Appendix

Appendix A: Public Involvement Summary

Technical Memorandum	
To:	Sonya Kazen, Oregon Department of Transportation Matilda Deas, City of Canby
From:	Stacy Thomas, JLA Public Involvement
CC:	Chris Maciejewski, DKS Associates Matt Hastie, Angelo Planning
Date:	July 14, 2009 - **DRAFT**

Project Purpose and Overview

Growth within the City of Canby and surrounding Clackamas County, coupled with a shortage of transportation funding to implement improvements is driving the need to update and reevaluate the City's TSP. The project team for the Canby TSP update is committed to developing creative, cost-effective solutions to meet local needs in a plan that is geared towards implementation.

Key community issues identified by the project team include:

- Connectivity and reducing reliance on Hwy 99E for local trips
- Managing congestion with limited funding sources
- Considering alternative mobility standards for the Hwy 99E corridor
- Connecting the City to gateways (ex. I-5)
- Proving crossing for all modes of transportation of Hwy 99E and the rail corridors

Listening to and engaging the public on these key issues and others they identify is important to the success of the TSP update process. The purpose of the Canby TSP update public involvement plan (PIP) is to provide a process that will result in a community supported plan update by:

- Providing TSP education to stakeholders, so they can understand the project process and regulatory framework

- Forming a Technical Advisory Committee (TAC) and a Citizen Advisory Committee (CAC) to directly engage a broad range of community and governmental stakeholders

- Holding TAC and CAC meetings at key points in the project to providing information and opportunity for input that will guide the TSP update

- Holding community briefings with key business and neighborhood groups

- Engaging the broader community by holding community workshops to provide information and gather input during the alternatives analysis and to review and comment on the draft TSP update

- Providing meeting and project information on the City's website and newsletter, and to the local media

Advisory Committees

Together these groups are charged with helping the PMT and the decision makers to identify and address community issues throughout the planning effort. At major milestones they will be asked to review the technical work and seek consensus-based recommendations that balance the various community interests and accomplish the purposes planning effort.

Technical Advisory Committee (TAC)

The TAC will be composed of local elected officials, resource agency representatives, transportation providers and stakeholders and will provide:

- Project guidance on addressing issues that impact their jurisdiction

- A conduit to stakeholders in their jurisdiction

- Oversight to assure consistency between overlapping agency plans

Citizen Advisory Committee (CAC)

This group will be composed of stakeholders that represent a range of interests including community stakeholders and citizens representing seniors, disabled, low income, youth, business and industry. The CAC shall also strive to include participants from each City neighborhood.

The CAC will provide guidance on identifying and addressing local needs for the Canby Transportation System.

Community Meetings

The following tools are intended to provide greater access to the public and will bring a larger and more inclusive set of participants into the planning process. They include two community workshops and a series of community group briefings.

Workshops

The two workshops will use an open house format and are intended to:

Workshop #1:

Present overview of the project's purpose, existing and future conditions, and *seek feedback* on goals and objectives of the plan as well as *seek suggestions,* through a facilitated discussion, for transportation system alternatives to be considered when developing alternatives to meet the transportation system deficiencies.

Workshop #2:

Present an overview of the Draft TSP and *seek feedback* for the recommended TSP.

Briefings

The City will hold up to five (5) neighborhood briefings and conduct up to eight (8) stakeholder briefings to summarize the Draft Transportation Solutions Report recommendations. These groups should include:

- Impacted neighborhood groups, including area schools
- Pioneer Industrial Park businesses
- Downtown businesses
- Fairgrounds
- Freight representatives

Public Information

Website

A section dedicated to the TSP update will be included on the City's website and will include current technical and process information, including meeting notices, summaries, maps and memos.

News Releases and Articles

News releases will be drafted and issued at key points in the process (ex. project kick-off, prior to community workshops). In addition, staff will write two articles for submission to the *Citizens Quarterly*, one prior to each of the community workshops. Articles can also be used as utility bill inserts.

Mailings/Flyers

Meeting information mailers will be developed prior to each public event. In addition, the staff will develop flyers to be distributed at several locations within the City and planning area. Meeting information will also be included in the City's newsletter.

Tasks and Responsibilities

Task	Description	PI Lead
Public Involvement Plan	Prepare a detailed plan outlining stakeholder outreach methods, advertisement of meetings, distribution of work products, workshop format, and roles and responsibilities	JLA
Project Web Site	Provide content, graphics, layout and updates for project webpage to be hosted on City's website. Initial content should include a planning process description, schedule, opportunities for involvement and contact information. Updates will include current technical and process information, including meeting notices, summaries, maps and memos.	City
TAC and CAC Meetings	Form and facilitate the TAC and CAC, provide meeting logistics and notification, distribute meeting materials Lead presentations, prepare information and display materials, agendas, summaries and graphics	City DKS
Community Workshops	Schedule and provide meeting logistics and set-up, provide staff, distribute/mail meeting notification information and leave-behinds, co-facilitate meeting discussions Prepare meeting notification materials for distribution; meeting format strategy; prepare handouts and PowerPoint information and content for display materials, sign-in sheets and comment cards, provide staff, co-facilitate meeting discussions Lead presentations, prepare information and display materials, agendas, summaries and graphics	City JLA DKS

Community Briefings	Coordinate and facilitate up to five (5) neighborhood briefings and up to eight (8) stakeholder briefings to summarize the Draft Transportation Solutions Report recommendations. Provide written summary of comments received.	City
News Releases	Draft and issue news releases at key project points in the planning process. Act as project contact to the media.	City
Articles	Draft and submit two (2) project articles to the *Citizens Quarterly*, prior to each of the community workshops. Articles can also be used as utility bill inserts.	City
Stakeholder Lists	Compile and update project contact list of interested parties and stakeholders. Keep parties updated with project information	City

Canby Transportation System Plan Update
Community Workshop #1
November 5, 2009
6:30 p.m.
Canby Adult Center

Project Description and Background

This project will prepare an update to the City of Canby's current Transportation System Plan (TSP), which was adopted in 2000. The Canby TSP Update will include implementing land use ordinances and funding strategy recommendations. A TSP is:

- A plan that guides how a community invests in transportation services as growth occurs over the next 20 years.
- A collaboration with other agencies to combine resources for all forms of travel.
- A benchmark and implementation tool for community design principles.

City residents have consistently ranked traffic congestion as a major concern in various City surveys. The TSP Update project is an opportunity to identify alternative approaches for easing that congestion. Transportation alternatives such as improved transit, pedestrian, and bicycle facilities will also be considered for their economic, environmental, and health benefits.

The TSP Update is forecasting transportation needs to serve buildout of the City's Comprehensive Plan land use through the year 2030, which would result in a year 2030 population of 24,700 and approximately 8,500 new jobs. Combined with regional growth in traffic, the resulting increase in demand for transportation facilities needs to be managed with a reasonable investment of City, County, and State transportation funds. Preliminary funding analysis indicates that the City may have a 20-year capital improvement budget of approximately $40 Million to spread throughout the City.

Purpose of Tonight's Meeting

At tonight's meeting, project staff will present findings from existing and future conditions, introduce and seek feedback on goals and policies, and seek suggestions for transportation system alternatives to be considered when developing solutions. Project team members will be staffing four topic areas where you can discuss your concerns and provide suggestions:

- Project Goals and Policies
- Bicycle and Pedestrians Facilities
- Transit and Rail Facilities
- Motor Vehicles Facilities

For more information and to stay involved in this project, please contact:

Matilda Deas, Project Planner, City of Canby
503-266-7001, extension 223
deasm@ci.canby.or.us

Project Schedule
City of Canby TSP Update

	2009: JUL – AUG	2009: AUG – NOV	2009–2010: NOV – APR	2010: APR – JUN
Technical Analysis	Task 1: Project Initiation	Task 2: Existing Conditions and Future Needs	Task 3: Alternatives Analysis	Task 4: Draft TSP Preperation
Public Outreach Process	Advisory Committee Meeting 1	Advisory Committee Meeting 2; Public Event / Workshop 1	Advisory Committee Meeting 3; Key Stakeholder Outreach 1; Advisory Committee Meeting 4	Advisory Committee Meeting 5; Public Event / Workshop 2; Public Event / Workshop 3
Key Work Products	Project Schedule Public Involvement Plan CAC/TAC #1 - Project Intro Draft Ch. 2 - Goals and Policies	Tech Memo - Background Document Review Tech Memo - Future Forecasts Draft Ch. 3 and 4 - Existing Conditions and Future Needs Tech Memo - Industrial Area Cross Sections CAC/TAC #2 - Review Ch. 3 and 4	Community Workshop #1 - Project Info, Goals, Existing and Future Needs CAC/TAC #3 - Preliminary Alternatives Review Draft Transportation Solutions Report Tech Memo - STA Suitability for Downtown Canby Tech Memo - Connectivity to the Industrial Area CAC/TAC #4 - Review Solutions and Funding Options City Outreach to Key Stakeholders/Interest Groups	Tech Memo - Implementing Ordinances Draft TSP CAC/TAC #5 - Review Draft TSP Community Workshop #2 - Review Draft TSP Joint City Council/Planning Commission Work Session Recommended City of Canby TSP

1 Public Event / Workshop

3 Advisory Committee Meeting

1 Key Stakeholder Outreach

DKS Associates
TRANSPORTATION SOLUTIONS

Canby TSP Update Open House

Thursday, November 5th, 2009
Canby Adult Center

Name	Affiliation	Address (including city and zip code)	Phone Number	E-mail
[illegible]	Riverside assoc.	1040 NW 13th	503-266-3919	[illegible]@aol.com
Sandy Woods		358 SE 13th Pl	503-263-3300	
Roger Skoe		1853 N. Teakwood Circle, Canby	503-266-1321	skoe@canby.com
Neale Inahara	Resident	1396 S. Maple St. Canby	503-720-9064	
Susan Myers	✓	372 SE 13th Pl., Canby	503-701-4254	
Edward Walker	✓	1526 N Plum St Canby	503 266 1153	
[illegible]	✓	1441 S Ivy #1201 CANBY	503-266-8870	
Florence Ball	✓	1238 S Cedar Lp Canby	503-266-5313	
Charlie Burden	Roy L. Burden Family Trust	23230 S. Hwy 99E Canby, OR 97013	503-313-7552	chaseburden@msn.com
Tim Dale	Resident	1170 SE 14th Canby 97013	503.657.3001	timd@canby.com
Bryan Brown	City of Canby - Planning		503-266-7001	brownb@ci.canby.or.us

Canby TSP Update Open House

Thursday, November 5th, 2009

Canby Adult Center

Name	Affiliation	Address (including city and zip code)	Phone Number	E-mail
Jackie Jones		482 SW 13th Ave 97013	503 266 6405	~~jack~~ jacqjones@msn.com
Dwayne Barnes		829 N. Maple Lane	503 ~~266~~ 266 4104	barnesd@ci.canby.or.us
Kelly Barnes		"		

City of Canby TSP Update
Public Workshop #1–Meeting Summary

Meeting Date:	Thursday, November 5, 2009 6:30 pm – 8:00 pm
Project Team Attendance:	Matilda Deas, City of Canby Chris Maciejewski, DKS Brad Coy, DKS Stacy Thomas, JLA Public Involvement
Location:	Canby Adult Center
Community Attendance:	14 people signed in

Workshop Purpose:

The purpose of the first public workshop was to introduce the Transportation System Plan (TSP) update project to the community, present findings from existing and future conditions, introduce and seek feedback on goals and policies, and seek suggestions for transportation system alternatives to be considered when developing solutions. A two-page project information handout was given to participants when they signed in, and included a project schedule.

Flow of the Workshop:

Chris Maciejewski, the consultant project manager, began the workshop by welcoming participants, introducing project team members, and leading a PowerPoint presentation about the TSP project. He discussed the project background, key areas of the TSP, and findings from existing and future conditions.

Following the presentation, Chris encouraged participants to visit and provide input at four stations corresponding to the TSP's key areas. Members of the project team staffed each station and summarized community input. The meeting ended at approximately 8:00 p.m.

Demographics of Workshop Participants:

Fourteen community members attended the workshop.

Attendees identified where they live and work on a large map of Canby and the surrounding area. Four people indicated that they work within the City of Canby. Ten people identified they live within the City of Canby.

Public Input:

Participants were given the opportunity to visit four information and input stations during the workshop. Each station was staffed by a member of the project team. Public input was noted on maps, flipcharts or boards at each station, and is summarized below.

Station 1: Project Goals and Policies

Participants were asked to rate the goals and policies most important to them by placing a total of six dots next their selected goal(s)/policy(ies). Participants could use the dots however they chose. For example, they could place their dots by six different goals/policies, or use all six dots next to one specific goal/policy. A summary of the ranking exercise follows. The top three rated goals/policies are shown in bold.

- **Goal 1 (Livability), policy (d) received 19 dots**
  - *Provide an adequate truck route network with reasonable connectivity between the industrial areas and the regional road network, while limiting commercial and neighborhood conflicts. Protect residential neighborhoods, school zones, and parks from excessive truck traffic, noise, and pollutants.*
- **Goal 2 (Safety), policy (a) received 5 dots**
  - *Design and maintain safe and secure pedestrian and bicycle ways between residential neighborhoods, parks, schools, the Clackamas County fairgrounds, downtown Canby, and other activity centers. Sidewalks should be provided on all public streets within city limits, especially along South Ivy Street.*
- Goal 2 (Safety), policy (c) received 1 dot
  - *Design safe and efficient vehicle, bicycle, pedestrian, and transit crossings at existing at-grade Union Pacific Railroad crossings, especially when high speed passenger rail service is provided in the future. Consider new grade separation projects to safely accommodate vehicles and/or bicycle, pedestrian and transit crossings.*
- Goal 2 (Safety), policy (f) received 1 dot
  - *Install traffic calming measures (e.g. pavement treatments at pedestrian crossings, driver speed feedback signs, speed humps, curb extensions, traffic circles, and diverters) at strategic locations to lower travel speeds and improve pedestrian safety.*
- **Goal 3 (Vitality), policy (g) received 10 dots**
  - *Work with the State and County to improve Canby's connection to I-5 to allow for improved commuter and commercial travel. In the short term, reduce delays at OR 99E/Barlow Road. In the long term, develop a more direct, efficient roadway between Canby and I-5.*
- Goal 5 (Travel Choices), policy (a) received 1 dot
  - *Construct sidewalks (with planter strips, see Policy 1.f) on both sides of all streets. Include sidewalk construction in all roadway improvement projects and implement local improvement districts (LIDs) when possible to complete and connect missing sidewalk throughout town.*
- Goal 5 (Travel Choices), policy (i) received 1 dot
  - *Support transportation services for the handicapped.*
- Goal 6 (Quality Design), policy (h) received 2 dots
  - *Require developers to include pedestrian, bicycle, and transit-supportive improvements within proposed developments and to adjacent rights-of way in accordance with adopted policies and standards.*
- Goal 6 (Quality Design), policy (i) received 1 dot
  - *Require developments adjacent to undeveloped land to provide local street stubs that future developments can connect to.*
- Goal 6 (Quality Design), policy (j) received 1 dot
  - *Require developments along rail lines to plan sites and transportation facilities to allow for rail service without blocking motor vehicle traffic. Require developments to install features to block rail noise and to provide barrier fences or walls as appropriate to ensure safety and reduce rail impacts.*

- Goal 7 (Reliability and Mobility), policy (d) received 1 dot
    - *Adopt City mobility standards to evaluate the impacts of growth on City facilities and to ensure sufficient capacity to accommodate future travel demand (vehicular, bicycle, pedestrian, etc.) along Canby's collector and arterial streets, and along OR 99E. The standard for signalized, all way stop, or roundabout intersections should be level of service D and a volume to capacity ratio equal to or less than 0.85. The standard for unsignalized two way stop control intersections should be level of service E and a volume to capacity ratio equal to or less than 0.90. Mobility should be evaluated by methods approved by the City Engineering or Public Works Department (e.g. Highway Capacity Manual or aaSidra for roundabouts). The City standard for OR 99E must meet or exceed the Oregon Highway Plan mobility standard for the highway.*
- Goal 8 (Efficient and Innovating Funding), policy (d) received 1 dot
    - *Maximize the cost effectiveness of transportation improvements by prioritizing operational enhancements and improvements that address key bottlenecks.*
- Goal 9 (Compatibility), policy (e) received 2 dots
    - *Coordinate with the County and State agencies to ensure that improvements to County and State highways within the City benefit all modes of transportation.*

Station 2: Bicycle and Pedestrian Facilities

- Pedestrian visibility/safety on 13th at crosswalk near school
    - Vehicles do not stop or slow down even though there is a speed bump
    - Maybe add lights to road (inset cross-walk lights)
- S. Ivy has large sections of missing sidewalks
- 13th should not be a truck route (because there are schools, parks, etc.) – there needs to be an alternate route for industrial area traffic
- Arndt Road – I-5 – 3rd Avenue connection
- Pine Street/99 pedestrian cross walk flashing hand too short of time to cross

Station 3: Transit and Rail Facilities

- Better transit connections to cinema – to accommodate kids taking the bus
- Wish CAT would run on Saturdays and be more direct
- Explore alternate funding for transit (not just business)

Station 4: Motor Vehicle Facilities

- Difficult to turn out from Birch to Knights Bridge
- Concerned about a truck route on 13th – safety at schools and parks (2 comments)
- Look at 99E/Barlow – southbound left turn lane; split timing; interchange
- Route trucks from industrial area headed southwest down Mulino to Lone Elder towards Aurora – school buses too
- Pine/4th Street is a mess, especially during the fair
- Ivy/Township – hard to make turns

Public and Media Outreach

Matilda Deas, Project Planner for the City of Canby, managed the public and media outreach for the workshop by publishing a meeting notice in *The Canby Herald*, the city's local newspaper, on October 28th and producing and posting meeting fliers in both English and Spanish at the Canby Public Library, Canby Planning Department office, Canby City Hall and on Cutsforth's Thriftway community message board. The fliers indicated that a Spanish speaking staff member would be available at the meeting. Copies of the fliers and newspaper notice are attached.

