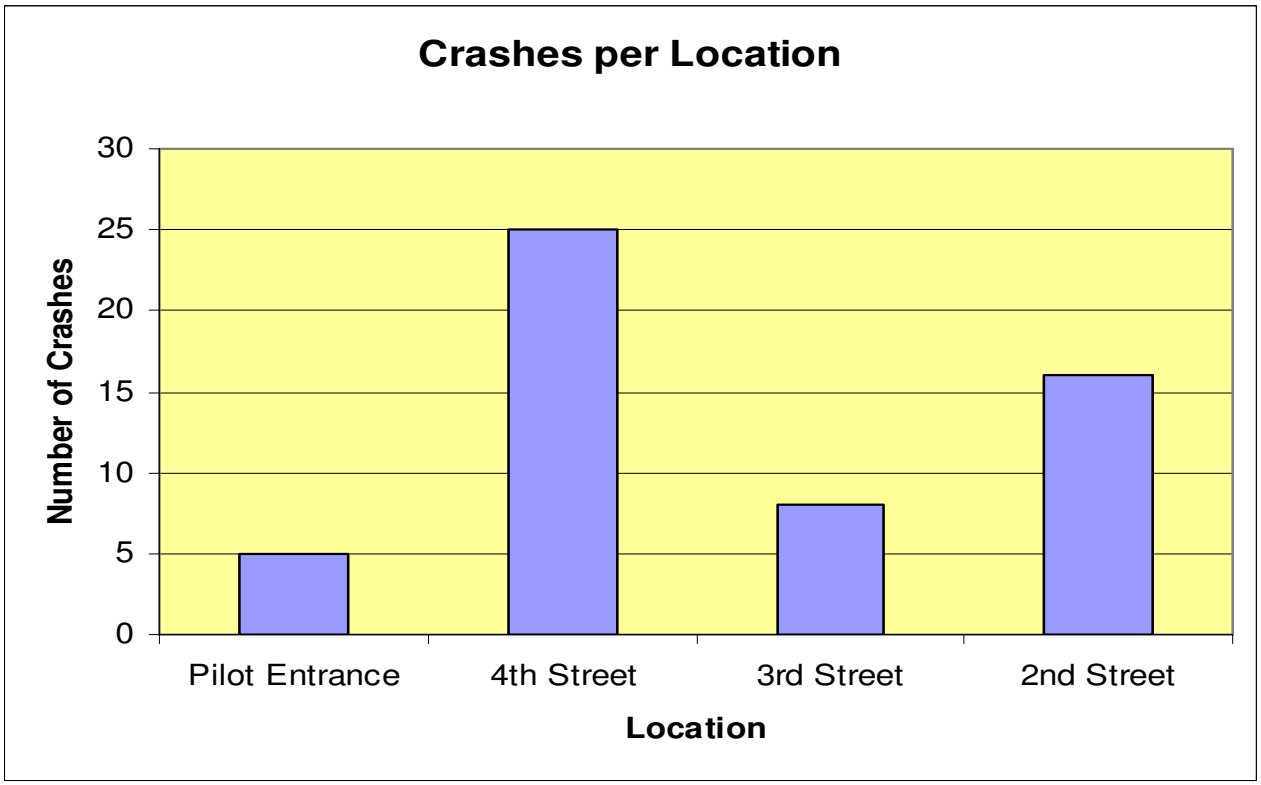


Figure 6. Crash per Location on East Idaho Avenue from 1998 - 2004

The intersections of 4th Street and 2nd Street experience the most crashes. This suggests a need for operational or geometric improvements. Figure 7 shows the type of crashes per location at each respective intersection and emphasizes a problem at the intersections with rear-end and angle crashes, especially, at 4th Street and 2nd Street.

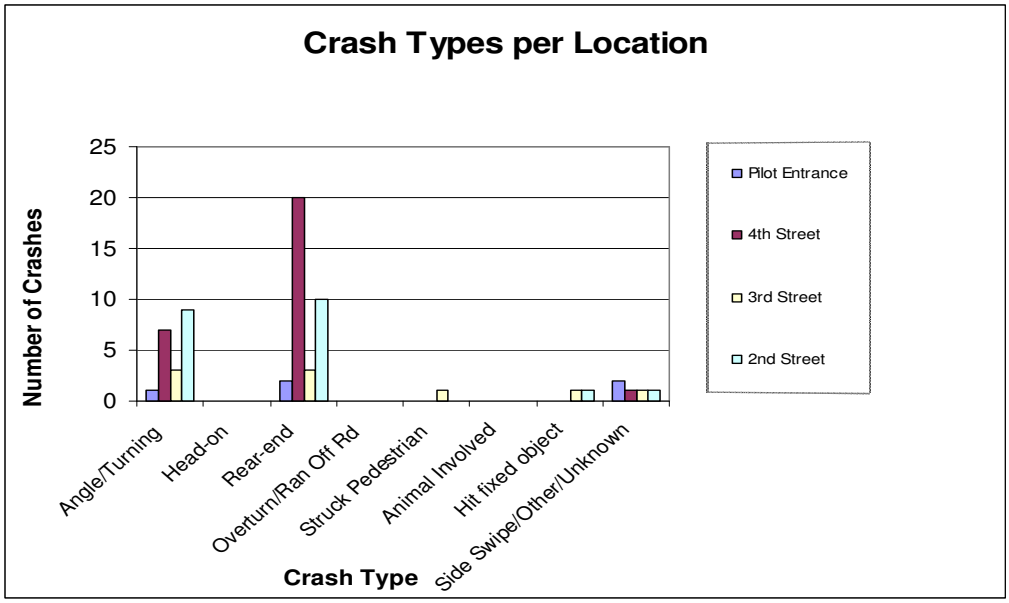


Figure 7. Crash Types per Location on East Idaho Avenue

There was a particular interest expressed by the project team for the incidents that occurred within the corridor before and after the raised median was installed between the ramps and 4th Street. Figure 8 shows the average number of crashes per year before and after the median installation (median installed May of 2003).

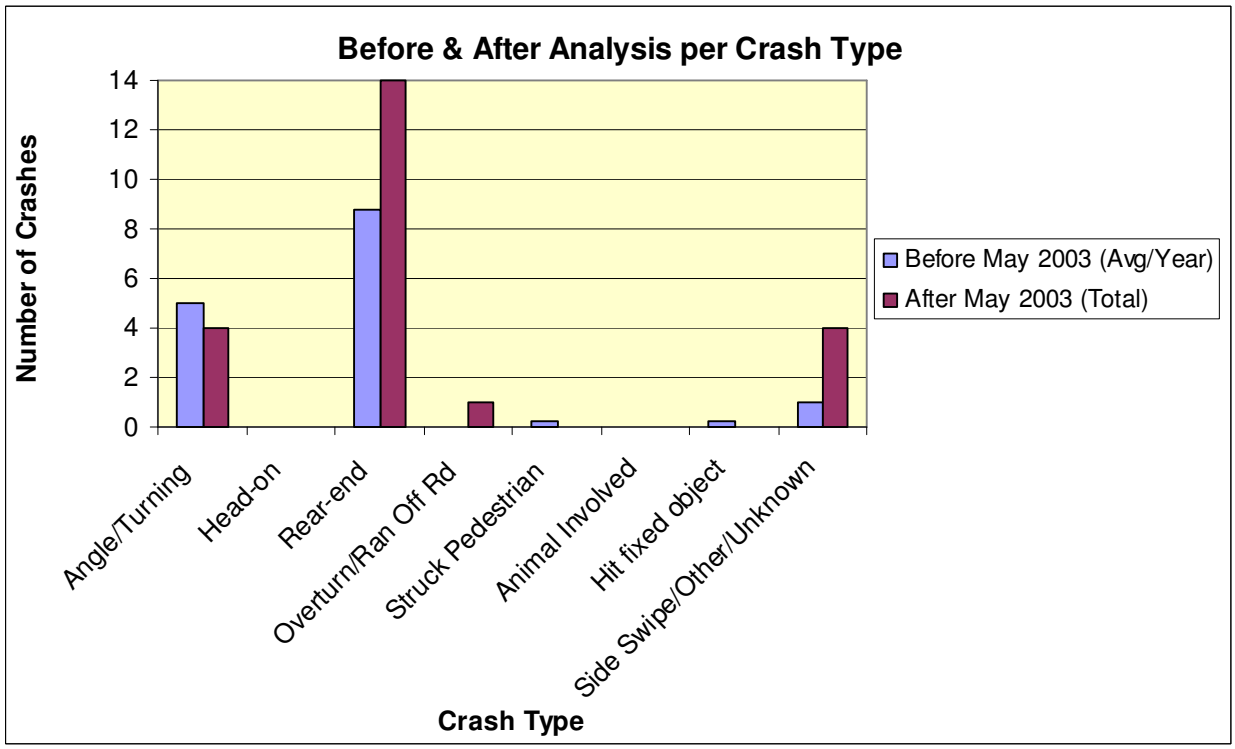


Figure 8. Before and After Crashes per Type Before and After May 2003 – Median Installation

The project team recognizes that since the implementation of a median on East Idaho Avenue, there is only a little over a years worth of crash records. This amount of data is insufficient to draw any concrete conclusions. Driver adaptation and trends in data have not been formulated. Thus, the 6-year average of past data is compared to a present 1 year data set. However, based on the limited data, the following conclusions were drawn:

- Fewer crashes were reported at the Pilot entrance
- Intersection crashes increased on average
- There were a greater number of rear-end crashes reported
- Fewer severe crashes such as angle crashes were reported

Analysis of the crash data assisted in identifying problem areas and supporting congestion areas identified in the operational analysis of existing conditions. The crash distribution data and analysis shown in Figure 9 assisted in the documentation of study area deficiencies.