YOU'RE INVITED!

TO WHAT? **A PUBLIC WORKSHOP TO DISCUSS CANBY'S TRANSPORTATION SYSTEM PLAN UPDATE**

WHEN? **6:30 PM THURSDAY NOV. 5TH**

WHERE? **CANBY ADULT CENTER**
1250 S IVY STREET IN CANBY

The City of Canby is working with DKS Associates Inc. to update our Transportation System Plan. The Transportation System Plan identifies transportation facilities needed to support our community's transportation needs over the next 20 years, which also includes bicycle and pedestrian facilities.

We hope you can join us for this facilitate discussion and meet the consultants working with the City on this project.

For more information contact

Matilda Deas, AICP
Canby Planning Department
170 NW 2nd Avenue
Canby, OR 97013

Staff speaks Spanish and will be available at this community forum

¡LE INVITAN!

¿A QUÉ? **UNA SESIÓN PÚBLICA PARA DISCUTIR LA ACTU ALIZACIÓN DEL PLAN DEL SISTEMA DEL TRANSPORTE DE CANBY**

¿CUÁNDO?

¿DÓNDE? **CANBY ADULT CENTER**
1250 S IVY STREET IN CANBY

La ciudad de Canby está trabajando con DKS Associates Inc. para poner al día nuestro plan del sistema del transporte. El plan del sistema del transporte identifica las instalaciones del transporte necesitadas para apoyar las necesidades del transporte de nuestra comunidad durante los 20 años próximos cuál también incluye instalaciones de la bicicleta y del peatón. Esperamos que usted pueda ensamblarnos para esto discusión facilitada y satisfacer a los consultores que trabajan con la ciudad en este proyecto.

Contacto para más información:

Matilda Deas, AICP
Departamento del Planeamiento de Canby
170 NW 2nd Avenue
Canby, OR 97013
503-266-7001

NOTICE OF PUBLIC WORKSHOP

CITY OF CANBY

The City of Canby invites the public to attend a workshop and discussion facilitated by the consultants leading the City of Canby's Transportation System Plan Update process.

The community workshop will be held at the Canby Adult Center located at 1250 S. Ivy Street from **6:30 PM to 8 PM on Thursday November 5, 2009.**

For additional information contact Matilda Deas, AICP

City of Canby Planning Department
503-266-7001

Published in the Canby Herald on Oct 28, 2009
Sent to the Canby Herald on Oct 23, 2009

E-mail to: pjones@eaglenewspapers.com
Please send proof. Fax Number 503-266-1574
If you have questions, please call Jill Thorn at 503-266-7001
Account ____100-103-419-6100_________________

Canby Transportation System Plan Update
Community Workshop #2
May 26, 2010
6:30 p.m.
Canby Adult Center

Project Description and Background

The City of Canby has just completed a draft update to the current Transportation System Plan (TSP), which was adopted in 2000. The Canby TSP Update includes implementing land use ordinances and funding strategy recommendations. A TSP is:

- A plan that guides how a community invests in transportation services as growth occurs over the next 20 years.
- A collaboration with other agencies to combine resources for all forms of travel.
- A benchmark and implementation tool for community design principles.

The Draft TSP was prepared with strong public and agency participation and received input from a technical advisory committee, a community advisory committee and the public, through community workshops. The TSP Update project identifies alternative approaches to address the following key deficiency areas:

- Lack of connectivity due to railroads, rivers, wetlands, and development patterns
- Lack of east-west capacity on OR 99E due to limited presence of parallel routes
- Lack of intersection turning capacity at key intersections

The TSP Update is forecasting transportation needs to serve buildout of the City's Comprehensive Plan land use through the year 2030, which would result in a year 2030 population of 24,700 and approximately 8,500 new jobs. Combined with regional growth in traffic, the resulting increase in demand for transportation facilities needs to be managed with a reasonable investment of City, County, and State transportation funds. It is expected that the City will have approximately $36 million for new transportation improvement projects and programs based on existing revenue sources.

Purpose of Tonight's Meeting

At tonight's meeting, project staff will present an overview of the draft Canby TSP and the proposed projects and will seek public input. You can discuss the draft TSP with project team members at the following project stations:

- Bicycle and Pedestrians Facilities
- Transit and Rail Facilities
- Motor Vehicles Facilities
- Funding Plan

- *Over* -

What's Next

The next opportunity for public comment on the plan will be on June 9, 2010 at the joint City Council/Planning Commission work session.

Project Contact Information

For more information and to stay involved in this project, please contact:

Matilda Deas, Project Planner, City of Canby
503-266-7001, extension 223
deasm@ci.canby.or.us

Canby TSP Update Open House

Thursday, May 27, 2010

Name	Affiliation	Address (including city and zip code)	Phone Number	E-mail
Torgeson James A.	Property Owner (Canby Area)	1331 SE 51st, Portland, OR 97215	503.310.6014	jsatt@pcez.com.
Trost Jim	Canby resident	N Ivy St Canby	503 651-2527	jamest@canby.com
Roger Skoe		1853 N. Teakwood Cir	503 266-1321	skoe@canby.com
John J. Henri	Resident / City Council	2029 N. Forest Ct. Canby	(503) 263-6300	jhenri@jjhenri.com
Lisa Weygandt		2522 SE Township Rd	503-266-5877	wey1013@mac.com
Chris German	Canby Resident Tofte Farms	1374 S Maple St Canby	503-266-3278	tcgerman@canby.com

Canby TSP Update Open House

Thursday, May 27, 2010

Name	Affiliation	Address (including city and zip code)	Phone Number	E-mail
Randy Carson		556 SE 10th Ave Canby Or 97013	503-266-5624	
Don & Peggy Peterson	Parsons Canby Phcy.	294 N.W. 2nd Ave Canby	503-266-3053	[redacted]peterson@web-ster.com
Susan Myers	Tofte Farms HOA	372 SE 13th Canby OR	503-263-1820	Susanmyers@Canby.com
Bryan Brown	City of Canby - Staff			

City of Canby TSP Update
Public Workshop #2 – Meeting Summary

Meeting Date:	Thursday, May 27, 2010 6:30 pm – 8:30 pm
Project Team Attendance:	Matilda Deas, City of Canby Chris Maciejewski, DKS Brad Coy, DKS Stacy Thomas, JLA Public Involvement
Location:	Canby Adult Center
Community Attendance:	11 people signed in

Workshop Purpose:
The purpose of the second public workshop was to introduce the draft Transportation System Plan (TSP) update to the community, present proposed solutions included in the draft plan, and to receive public feedback. A one-page project information handout was given to participants when they signed in.

Flow of the Workshop:
Chris Maciejewski, the consultant project manager, began the workshop by welcoming participants, introducing project team members, and leading a PowerPoint presentation about the draft TSP. He discussed the key areas of the TSP, and outlined the proposed projects included in the draft plan.

Following the presentation, Chris encouraged participants to visit with staff, review information boards, and provide input on comment cards. The meeting ended at approximately 8:30 p.m.

Demographics of Workshop Participants:
Eleven community members attended the workshop.

Attendees identified where they live and work on a large map of Canby and the surrounding area. Five people indicated that they work within the City of Canby. Eight people identified they live within the City of Canby.

Public and Media Outreach:
Matilda Deas, Project Planner for the City of Canby, managed the public and media outreach for the workshop by publishing a meeting notice in *The Canby Herald*, the city's local newspaper, on May 22, 2010 and producing and posting meeting fliers in both English and Spanish at the Canby Public Library, Canby Planning Department office, Canby City Hall and on Cutsforth's Thriftway community message board. The fliers indicated that a Spanish speaking staff member would be available at the meeting.

The workshop participants were encouraged to attend and to provide comment at the joint City Council/Planning Commission work session on June 9th.

Summary of Public Comments:

During the PowerPoint presentation outlining the draft TSP, the following comments were heard from workshop participants:

- Participant felt there was a lack of notice for both tonight's meeting and the TSP update process and believed because all property owners are potentially affected by the TSP, they should receive direct notice. Matilda explained that it was not possible to send a direct mailing to all city residents, businesses and property owners due to cost. However, she outlined the various ways the meeting was noticed, including advertisement in the Canby Herald, contacting neighborhood associations, and various postings around town, detailed in the Public and Media Outreach section above. Chris explained that the plan is still a draft document, and public input on the draft plan is being sought during tonight's meeting.
- Two participants who own business property on Grant believed that the proposed one-way direction on Grant will ruin Canby's downtown by making it harder to reach businesses on that street. They would like the one-way directions proposed for Grant and Ivy to be switched. They were also concerned with the loss of parking in the downtown area.

The following are copies of the comment cards received at the workshop.

Comment Card:
I would like to see a roundabout (S. Haines, Bremer, Mulino, SE 1st Ave. and a new direct connection to Otto Rd.). Do not designate S. Haines Rd. as a truck route. Do not designate SE 1st Ave. as a truck route.

Comment Card:
Encouraged by thought put into bike facilities. An easier access from downtown to the Safeway area, one that would not require riding on the highway would be very helpful.

Comment Card:
Thank you for providing this opportunity for feedback. I appreciate that SE 13th is no longer a truck route. I hope that more improvements are made to support pedestrian crossing safely across 13th Ave. to the schools and parks. Love the Otto Rd. crossing idea to move industrial traffic quicker to 99E and they are off the interior roads.

Canby Transportation System Plan Update
Community Workshop #2
May 26, 2010

Project Description and Background

The City of Canby has just completed a draft update to the current Transportation System Plan (TSP), which was adopted in 2000. The Canby TSP Update includes implementing land use ordinances and funding strategy recommendations. A TSP is:

- A plan that guides how a community invests in transportation services as growth occurs over the next 20 years.
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- Lack of connectivity due to railroads, rivers, wetlands, and development patterns
- Lack of east-west capacity on OR 99E due to limited presence of parallel routes
- Lack of intersection turning capacity at key intersections

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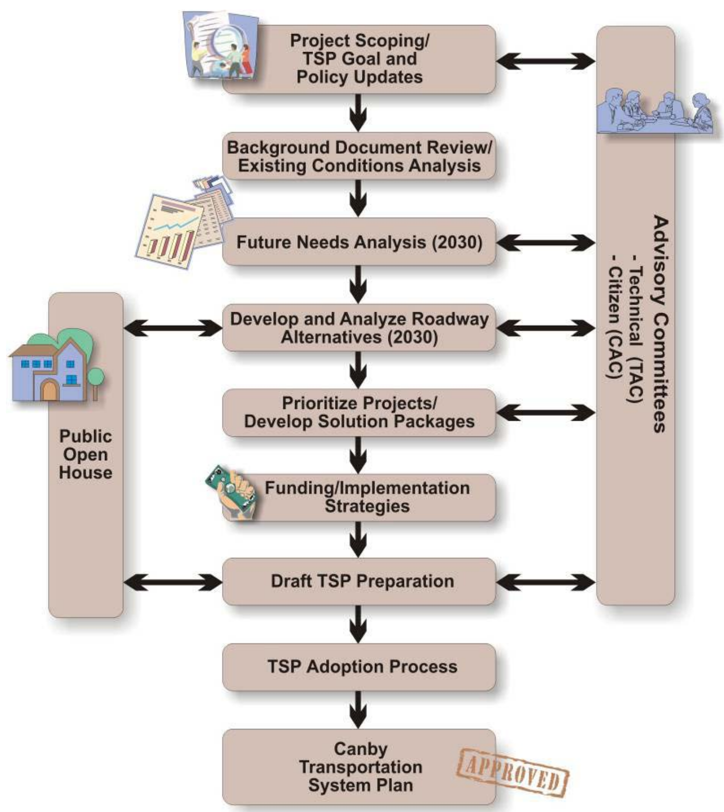
- Bicycle and Pedestrians Facilities
- Motor Vehicles Facilities
- Funding Plan

What's Next

The next opportunity for public comment on the plan will be on June 9, 2010 at the joint City Council/Planning Commission work session.



Project Contact Information

For more information and to stay involved in this project, please contact:

Matilda Deas, City of Canby, 503-266-7001, deasm@ci.canby.or.us

YOU'RE INVITED!

TO WHAT? A PUBLIC OPEN HOUSE TO PREVIEW CANBY'S DRAFT TRANSPORTATION SYSTEM PLAN UPDATE

WHEN? 6:30 PM THURSDAY MAY 27TH

WHERE? CANBY ADULT CENTER
1250 S IVY STREET IN CANBY

The City of Canby is working with DKS Associates Inc. to update our Transportation System Plan. The Transportation System Plan identifies transportation facilities needed to support our community's transportation needs over the next 20 years, which also includes bicycle and pedestrian facilities.

We hope you can join us for this facilitated discussion and meet the consultants working with the City on this project.

For more information contact
Matilda Deas, AICP
Canby Planning Department
170 NW 2nd Avenue
Canby, OR 97013
503-266-7001
deasm@ci.canby.or.us

Staff speaks Spanish and will be available at this community forum

Posted around town – City Hall, Library, Planning Dept, Thriftway

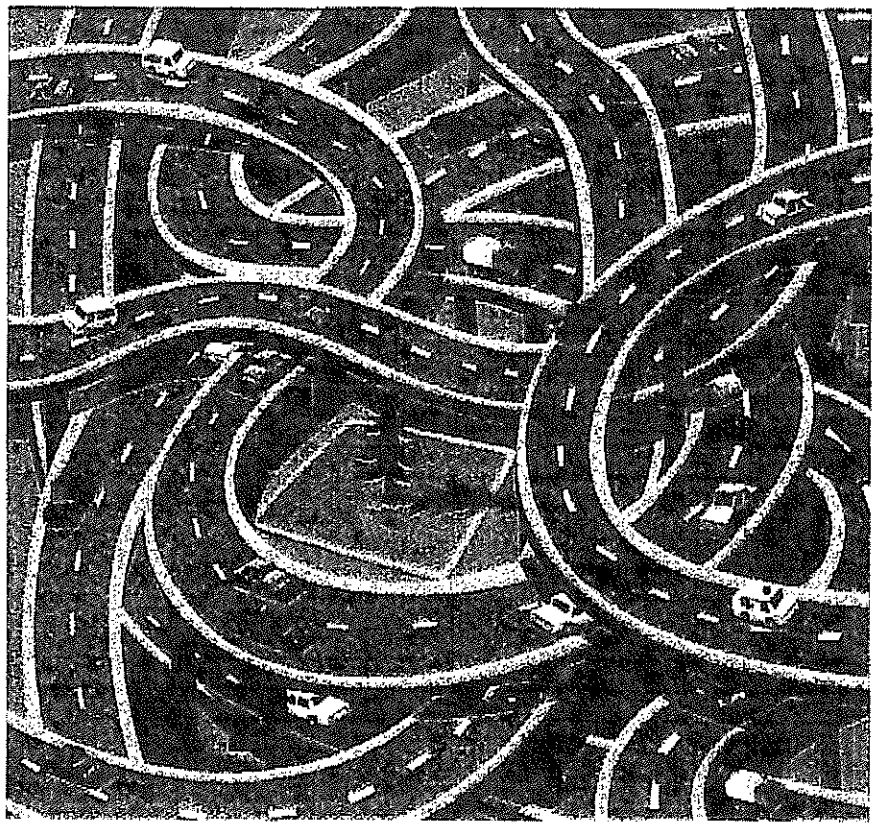
¡LE INVITAN!