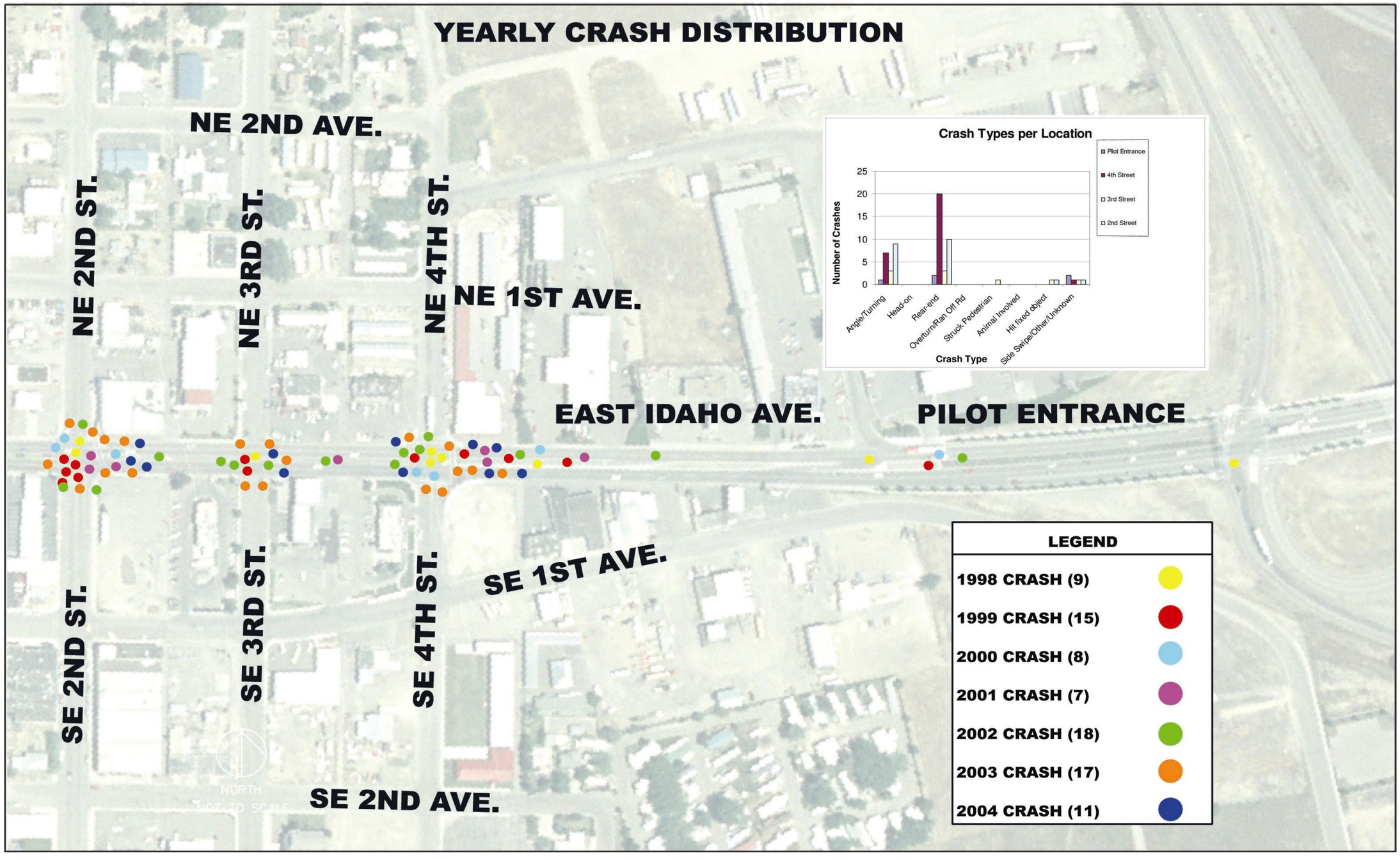


Figure 9. Yearly Crash Distribution

3. FUTURE CONDITIONS

3.1 FUTURE BACKGROUND VOLUMES

Based on the demographics and land use section of the Ontario TSP and the population and employment census, the annual growth rate has been 2.0%, historically. The growth rates through the next 20 years show slight variance for the City of Ontario, however ODOT, the City and the project team agreed on an average annual growth rate of 2.0% for the study area over the next 20 years. This rate was applied to the existing traffic data to arrive at 2015 and 2025 future background traffic volumes. Projected intersection turning movements were distributed based on existing turning movement patterns. Typically, the background traffic volume growth represents regional growth, including residential growth in adjacent communities and traffic growth passing through the study area. The future background volume projections account for a potential reduction of "through" volumes in the East Idaho Avenue corridor that would shift to the new Yturri Beltline.

3.2 2015 BACKGROUND LEVELS OF SERVICE

Table 4 summarizes PM peak hour intersection levels of service at the study area intersections under 2015 background conditions. In this scenario, three intersections along East Idaho Avenue are expected to operate with V/C ratios that exceed the existing ODOT 0.75 V/C standard. The signalized intersections of East Idaho Avenue/2nd Street and East Idaho Avenue/4th Street would operate with V/C ratios of 0.77 and 0.76, respectively. It should be noted that these intersections would operate acceptably within the V/C standard with the pending reclassification of East Idaho Avenue. These intersections would have heavy east-west volumes, which would create periodic queuing. The northbound and southbound approaches at East Idaho Avenue/3rd Street would experience extensive delays, and the V/C ratio on the southbound approach would exceed both the existing OHP standard as well as the new standard associated with the reclassification of East Idaho Avenue. The inability of vehicles on 3rd Avenue to find adequate gaps in the traffic stream on East Idaho Avenue would be partially caused by queues spilling back from the intersections of East Idaho Avenue/2nd Street and East Idaho Avenue/4th Street.

Among the study area intersections not located along East Idaho Avenue, the intersection of SE 5th Avenue/SE 2nd Street would have movements exceeding LOS E under 2015 background conditions. The intersection was assumed to retain its existing traffic control with stop signs on the north and south approaches. Retaining the existing traffic control would result in poor operations on the north and south approaches, with lengthy delays for northbound and southbound left turns.

Table 4. 2015 Background PM Peak Hour Intersection Levels of Service

Intersection	Average Delay (seconds/vehicle)	Maximum V/C ratio	LOS
Signalized Intersections			
E Idaho Avenue @ NE/SE 2nd Street	28.4	0.77	C
E Idaho Avenue @ NE/SE 4th Street	20.4	0.76	C

Intersection	Critical Movement	Critical Delay (seconds/vehicle)	Critical V/C ratio	LOS
Unsignalized Intersections				
NE 1st Avenue @ NE 2nd Street	WB All	11.4	0.11	B
NE 1st Avenue @ NE 3rd Street	WB All	10.1	0.03	B
NE 1st Avenue @ NE 4th Street	EB All	10.3	0.04	B
E Idaho Avenue @ Pilot Entrance	SB Right	17.1	0.11	C
SE 1st Avenue @ SE 2nd Street	EB All	13.3	0.09	B
SE 1st Avenue @ SE 4th Street	EB All	10.7	0.09	B
SE 5th Avenue @ SE 10th Avenue	SB All	21.5	0.18	C
E Idaho Avenue @ NE/SE 3rd Street	SB All	324.2	1.20	F
	NB All	82.6	0.45	F
SE 5th Avenue @ SE 2nd Street	SB Left	87.3	0.28	F
	NB Left	106.1	0.51	F

3.3 2025 BACKGROUND LEVELS OF SERVICE

Table 5 summarizes PM peak hour intersection levels of service under 2025 background conditions. Operations in this scenario are expected to be similar to those anticipated for 2015 background conditions, but the deficiencies would be more pronounced. Three intersections along East Idaho Avenue are expected to exceed both the existing 0.75 V/C standard as well as the pending 0.85 V/C standard. East Idaho Avenue/2nd Street would experience extensive queuing and delays on the eastbound, westbound and northbound approaches. At East Idaho Avenue/4th Street, queuing and delays would occur on the eastbound, westbound and southbound approaches. The unsignalized intersection of East Idaho Avenue/3rd Street would experience unacceptable delays on the northbound and southbound approaches, partly due to queuing on East Idaho Avenue backing up from 2nd Street and 4th Street and blocking the intersection.

The northbound and southbound approaches at SE 5th Avenue/SE 2nd Street would operate at LOS F under 2025 background conditions, exceeding the LOS E threshold. The extensive delays would be caused by the inability of northbound and southbound vehicles to find gaps in the traffic stream, and vehicles making left turns from these approaches would experience the longest delays.

Table 5. 2025 Background PM Peak Hour Intersection Levels of Service

Intersection	Average Delay (seconds/vehicle)	Maximum V/C ratio	LOS
Signalized Intersections			
E Idaho Avenue @ NE/SE 2nd Street	55.2	0.98	E
E Idaho Avenue @ NE/SE 4th Street	31.6	0.96	C

Intersection	Critical Movement	Critical Delay (seconds/vehicle)	Critical V/C ratio	LOS
Unsignalized Intersections				
NE 1st Avenue @ NE 2nd Street	WB All	12.3	0.14	B
NE 1st Avenue @ NE 3rd Street	WB All	10.4	0.03	B
NE 1st Avenue @ NE 4th Street	EB All	10.9	0.05	B
E Idaho Avenue @ Pilot Entrance	SB Right	22.8	0.22	C
SE 1st Avenue @ SE 2nd Street	EB All	15.6	0.13	C
SE 1st Avenue @ SE 4th Street	EB All	11.4	0.12	B
SE 5th Avenue @ SE 10th Street	SB All	27.6	0.22	D
E Idaho Avenue @ NE/SE 3rd Street	SB All	--	7.34	F
	NB All	957.1	2.75	F
SE 5th Avenue @ SE 2nd Street	SB Left	--	--	F
	NB Left	--	--	F

3.4 FUTURE PROJECT TRAFFIC IMPACTS

After evaluating existing and future background conditions, analysis of project-related traffic impacts was completed. The process of volume forecasting for 2015 and 2025 was broken up into two tiers: developing future background volumes (described above), and developing project-related volumes. It was imperative that future conditions and traffic volumes associated with the partial and full build-out of the develop-ready lands represent both the future background and project-related growth.

ODOT commissioned this traffic study to evaluate build-out conditions. Parametrix sought to understand how much develop-ready land exists within and near the study area that would potentially impact traffic growth over the next 10 to 20 years. From land use and parcel maps provided by the city, there were three develop-ready areas within the study area, listed below and depicted in Figure 10.

- North Sector – approximately 30 acres or 1.3 million square feet (SF)

  From City land use maps, this area is located north of the Pilot property and is bounded by I-84 to the east. It is bounded by NE 3rd and NE 4th Streets as it wraps up near the Heinz Operation Buildings.
- Central Sector – approximately 1.2 acres or 50,000 SF

The central sector is a develop-ready or redevelop-ready area located adjacent to East Idaho Avenue extending from I-84 to SE/NE 4th Street and south to SE 1st Avenue.

- South Sector – approximately 15 acres or 650,000 SF.

  The south sector extends from behind the Sizzler restaurant south to SE 5th Avenue wrapping around the residential and school area to the west and bound by I-84 to the east.

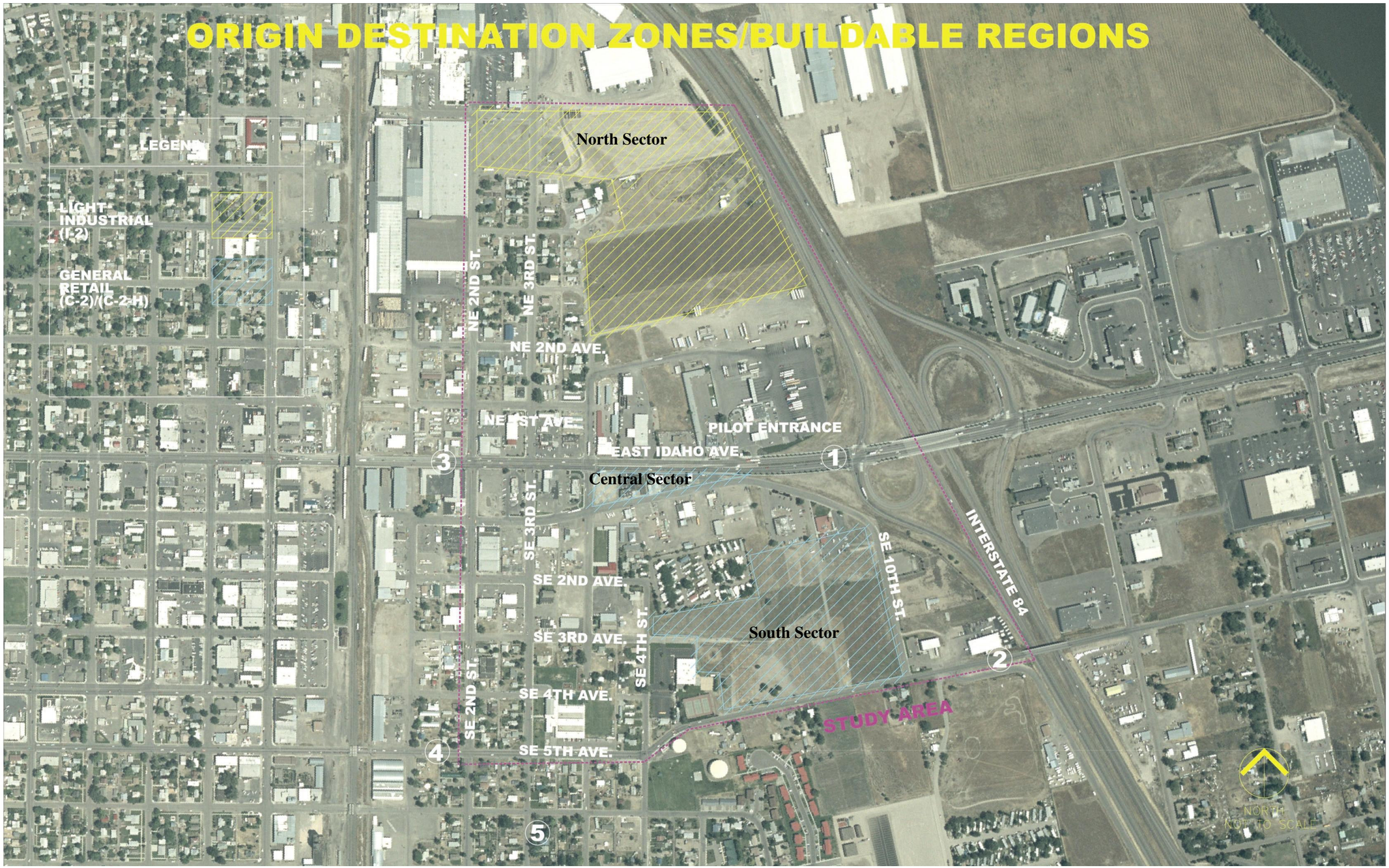


Figure 10. Develop-Ready Lands, Assumed Land Types and Origin/Destination Routes

Land use designations were also obtained from the City's land use map. The north sector is classified as a light industrial area. Both the central and south sectors of the study area are classified as commercial and heavy commercial zones for potential office development. Based on the Institute of Transportation Engineers (ITE) *Trip Generation Manual, Seventh Edition*, a 0.25 floor area ratio (FAR) was used to determine the number of vehicle trips that each sector would generate (this was also used as a part of the Aikins/Comprehensive Traffic Study on the east side of I-84). Under full build-out conditions, north sector lands would consist of about 325,000 SF of built space, the center sector would have 12,500 SF of buildable space, and the south sector would have approximately 162,500 SF of built space.