¿A QUÉ? UNA CASA ABIERTA A LA ACTUALIZACIÓN DEL PLAN DEL SISTEMA DEL TRANSPORTE DEL BOSQUEJO DE CANBY DE LA INSPECCIÓN PREVIO

¿CUÁNDO? 6:30 P.M. EL JUEVES 27 DE MAYO

¿DÓNDE? CANBY ADULT CENTER
1250 S IVY STREET IN CANBY

La ciudad de Canby está trabajando con DKS Associates Inc. para poner al día nuestro plan del sistema del transporte. El plan del sistema del transporte identifica las instalaciones del transporte necesitadas para apoyar las necesidades del transporte de nuestra comunidad durante los 20 años próximos cuál también incluye instalaciones de la bicicleta y del peatón. Esperamos que usted pueda ensamblarnos para esto discusión facilitada y satisfacer a los consultores que trabajan con la ciudad en este proyecto.



Contacto para más información:

Matilda Deas, AICP
Departamento del Planeamiento de Canby
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503-266-7001
deasm@ci.canby.or.us

Date:	# Of Pages: 2	QUICK FAX OfficeMax
To: Stacey		From: Matilda
Co./Dept.		Co./Dept. Canby Planning
Fax: 503-230-4877		Fax:
Phone:		Phone: 503 266 7001
Note:		E-Mail:

Canby TSP Update Open House

Thursday, May 27, 2010

Name	Affiliation	Address (including city and zip code)	Phone Number	E-mail
Torgeson James A.	Property Owner (Canby Area)	1331 SE 51st, Portland, OR 97215	503.310.6014	jsaltc@pcez.com.
Trost Jim	Canby resident	N Ivy St Canby	503 651-2527	jamest@canby.com
Roger Skoe		1853 N. Teakwood Cir	503 266-1321	skoe@canby.com
John J. Henri	Resident / City Council	2029 N. Forest Ct. Canby	(503) 263-6300	jhenri@jjhenri.com
Lisa Weygandt		2522 SE Township Rd	503-266-5877	wey1013@mac.com
Chris German	Canby Resident Tofte Farms	1374 S Maple St Canby	503-266-3278	tcgerman@canby.com

Canby TSP Update Open House

Thursday, May 27, 2010

Name	Affiliation	Address (including city and zip code)	Phone Number	E-mail
Randy Carson		556 SE 10th Ave Canby Or 97013	503-266-5624	
Don & Peggy Peterson	Parsons Canby Phcy.	294 N.W. 2nd Ave Canby	503-266-3053	[redacted]peterson@web-ster.com
Susan Myers	Tofte Farms. HOA	372 SE 13th Canby, OR	503-263-1820	Susanmyers@Canby.com
Bryan Brown	City of Canby - Staff			

Canby TSP Update Open House

May 27, 2010

Name: Roger Skoe

Email (if you wish to receive project updates): ______________________

Please share any comments you have about the project:

I would like to see a roundabout (S Haines, Bremer, Mulino, SE 1st Ave, + a new direct connection to Otto Rd).

Do not designate S. Haines Rd as a truck route

Do not designate SE 1st Ave as a truck route

Canby TSP Update Open House
May 27, 2010

Name: Chris German

Email (if you wish to receive project updates): tcgerman@canby.com

Please share any comments you have about the project:

Thank you for providing this opportunity for feedback. I appreciate that SE 13th is no longer a truck route. I hope that more improvements are made to support pedestrian crossing safely across 13th Ave to the schools and parks.

Love the Otto Rd crossing idea to move industrial traffic quicker to 99E and they are off the interior roads

Canby TSP Update Open House
May 27, 2010

Name: Jim Trost

Email (if you wish to receive project updates): jamost@canby.com

Please share any comments you have about the project:

Encouraged by thought put into bike facilities.

An easier access from downtown to the Safeway area, one that would not require riding on the highway would be very helpful.


Proposed Circulation Modification
N
Grant
3rd
Holly
Ivy
2nd
1st
OR 99E
Restripe to provide 3 lanes from 2nd to 99E
Convert one-block to parallel parking
Diverter to prohibit westbound
Diverter to prohibit eastbound
Add Turn Lane
Convert to one-way
Diverter to prohibit eastbound
Right Only
2nd
3rd
Convert to one-way
Right Only
Left Only
Narrow to 2 lanes
Add Turn Lane
Convert to one-way
Realign 2nd
Right Only
Left Only
Right Only
Traffic Signal
Stop Sign

Canby TSP Citizen Advisory Committee Protocols

Meeting Ground Rules:

- Treat everyone with respect.
- Listen carefully with the intent of understanding.
- Let others finish before speaking.
- Share the air– let others speak once before speaking twice.
- Raise issues honestly, clearly and early in the process.
- Focus questions and comments on the subject at hand and stick to the agenda.
- When discussing events or issues of the past, apply them productively to the present discussion.
- Seek to find common ground.
- Prepare for meetings by reading materials in advance and arriving on time.
- Notify staff in case of absence.
- Put cell phones on silent mode.

Meeting Protocols:

- Meetings will end on time. If agenda items cannot be completed on time, the group will decide if the meeting should be extended or if an additional meeting should be scheduled.
- Meetings will be facilitated.
- If we have an unavoidable conflict that requires us to be late or absent, we will notify the staff.
- Project staff will support the team process by distributing agendas in advance by e-mail; providing discussion materials in advance, when possible; responding to questions respectfully and honestly; and providing requested information in a timely manner.

Between meetings, members will:

- Be free to speak with each other about issues and in ways that support the group process.
- Not take actions or discuss issues in any way that undermines the group process.
- Notify the project team (City or DKS) with information that the other members and the project team need to hear.
- Share information with our represented groups with help from the project team.
- Notify City staff about any communications with the news media.

Decision making

- The CAC is an advisory body that does not make formal votes in the TSP development process.
- Recommendations on TSP materials will be made by general agreement of the CAC.
- General agreement is the point at which the majority of the CAC members can support the decision as the most viable choice (although it may not be their personal favorite).
- If the group has strong divisions on an issue, the project team may work with those with opposing views outside of the meetings to try to find a solution.
- If it is clear after repeated attempts that developing general agreement is not possible, the committee’s issues will be forwarded along with the Draft TSP for consideration by Planning Commission and City Council.

July 23, 2009

Canby TSP
CAC Meeting #1 Summary
July 23, 2009 (5-8 p.m.)
Canby City Hall

CAC Members Present:	Jan Milne (Planning Commissioner), Susie Myers (SECNA), Jackie Jones (SWCNA), Leonard Walker (NECNA), Bob Tice (Canby Livibility)
CAC Members Absent:	John Henri (City Councilor), Tom Finch (Riverside NA), Sandy Wood (SECNA), Representatives for the Chamber of Commerce or Bike/Pedestrian interest groups
Agency Team Present:	Matilda Deas and Bryan Brown (City of Canby), Sonya Kazen (ODOT Region 1)
Consultant Team:	Chris Maciejewski and Brad Coy (DKS)

I. Tour of Canby
   a. The CAC members, consultants, and agency team toured the city to view the particular areas of greatest concern and explain the issues to the consultant team. During the tour, various issues were discussed.
   b. Leonard – one main issue of concern was how he saw a dangerous maneuver at the Dairy Queen driveway near Elm St: a driver turned left out of the site, got impatient, and drove the wrong way in order to circumvent the queue waiting at the Elm St traffic light . . . replacing the double yellow center line with a median may be one way to address this and similar issues
   c. West Industrial Area
      i. The two legs of 3rd Ave at Cedar are offset and are part of the truck route to service the western industrial area. The offset geometry and location of on-street parking may make the movement difficult for trucks.
      ii. 3rd Street is narrow and the on-street parking makes it difficult for two-way travel with trucks
      iii. There used to be truck cut-through to neighborhoods to the north, but a one-way restriction was put in to limit that
      iv. Johnson Controls is one of the largest employers in the City (making batteries) and generates truck traffic during all hours
      v. Trucks cutting through the residential area is a major issue
      vi. Sonya mentioned that a land use option to solve the truck impact on neighborhoods is to relocate the industrial uses to the Sequoia Industrial Park and redevelop the west industrial area
      vii. A solution that was examined in the prior TSP included a new road connection over the railroad that would connect to Hwy 99E at Berg Pkwy

d. Highway 99E Issues
    i. Elm/99E and Ivy/99E
        1. Congestion is bad during the peak (15 minutes near 5 pm) and drivers on the Elm or Ivy approaches often have to wait 2 or 3 cycles
            a. Chris mentioned that adaptive signal timing may be a good option to consider for the highway intersections to respond to surges in traffic and better serve the side-street if the demand on the highway doesn't require as much green time
    ii. Ivy/99E
        1. This is one of the most problematic intersections . . . the old historical building on the southwest corner is a big obstacle to improving the intersection
    iii. Bus stops
        1. Buses must stop in the middle of the right travel lane
    iv. Pedestrian facilities
        1. The trail crossing is the only good facility
        2. Otherwise Hwy 99E is not pedestrian friendly in any way because sidewalks are limited and there are no street trees or other buffer

e. Fairgrounds
    i. Odd angled intersections and roads connecting near the fairgrounds
    ii. No sidewalk facilities = dangerous! Problem waiting to happen
        1. County in the past has been very unresponsive regarding providing right-of-way to use to improve access to fairgrounds . . . may be more willing now because they have a potential development requiring buyoff from the City

f. Sequoia industrial area
    i. Approximately 300 acres is available for development (one of the largest locations of available industrial area in the state)
    ii. Access to 99E is a main concern
    iii. Potential connections include access to 13th Ave, which has multiple schools, parks, and residences all along it . . . and traffic calming is also present

g. 13th Avenue
    i. Trucks from industrial area and buses from bus barn may travel entire length of 13th Ave in order to access Highway 99E at Berg Pkwy (with the intent to head southwest out of town) . . . they may do this either because it is difficult to access Hwy 99E earlier or to avoid the highway signals
    ii. At the main park east of Ivy St a comment was made that there is not enough parking and so drivers park in the neighborhood to the south

II. Project Scope/Schedule Overview/Committee Role/TSP Overview Presentation
    a. Following the tour, the CAC returned to City Hall and the project scope, schedule overview, and committee role were discussed. Chris presented a PowerPoint slideshow that overviewed the purpose, method, and characteristics of a transportation systems plan (TSP)

III. Desired Outcomes

a. Chris requested each CAC member to comment on issues they would like to see addressed by the TSP update
    i. Leonard
        1. Access at Dairy Queen (as discussed previously during the tour)
        2. County roads in the city are substandard
            a. Maintenance issues
            b. Funding partnerships to modernize?
            c. Bring up to standard and turn over to City
                i. Storm water management is a big issue
        3. Connection to future City park north of City near logging road/trail
    ii. Susie
        1. Sequoia Industrial park development
            a. Feels development is a good thing, but wants to make sure it is well accommodated
            b. Access to Hwy 99E is the big issue . . . 1 or 2 new accesses would be preferred to accommodate the high number of trucks that the site would service when built out . . . otherwise trucks are going to use 13th Ave, which the residents are against
            c. Site also needs good circulation
    iii. Jan
        1. Traffic calming in northwest part of city, which has wide streets and seems to encourage speeding
        2. Birch St is known by locals as a preferred connection between Knights Bridge and Territorial because there are no stop signs
    iv. Bob
        1. Bike/pedestrian connections between neighborhoods, parks, schools, fairgrounds, and downtown
        2. Appropriate traffic control
        3. Safe crossings of highway and railroad
        4. Green space management, especially for north side of town, which has a limited number of parks
    v. Jackie
        1. Traffic calming on 13th Ave between Elm and Ivy
            a. The intersection with Fir St may be the best location to install pedestrian bulb-outs, a raised pedestrian crossing, or other traffic calming measures
    vi. Other topics
        1. Access management along collector roadways with residential fronting uses is an issue. They don't want to have homes back to the collector and create a walled environment
            a. Chris described a solution created for Silverton in their TSP update where homes would have side-lots to the collector and frontage to local streets that intersect the collector

every 150 feet or so. Walls aren't permitted on the side-lots. Therefore, access management is achieved on the collector and it is still a livable neighborhood design.

2. Ivy street
    a. Needs sidewalks
    b. Intersection with Hwy 99E is a definite issue that needs to be addressed

IV. Project Goals

a. The CAC was provided handouts that show the (1) previous TSP's evaluation criteria and (2) a list of suggested goals that are consistent with current State TSP requirements. The CAC was asked to look at goals and talk with constituents of interest groups they represent to determine what goals are important and what specific policies they are interested in having as part of the TSP . . . handouts provided are general and to be used as examples; if desired, CAC and constituents can:
    i. Determine what goals they like or don't like
    ii. Create new goals
    iii. Help make the goals more specific
    iv. Carry over any of the previous TSP's evaluation criteria as policies in this TSP update

V. Next Steps

a. CAC follow-up
    i. Review goals with constituents . . . respond within 2 weeks
b. DKS follow-up
    i. Provide meeting summary/minutes by the following week
    ii. Provide glossary and/or list of acronyms to CAC
c. City staff follow-up
    i. Send today's meeting handouts to CAC electronically
    ii. Follow-up with members not in attendance
    iii. Keep all meeting materials as resource to provide interested citizens
d. Future meeting times for CAC (consensus was reached by attending participants)
    i. Would like meetings in evenings (6:30 – 8:30 p.m. works well)
    ii. During the middle of week (Thursday was determined to work best)
e. Next meeting scheduled for October 14th
    i. Jan has a conflict for this week in October . . . she asked the team to consider moving the meeting if it works within the project schedule
    ii. The meeting is following existing conditions and future needs analyses . . . the corresponding documents will be provided prior to the meeting for CAC members to review

Canby TSP
TAC Meeting #1 Summary
July 23, 2009 (4-6 p.m.)
Canby City Hall

TAC Members Present: Curt McLeod (Curran-McLeod), Julie Wehling (Canby Area Transit), Matilda Deas, Dwayne Barnes, and Bryan Brown (City of Canby), Sonya Kazen and Avi Tayar (ODOT Region 1)

TAC Members Absent: Jeff Crowthers (Canby Public Works), Todd Gary (Canby Fire Dept.), Jorge Tro (Canby Police Dept.), Jennifer Donnelly (DLCD), Carol Muuewsen or Wayne Layman (Canby School District)

Consultant Team: Chris Maciejewski and Brad Coy (DKS)

I. Introductions
   a. Members present introduced themselves and provided phone numbers and email addresses on sign in sheet

II. Project Scope/Schedule Overview
   a. Chris discussed the project schedule (timeline graphic)
      i. Some unique items that will be addressed in this project, compared to a typical TSP, include the tech memo discussing industrial area cross sections and the analysis of whether an STA on the highway through town is a viable option
   b. Sonya suggested adding another public work session earlier in the process (during alternatives analysis) to allow community feedback before the bulk of the preferred alternatives analysis is performed. Maybe we could move the open house to present the draft TSP to an open house to review alternatives?
   c. Chris indicated that funding constraints will be identified and considered in the plan development process to help guide the selection of preferred alternatives
   d. The TAC discussed having representatives from the ODOT District Office, ODOT Rail, and Deschutes County added to the committee

III. Project Goals – Desired Outcomes
   a. Chris requested that each TAC member comment on issues they would like to see addressed in the TSP update
      i. Avi
         1. Private access on the highway could be an issue (referred to RiteAid development)
         2. Canby congestion on the highway is not as bad as other places he

deals with in the region, so hopefully we can meet operating standards

ii. Matilda
    1. Ivy/99E is a terrible intersection
    2. How to best serve Sequoia industrial area is a concern
    3. Working with the railroad on crossings will be important . . . experience to-date in working with ODOT Rail has been straight forward
    4. A new connection to the industrial area in west Canby should be examined. There was a plan for a connection but development may have changed to ability to do that. However, the City owns some land in the area.
        a. Sonya – Is it possible to swap land to obtain right-of-way for new facilities?
        b. Curt - the site was obtained by condemnation, so a land swap now might look bad

iii. Bryan
    1. Truck traffic around 13th Ave . . . there are homes, schools, and parks on the routes used by trucks and he wants to see if there is a better way to route trucks to avoid these areas (this is likely the issue of greatest community-wide concern that will be addressed by the TSP)
    2. Small industrial pocket north of Hwy 99E (Johnson Controls) surrounded by residential areas (including a more recently built high-density housing area) . . . there is cut-through truck traffic and lots of complaints
    3. Long-range vision of 2nd St providing an access to fairgrounds from downtown. . . would like an analysis of which street is best to use for the connection
    4. Prioritization of sidewalks is critical . . . they are needed everywhere, but where to start?
        a. Sonya – it is important to involve parents and schools in this discussion; Safe Routes to School planning may be a good way to address this
    5. Arterials through the neighborhood is an issue
        a. For example, Knights Bridge Road quickly transitions from arterial to local street (speeds drop significantly on the hill up into town)

iv. Curt
    1. SDC funding recommendations need to be compatible with the methodology used to levy the fees
    2. Aesthetics, especially along Hwy 99E . . . possibly include a capital improvement project that takes care of landscaping
    3. Cross-sections need to reconcile bike lanes/paths, storm drains, on-street parking, etc. . . . to-date they have not been able to make

everything work together to meet street standards due to existing road width/right-of-way constraints.

4. Quiet zone issue (for railroad) . . . a capital improvement project may be needed to support obtaining this zone

v. Sonya
   1. Quick response project . . . railroad designs are currently being worked out at Ivy/N 1st Ave . . . what should be done here to improve this area, which currently has significant traffic circulation issues
      a. This project will likely be able to use some of the TSP analysis/data

vi. Julie
   1. Would like the TSP to take pedestrian access into account, specifically as it relates to bus stop locations, curb cuts, etc.
   2. Buses currently stop along the highway in the right travel lane and block traffic . . . this is an issue to possibly address

vii. Dwayne
   1. Turn lane markings for highway intersections are often located prior to the railroad crossing, which causes confusion and may have been a factor in a fatality that occurred at one of the crossings

b. Other
   i. Chris mentioned that it appears the Oregon Highway Plan does not designate Hwy 99E as an ODOT freight route, which would greatly simplifies the process to obtain an STA
   ii. Sonya added some additional information about the railroad crossings
      1. ODOT controls public rail crossings
      2. Problems arise when private crossings morph into public crossings
      3. There are rail crossing orders (of file at ODOT) . . . it may be helpful to find what there is for Canby
      4. Federal direction is to close as many at-grade rail crossings as possible due to safety issues
      5. New crossings are typically only allowed by giving up an existing crossing
      6. Crossing width expansions also require negotiation
   iii. Problem areas include:
      1. Fairgrounds and 3rd and 4th and Pine
      2. Ivy/99E
         a. the historical building on the southwest corner is an obstacle
         b. Turning radii are too small for trucks . . . they either jump the curb or use adjacent travel lanes, which has a significant effect on the entire intersection

IV. Next Steps
   a. Matilda – to contact Clackamas County and request their participation in the TAC
   b. Next meeting is following existing conditions and future needs analyses (mid

October). . . the corresponding documents will be provided prior to the meeting for TAC members to review

V. Tour of Canby
    a. TAC members were invited to join the Citizen Advisory Committee (CAC) on a driving tour of transportation issues in Canby. Notes from the tour are included in CAC Meeting #1 Summary

Canby TSP
CAC Meeting #2 Summary
July 23, 2009 (6:30-9 p.m.)
Canby City Hall

CAC Members Present:	Jan Milne (Planning Commissioner), Susie Myers (SECNA), Jackie Jones (SWCNA), Leonard Walker (NECNA), Liz Belz-Templeman (Bike/Pedestrian interest group)
CAC Members Absent:	John Henri (City Councilor), Tom Finch (Riverside NA), Sandy Wood (SECNA), Representatives for the Chamber of Commerce
Agency Team Present:	Matilda Deas (City of Canby)
Consultant Team:	Chris Maciejewski and Robert Acevedo (DKS)

I. Introduction/TSP Presentation
   a. Chris walked through his presentation outline, explained the work done thus far and the goals of the meeting.
   b. Timeline for comments to be returned for the draft chapters was set for Wednesday November 4th.

II. Discussion of Project Goals
   a. Liz-pointed out vague language used in goals and thought more precise references were needed. Chris explained the reasoning for the general language and the group agreed that general wordage was more appropriate.

III. Review of Existing Conditions/Future Needs
   a. Susan- voiced a concern about access management along 99E, specifically the parking for commercial lots around the Elm intersection.
   b. Susan- Mentioned Elm/13th was a problem area, difficult for pedestrians to cross.
   c. Leonard/Susan- Suggested a walkway/pedestrian facility from the bridge down to provide access to Fred Meyers without having to cross the ditch or Redwood Street.
      i. Some kind of ADA access, Elevator, spiral ramp, etc…
   d. Group- Mentioned that Cutsforth's Thriftway has the highest bike/ped volumes for the area.
   e. Leonard- Brought up sight distance issues and Truck turning geometry.
      i. Would like to see mountable curbs or similar treatment to help trucks maneuver.
   f. Suzan- Mentioned safety concerns at Pine/99E
      i. Vehicles getting stuck on the tracks
         1. Group discussed the problems-on room for one maybe two cars between the stop bar and the rail
         2. Suggested moving the stop bar before the rail crossing.

g. Leonard- Mentioned the increase in industrial companies using rail instead of trucks to transport goods. Wanted the possibility of increased rail usage and decreased truck usage to be examined.

IV. Alternatives to Meet Needs

a. Chris- Discussed concepts for mitigating recognized deficiencies.
   i. Jug-handle removing Left turns from 99E onto Ivy
   ii. Group responded well to this concept and suggested this might be phase 1 on the way to an overpass along Ivy.

b. Group- Expressed a concern for the possibility of a roadway crossing the logging road (ped/bike path), would rather nothing cross the path.

c. Group-Discussed the need for better traffic flow near the fair grounds.
   i. Suggested a couplet along 3rd and 4th.

V. Next Steps

a. CAC follow-up
   i. Comments on Draft chapters due by November 4th, 2009.

b. DKS follow-up
   i. Provide meeting summary/minutes by the following week

c. City staff follow-up
   i. Follow-up with members not in attendance
   ii. Keep all meeting materials as resource to provide interested citizens

d. Next meeting scheduled for December 1st.

e. Community Workshop on November 5th.

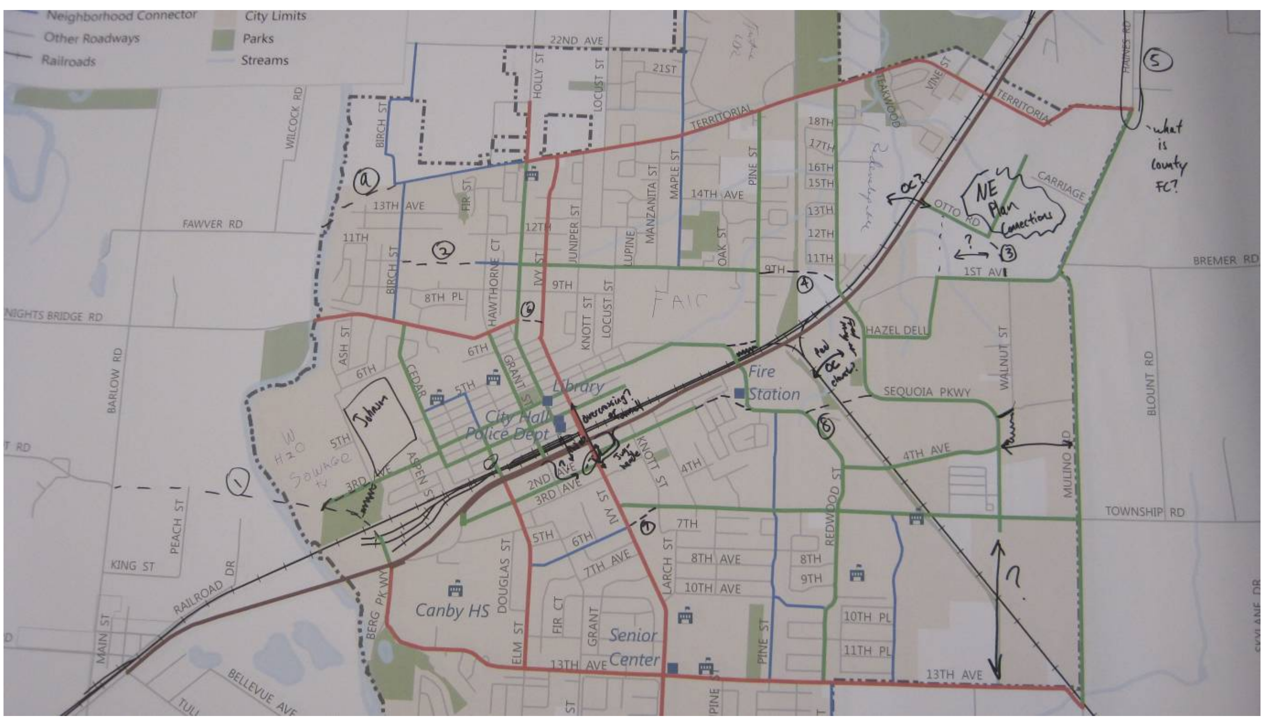

Figure 1, map of brainstorming markups.

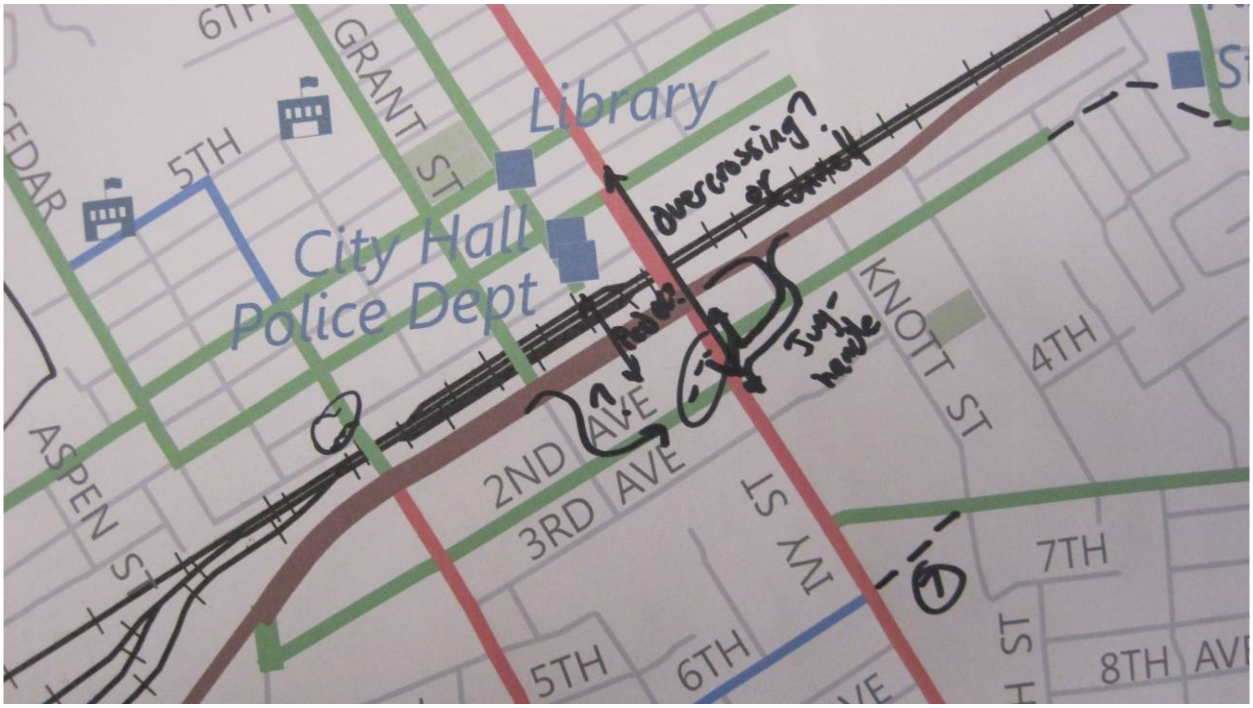

Figure 2. Map showing close up of the Jug handle at Ivy

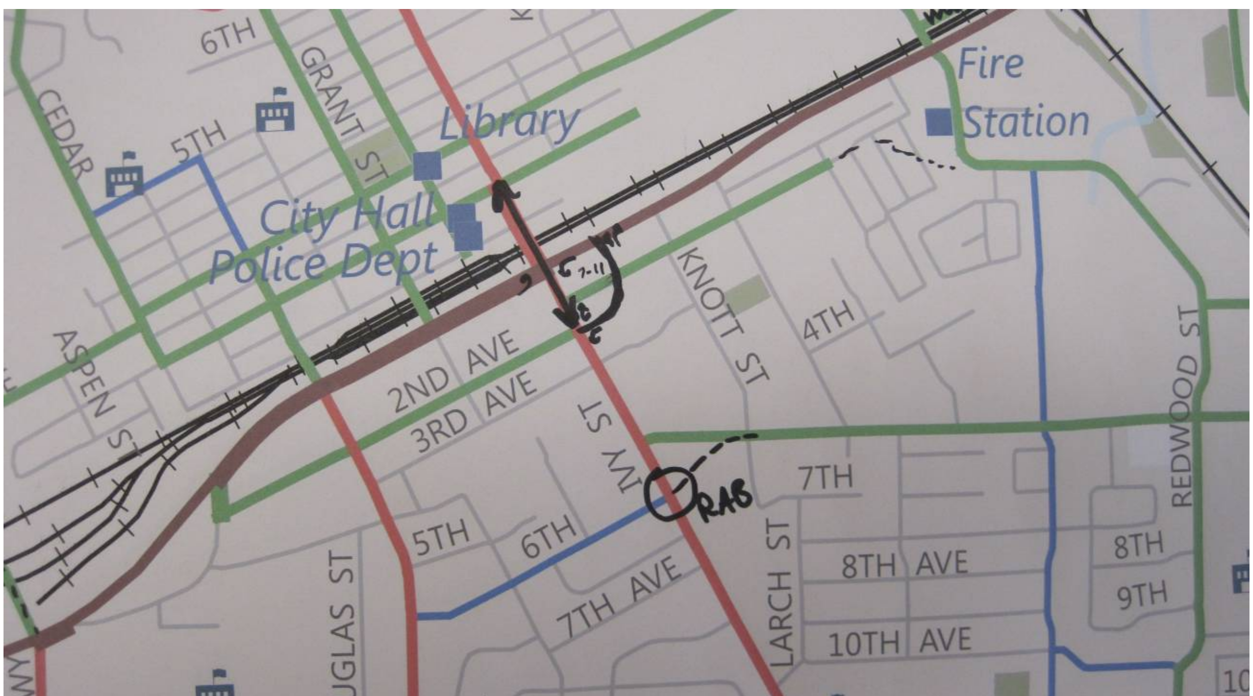

Figure 3. Roundabout concept at 6^{th} and Ivy

Canby TSP
TAC Meeting #2 Summary
July 23, 2009 (3-5 p.m.)
Canby City Hall

TAC Members Present: Todd Mobley (Lancaster Engineering) Curt McLeod (Curran-McLeod), Julie Wehling (Canby Area Transit), Matilda Deas and Bryan Brown, (City of Canby), Sonya Kazen and Avi Tayar (ODOT Region 1)

TAC Members Absent: Jeff Crowther and Dwayne Barnes (Canby Public Works), Todd Gary (Canby Fire Dept.), Jorge Tro (Canby Police Dept.), Jennifer Donnelly (DLCD), Carol Muuewsen or Wayne Layman (Canby School District)

Consultant Team: Chris Maciejewski and Robert Acevedo (DKS)

I. Introductions
    a. Members present introduced themselves and provided phone numbers and email addresses on sign in sheet
    b. Chris-discussed the agenda for the meeting.