The *Trip Generation Manual* was also used to obtain trip rates (trips generated per 1,000 SF of building area) for each develop-ready sector. A "light industrial" trip rate of 0.42 trips per 1,000 SF was assumed for the north sector. The total square footage for the central and south sectors were added. Of this buildable area, 2.5% was considered for general office space by applying a trip rate of 1.49 trips per 1,000 SF as indicated in the City's TSP. A general retail trip rate of 2.71 trips per 1,000 SF was used for the rest of the develop-ready area in the central and south sectors.

Timing of the development has not been set therefore based on dialogue with the City, Parametrix assumed that 50% of the develop-ready land would develop by the year 2015 and full build-out would occur by 2025.

Completion of the trip generation exercise enabled the anticipated project-related vehicle trips to be distributed onto the surrounding street system. Parametrix established 5-origin and destination locations to/from which, traffic would enter and exit the study area. Routes were developed to and from these origin/destination locations from each of the develop-ready areas. It was assumed that drivers would choose the pathways of least resistance (minimum travel time). Entering and exiting percentages for the PM peak hour were extracted from the ITE *Trip Generation Manual* for the respective land uses (see Appendix B for an example).

By this process, project related volumes were added to the future background traffic volumes. Volume balancing was performed on East Idaho Avenue to avoid unbalanced intersections. Analysis was completed for 2015 and 2025.

3.5 2015 BACKGROUND PLUS PROJECT LEVELS OF SERVICE

Analysis of 2015 and 2025 background plus project levels of service included the same assumptions that were used in the previous scenarios. Intersection operations along East Idaho Avenue were based on the existing (0.75) and pending (0.85) V/C ratios dictated by ODOT, and LOS E was used as the operational threshold for the remaining study area intersections. In 2015, addition of project traffic would cause three intersections along East Idaho Avenue to exceed the existing 0.75 V/C standard (as shown in Table 6). At the intersection of East Idaho Avenue/2nd Street, the westbound approach is anticipated to experience the longest delays, with queues periodically extending back to 4th Street. At East Idaho Avenue/4th Street, the eastbound approach would experience the longest delays with queues occasionally spilling back beyond 3rd

Street. The periodic blocking of the East Idaho Avenue/3rd Street intersection by the queues described above is expected to deteriorate conditions at the intersection. The northbound, and especially the southbound approaches would experience long delays (the southbound approach would exceed the existing and pending V/C standards).

Only one intersection on the remaining study area street network would exceed LOS E in 2015 with project traffic. The northbound and southbound approaches at SE 5th Avenue/SE 2nd Street would operate at LOS F due to the anticipated heavy traffic stream on the eastbound and westbound approaches, making it difficult for vehicles on the northbound and southbound approaches to find adequate gaps to access or cross SE 5th Avenue. In particular, the left turn movements on the northbound and southbound approaches are expected to have the longest delays. Figure 11 shows the associated turning movement volumes and traffic conditions for the 2015 year plus project traffic.

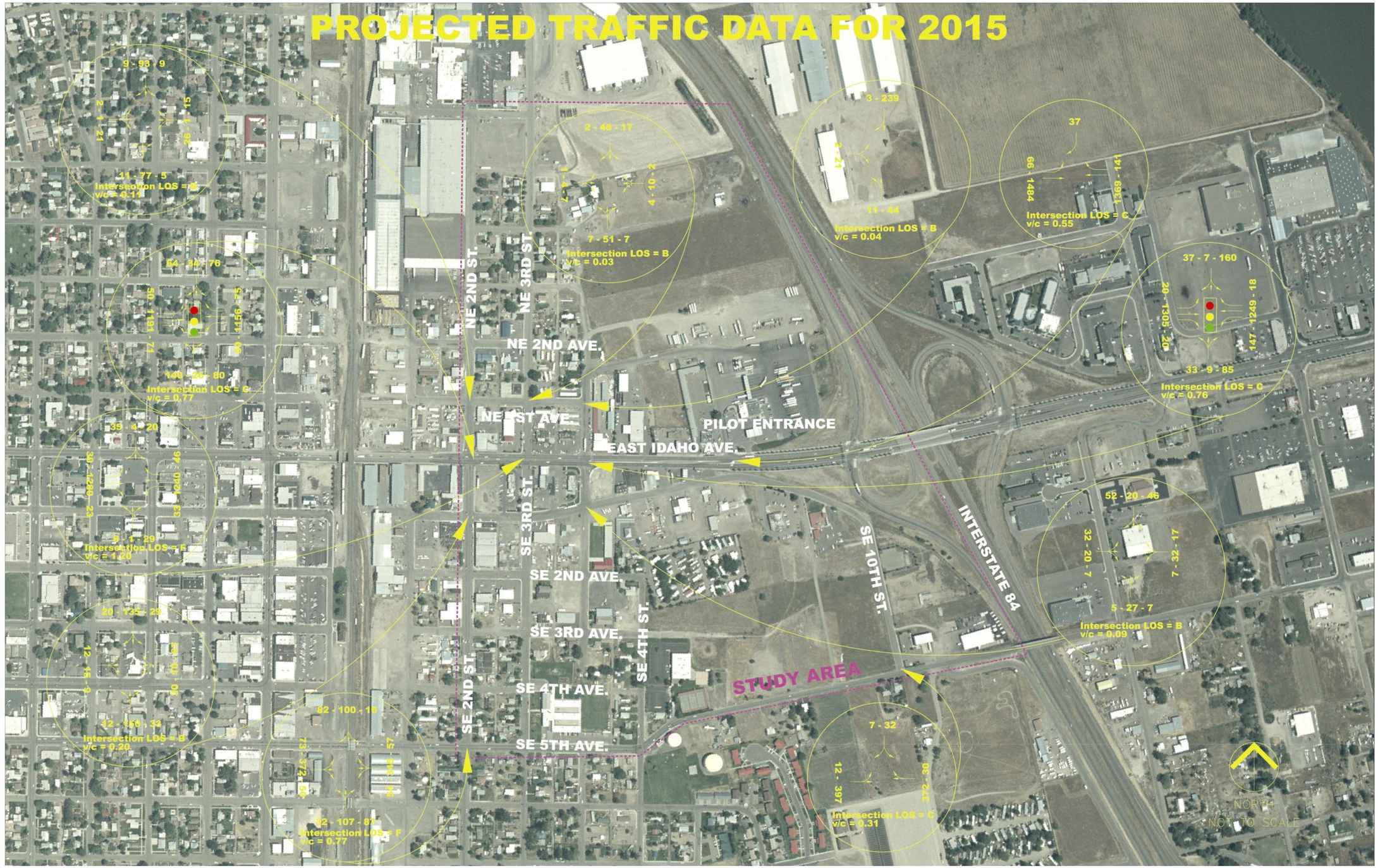


Figure 11. Future Traffic Conditions for 2015

Table 6. 2015 Background Plus Project PM Peak Hour Intersection Levels of Service

Intersection	Average Delay (seconds/vehicle)	Maximum V/C ratio	LOS
Signalized Intersections			
E Idaho Avenue @ NE/SE 2nd Street	28.2	0.77	C
E Idaho Avenue @ NE/SE 4th Street	23.6	0.82	C

Intersection	Critical Movement	Critical Delay (seconds/vehicle)	Critical V/C ratio	LOS
Unsignalized Intersections				
NE 1st Avenue @ NE 2nd Street	WB All	11.6	0.11	B
NE 1st Avenue @ NE 3rd Street	WB All	10.3	0.03	B
NE 1st Avenue @ NE 4th Street	EB All	10.4	0.04	B
E Idaho Avenue @ Pilot Entrance	SB Right	17.7	0.14	C
SE 1st Avenue @ SE 2nd Street	EB All	13.8	0.10	B
SE 1st Avenue @ SE 4th Street	EB All	12.4	0.12	B
SE 5th Avenue @ SE 10th Avenue	SB All	36.5	0.58	E
E Idaho Avenue @ NE/SE 3rd Street	SB All	739.9	2.05	F
	NB All	117.9	0.79	F
SE 5th Avenue @ SE 2nd Street	SB Left	163.4	0.60	F
	NB Left	155.4	0.64	F

3.6 2025 BACKGROUND PLUS PROJECT LEVELS OF SERVICE

Table 7 summarizes PM peak hour intersection levels of service under 2025 background plus project conditions. Detailed peak hour turning movement volumes and traffic conditions are shown in Figure 12. Operations at three intersections along East Idaho Avenue would exceed both the existing and pending ODOT V/C standards. Poor operations at East Idaho Avenue/2nd Street would be characterized by extensive queuing and delays on all approaches. Eastbound queues would spill back several hundred feet to the west, and westbound queuing would spill back as far as 4th Street. Northbound and southbound queues would occasionally spill back to NE 1st and SE 1st avenues, respectively. The intersection of East Idaho Avenue/4th Street is expected to experience excessive queuing on all approaches. Also the eastbound queues would consistently spill back beyond 3rd Avenue, and the northbound and southbound queues would occasionally spill back to NE 1st and SE 1st avenues, respectively. Queue spillbacks from the East Idaho Avenue/2nd Street and East Idaho Avenue/4th Street intersections are expected to contribute to poor operations at East Idaho Avenue/3rd Street. The northbound and southbound approaches would experience long delays, with queues spilling back as far as NE 1st and SE 1st avenues, respectively.

Figure 12. Future 2025 Traffic Conditions

Similar to the scenarios described above, SE 5th Avenue/SE 2nd Street is expected to exceed LOS E under 2025 background plus project conditions. The northbound and southbound approaches would experience lengthy delays and queuing. The intersection of SE 5th Avenue/SE 10th Avenue would also operate poorly in this scenario, particularly on the southbound approach. This approach was assumed to retain its current lane configuration with a shared left/right turn lane. Vehicles on this approach would experience extensive delays as the heavy eastbound and westbound volumes would not have to stop and would provide few gaps in the traffic stream.