II. Project Goals – Discussion
    a. Curt- wanted to clarify if the goals set out in the TSP were guidelines or strict enforceable policies
        i. Consensus of the group that it would be a guideline and policy would be set out in Code.
    b. Sonya – remarked that in the end, Angelo Code work and goals/policies need to mesh, if something is in code it needs to fit under goals/policies.
    c. Curt- Commented on Goal #1 F,
        i. Wordage should suggest guidance not a request
    d. Group- came to an agreement that a global change to word usage should be considered so not to sound absolute but more as guidance.
        i. Use wordage such as
            1. Encourage
            2. Where feasible
            3. Shall be provided on all newly constructed streets
        ii. Goal #2 F, reads as a mandate not a guideline.
    e. Sonya- Goal #1 e, specifically state quite zone in this section.
    f. Sonya- Suggested that State sustainability goals (specifically climate change goals) be included in Goal #4.
    g. Julie- Voiced concern about the ODOT bus pullout requirement.

            i. Sonya-Suggested to change wordage to "consider intersection operations and traffic volumes when considering bus stop placement and pullouts" or similar generic language.
    h. Sonya- Goal #6 m, suggested more generic word usage.
            i. Special Transportation area (STA) designation for 99E through Canby was discussed as a possibility. Group felt this was a topic that should be looked into.
    i. Sonya- Mentioned that freight routes could not have capacity requirements reduced.
            i. 99E is considered a motor carrier route.
            ii. Issue that should be kept in mind.
    j. Sonya- Mentioned the future of high speed passenger rail
            i. Concluded that the topic should be included as follows or similar
            ii. If Intercity high speed rail or bus comes through, Canby wants a stop

III. Review of Existing Conditions/Future Needs
    a. Bryan- Was unclear about the meaning of future baseline condition and thought this term should only be used for the existing condition and the future condition be referred to as the future no-build condition.
    b. Avi – Suggested numbering the study intersection in the introduction to the existing conditions and carrying the numbers throughout the report to maintain consistency.
    c. Curt- would like to see Triangle Park located at Holly and Knights Bridge Road shown on the area maps and included in the ped/bike section as a Central Hub for the ped and bike community.
    d. Chris – Asked if ped/bike inventories seemed to be complete and to the groups knowledge, all facilities were included.
            i. Matilda mentioned that local schools had performed a system wide inventory of sidewalks for safe routes to school analysis.
            ii. DKS- to see about getting data.
    e. Sonya – Asked if we should be looking at emergency routes, plans and responses.
            i. This is where the fire department and related departments need to get involved.
    f. Julie – Asked if we should look at classifying roadways as transit routes/lines
            i. Classifying existing transit routes and determining future routes that should be considered for conversion to transit routes should be included.
                1. Provided by Canby Transit
            ii. Show transit routes as a future condition overlay
            iii. Code language geared towards development along transit routes.
    g. Chris – Provided a brief introduction to chapter 4 and walked through the methodology and requested any feedback from the committee.
    h. Curt – Suggested including ADT volumes and gross trip volumes.
            i. Provide ADT by multiplying by 10, discuss the background of the rule of thumb (10) as footnote.

IV. Brainstorm Alternative to Meet Needs
    a. Chris – opened with pointing out deficiencies/problem areas

b. Chris – Proposed Ivy overpass if could land at 2nd street.
c. Curt – Proposed overpass at Berg to connect with Arndt extension
    i. Downsides mentioned; large project, difficulties getting another river crossing. Concept (1) on map
d. Julie- suggested looking into parallel frontage roads to 99E
e. Julie- Suggested modifying truck routes, either out of the area or along a different route to alleviate the downtown area.
    i. 10th Street extension to Birch
f. Julie- Suggested a connection from Knights Bridge to 3rd.
g. Julie – Suggested Township extension
    i. There were concerns of old houses and schools that would be impacted on 5th.
h. Avi – Suggested the improvement of Haines Road, concept (5) on map.
    i. Curt was concerned that this improvement would bring truck traffic through residential neighborhoods.
    ii. Need to check county classification.
i. Sonya – suggested checking the Northeast Canby Plan for their planned connections
j. (8) on map – 2nd street extension
    i. Main concern is with relocating the fire station
    ii. Would have to go under rail
k. Curt – mentioned that that the 4th Ave extension to Mulino will happen.
l. (9) on map- Providing an extension of Territorial with a new river cross could alleviate local traffic but might not address the traffic flow to the southeast of Canby.
m. Chris – Suggested the jug handle at Ivy to remove the left turns from 99E
    i. Group reacted positively
n. Sonya – Suggested grade separating Territorial crossing
o. Avi – suggested an alternative needs to be provided for the Southbound left at Ivy and 99E. He said this is a heavy movement.
p. Group – Agreed that an access (e.g., elevator) needs to be provided to the existing pedestrian overpass providing better access to the Fred Meyers.
q. Curt – Suggested elevating or sinking the rail through the downtown.
r. Matilda – Suggested a tunnel for Ivy under 99E and rail.
s. Matilda – Mentioned that there are future plans for traffic calming along Birch.

V. Next Step
a. Community workshop on November 5th
b. Meeting #3 – December 1st
    i. For next meeting bring maps overlaid on aerials and/or Comp plan zoning.
    ii. Group agrees with Chris' view for the community workshop.

Figure 1, map of brainstorming markups.

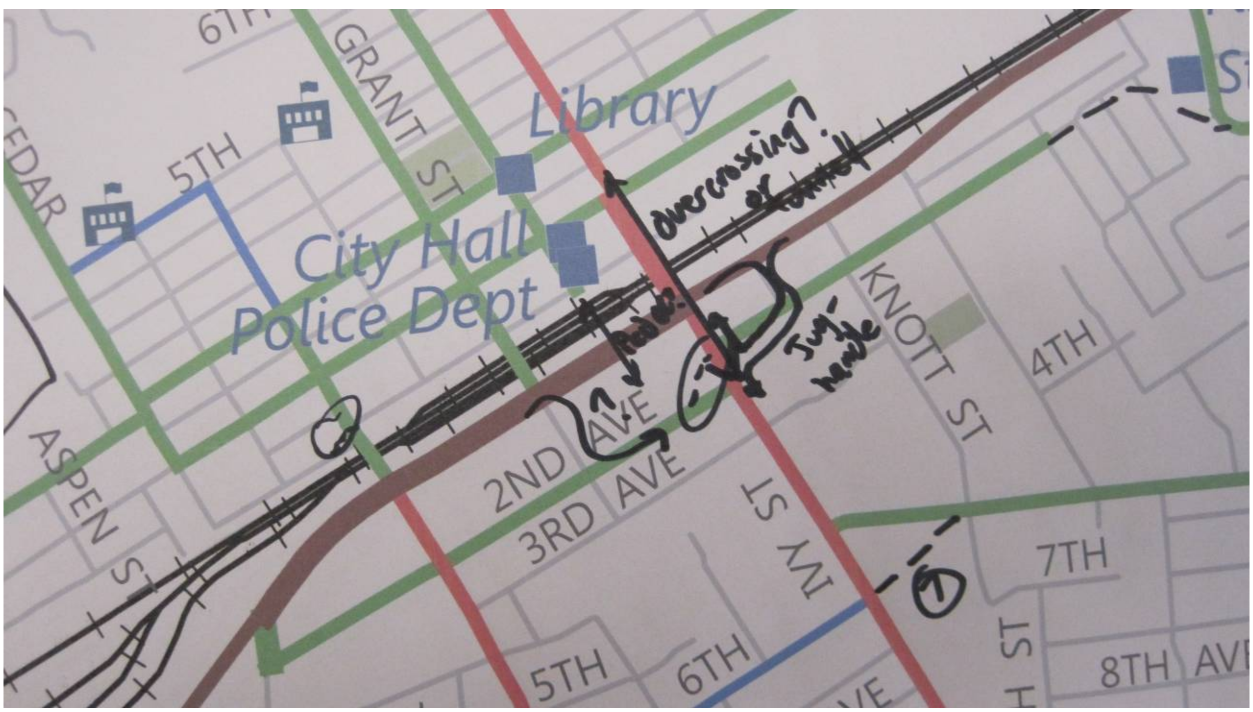

Figure 2. Map showing close up of the Jug handle at Ivy

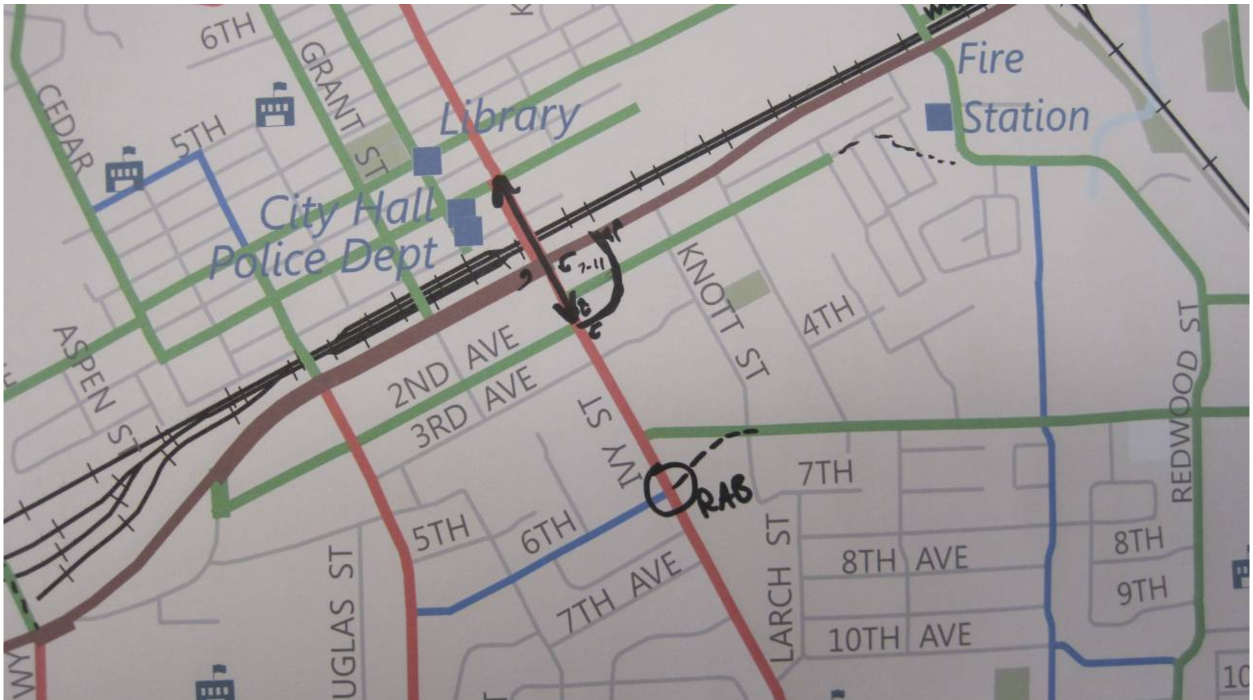

Figure 3. Roundabout concept at 6th and Ivy that was discussed in the CAC meeting

Canby TSP
Alternative Work Session Findings
November 17, 2009 (9:30-11:30 a.m.)
Canby Planning Department

Present: Matilda Deas, Dwayne Barnes, Jeff Crowthers, and Bryan Brown (City of Canby); Sonya Kazen and Avi Tayar (ODOT Region 1); Chris Maciejewski, Garth Appanaitis, and Brad Coy (DKS)

These findings are not based on chronological discussion, but instead sort the alternatives by problems they address.

I. Knights Bridge Road (Corridor Capacity Improvements or Alternative Routes)

1. Arndt Road extension to Berg Pkwy (bridge over river)
a. Pulls traffic off Knights Bridge Road (clear capacity benefit)
b. Helps truck traffic from NW industrial area to have better access to the highway and to the west (would be able to avoid residential area)
c. Two-lane road/bridge would be sufficient for estimated volumes
d. Needs to be grade separated from RR tracks (tunnel under tracks)

Finding: Very desirable alternative though may be cost prohibitive. Need to coordinate with Clackamas County and/or City of Barlow.

2. Territorial Bridge
a. Very localized and minor benefit (only reduces traffic on Birch and Knights Bridge Road)

Finding: Costs will exceed benefits. Do not consider further.

3. Knights Bridge Road extension between Holly and Ivy
a. Would help truck route (to be able to stay on arterials)
b. Would not provide capacity benefits to system

Finding: Costs will exceed benefits. Do not consider further.

II. OR 99E (Corridor Capacity Improvements or Alternative Routes)

1. 10th Street extension between Grant and Birch
a. Only provides local connectivity (little capacity benefit)

Finding: Do not analyze further, but consider for local street connectivity.

2. 10th Street extension over logging road
a. Two-lane road would be sufficient for estimated volumes
b. Pulls traffic off OR 99E between Fred Meyer and fairgrounds, which helps out capacity
c. Pine Street connection to Pine St/NE 4th St intersection can be closed (currently there are intersection spacing and safety concerns)

d. Would require improvement to Redwood/OR 99E intersection (may be an issue if RR would need to be widened)
e. Better option may be frontage road closer to OR 99E

Finding: Keep as a possible option to combine with other improvements (2nd tier behind frontage road between Pine and Redwood or Otto).

3. **Otto Rd interchange (or interchange/traffic signal hybrid) with frontage road to Pine St (modeled with frontage road speed of only 25 mph) and closure of Pine St RR crossing**
   a. Frontage road attracts approximately 700 vehicles (bi-directional), which is not as much as desired
   b. Doesn't do much to pull traffic off of Township
   c. NE 3rd Ave sees shift in directional traffic (increase in EB because interchange would be easier for accessing OR 99E than turning left from Ivy St, decrease in WB because vehicles would stay on OR 99E until Ivy and then turn right)
      1. The result is that Ivy/OR 99E sees more WBR and less SBL, which overall is better for the intersection
   d. Interchange would likely help the industrial park and provide a better connection to the highway, though connection through the NE Canby Concept Area would be important

   Finding: Good start, but further analysis and fine-tuning needed.

4. **Otto Road overcrossing (without OR 99E access)**
   a. Provides minor reduction in traffic at other nearby OR 99E intersections (i.e., on Territorial and Redwood-Sequoia)
      1. this is not sufficiently significant to justify the cost of an overpass

   Finding: Access to OR 99E would definitely be needed in conjunction with overpass. Otherwise, costs will exceed benefits.

5. **Otto connections to Hazel Dell and SE 1st or Mulino**
   a. Helps reduce congestion at Sequoia Pkwy
   b. Connection to SE 1st or Mulino helps reduce traffic on Haines Road and at OR 99E/Haines intersection
   c. Impacts potential future residential are (see NE Canby Concept Plan)

   Finding: Dependent upon improvements at OR 99E/Otto Road, but these connections will likely be important to accommodate connectivity between the Canby Pioneer Industrial Area and OR 99E.

6. **SE 2nd Ave extension to Sequoia Pkwy (crossing over rail)**
   a. Reduces traffic a little on OR 99E (but not much)
   b. Two-lane road/bridge over Oregon Pacific RR would be sufficient for estimated volumes
      1. However, there is a nearby bridge at SE 4th St, that has sufficient capacity

   Finding: Costs will exceed benefit. Do not consider further.

7. **Access management considerations along OR 99E**
   a. Narrow lots between OR 99E and railroad practically require each development to have own driveway (which is a safety concern that will only get worse as volumes increase)
   b. Possible option is median, which would require driveways to become right-in/right-out
   c. Better use may have been to make this strip into a park

   Finding: Use the model to estimate whether there are operational impacts that result from allowing only right-in/right-out movements

III. Township Road (Corridor Capacity Improvements or Alternative Routes)

1. **SE 4th extension from Sequoia Pkwy to Mulino (at current Walnut St leg of SE** 4th/Sequoia Pkwy intersection)
   a. Only shifts a hundred vehicles or so from nearby parallel roads (very local benefit)
   b. No significant system capacity benefit

   Finding: Provides connectivity rather than capacity benefit and should be a developer driven improvement.

2. **Roundabout at Township/Ivy and possible alignment with S 6th St**
   a. Pulls some traffic from OR 99E
   b. Adds traffic to Township
      1. Would definitely drive the need for a corridor upgrade to Township
         a. Upgrade to 3-lane cross section (with center turn lane) may be sufficient
         b. Would likely require removal of on-street parking
         c. May be a problem due to right-of-way limitations
   c. Alignment with 6th St . . .
      1. Would provide additional east-west route through town, which would likely help reduce highway volumes
         a. However, 6th St is currently a somewhat small residential street that is not really used by through traffic
      2. Realignment of Township is problematic due to number of houses that would need to be removed
      3. Other possible option would be a “dumbbell” design of two adjacent roundabouts on Ivy (at Township and 6th St)
         a. Roundabouts at both would help EB left turns at 6th St to access Township . . . otherwise use of 6th as through street is less attractive
   d. There would likely no difficulty in getting sufficient right-of-way to install the roundabout at Ivy/Township (without trying to align with 6th St)

   Finding: At a minimum, the Ivy/Township roundabout is very desirable and doable, though it may increase traffic on Township and increase the need for corridor-wide improvements.

IV. Ivy/OR 99E (Intersection Capacity Improvements)

1. **Grade-separated crossing**
   a. Above grade requires more clearance (30 ft) than below grade (20 ft); therefore, below grade is better
   b. Even a below grade crossing would not surface until NE 3th Ave, which would bypasses 2nd Ave (i.e., downtown) and would not be good for the city

   Finding: Inability to maintain Ivy/N 2nd Ave intersection is considered prohibitive.

2. **Jug handle**
   a. Overall benefit is that left turns are removed from OR 99E (removed completely from westbound direction and become through movements for eastbound direction), which allows additional green time to be allotted to side streets
   b. Lots of details to still determine because of multiple possible options

   Finding: A good potential alternative that needs further analysis and fine tuning.

3. **Couplet (Ivy used for northbound traffic, Grant used for southbound)**
   a. Modeling has not yet been done
   b. Main issue is where to do diverge/converge on the north (no good locations)
      1. 2nd Ave is downtown
      2. 3rd Ave and 4th Ave are next to Wait City Park (and are closed for occasionally for City events)
      3. 5th Ave and 6th Ave are next to Knight Elementary School
      4. No good options farther north either
      5. Motorists would basically have to decide which connecting street they would want to use

   Finding: Use model to analyze further and see what expected benefits are for OR 99E/Ivy and OR 99E/Grant intersections. Then, decide if additional effort should be made to address the diverge/converge issues on the north.

V. SE 13th Ave (Trucks Routing by Parks and Schools)

1. **Sequoia Pkwy extension to the south from Township to SE 13th**
   a. Does not add much traffic to SE 13th Street, but it does add some industrial area traffic and shift away other traffic (so, likely to result in greater number of trucks)
   b. OR 99E volumes not significantly affected
   c. Provides some benefit to east end of Township but not really to west end (which is where the main capacity issues occur)

   Finding: It is still uncertain what the effect will be. Wait to analyze again until there are more fine-tuned Canby Pioneer Industrial Area-OR 99E connectivity solutions.

VI. Safety Related Improvements at Isolated Locations throughout City

1. **Close RR crossing at Pine St**
   a. This would help improve safety
   b. One way to access the fairgrounds would be to upgrade Pine Street and route everyone to Territorial
      1. Pine St needs to be improved anyway, though it is a residential road and this may cause issues
      2. Likely not going to be attractive because it is so out of direction
   c. A frontage road would also be an option (see discussion related to other alternatives)

   Finding: Good option for increasing safety and being able to potential open or widen another railroad crossing (e.g., at Otto Road).

2. **Realignment of SW 2nd Ave and SE 2nd Ave at Ivy St**
   a. Needed as safety/operational improvement
   b. Doable

   Finding: Desirable and doable.

3. **Industrial area connectivity**

   Finding: Needed.

4. **Roundabout at Mulino/SE 13th**
   a. Safety benefit
   b. Creek may be an impediment

   Finding: Desirable improvement, but still need to determine whether other constraints make it infeasible.

Canby TSP
CAC Meeting #3 Summary
December 8, 2009 (6:30-8:30 p.m.)
Canby Planning Department

CAC Members Present:	Jan Milne (Planning Commissioner), Jackie Jones (SWCNA), and John Henri (City Councilor)
CAC Members Absent:	Tom Finch (Riverside NA), Sandy Wood (SECNA), Susie Myers (SECNA), Leonard Walker (NECNA), Liz Belz-Templeman (Bike/Pedestrian interest group), Representatives for the Chamber of Commerce
Project Team Present:	Matilda Deas (City of Canby); Chris Maciejewski, Garth Appanaitis, and Brad Coy (DKS)

The findings and discussion items below are not based on a chronological discussion, but instead sort the alternatives by issues they address. (And FYI . . . the main future growth areas include the following: OR 99E, Knights Bridge Rd, S Township Rd)

I. Knights Bridge Road and Barlow/OR 99E Intersection (Corridor Capacity Improvements or Alternative Routes that improve access to/from the west)

1. Arndt Road extension to Berg Pkwy (bridge over river)

a. Pulls traffic off Knights Bridge Road (clear capacity benefit)
b. Helps truck traffic from NW industrial area to have better access to the highway and to the west (would be able to avoid residential area)
c. Two-lane road/bridge would be sufficient for estimated volumes of about 10,000 ADT (though Chris expressed his feeling that this is only about ½ of what he would desire for such an expensive project)
d. Needs to be grade separated from RR tracks (tunnel under tracks)

Finding: Desirable alternative though may be cost prohibitive. Need to coordinate with Clackamas County and/or City of Barlow to make a good decision.

2. Territorial Bridge

a. Very localized and minor benefit (only reduces traffic on Birch and Knights Bridge Road, and attracts approx. 5,000 ADT)
b. Avoids water intake for City

Finding: Costs expected to exceed benefits. Do not consider further, but do let community know that it was initially considered.

3. **Arndt Rd extension without bridge (new OR 99E intersection near Ford dealership)**
    a. Helps Knight Bridge significantly (similar to the extension with the bridge), but is much less expensive because it doesn't require a new bridge
    b. Requires a new RR crossing (but it may be possible to have as a grade separated crossing)
    c. Maybe construct in conjunction with Berg extension (i.e., tunnel under railroad tracks), which would still provide a way for industrial area trucks to stay out of neighborhood

    Finding: Likely the best alternative to address Knights Bridge Rd congestion and access to/from the west

4. **Barlow Rd/OR 99E Interchange**
    a. Almost as good for circulation as Arndt Rd extension
    b. Overcrossing or undercrossing would likely run the entire length of the City of Barlow (which would be a significant affect)

    Finding: Costs expected to exceed benefits. Do not consider further, but do let community know that it was initially considered.

OVERALL FINDING: A refinement plan is needed and should be identified in the TSP instead of selecting any of these alternatives.

II. North Side of OR 99E and East Side of Town (Corridor Capacity Improvements or Alternative Routes)

1. **10th Street extension on west (between Grant and Birch)**
    a. Small benefit. . only provides local connectivity

    Finding: Do not analyze further as part of TSP, but consider for local street connectivity (and have developers construct when area develops).

2. **10th Street extension on east (between Pine and Redwood)**
    a. Provides some relief to OR 99E
    b. May also work well in conjunction with the "Otto Interchange" alternative (in place of the Pine St frontage road)

    Finding: Analyze in conjunction with the "Otto Interchange" (in place of the Pine St frontage road)

3. **Frontage Road between Pine St and new Otto Rd with closure of Pine St/OR 99E and Grade-separated overcrossing at Otto Rd**
    a. Interchange/traffic signal hybrid with two two-phase signals instead of free-flow interchange ramps (traffic signals can meet OR 99E spacing needs)
    b. Pulls traffic off OR 99E between Fred Meyer and fairgrounds
    c. Significant benefit to Ivy/OR 99E because vehicles would use frontage road instead of making the southbound left-turn movement

d. One lane of Pine Street crossing of railroad could be left open for emergency use (emergency vehicles with pre-emption could raise gates when needed)
e. Possible frontage road alignment issues (i.e., the power station between Pine and Redwood and the fairly new townhomes east of Redwood)
f. John indicated that this doesn't much help the City Council's desire to use Pine Street as a nice entrance to downtown

Finding: Keep as an alternative to further refine.

4. **Realignment of NE 4th Ave such that it connects with N Pine St through the open field and has the other Pine St (i.e., which crosses the railroad tracks and intersects OR 99E) tee into it**
   a. This was a new idea presented by John Henri

   Finding: Analyze this new alternative.

III. South Side of OR 99E, including Township Road (Corridor Capacity Improvements or Alternative Routes)

1. **Sequoia Pkwy extension to the south from Township to SE 13th (with bridge over railroad tracks and multi-use trail)**
   a. Does not solve industrial area access problems
   b. Does not add much traffic to SE 13th Street (Traffic still wants to go to OR 99E)
   c. Question was raised about how STA on OR 99E through town would affect model results due to lower travel speeds . . . while it is not expected to be significant, the effect should still be accounted for

   Finding: It would be more cost effective to provide better access to OR 99E than to spend the money on a bridge over the railroad and trail. However, STA through town may change model results due to lower travel time on OR 99E.

2. **SE 2nd Ave extension to Sequoia Pkwy (crossing over rail)**
   a. Reduces traffic a little on OR 99E (but not much)
   b. There is already a nearby bridge (SE 4th Ave) with extra capacity
   c. Goes through the trailer home park (which would cause land acquisition to be problematic)

   Finding: Costs will exceed benefit. Do not consider further.

3. **Realignment of Township with 6th (and roundabout at Township/Ivy)**
   a. Alignment with 6th St provides additional east-west route through town, which would likely help reduce highway volumes
   b. Adds traffic to Township and 6th St (though, 6th St is currently a somewhat small residential street that is not currently designed to be used by through traffic)
   c. Makes it faster for westbound vehicles on OR 99E to turn left prior to Ivy (at Locust) and use Locust to access Township and then use the roundabout to turn left and head south on Ivy (this is not a desirable cut-through and may require a median on OR 99E to prevent)

d. Realignment of Township is also problematic due to number of houses that would need to be removed

Finding: Township realignment with 6th Street is not a good option, though roundabout is (see next alternative).

4. Roundabout at Township/Ivy (no realignment of Township)

a. Helps lower OR 99E traffic
b. Attracts vehicles to Township (which becomes a major east/west corridor)
c. Failure could occur if queue backed up from Ivy/OR 99E intersection
d. Other option instead of a roundabout would be a traffic signal

Finding: This is a good alternative, especially in conjunction with improvements along Township (which would need to be a major east/west corridor and may be the bigger concern to residents).

IV. Ivy/OR 99E (Intersection Capacity Improvements)

1. Grade-separated crossing (Tunnel from N 3rd to S 3rd)

a. Below grade is better because it requires less clearance (20 ft instead of 30 ft needed for above grade crossing)
b. Bypasses 2nd Ave (i.e., downtown) and would not be good for the city
c. Just moves problems elsewhere

Finding: This alternative is problematic. Do not analyze further.

2. Jug handle

a. Helps the wrong left turn movements (a jug handle on the north side would work better than one the south side)
b. Traffic diverts to Grant or Elm instead of using jug handle

Finding: Do not consider further.

3. Downtown Circulation Changes (northbound Ivy/southbound Grant couplet)

a. Spreads out traffic to the three OR 99E intersections (Elm, Ivy, and Grant) and is very promising to allow them to meet standards
b. Everyone liked this alternative . . . most promising of all alternatives considered to-date . . . hard to know if anyone will have negative reaction and what they would be (besides businesses just not liking couplets)
c. Like S 3rd Ave much better than S 2nd for southern tie-in
d. Main difficulty is how to head south on Ivy out of town . . . would have to go to Grant to head south and then backtrack a few blocks to Ivy
e. Removes eastbound right turns at OR 99E/Ivy (i.e., from OR 99E onto Ivy) . . . this solves the turning radius problem (due to the building close to the corner)
f. Even though this is a couplet, it is on local streets instead of the highway . . . so it shouldn't meet with as much resistance; however, it may still be best to frame this alternative as a "Downtown Circulation Change" instead of a couplet

Finding: This appears to be a clear winner.

V. Safety Related Improvements at Isolated Locations throughout City

1. Berg Tunnel from OR 99E to NW 3rd Ave

a. About 150 vehicles per direction during p.m. peak hour (approx. 3,000 ADT), but mostly trucks
b. Not a downtown capacity solution . . . really a neighborhood solution
c. May be difficult for trucks to travel uphill to OR 99E . . . but cement trucks currently do so
d. Main issue would likely be the cost

Finding: Keep as an alternative to consider later as part of an overall alternatives package.

Other Issues Addressed at Meeting

In addition to the alternatives analysis workshop, two other issues were discussed.

1. Transportation Alternatives Evaluation Criteria
   a. Preliminary alternatives evaluation criteria developed by Chris and Brad at DKS were provided to the CAC members for their review
   b. All CAC members left with assignment to review the evaluation criteria, compare with goals and policies (Draft TSP Ch. 2) and provide feedback to DKS by January 15, 2009

2. Bicycle and Pedestrian Prioritization
   a. Example prioritization figures (from DKS's work on the Beaverton TSP) were provided to CAC to show them what DKS intends to do for Canby
   b. The prioritization surveys upon which the Canby analysis will be based were provided to CAC members for them to fill out (and to bring to their constituents to fill out) and return to DKS by January 15, 2009

TSP CAC Sign In Sheet 12.8.09

NAME	ORGANIZATION	PHONE	EMAIL
JACKIE JONES	SW neighborhood Assoc	503-266-6405	jacqjones@msn.com
Jan Milne	Plan. comm.	503-266-5552	janmilne@canby.com
John Henri	City Council	503-780-0062	jhenri@jjhenri.com
GARTH APPANAITIS	DKS		
Brad Coy	"		
Chris Maciejewski	"		
Matilda Deas	City of Canby		

Canby TSP
TAC Meeting #3 Summary
December 8, 2009 (3-5 p.m.)
Canby Planning Department

TAC Members Present:	Matilda Deas, Dwayne Barnes, Jeff Crowther, and Bryan Brown (City of Canby); Sonya Kazen, Avi Tayar, and Ted Miller (ODOT Region 1); Todd Mobley (Lancaster Engineering)
TAC Members Absent:	Curt McLeod (Curran-McLeod), Julie Wehling (Canby Area Transit), Todd Gary (Canby Fire Dept.), Jorge Tro (Canby Police Dept.), Jennifer Donnelly (DLCD), Carol Muuewsen or Wayne Layman (Canby School District), Clackamas County representative
Consultant Team:	Chris Maciejewski, Garth Appanaitis, and Brad Coy (DKS)

Purpose of this TAC work session: to narrow down field of alternatives to further refine and analyze.

The findings and discussion items below are not based on a chronological discussion, but instead sort the alternatives by issues they address. (And FYI . . . future growth areas include the following: OR 99E, Knights Bridge Rd, S Township Rd, SE 13th Ave, Sequoia Pkwy, Haines Rd, and Mulino Rd)

A yellow star marks new alternatives to analyze

I. <u>Knights Bridge Road and Barlow/OR 99E Intersection (Corridor Capacity Improvements or Alternative Routes that improve access to/from the west)</u>

1. Arndt Road extension to Berg Pkwy (bridge over river)

a. Pulls traffic off Knights Bridge Road (clear capacity benefit)
b. Helps truck traffic from NW industrial area to have better access to the highway and to the west (would be able to avoid residential area)
c. Two-lane road/bridge would be sufficient for estimated volumes of about 10,000 ADT (though Chris expressed his feeling that this is only about ½ of what he would desire for such an expensive project)
d. Needs to be grade separated from RR tracks (tunnel under tracks)

Finding: Desirable alternative though may be cost prohibitive. Need to coordinate with Clackamas County and/or City of Barlow to make a good decision.

2. **Territorial Bridge**
   a. Very localized and minor benefit (only reduces traffic on Birch and Knights Bridge Road, and attracts approx. 5,000 ADT)
   b. Avoids water intake for City

   Finding: Costs expected to exceed benefits. Do not consider further, but do let community know that it was initially considered.