Table 7. 2025 Background Plus Project PM Peak Hour Intersection Levels of Service

Intersection	Average Delay (seconds/vehicle)	Maximum V/C ratio	LOS
Signalized Intersections			
E Idaho Avenue @ NE/SE 2nd Street	59.6	0.99	E
E Idaho Avenue @ NE/SE 4th Street	48.3	1.18	D

Intersection	Critical Movement	Critical Delay (seconds/vehicle)	Critical V/C ratio	LOS
Unsignalized Intersections				
NE 1st Avenue @ NE 2nd Street	WB All	12.9	0.15	B
NE 1st Avenue @ NE 3rd Street	WB All	10.9	0.04	B
NE 1st Avenue @ NE 4th Street	EB All	11.3	0.06	B
E Idaho Avenue @ Pilot Entrance	EB Left	24.9	0.31	C
SE 1st Avenue @ SE 2nd Street	EB All	16.8	0.15	C
SE 1st Avenue @ SE 4th Street	EB All	16.6	0.20	C
SE 5th Avenue @ SE 10th Avenue	SB All	382.5	1.68	F
E Idaho Avenue @ NE/SE 3rd Street	SB All	--	14.76	F
	NB All	--	--	F
SE 5th Avenue @ SE 2nd Street	SB Left	--	--	F
	NB Left	--	--	F

3.7 STREET SYSTEM DEFICIENCIES UNDER EXISTING AND FUTURE CONDITIONS

Using the existing and pending ODOT V/C standards as a basis for evaluation, all study area intersections along East Idaho Avenue currently operate acceptably. Using the 0.75 V/C standard, the signalized intersections of East Idaho Avenue/2nd Street and East Idaho Avenue/4th Street would exceed this standard under all future scenarios. These intersections would only exceed the pending 0.85 V/C standard under 2025 background and 2025 background plus project conditions. Poor operations would be characterized by extensive queuing particularly on the eastbound and westbound approaches, and to a limited extent on the northbound and southbound approaches. Queue spillbacks at these intersections under future

scenarios would contribute to delays and associated queuing on the northbound and southbound approaches to the East Idaho Avenue/3rd Street intersection. Operations at this intersection would exceed both the existing and pending V/C thresholds under all future scenarios.

LOS E was used as the threshold for determining whether the remaining study area intersections would operate acceptably under each of the scenarios described above. Based on this standard, SE 5th Avenue/2nd Street operates sufficiently under existing conditions but would exceed the LOS E standard under all future scenarios. Poor operations would be caused by northbound and southbound traffic on SE 2nd Street unable to access or cross SE 5th Avenue due to inadequate gaps in the traffic stream. The southbound approach at the intersection of SE 5th Avenue/SE 10th Street would exceed the LOS E standard under 2025 background plus project conditions due to heavy volumes on the east and west approaches.

Besides these operational deficiencies, the project team identified the following additional five priority needs and deficiencies:

1. Existing business access and circulation is insufficient
2. Future access to business and industrial developments is insufficient
3. Need additional access on the north and south side of East Idaho Ave – Inadequate circulation
4. Need the 2003 and 2004 crash data for evaluation of the median treatment
5. An additional railroad and/or Interstate crossing to the north of E. Idaho is needed and there are inadequate parallel E/W-N/S streets north and south of E. Idaho

4. DEVELOPED ALTERNATIVES THROUGH A STRONG PUBLIC INVOLVEMENT PROCESS

Previously completed work and analysis in this study led up to the ability to develop alternatives for this growing region in and around East Idaho Avenue and answer the questions posed in Section 1.0 of this report. Alternatives of the study were developed as appropriate solutions for future implementation and address existing and future deficiencies while accommodating growth in the region. A strong public involvement process from the beginning of the study process was key to the alternative development. This section will introduce the public involvement process and identify the developed alternatives arrived at through this involvement process.

4.1 PUBLIC INVOLVEMENT PROCESS

The public involvement process was two tiered. The first tier consisted of a project team that was formed early on in the study composed of agency staff and key stakeholders. The second tier consisted of the open public meeting and providing an opportunity to review and give input to the developed alternatives. This involvement was highly successful bringing everything to the table and allowing public buy-in to the study process and it outcomes.

One of the beginning tasks of the project was forming the project team. The team consisted of Oregon Department of Transportation (ODOT) staff, City of Ontario personnel, business owners (who also served as involved citizens), and the engineering consultants. The project team met every other week through conference calls and workshop meetings. These conference calls and workshop meetings were important to provide status updates on the study process with its short time frame and bring all needs/issues to the forefront. Calls and meetings also served to answer questions and bring consensus on sensitive matters. Figure 13 shows the workshop meeting dates, the key topics addressed in each of the meetings, and the outcome of the meetings.

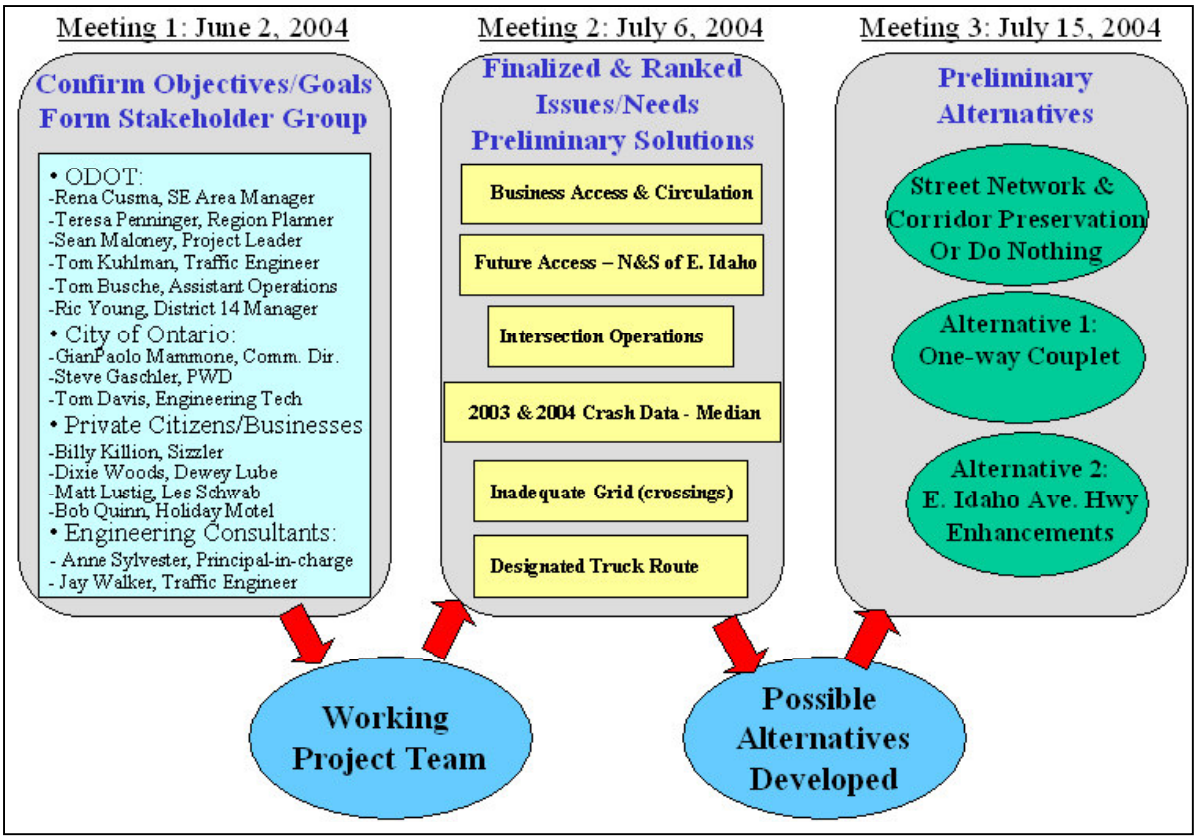


Figure 13. The Public Involvement Process

4.2 ALTERNATIVES DEVELOPED

From Figure 13, meeting 2 finalized and ranked the issue/needs and commenced the process of developing preliminary solutions. Deficiencies, as mentioned in section 4, were brought out as a part of workshop meeting #2 with project team members while addressing "Issues and Needs" within the study area. Below are listed the issues and needs discussed by the project team and reaffirmed by the public in the public open house meeting (the top five are in rank order):

1. Existing business access and circulation
2. Future access to business and industrial developments
3. Access on the north and south side of East Idaho Ave – Inadequate circulation
4. Need of the 2003 and 2004 crash data for evaluation of the median treatment
5. No railroad crossings north of E. Idaho and inadequate parallel E/W-N/S streets north and south of E. Idaho

- Land N. of E. Idaho and S. Commercial
- Inefficient signal timing
- School zone in traffic pattern
- Width of E. Idaho for truck turns
- Excessive speed off I-84 ramps

- Rear end crashes – existing and future congestion at 2nd, 3rd, and 4th
- Additional signage to route traffic
- Truck traffic and access to/from Ontario
- Diesel access to/from Ontario
- Pedestrian crossing on E. Idaho
- Congestion at E. Idaho and 3rd
- U-turns at 4th and Pilot inadequate - short stack distance at Pilot

From the needs, concerns and deficiencies list and through a "give and take" process, viable solutions were brainstormed. Workshop meeting #3 with the project team narrowed preliminary solutions into three possible alternatives. The three developed alternatives, as listed under meeting #3 in Figure 13, are:

- Street Network and Corridor Preservation and/or Do Nothing in the Short Term
- One-way Couplet
- East Idaho Avenue Corridor Enhancements

1. Street Network and Corridor Preservation and/or Do Nothing in the Short Term Alternative: this alternative would work towards a long-term solution of extending the City grid to provide more north/south and east/west circulation routes in the study region that would assist in traversing the railroad and interstate barriers. The alternative would incorporate a right-of-way preservation and land acquisition program. No improvements would be made in the short-term. As shown in Figure 14, the alternative would include:

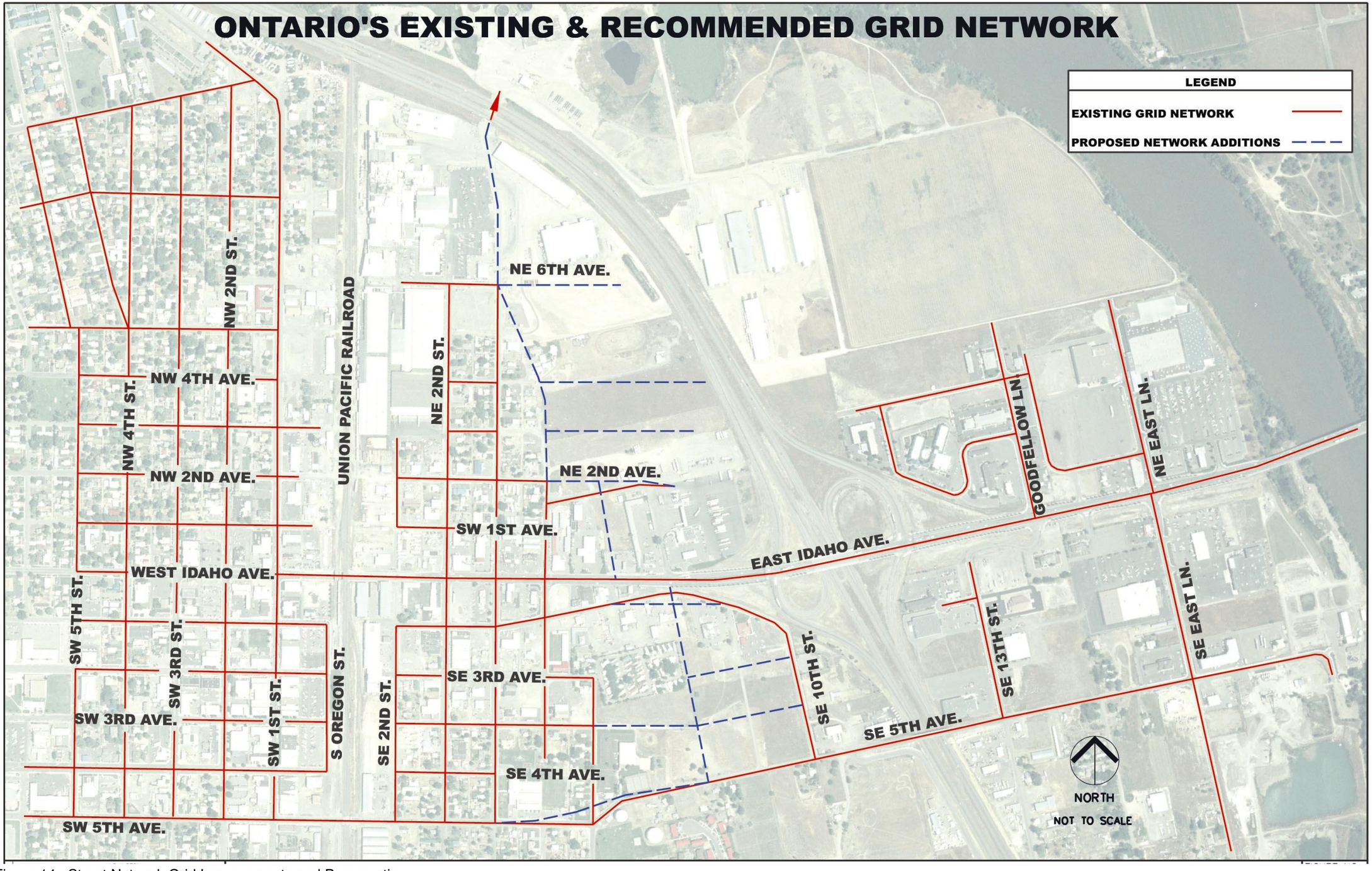


Figure 14. Street Network Grid Improvements and Preservation

North of East Idaho Avenue

- Extending NE 4th to the under utilized Interstate underpass by Ore-Ida
- Realigning NE 2nd Ave to the Pilot circulation road
- Providing an access route from NE 2nd Ave to East Idaho Ave between Les Schwab and Dewey Lube
- Extending NE 3rd, NE 4th and NE 6th avenues east to the Interstate setback

South of East Idaho Avenue

- Making alignment changes to the SE 5th railroad and Interstate crossing as well as improving the bridge crossing at the Interstate
- Realigning SE 1st Avenue
- Extending SE 3rd and 2nd avenues
- Provide a north/south connection between SE 5th and SE 10th that connections SE 5th and East Idaho avenues

2. One-way Couplet Alternative: The One-way couplet would incorporate all of the street network grid improvements shown in Figure 15. Also, it would include turning East Idaho Avenue and SE 1st Avenue into a one-way couplet. Current right-of-way widths would allow for 4 and 3-lane cross-section with optional on-street parking in some locations (as desired). SE 1st Ave. would need alignment improvements as it converges into East Idaho Avenue. The alternative would require a new railroad crossing, as well as, new signals at SE 2nd and NW 2nd Street crossings with SE 1st Avenue.

Most sensitive would be the intersection improvements and treatments at the point of convergence to East Idaho Avenue. The intersections proximity to the Interstate 84 interchange raises concerns. The SE 10th Street loop would have a cul-de-sac just north of the Malheur Retirement Center Office. The SE 2nd Ave extension would provide access to Sizzler and the other businesses around SE 10th Street. A SE 5th Ave/SE 2nd Street signal would also be added and improvements made to SE 2nd Street to improve this highly traveled corridor. As shown in Figure 15, there would be new crossings added for a NE 2nd Avenue west crossing of the railroad line and a NE 4th Avenue west crossing of the freeway.

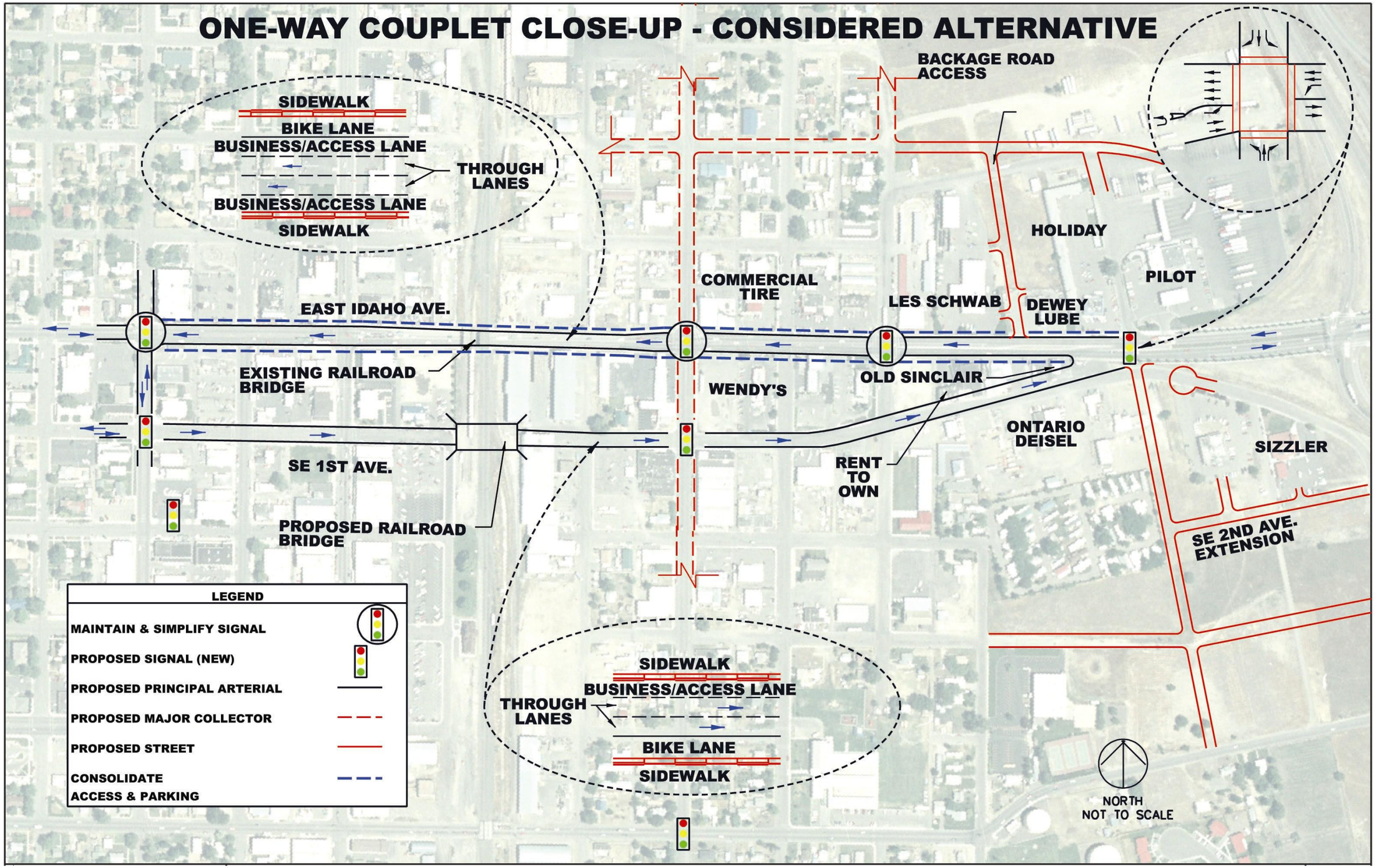


Figure 15. The One-way Couplet Alternative

3. East Idaho Avenue Highway Enhancements Alternative: The East Idaho Avenue Highway Enhancement alternative also incorporates the street network grid improvements and preservation shown in Figure 16. However, it places greater emphasis on improvements to SE 5th Avenue, the at-grade crossing of the railroad tracks and the bridge crossing the freeway. SE 5th Avenue would have its classification upgraded to a minor arterial sharing the responsibility of carrying traffic across the freeway.

The following list of improvements would also be implemented as a part of this alternative (as shown in):

- Consolidation of driveway accesses along East Idaho Avenue and encouragement of shared parking – currently there area 13 and 14 access points on the north and south side of the corridor respectively within this 1,730 feet of roadway. According to the FHWA Access Density and Connection Spacing Analysis, 15 or greater access points within a mile spacing increases crashes/incidents, especially, in regards to rear-end collisions. This corresponds with the crash analysis completed in the Existing Conditions section of this report (Section 2.0).
- Improvement of SE/NE 2nd and NE 4th Streets as propose major collectors to support higher volumes of traffic and better utilization of existing freeway under and over passes to the north and south of East Idaho Avenue, respectively.
- Installment of a signal at SE 2nd Street and SE 5th Avenue.
- Signal optimization and coordination of ramp, NE 4th, SE 2nd and Oregon Street signals along East Idaho Avenue.
- Limited access at the intersection of SE/NE 3rd Street and East Idaho Avenue through the use of a raised median similar to what was installed East of NE 4th Street.
- Lane geometry improvements at the Pilot Entrance, NE 4th Street and SE 2nd Street including longer turning bay lengths, larger turning radii for truck use, better bicycle and pedestrian facilities, etc.
- As shown in Figure 15, avoidance of 4-way control at the Pilot entrance by providing right-in, right-out movements only from the new north approach to East Idaho Avenue - allow for a raised “t” island/striping to assist the median in controlling cross traffic movements.
- The alternative would also better designate truck routes and instruct truck operators on those routes.

In workshop meeting #3, this highway enhancement alternative, Alternative #3, seemed to surface to the top as the preferred alternative. Discussions pointed to it as the most viable alternative to improving access and circulations in the area around E. Idaho Ave and answering the study questions. Advantages and disadvantages of all developed alternatives addressed by the project team are shown in Table 8 below. It was decided to introduce all three alternatives to the public by way of a public open house with alternative 3 being the preferred alternative by the project team. Based on public input the team would draw final conclusion and make recommendations

Table 8. Advantages and Disadvantages of Each Alternative

Alternatives

Corridor Preservation

Advantages	Disadvantages
- Establishes grid	- Requires ROW
- Provides connectivity	- Dirsupts access
- Improves circulation	- Disrupts businesses
- Entices development	
- Assists in driveway consolidation	

One-way Couplet

Advantages	Disadvantages
- Improves traffic flow	- Places signal close to I.C.
- Removes left-turn movts	- Generates circulation traffic
- Increases capacity	- Disrupts access
- Provides bike and ped amenities	- Requires expensive RXR crossing
	- Forms complicated/ unfamiliar intersections

E. Idaho Highway Enhancements

Advantages	Disadvantages
- Improves traffic flow	- Closes thru and left movements on 3rd
- Decreases vehicle queues	- Requires ROW
- Increases capacity	- Dirsupts some access
- Improves circulation	
- Utilizes existing freeway under/overpass	
- Promotes better truck movement	
- Utilizes existing freeway under/overpass	
- Provides better access	