3. **Arndt Rd extension without bridge (new OR 99E intersection near Ford dealership)**
   a. Helps Knight Bridge significantly (similar to the extension with the bridge), but is much less expensive because it doesn't require a new bridge
   b. Requires a new RR crossing (but it may be possible to have as a grade separated crossing)

   Finding: Likely the best alternative to address Knights Bridge Rd congestion and access to/from the west

4. **Barlow Rd/OR 99E Interchange**
   a. Almost as good for circulation as Arndt Rd extension
   b. Overcrossing or undercrossing would likely run the entire length of the City of Barlow (which would be a significant affect)

   Finding: Costs expected to exceed benefits. Do not consider further, but do let community know that it was initially considered.

OVERALL FINDING: A refinement plan is needed and should be identified in the TSP instead of selecting any of these alternatives (though it may be good for TSP to determine when in the future the issue needs to be addressed). The refinement plan would need Canby, Clackamas County, Barlow, and ODOT at the table so there is consensus and buyoff. Also, it may be possible to get a TGM grant for the study.

II. North Side of OR 99E and East Side of Town (Corridor Capacity Improvements or Alternative Routes)

1. **10th Street extension on west (between Grant and Birch)**
   a. Small benefit. . only provides local connectivity

   Finding: Do not analyze further as part of TSP, but consider for local street connectivity (and have developers construct when area develops).

2. **10th Street extension on east (between Pine and Redwood)**
   a. Provides some relief to OR 99E
   b. May also work well in conjunction with the "Otto Interchange" alternative (in place of the Pine St frontage road)
   c. Would need to cross the multi-use trail, but a ped signal for the trail may be the best option (so that grade separation is not needed)

   Finding: Analyze in conjunction with the "Otto Interchange" (in place of the Pine St frontage road)

3. **Frontage Road between Pine St and new Otto Rd with closure of Pine St/OR 99E and Grade-separated overcrossing at Otto Rd**
   a. Interchange/traffic signal hybrid with two two-phase signals instead of free-flow interchange ramps (traffic signals can meet OR 99E spacing needs)
   b. Pulls traffic off OR 99E between Fred Meyer and fairgrounds
   c. Significant benefit to Ivy/OR 99E because vehicles would use frontage road instead of making the southbound left-turn movement
   d. One lane of Pine Street crossing of railroad could be left open for emergency use (emergency vehicles with pre-emption could raise gates when needed)
   e. Possible frontage road alignment issues (i.e., the power station between Pine and Redwood and the fairly new townhomes east of Redwood)

   Finding: Keep as an alternative to further refine.

4. **Otto Rd Connection to Pioneer Industrial Park**
   a. Very helpful for industrial access to OR 99E
   b. Would have to connect through the NE Canby Concept Area
      1. Access to new development may work best by having a roundabout on Otto with developments accessing the side streets to the roundabout

   Finding: Keep as an alternative to further refine.

III. South Side of OR 99E, including Township Road (Corridor Capacity Improvements or Alternative Routes)

1. **Realignment of Township with 6th (and roundabout at Township/Ivy)**
   a. Alignment with 6th St provides additional east-west route through town, which would likely help reduce highway volumes
   b. Adds traffic to Township and 6th St (though, 6th St is currently a somewhat small residential street that is not currently designed to be used by through traffic)
   c. Makes it faster for westbound vehicles on OR 99E to turn left prior to Ivy (at Locust) and use Locust to access Township and then use the roundabout to turn left and head south on Ivy (this is not a desirable cut-through and may require a median on OR 99E to prevent)
   d. Realignment of Township is also problematic due to number of houses that would need to be removed

   Finding: Township realignment with 6th Street is not a good option, though roundabout is (see next alternative).

2. **Roundabout at Township/Ivy (no realignment of Township)**
   a. Helps lower OR 99E traffic
   b. Attracts vehicles to Township (which becomes a major east/west corridor)
   c. Other option instead of a roundabout would be a traffic signal

   Finding: This is a good alternative, especially in conjunction with improvements along Township (which would need to be a major east/west corridor and may be the bigger concern to residents).

3. **SE 2nd Ave extension to Sequoia Pkwy (crossing over rail)**
   a. Reduces traffic a little on OR 99E (but not much)
   b. There is already a nearby bridge (SE 4th Ave) with extra capacity
   Finding: Costs will exceed benefit. Do not consider further.

4. **Sequoia Pkwy extension to the south from Township to SE 13th (with bridge over railroad tracks and multi-use trail)**
   a. Does not solve industrial area access problems
   b. Does not add much traffic to SE 13th Street, but it does add some industrial area traffic
   Finding: It would be more cost effective to provide better access to OR 99E than to spend the money on a bridge over the railroad and trail.

IV. Ivy/OR 99E (Intersection Capacity Improvements)

1. **Grade-separated crossing (Tunnel from N 3rd to S 3rd)**
   a. Above grade requires more clearance (30 ft) than below grade (20 ft); therefore, below grade is better
   b. Bypasses 2nd Ave (i.e., downtown) and would not be good for the city
   Finding: Inability to maintain Ivy/N 2nd Ave intersection is considered prohibitive.

2. **Jug handle**
   a. Helps the wrong left turn movements (a jug handle on the north side would work better than one the south side)
   b. Traffic diverts to Elm instead of using jug handle
   Finding: Do not consider further.

3. **Downtown Circulation Changes (northbound Ivy/southbound Grant couplet)**
   a. Spreads out traffic to the three OR 99E intersections (Elm, Ivy, and Grant) and is very promising to allow them to meet standards
   b. Much lower cost than grade separation at Ivy
   c. Takes care of Ivy/N 1st Ave problems (convert to two-way stop control)
   d. Main issue is where to do diverge/converge
      1. Knights Bridge Rd on the north seems best location, but would require property impacts (i.e., removing a house)
      2. N 6th Avenue on the north may be a good option to consider in order to limit private property impacts
      3. S 3rd Ave is probably the best location on the south (only other option would be S 2nd Ave)
   e. Everyone liked this alternative . . . hats off to Avi!
   f. Likely would work well with Otto interchange and frontage road
   g. Maybe analyze with reverse traffic flow (northbound Grant and southbound Ivy)
   Finding: This appears to be a clear winner.

V. Safety Related Improvements at Isolated Locations throughout City

1. Roundabout at Mulino/SE 1st/Haines Rd

a. Safety improvements needed at this atypical intersection
b. Some volume would route to OR 99E via Otto (instead of using Haines)

Finding: Keep as an alternative to further refine (and possibly include as an element of a larger OR 99E/Otto Road access alternative).

2. Berg Tunnel from OR 99E to NW 3rd Ave

a. Very expensive, but seen as a significant need in order to get trucks out of the neighborhood

Finding: Keep as an alternative to consider later as part of an overall alternatives package.

Other Issues Addressed at Meeting

In addition to the alternatives analysis workshop, two other issues were discussed.

1. Transportation Alternatives Evaluation Criteria
    a. Preliminary alternatives evaluation criteria developed by Chris and Brad at DKS were provided to the TAC
    b. Sonya recommended some additional evaluation criteria (see attached sheet)
    c. All TAC members left with assignment to review the evaluation criteria and provide additional feedback by December 18, 2009

2. Bicycle and Pedestrian Prioritization
    a. Example prioritization figures (from DKS's work on the Beaverton TSP) were provided to TAC to show them what DKS intends to do for Canby
    b. The prioritization surveys to be filled out (by CAC members and their constituents) were provided to TAC for their feedback/review

TSP TAC Sign In Sheet 12.8.09

NAME	ORGANIZATION	PHONE	EMAIL
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Canby TSP

Sonya Kazen Recommendations

Transportation Alternatives Evaluation Criteria

Goal	Evaluation Criteria Ideas
Livability	Reduces through travel on neighborhood streets (especially truck traffic)
	~~Supports use of pedestrian, bicycle and transit modes~~
	Supports ~~implementation of~~ Canby's ~~comprehensive land use plan~~ Vision for
Safety	Improves safety of railroad crossings
	Improves safety of street crossings of ~~collectors and arterials, trails and major school~~ routes
Economic Vitality	Improves access/connection to I-5 + OR 99E
	Improves freight access within/to Canby industrial areas
	Does not impact downtown access & parking ~~parking availability~~ or access to
Sustainability	Avoids impacting environmentally sensitive areas
	Reduces vehicle miles traveled and improves flow of vehicles to reduce greenhouse gas emissions
	Reduces additional pervious paving and/or provides swales to reduce and clean stormwater run-off.
Travel Choices	Provides pedestrian and bicycle facility improvements between key generators and to transit
Quality Design	Enhances street aesthetics, particularly downtown
Reliability and Mobility	Reduces local street traffic on OR 99E
	Intersections meet operating standards or alternative operating standards and other measures of effectiveness.
	Addresses key bottlenecks (thereby maximizing benefit)
Efficient and Innovative Funding	Reasonable funding source
	Maximizes use of available funding programs/sources ~~and programs~~
Compatibility	* Is consistent with Clackamas County and ODOT facility as planned, or further improves.

Impacts to private property or parks, etc.

Canby TSP

CSM Notes (based on Sonya's ideas)

Transportation Alternatives Evaluation Criteria

Goal	Evaluation Criteria Ideas	
Livability	Reduces through travel on neighborhood streets (especially truck traffic)	+ Consistent w/ Comp Plan + other Plans
Safety	Improves safety of railroad crossings	
	Improves safety of street crossings along major pedestrian and bicycle routes	+ ~~Improves crossings of trails~~
Economic Vitality	Improves access/connection to I-5	+ Improve Freight Access to Industrial Areas
Sustainability	Avoids impacting environmentally sensitive areas	+ Does not impact access to downtown parking
	Reduce vehicle miles traveled and improve flow of vehicles to reduce greenhouse gas emissions	
Travel Choices	Accommodates pedestrian and bicycle facility improvements between key generators (including connections to transit)	
Quality Design	• Enhances Aesthetics of Downtown	
Reliability and Mobility	Reduces local street traffic on OR 99E	
	Intersections meet operating standards or other performance measures	
Efficient and Innovative Funding	~~Reasonable funding source~~ Feasible funding	
	Addresses key bottlenecks (thereby maximizing benefit)	
Compatibility	Is consistent with or provides benefits to Clackamas County and ODOT facility planning or improves	

PRELIMINARY December 8, 2009

Canby TSP
CAC Meeting #4 Summary
March 4, 2010 (6:30-8:30 p.m.)
Canby Planning Department

CAC Members Present:	Roger Skoe (resident), Susie Myers (SECNA), Jackie Jones (SWCNA), Liz Belz-Templeman (Bike/Pedestrian advisory committee), John Henri (City Councilor), and Ron Berg (resident, building task force for Lutheran Church on SW 3rd Ave)
CAC Members Absent:	Tom Finch (Riverside NA), Jan Milne (Planning Commissioner), Sandy Wood (SECNA), Leonard Walker (NECNA), Representatives for the Chamber of Commerce
Project Team Present:	Matilda Deas (City of Canby); Chris Maciejewski and Brad Coy (DKS)

Purpose of this TAC work session: to review Draft Solutions Report (sections of report are in **bold**, followed by discussion items and significant comments)

Pedestrians

1) Reviewed ped and bike prioritization maps

2) Pedestrian list and map of financially constrained projects
   a) These lists are subject to change based on public feedback
   b) Even projects not on financially constrained list are good candidates for being built in conjunction with adjacent developments, roadway improvements, grants, etc.
   c) Susie: pedestrians crossing east leg of OR 99E/Ivy make it difficult for NBR vehicles to get through signal
   d) What benefit is OR 99E crossing near Locust and Knott (C4)? It goes with the STA and details can be ironed out.
   e) Susie: would like to see more pedestrian improvements on funded list (very low percent of pedestrian improvements
   f) Safe routes to school is one important consideration that the analysis hasn't accounted for
   g) If there are other projects that the CAC feels are important, then these can be moved to the financially constrained list
   h) Are Pine Street sidewalks needed? (more of a modernization project)
   i) Susie: Don't think constructing sidewalk on south side of SE 13th adjacent to farmland should even be included on list (because it is on edge of urban area and will be constructed when field develops)
   j) NE 10th Ave shows up as a very low priority, though is major E-W corridor, vehicles travel faster than 25 mph, and is a problem (though is more of a vehicular problem) because it is a back door to fairgrounds . . . lots of people walking, parks, etc.

   i) Matilda: Haven't received any grants, though apply every time (needs to be modernized) . . . main reason is due to need to own right-of-way or easements
   ii) CAC consensus: We should bump up 10th Avenue to a high priority project
 k) CSM: If there are a large number of modernization projects, then these could be partially funded by a utility fee
   i) CAC consensus: this would not be a good idea right now given the recent implementation and growing pains associated with the street maintenance fee
   ii) Lets circle back to modernization projects at the staff level to make sure we account for them
 l) CAC consensus: Some sidewalk needs to move up to funded list:
   i) Knights Bridge Road (both) . . . alternative funding (get info from Matilda)
   ii) Holly Street
   iii) Territorial Road
   iv) 10th Avenue

Bikes

1) Reviewed bike prioritization map
 a) Susie: lots of pedestrian/bike activity by Elm St (but not showing up as high priority)
   i) This activity is school-related and so would not be captured by prioritization analysis

2) Bike lanes on OR 99E was put in as placeholder for now because we need to do something; some options are:
 a) Parallel route on S 2nd Avenue (Bicycle Boulevard)
   i) Physical treatments to reduce vehicle volumes/speeds
   ii) John: not going to have community support in Canby
   iii) Ron: tough with narrow streets due to on-street parking, buses
   iv) Susie: not enough connectivity in south area
 b) Trail along railroad
   i) Matilda: had a study showing that the trail could go along railroad, but got squeezed at Molalla Forest Trail over-crossing
   ii) John: we should put the bike trail on north side of the tracks
   iii) CAC consensus: this is the better option

3) Lots of recreational cycling (these are important routes) . . . move these up to the funded list
 a) Knights Bridge out of town (from Holly to City Limits)
 b) Holly Street to the north (towards the ferry) . . . cyclists stay on Holly all the way into town (so make it from N 22nd Ave to Knights Bridge)

Motor Vehicle

1) Showed traffic simulations
 a) John: city council doesn't understand future gridlock . . . need to show people the traffic simulation to help them understand
 b) Matilda: this is a concern that she has also heard (people don't understand how bad things could be and why this level of improvements would be necessary)

2) Couplet:
   a) CAC: Like not having to remove diagonal parking from both sides
   b) John: likes this alternative a lot
   c) Susie: more residential uses on SW 3rd than on SW 2nd
   d) Ron: lives on this section of SW 3rd; feels that houses on SW 3rd would be hurt the most . . . recognizes that will live with whatever is the best solution (just wants to make sure there is careful consideration here)
   e) Ron: feels that the big problem with this solution is that the southwest corner Ivy/OR 99E isn't addressed (this is an existing problem)
   f) Susie: recognize the issue w/ using SW 2nd is the queuing on Ivy at OR 99E . . . would moving NBR movement over to SE 2nd and road just to the east of Ivy improve this?
      i) This is a possible consideration should analysis show NB queuing concerns on Ivy's approach to OR 99E

3) Otto Rd Over-crossing and Frontage Rd
   a) John: really likes how all of this works
   b) Matilda: it seems almost impossible to pull off . . . problematic how to condemn land, with potential likelihood for lawsuits
   c) Susie: with all of right-of-way acquisition, this project would need strong consensus
   d) CSM: frontage road is what is tough . . . over-crossing is expensive, but doable
   e) John: what does cost estimate include? . . . CSM: land right-of-way, but no building takes
   f) CSM: had discussion with ODOT staff that they may be willing to allow more congestion at OR 99E/Sequoia and OR 99E/Pine if we show that the frontage would work but is cost prohibitive
   g) Matilda: are we going to look at wider rail crossings? CSM: yes, but not likely to get far
   h) CSM: we will look at other options, especially a right-turn lane on OR 99E at Pine Street
   i) Susie: how about a more southern alignment and going under the Molalla Forest Rd trail instead of going through the apartment complex? Will this reduce property impacts?
   j) Next step is to work with ODOT to figure out a possible smaller fix that can go in financially constrained list . . . with frontage road on wish list

4) Other projects
   a) Susie: have you considered Territorial extension? (yes . . . last screening it was tossed because it didn't have significant improvements relative to expected cost)
   b) Susie: Barlow Rd has been much better recently (did ODOT make a signal timing change?)