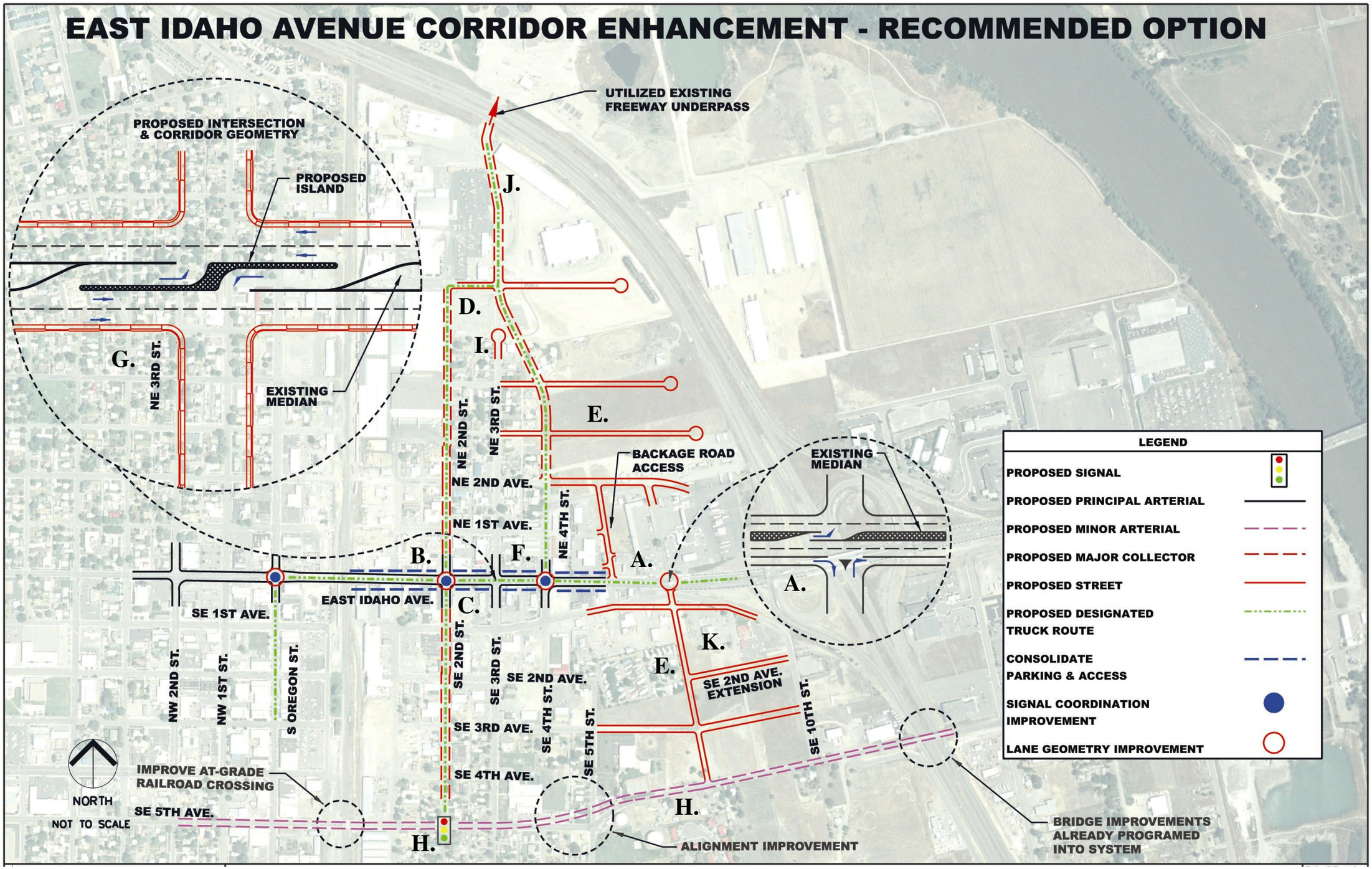


Figure 16. East Idaho Avenue Corridor Enhancements Alternative

5. FINAL CONCLUSIONS AND RECOMMENDATIONS

5.1 PUBLIC INPUT ON FINAL CONCLUSIONS

The three developed alternatives were presented to the public for input at the end of July as shown in Figure 17 below. A total of 31 people attended the public open house. Each attendee was provided an opportunity to see the displays and hear the presentation concerning the study process and developed alternatives. Comment sheets were provided for input at the meeting or later mail-in at attendee's convenience as shown in Appendix C. The comment period was left open until August 9th, two weeks following the public meeting. This allowed input from the public for the developed alternatives and assisted in establishing the final recommendation.

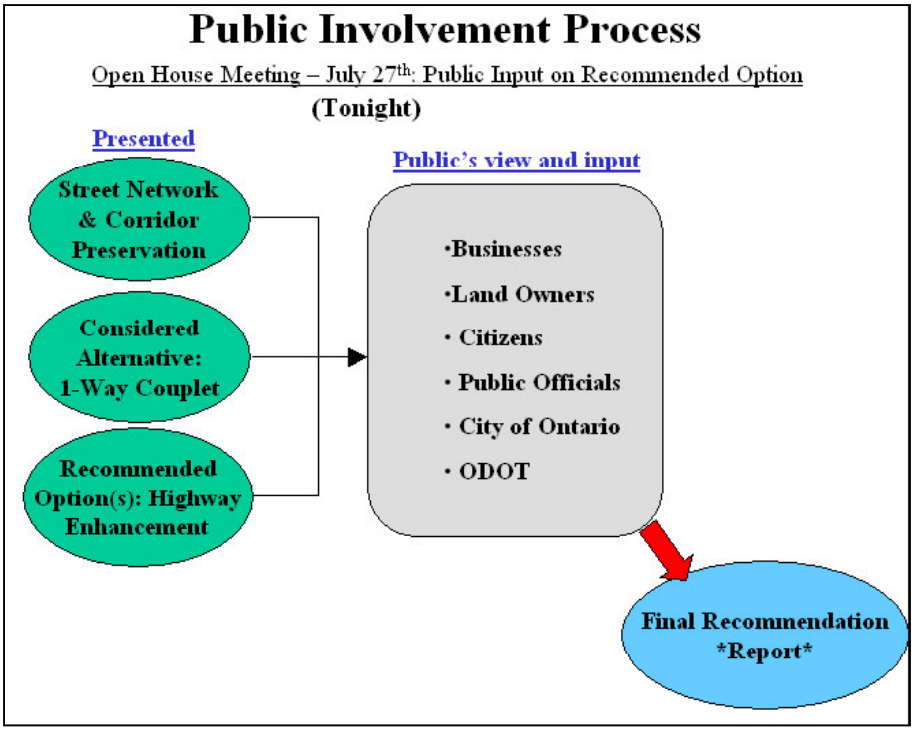


Figure 17. Alternative Presentation Process

5.2 FINAL RECOMMENDATIONS

From the public input (key comments are shown in Appendix C), additional review by the project team, and results from final analysis, the recommended alternative was confirmed as the East Idaho Avenue Highway Enhancements Alternative, Alternative #3. This enhancement alternative incorporates the street network grid improvements and preservation shown in Figure 14 with greater emphasis on improvements to SE 5th Avenue, the at-grade crossing of the railroad tracks and the bridge crossing the freeway. It implements all the improvements discussed in the alternative development section, Section 5: Alternative #3, and shown in greater detail below (the letters correspond to the timeline of implementation and corresponding cost estimate):

A. Provide additional business access between 4th Street and the Pilot next to Dewey Lube. This will allow a backage road connection to NE 2nd Ave for adjacent businesses and assist in consolidating driveways. Extend the new SE 7/8 Street from SE 5th Ave to connect into East Idaho Ave with a right-in, right-out access as shown in Figure 12 - avoidance of 4-way control at the Pilot entrance by providing right-in, right-out movements only from the new north approach to East Idaho Avenue (allow for a raised "t" island/striping to assist the median in controlling cross traffic movements).

B. Designate truck routes and instruct truck operators on those routes. As truck routes are designated, appropriate turning radii and other geometric and operational accommodations could assist commercial vehicle operations.

C. Optimize and coordinate ramp, NE 4th, SE 2nd and Oregon Street signals along East Idaho Avenue. Lane geometry improvements at the Pilot Entrance, NE 4th Street and SE 2nd Street including longer turning bay lengths, larger turning radii for truck use, better bicycle and pedestrian facilities, etc. Coordination, timing adjustments/optimization and intersection geometry improvements will assist in traffic flow and platooning along East Idaho.

D. Acquire Right-of-Way (ROW) to improve SE/NE 2nd and NE 4th Streets as major collectors to support higher volumes of traffic and better utilize the existing freeway under and over passes to the north and south of East Idaho Avenue, respectively.

E. Preserve corridors by acquiring new ROW as becomes available where street and avenue extensions are possible as shown in blue on Figure 10; pg 5-4.

F. Consolidate driveway accesses along East Idaho Avenue and encourage shared parking – currently there area 13 and 14 access points on the north and south side of the corridor respectively within this 1,730 feet of roadway. According to the FHWA Access Density and Connection Spacing Analysis, 15 or greater access points within a mile spacing increases crashes/incidents, especially, in regards to rear-end collisions. This corresponds with the crash analysis completed in the Existing Conditions section of this report (Section 2.0).

G. Limit access at the intersection of SE/NE 3rd Street and East Idaho Avenue through a raised median similar to what was installed East of NE 4th Street. Provide channelization

H. Improve SE 5th Ave to a minor arterial through alignment and bridge improvements. This would also include the installment of a signal at SE 2nd Street and SE 5th Avenue

I. Cul-de-sac NE 3rd Street. This will redirect traffic to NE 2nd and the newly extended NE 4th Street. NE 3rd Street will become a calm neighborhood local road serving the immediate residential area.

J. Extend NE 4th Street to the underutilized underpass to the north. Make improvements to the alignment, geometry and cross-section increasing the classification to a major collector and truck route.

K. Construct the north/south and east/west roadway grid to the north and south of East Idaho Ave.

5.3 ANALYSIS AND TIMELINE OF FINAL RECOMMENDATIONS

Table 9 shows the resulting analysis of the key intersections in future conditions with and without the recommended improvements. Significant improvements would be made in safety, operations, circulation and access. The following study questions were addressed and answered as shown in Table 9 as follows:

- For the properties south of East Idaho Avenue between SE 5th Avenue and SE 1st Avenue within the study area:

  1. The key intersection LOS and v/c ratios are shown at acceptable levels per planning thresholds. Note: Impacts were identified as v/c ratios, lane restrictions and or movement limitations.

  2. Recommended added street systems are shown to connect SE 5th Avenue and East Idaho Avenue east of SE 4th Street to enhance circulation and access.

Table 9. Analysis of Future conditions Without and With Recommended Improvements

	Without Improvements			With Improvements		
Intersection	Existing V/C (LOS)	2015 V/C (LOS)	2025 V/C (LOS)	Existing V/C (LOS)	2015 V/C (LOS)	2025 V/C (LOS)
SE 5th/SE 2nd	.65 (C)	.64 (F)	1.60 (F)	.65 (A)	.62(A/B)	.72 (B/C)
SE 5th/SE 10th	.09 (C)	.58 (E)	1.68 (F)	.09 (C)	.42 (C)	.69 (D)
SE 1st/SE 2nd	.15 (B)	.22 (B)	.32 (C)	.15 (B)	Little Change	
SE 1st/SE 4th	.07 (B)	.16 (B)	.27 (C)	.07 (B)		
E. Idaho/SE 2nd	.62 (C)	.77 (C)	.99 (E)	.62 (C)	.74 (C/D)	0.81 (D/E)
E. Idaho/SE 3rd	.41 (F)	2.05 (F)	14.76 (F)	.41 (F)	.52 (A)	.63 (B)
E. Idaho/SE 4th	.59 (B)	.82 (C)	1.18 (F)	.59 (B)	.90 (C/D)	0.83 (F)
E. Idaho/Pilot Ent	.45 (B)	.14 (C)	.69 (C)	.45 (B)		
NE 1st/NE 2nd	.08 (B)	.11 (B)	.15 (B)	.08 (B)	Little Change	
NE 1st/NE 3rd	.02 (A)	.03 (B)	.04 (B)	.02 (A)		
NE 1st/NE 4th	.15 (A)	.04 (B)	.25 (B)	.15 (A)		

- For the properties north of East Idaho Avenue between NE 2nd Street and I-84:

  1. Traffic impacts to the intersections of East Idaho Avenue at NE/SE 2nd Street, East Idaho Avenue at NE/SE 3rd Street, and East Idaho Avenue at NE/SE 4th Street are shown in the table. Acceptable levels-of-service are found in future conditions

analysis with the improvements implemented. Note: Impacts should be identified as v/c ratios, lane restrictions and or limitations.

2. As properties in this area develop, the recommendations show added and/or modified street system configurations and locations in the study area around E Idaho Ave.

3. All recommended mitigation measures to address intersections that are adversely impacted within the study area are also shown and addressed in the final recommendations.

The project team developed a timeline for implementing the improvements based on a short, medium and long-term implementation plan. Figure 18 shows the recommended timeline.

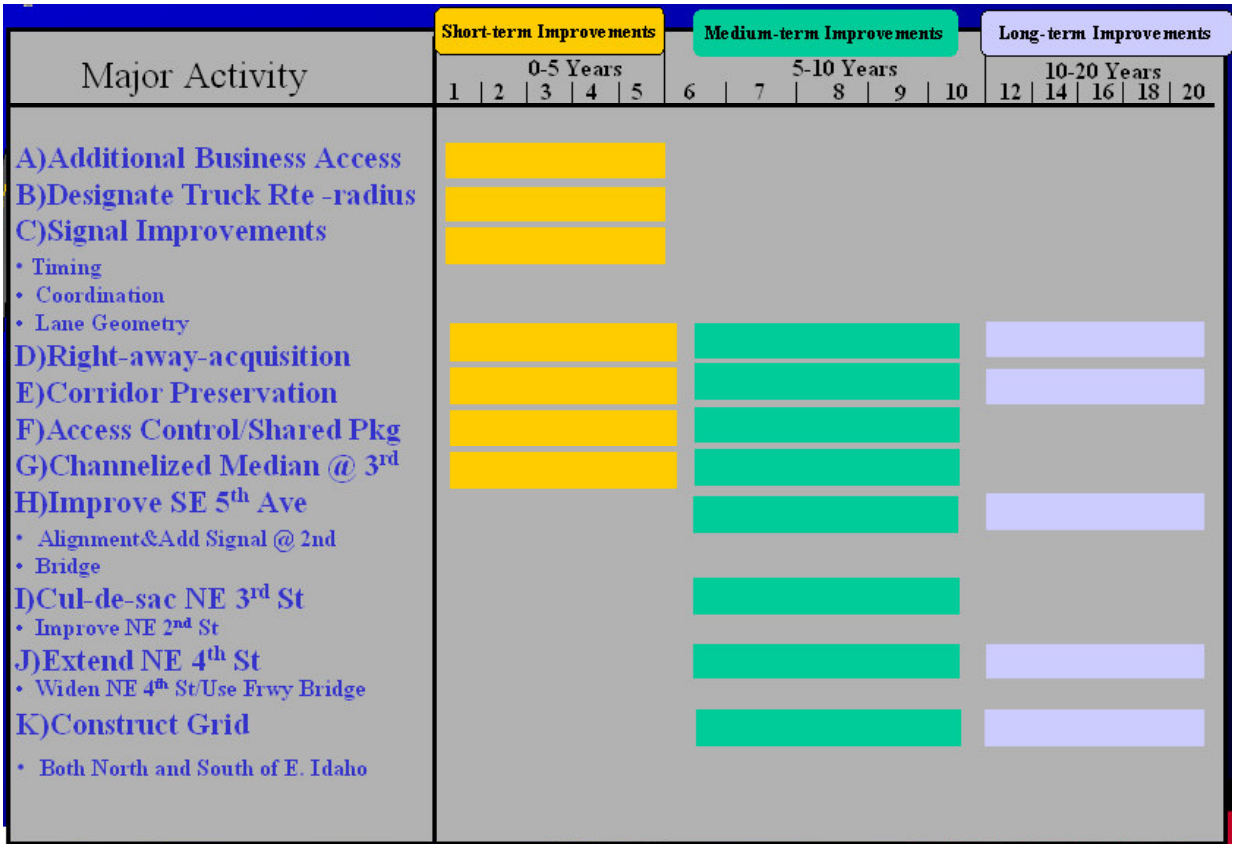


Figure 18. Recommended Improvement Timeline

5.4 APPROXIMATE COST ESTIMATE FOR THE RECOMMENDED IMPROVEMENTS

Table 10 displays the approximate costs associated with the implementation of the recommended alternative and solutions. Costs were obtained using unit average costs from ODOT. Approximate dimensions applied to these unit costs were obtained from semi-scalable aerial mapping. To obtain more exact costs, including labor costs, preliminary engineering estimates would need to be completed using scaled maps/drawings. Thus approximate costs are shown by timeline and improvement activity.

Table 10. Estimated Costs for the Preferred Alternative

Items	Unit Price			Recommended Alternative Improvements											Quantity Total	Cost
				Intersection Improvements					*Roadway Improvements*				*nd Parent Circulation and Access Improve*			
	Our Guess	ODOT	Units	Additional Business Access between 4th Street and Pilot (A)	Designate Truck Routes and instruct operators on the routes - geometric improvements (B)	Optimize and coordinate signals on East Idaho Avenue - Improve lane geometry (C)	Acquire ROW to improve SE/NE 2nd and 4th Streets as major collectors (D)	Preserve corridors by acquiring new ROW as it becomes available (E)	Consolidate driveway accesses along East Idaho Avenue and encourage shared parking (F)	Limit access at the intersection of 3rd Street through the use of a channelized median (G)	Improve SE 5th Avenue to a minor arterial through alignment and crossing improvts - widening (H)	Cul-de-sac NE 3rd Street to redirect traffic to 2nd and 4th Street (I)	Extend NE 4th Street to the underutilized underpass of the Interstate (J)	Construct the North, South, East and West roadway grid around the East Idaho Avenue Corridor (K)		
Right-of-Way (AC/SF)	$25,000/AC	$10.00	/SF	2,500	N/A	N/A	100	426,000	N/A	N/A	1,000	150	1,000	N/A	**430,750**	**$4,307,500.00**
Development of Policies & Standards	$25,000	$15,000.00	/LF	N/A	1	N/A	N/A	N/A	1	1	N/A	N/A	N/A	N/A	**3**	**$45,000.00**
Overall Pavement Frontage Cost (LF)	?	$150.00	/LF	500	50	N/A	100	N/A	N/A	N/A	400	500	800	7,100	**9,450**	**$1,417,500.00**
Striping/Delineation - Painting (LF)	$0.80/LF	$2.15	/LF	1,500	50	200	6,300	N/A	300	300	1,200	500	2,400	21,300	**34,050**	**$73,207.50**
Curb and Gutter (LF)	$8/LF	$11.35	/LF	1,000	50	N/A	600	N/A	150	150	800	500	1,600	14,200	**19,050**	**$216,217.50**
Signal Installation (EA)	$100,000/EA	$104,373.00	/EA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	N/A	**1**	**$104,373.00**
Signal Improvements (EA)	$10,000/EA	$10,000.00	/EA	N/A	N/A	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**3**	**$30,000.00**
Signage Placement/Replacement (EA)	$173/EA	$1,000.00	/EA	2	N/A	2	4	N/A	N/A	N/A	2	1	2	11	**24**	**$24,000.00**
Sidewalk (SF)	$2./SF	$3.30	/SF	200	50	100	600	N/A	150	150	400	500	400	14,200	**16,750**	**$55,275.00**
Earth Work (CY)	$21/CY	$0.30	/CF	N/A	100	N/A	N/A	N/A	N/A	N/A	2,500	100	20	5,000	**7,720**	**$2,316.00**
Landscaping (SF)	$2./SF	$2.50	/SF	N/A	100	200	1,000	N/A	50	50	1,000	50	50	2,000	**4,500**	**$11,250.00**
Drainage Improvements (LF)	$30/LF	$80.00	/LF	100	100	N/A	60	N/A	30	30	500	N/A	N/A	500	**1,320**	**$105,600.00**
Location Total Estimated Cost of Improvement =				**$125,235.00**	**$31,620.00**	**$33,260.00**	**$48,635.00**	**$4,260,000.00**	**$20,367.50**	**$20,862.50**	$128,230.00 *note + bridge & RXR improvement costs	$86,055.00	$156,771.00	**$1,376,325.00**		
Totals																**$6,392,239.00**

Short-Term	$4,539,980.00
Medium-Term	$371,056.00
Long-Term	$1,376,325.00

Appendix A – Traffic Volume Counts (Sample)

Time Begins	Car/Truck/Bike/Ped	Northbound				Southbound				Total North & South	Eastbound				Westbound				Total East & West	Total Intersection Count	Intersection Calculations
		Right	Thru	Left	Total	Right	Thru	Left	Total		Right	Thru	Left	Total	Right	Thru	Left	Total			
7:00	Cars	5	1	4			1	5			4	135	7		1	155	10				
to	Trucks/Bus	2						9			1		6			9	3				
	PCE	9	1	4	14	0	1	23	24	38	6	135	19	160	1	173	16	190	350	388	
7:15	Ped/Bike						1					2				1					
7:15	Cars						1	1			1	63			2	97	6				
to	Trucks/Bus							3				4	1			4	2				
	PCE	0	0	0	0	0	1	7	8	8	1	71	2	74	2	105	10	117	191	199	
7:30	Ped/Bike															1					
7:30	Cars	5				1		12			2	65	1		1	114	10				**Peak 15**
to	Trucks/Bus					2		10				8			1	8	1				418
	PCE	5	0	0	5	5	0	32	37	42	2	81	1	84	3	130	12	145	229	271	
7:45	Ped/Bike											2									
7:45	Cars	6		2		2		3			2	88	2		5	224	22				
to	Trucks/Bus			1				12			1	6				9					**Hourly Volumes**
	PCE	6	0	4	10	2	0	27	29	39	4	104	2	110	5	242	22	269	379	418	1276
8:00	Ped/Bike											1				2					1218
8:00	Cars	2				1		4			1	99	2		3	158	14				1376
to	Trucks/Bus					1		6				6				10					1449
	PCE	2	0	0	2	3	0	16	19	21	1	111	2	114	3	178	14	195	309	330	1398
8:15	Ped/Bike										1					2					
8:15	Cars	1	1	3		2	1	7			4	94	4		3	170	15				
to	Trucks/Bus							8				12				6					**Peak Volume**
	PCE	1	1	3	5	2	1	23	26	31	4	118	4	126	3	182	15	200	326	357	1449
8:30	Ped/Bike																				
8:30	Cars	1				3	1	2			1	120	4		1	152	7				
to	Trucks/Bus					1		9				5				9	2				
	PCE	1	0	0	1	5	1	20	26	27	1	130	4	135	1	170	11	182	317	344	**PHF**
8:45	Ped/Bike																				0.87
8:45	Cars	6		1				5			3	117	4		5	160	14				
to	Trucks/Bus	1				1		4			1	7	1			6	5				
	PCE	8	0	1	9	2	0	13	15	24	5	131	6	142	5	172	24	201	343	367	
9:00	Ped/Bike																				
Lane Totals		61	4	23	46	33	9	261	184	230	46	1717	72	945	45	2649	235	1499	2444	2674	

Appendix B – Example of ITE Trip Generation Manual

Specialty Retail Center
(814)

Average Vehicle Trip Ends vs: **1000 Sq. Feet Gross Leasable Area**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

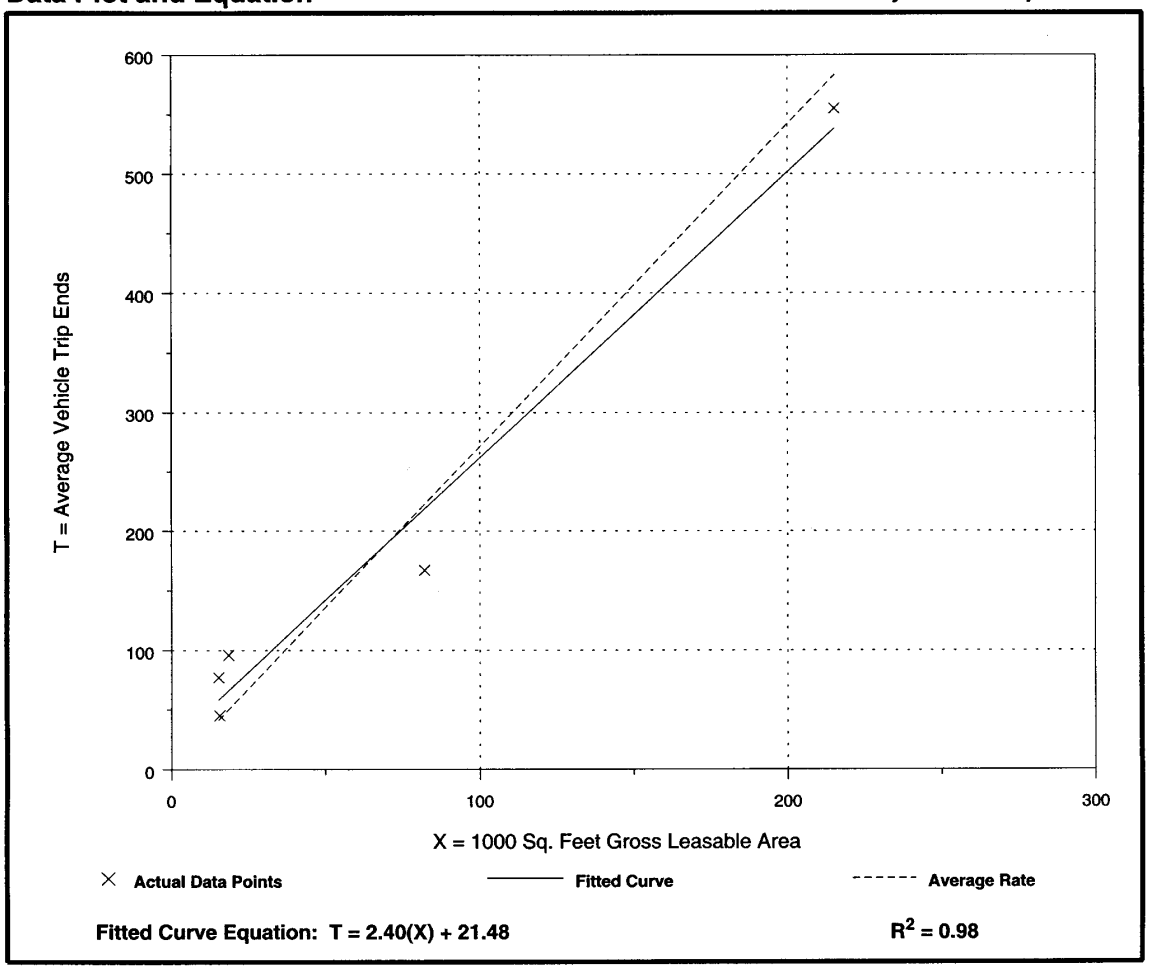
Number of Studies: 5
Average 1000 Sq. Feet GLA: 69
Directional Distribution: 44% entering, 56% exiting

Trip Generation per 1000 Sq. Feet Gross Leasable Area

Average Rate	Range of Rates	Standard Deviation
2.71	2.03 - 5.16	1.83

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Fitted Curve Equation: T = 2.40(X) + 21.48

R^2 = 0.98

Trip Generation, 7th Edition 1339 Institute of Transportation Engineers

General Office Building
(710)

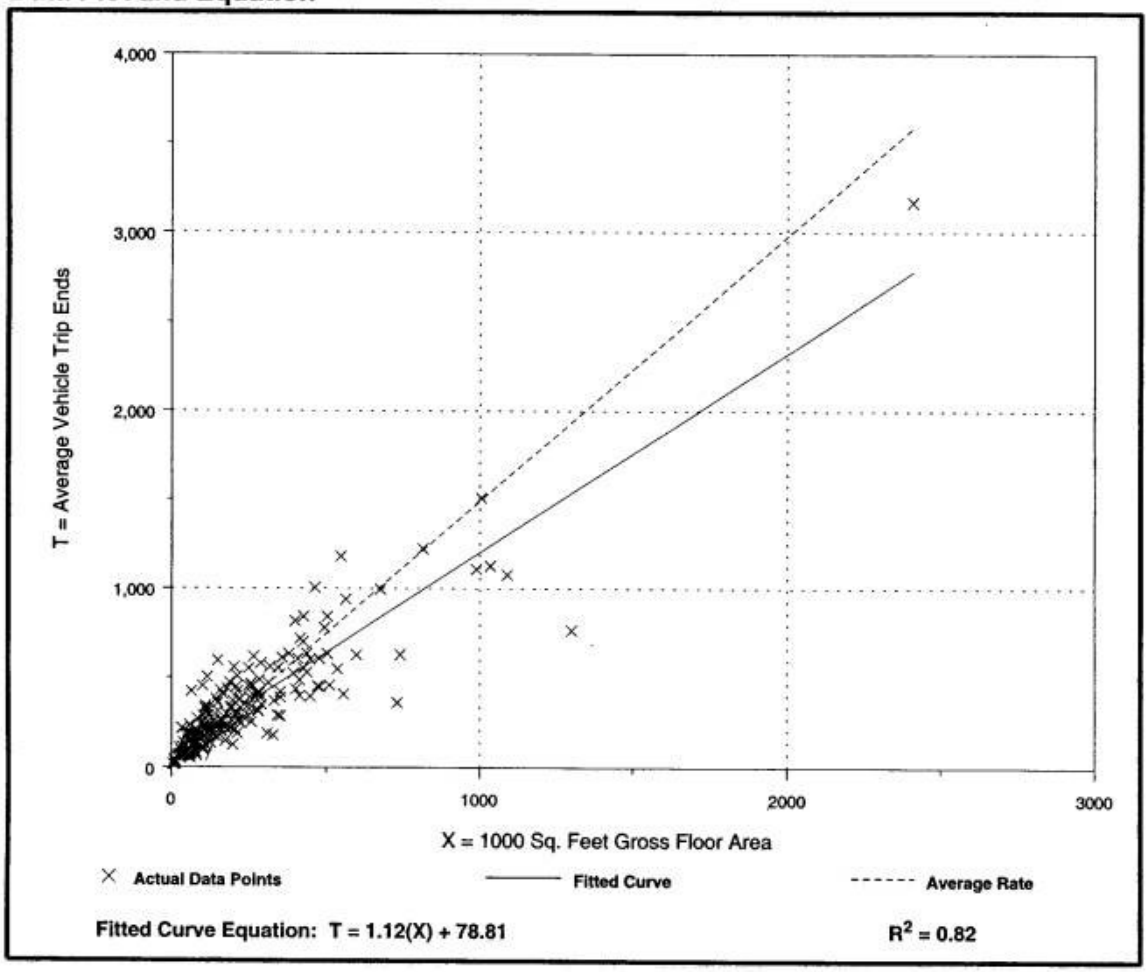
Average Vehicle Trip Ends vs: **1000 Sq. Feet Gross Floor Area**
On a: **Weekday,**
P.M. Peak Hour

Number of Studies: 235
Average 1000 Sq. Feet GFA: 216
Directional Distribution: 17% entering, 83% exiting

Trip Generation per 1000 Sq. Feet Gross Floor Area

Average Rate	Range of Rates	Standard Deviation
1.49	0.49 - 6.39	1.37

Data Plot and Equation



General Light Industrial
(110)

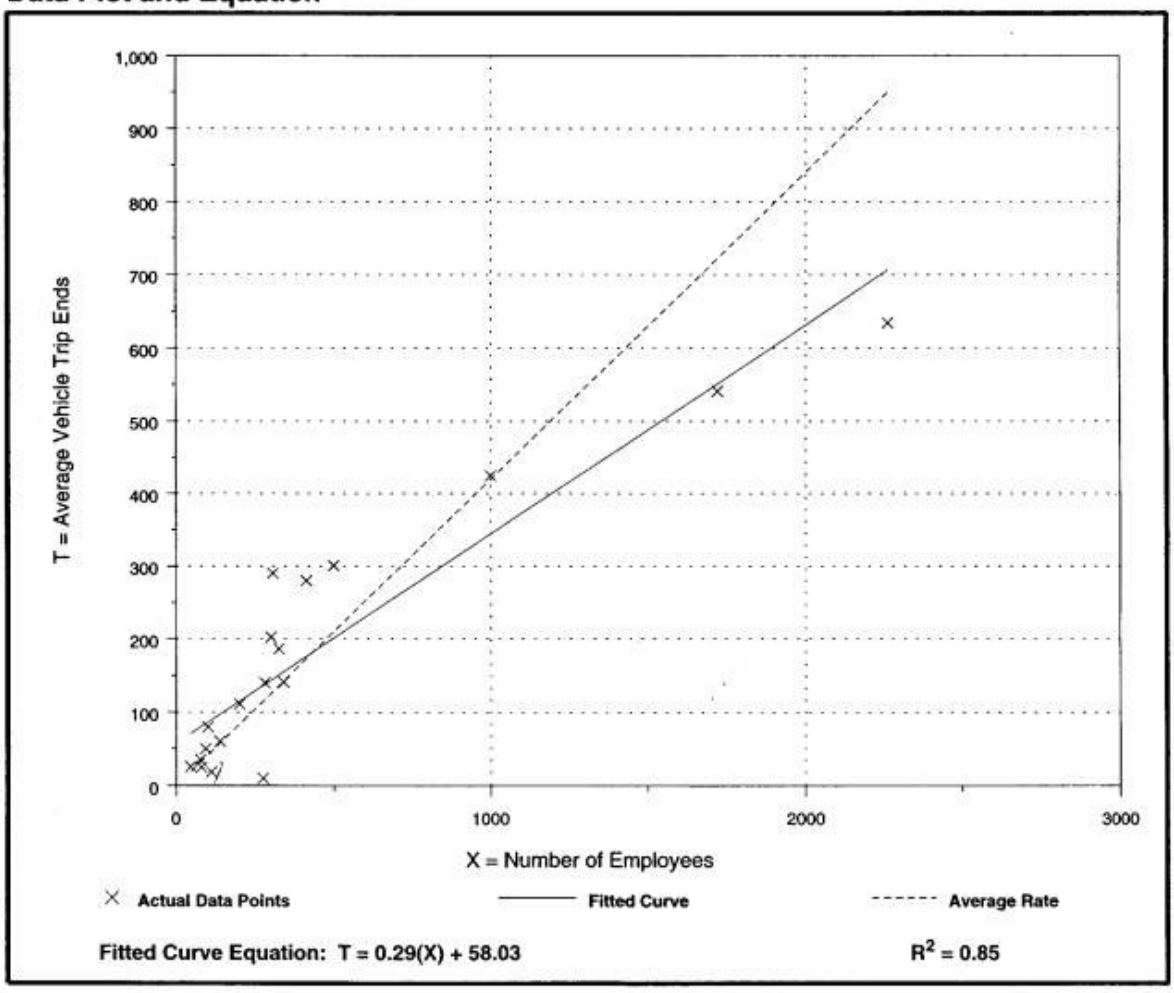
Average Vehicle Trip Ends vs: **Employees**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Number of Studies: 19
Avg. Number of Employees: 451
Directional Distribution: 21% entering, 79% exiting

Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.42	0.04 - 0.95	0.67

Data Plot and Equation

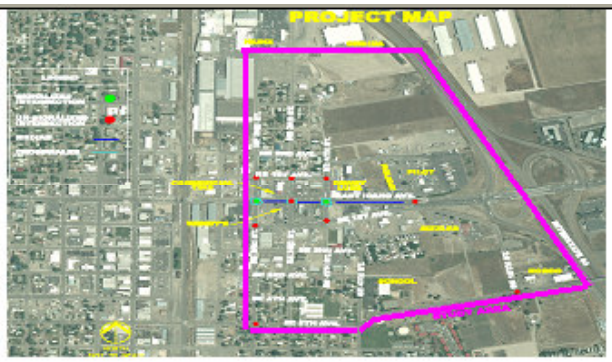


Appendix C – Comment Sheet and Public Meeting Comments

City of Ontario, E. Idaho Avenue
Traffic Access and Circulation Study

Public Open House
July 27, 2004

COMMENT SHEET



Please return your comments by August 4, 2004 to the address printed on the back of this sheet.
If you have questions or need additional information, please call:
Sean Maloney, Project Leader @ 541-889-8558 or email Sean.Maloney@odot.state.or.us

Name: _____ Phone (Optional): _____

Address (optional): _____

Parametrix

A lists of key comments provided on the above comment sheet by those who attended the public open house is shown below:

- Consider a separated grade crossing at SE 5th Avenue railroad tracks to encourage travel on SE 5th Ave.
- Please be certain that Ontario moves immediately to begin to limit commercial accesses off of SE 5th Ave. As it develops, we need to concentrate commercial access off of the interior streets.
- Thanks for holding this great public forum! Conspicuously Absent: Ore-Ida!
- The one-way grid proposal had me worried but I really like the preferred solution. Making SW 5th Ave. a major traffic mover is the way to go and the other added streets will open up a lot of area for development. My major worry is $$-hope you can help a lot!!
- I would like to see the median from 4th Street to Pilot.

Appendix D – Synchro Analysis Results