5) Funding:
   a) CSM: would need to double SDC rate to fund all of these . . . but this is assuming City pays entire cost
   b) John: doesn't ever see city paying entire 26 million for Otto Rd over-crossing . . . would need State support
   c) CSM: may be able to coordinate with ODOT to partner for 50-50 share of costs for highway improvements (similar to what was done for Sisters)

Next Steps:
1) Matilda to do community briefings
2) May take a little time-out to figure out rail issue on Pine St and whether we are limited to existing crossing width
3) John: anything to bring to state legislatures to put pressure on rail?
   a) CSM: lets wait until we see what smaller fixes are possible
4) STA Rate comparison
   a) Susie: make sure the commercial/industrial uses are paying an increased rate, too
   b) Susie: one difference between rate comparisons with these other cities is that Canby is not close to I-5

Canby TSP
TAC Meeting #4 Summary
March 4, 2010 (3-5 p.m.)
Canby Planning Department

TAC Members Present: Matilda Deas and Bryan Brown (City of Canby); Sonya Kazen, and Ted Miller (ODOT Region 1); Curt McLeod (Curran-McLeod)

TAC Members Absent: Jeff Crowther (City of Canby); Avi Tayar (ODOT Region 1); Todd Mobley (Lancaster Engineering); Julie Wehling (Canby Area Transit); Todd Gary (Canby Fire Dept.); Jorge Tro (Canby Police Dept.); Jennifer Donnelly (DLCD); Carol Muuewsen or Wayne Layman (Canby School District); Clackamas County representative

Consultant Team: Chris Maciejewski and Brad Coy (DKS)

Purpose of this TAC work session: to review Draft Solutions Report (sections of report are in **bold**, followed by discussion items and significant comments)

Pedestrians

1) Reviewed ped prioritization map
   a) Explanation of how we used this as a backdrop for prioritization

2) Explanation of Table 1 (financially constrained list based on criteria) and what the criteria mean
   a) How about elevator discussion in downtown? (was identified in Urban Renewal Plan?)
      i) Plan is to do STA with ped islands instead

3) STA on OR 99E
   a) Ted Miller: not a fan of speed dropping to 25 mph
      i) This is not a requirement, but 25 mph is typical for an STA . . . 30 mph is what Oregon City has, so 30 mph would also be best for Canby
   b) Sonya: Please change wording on Cut Sheet 4 from “should” to “may be”
   c) Ped refuge island can be put in due to one-way
      i) Curt: Have always fought to get adequate lane widths, so how to make room for ped refuge? How to get room for bike lanes?
         (1) Sonya: starting with narrower lane widths means that they are the status quo and it gives us more room
      ii) How about Elm Street crossing?
         (1) No refuge, but can improve crossing and ramps so that it is better for peds

iii) Even though the TSP will identify these improvements, the person who eventually designs the project has to have a study to address why the pedestrian crossing and refuge island are needed
iv) ODOT is willing to put ped islands and ramps, but how to make crossings safe? Do not strip crosswalks . . . looking at new designs, including rapid flashers

4) Trail connection near Fred Meyer
   a) West side connection that ramps up to the trail and connects to the sidewalk (uses rail crossing)
   b) Curt: likes the idea of a west side connection (had not thought of west side because east side is more direct, but rail crossing is critical consideration)

5) Sidewalks near Fairgrounds
   a) Curt: How to make this work? Have had problems in the past
      i) Matilda: has been working with Fairgrounds and they are willing to help out . . . also are willing to work with Plumbing Co

6) Sidewalks
   a) How about local street system? (e.g., Fir to Cedar and 1st to 5th have been filling sidewalk gaps)
      i) This report only identifies projects on the arterial/collector system
   b) Some sidewalk projects are identified but not on funded list . . . these to be constructed as roadways improved or adjacent sites develop . . . not all are key to network, but still identified in plan

7) Funding and Phasing
   a) Repaving costs should be included in cost estimates (not in maintenance cost forecasts)

Bikes

1) Downtown (how to get bike lanes through town on OR 99E or parallel route)
   a) Not enough room to have bike lanes on OR 99E
   b) Trail along rail corridor would be nice, but would need approval . . . has been looked into in past and would need to be fenced
   c) Parallel route is another option that should be considered
   d) CSM: What about bike boulevards on SW 2nd Ave from high school to Locust?
      i) Canby telephone lot owns a site and may object
      ii) Typical physical treatments to manage auto traffic (such as directional diverters)
         (1) How about just sharing it without doing any physical treatments?
      iii) Tricky part is crossing Ivy
         (1) TSP Plan should include an "S" curve realigning South 2nd Ave with relocating parking servicing Canby telephone lot . . . this would also benefit bike boulevard
         (2) S 2nd Ave near Canby telephone is used for cut-through . . . would need some sort of treatment
      iv) Put in bike system map or maybe tie into Ivy/OR 99E improvements instead (to allow better signal operations and more likelihood of being funded)
      v) Using S 2nd Ave as bike boulevard also makes it better to use SW 3rd for couplet

   e) Curt: Have talked before about closing Grant Street (Curt feels that this is the crossing that is needed the least at the moment and that the City could do without it)
      i) Grant is needed for proposed solution to work, especially because Grant, Elm, and Ivy are all just under V/C threshold

Motor Vehicles

1) Overall thoughts on some of the solutions
   a) Pine St may be fixable (instead of just closing in conjunction with Otto over-crossing)
      i) Also, how to improve safety at Pine St crossing until Otto over-crossing is constructed?
   b) Hard for Curt to imagine that Otto over crossing is more important than Berg crossing (we will address this later)
   c) Brian: Important to make it clear that a piecemeal approach will not work because improvements are tied with each other and model is accounting for all of them together
   d) High Speed Rail may affect options, but will have to wait and see . . . may need changes to plan at a later date

2) CSM: Introduction of evaluation with explanation of non-capacity solutions (review of Draft Solutions Report)
   a) Transit: would like to increase service, but not likely
   b) Employer TDM options
      i) Sonya: Should consider what you are going to require in code and what thresholds to use . . . Transportation Management Association (TMA) makes sense for Canby Pioneer Industrial Area
      ii) Matilda: TMA may not be best, but instead right now would be tough sell . . . instead set a lower threshold and have approval criteria and worksheet
      iii) Could help lower greenhouse gases, outcome may be increased exposure to other options and education of importance of accommodating other modes . . . may be all that is needed
      iv) Step in right direction, but won't remove other needed improvements
   c) Parking pricing . . . not economically viable (would not return bang for buck)
      i) Curt: Parking perception is that there isn't enough in some locations, Grant St between OR 99E and N 2nd Ave may be one tough sell
      ii) Sonya: may be good to include discussion of past parking study and how its findings were that there is excess parking
      iii) Curt: angled parking is easier, so he prefers; others disagree
   d) STA
      i) Sonya: didn't realize STA would have effect on highway . . . initially requested additional discussion on how local streets will service local traffic . . . then looked more closely at how Cut Sheet 4 and concluded it discusses it after all

3) Downtown Circulation
   a) First idea is to tie in at Knights Bridge Rd
      i) House in the way may currently be vacant . . . go buy it!
      ii) Curt: somewhat concerned about out-of-direction travel for local traffic
         (1) DKS: This will be very limited for only some of the local traffic

        (2) DKS: Model shows that overall VMT in city will be lower
    iii) Curt: No discussion of Territorial and SW Berg being key routes and how to address?
        (1) DKS: Future needs analysis did not identify any problems, so no need to address
    iv) Berg Pkwy rail grade-separated crossing
        (1) Not part of package we are trying to fund
        (2) Police department wants this project (they are relocating at Berg)
        (3) Curt: can we push to encourage this project and tie it in to County project connecting across the river?
        (4) Change discussion of Berg to say either over-crossing OR under-crossing
            (a) Railroad says more expensive to do under-crossing (second rail line needed, etc.)
        (5) Curt: would like to see it recommended in a plan
        (6) TAC consensus: move this project onto a recommended/non-funded list
            (a) Financially reasonable may be better term to use than financially constrained when discussing preferred list of solutions

4) Otto Rd
  a) Connection to industrial area
    i) Some cleanup will be needed
    ii) Curt: Would like industrial traffic off of 1st Ave . . . tell us we need another connection between Hazel Dell to Walnut to keep industrial traffic internal to Industrial Area
        (1) CSM: from a connectivity point of view, it would be great . . . but, building is in the way, so not practical
    iii) Mulino/Haines/SE 1st Roundabout included in funded list for safety and overall circulation
  b) Otto Rd over-crossing and frontage rd
    i) Better place for money than Berg (possibly a different story if Berg was connection to I-5, but probably not because near Ford dealership would be much better)
    ii) Building the frontage road may be most difficult to get community buy-off on
        (1) Sonya: is it realistic to think that we can get a frontage road? We need to be CERTAIN that we really do need it before fighting this battle, because it will be.
        (2) Possible big chunk of savings if you don't do Otto over crossing with frontage road . . . maybe try to develop the "best alternative" to see what other option may be available
            (a) A different solution would likely include right-turn lanes on highway
            (b) What about widening highway to 7 lanes and then improving Pine St?
                (i) Sonya: policy-wise, ODOT prefers local solutions rather than widening the highway and may financially contribute to improvements that allow highway to not be widened
                (ii) Maybe replace pedestrian bridge with savings from not doing Otto Rd over crossing (if extra space is needed for 7-lane highway to carry extra capacity)
                (iii)One consideration is that wider highways would affect the rail interchange and the two crossings of OR 99E

5) Quickly shown traffic simulation

Next Tasks

1) Revisit analysis to consider other options besides Otto Road over-crossing with frontage road

Canby TSP
CAC Meeting #5 Summary
June 3, 2010 (6:30-8:30 p.m.)
Canby Planning Department

CAC Members Present:	Susie Myers (SECNA) and Jackie Jones (SWCNA). Also present – non-CAC member Roger Skoe (resident).
CAC Members Absent:	John Henri (City Councilor), Tom Finch (Riverside NA), Jan Milne (Planning Commissioner), Sandy Wood (SECNA), Leonard Walker (NECNA), Liz Belz-Templeman (Bike/Pedestrian advisory committee), Ron Berg (resident, building task force for Lutheran Church on SW 3rd Ave), and Representatives for the Chamber of Commerce
Project Team Present:	Matilda Deas (City of Canby); Chris Maciejewski and Brad Coy (DKS); Matt Hastie and Serah Breakstone (Angelo)

Purpose of this TAC work session: to review Draft TSP highlights, discuss recent community feedback, and determine needed revisions to finish draft and start adoption process

Code Work Review by Angelo

1) Most recent update process was performed in 2000, so this addresses changes since that moment

2) Working on a separate process of implementing low impact developments into the code

3) Some of the main updates:
   a) Traffic Impact Study guidelines
      i) Option to choose own engineer or have on-call City engineer perform study
   b) Neighborhood through trip study
      i) Option to include as a section of TIS or as a stand alone document
      ii) Need to clarify mitigation threshold
   c) Safety and functionality standards required as part of any development
      i) Street drainage
      ii) Utilities
      iii) Paved roadway along frontage
   d) Access
      i) New language requiring access management plan
      ii) Intended to demonstrate why the deviation is necessary and what impacts will result

4) Need to define rough proportionality

Outreach Events

1) Downtown business owner meeting
   a) Attended primarily by City staff and counselors
   b) One property owner

2) Open House Feedback/Review of presentation
   a) One couple voiced concerns about one-way southbound flow on Grant

Review of TSP

1) Should TSP mention that improvements would not be implemented until triggered?
   a) Additional discussion at beginning of motor vehicle improvement about how or when improvements would be constructed may be good to add, but still might not resolve citizen concerns
   b) Better approach (approved by CAC) is to add discussion to goals and policies section that improvements would not be performed until operation standards are exceeded
   c) Two "f" items under Goal 3 (need to fix)

2) To provide sidewalks on NE 3rd and NE 4th, could add a project that converts these roadways to one-way flow from their junction to Locust Street

3) What are we going to do regarding bicycle lanes in downtown Canby?
   a) There are some options:
      i) Parallel route on Holly
      ii) Next to parallel parking
      iii) Next to back-in diagonal parking (this would allow bike lanes next to angled parking)

4) Downtown Circulation
   a) Not having SE 2nd Ave realigned does not significantly affect this alternative
   b) Suzie mentioned that one big problem with NB right-turns from Ivy to OR 99E is that a pedestrian crossing the east leg stalls traffic for the entire lane
      i) One solution if this does turn out to be an issue would be to route right-turning traffic to SE 2nd Ave
   c) Right turn from OR 99E onto Ivy Street would be difficult due to right-of-way impacts to car wash
   d) Parking impact on Grant St between NW 1st Ave and NW 2nd Ave
      i) Would go from 11 stalls to 5 stalls
      ii) Solid storefront on west side, while there is a parking lot on east side (so likely more support for parallel parking on east side)
   e) North circulation concerns
      i) Could use either NW 6th Ave
      ii) Show options in TSP and leave issue for later decision
         (1) Would be especially important to involve neighbors on NW 6th Ave and Knights Bridge Rd in this decision
   f) Considered reverse flow (clockwise)

  i) Additional endpoint needs (i.e., roundabout) would add significant cost
  ii) Transit center would not work at current location with southbound Ivy Street
  iii) Other cons compared to counter-clockwise flow

5) Pine St-NE 4th Ave improvements that are part of Financially-Constrained Package
   a) ODOT Rail is okay (can widen rail crossing if pull stop bar behind railroad tracks)
   b) ODOT is okay (v/c < 1.0 even though greater than mobility standard)
   c) Reduces cost significantly

6) We don't have priorities set within Financially-Constrained Package
   a) Suzie feels that Pine Street improvements is a top priority project
   b) Prioritization will come when City prepares CIP list based on TSP projects

7) Financially-Constrained Package can be funded with existing revenue streams
   a) First time DKS has seen this happen

8) Discussion of Industrial Area adjustments
   a) If policy is to have free-flowing truck movement, then we recommend 40-ft wide roads
   b) Walnut (as currently being built) is only 32 ft wide with parking on one side
   c) Instead of extending Otto Rd to align with Walnut, how about aligning it to extend to Mulino?
      i) Could still have connection to align with Walnut
      ii) Could also have local connection to align with Hazel Dell
         (1) Need to change local street connectivity (see markups on large figure)
   d) SE 1st Ave and Haines Rd should not be shown as truck routes

County Jurisdiction/Coordination Items

1) Mulino/SE 13th Avenue intersection has issues that the County needs to address
   a) We expect it to be a priority for the County
   b) One key issue is low clearance on bridge under railroad tracks

2) County is transitioning to a new manager
   a) County is updating their TSP as well . . . should include I-5 to Canby connection and Mulino/SE 13th issues
      i) Matilda to follow up with County

Canby TSP
TAC Meeting #5 Summary
June 3, 2010 (3-5 p.m.)
Canby Planning Department

TAC Members Present:	Matilda Deas and Bryan Brown (City of Canby); Sonya Kazen (ODOT Region 1); Curt McLeod (Curran-McLeod)
TAC Members Absent:	Jeff Crowther (City of Canby); Avi Tayar (ODOT Region 1); Todd Mobley (Lancaster Engineering); Julie Wehling (Canby Area Transit); Todd Gary (Canby Fire Dept.); Jorge Tro (Canby Police Dept.); Jennifer Donnelly (DLCD); Carol Muuewsen or Wayne Layman (Canby School District); Clackamas County representative
Consultant Team:	Chris Maciejewski and Brad Coy (DKS); Matt Hastie and Serah Breakstone (Angelo)

Purpose of this TAC meeting: to review Draft TSP highlights, discuss recent community feedback, and determine needed revisions to finish draft and start adoption process

Code Work Review by Angelo

1) Is currently working on concurrent code update project
   a) Looking at incorporating low impact development

2) For TSP, made changes to ensure compliance with recent changes to TPR

3) Traffic impact language gives City supporting language to apply conditions of approval to developments
   a) DKS gave guidance due to experience as on-call engineer
   b) Process also outlined (e.g., pre-app conference, etc.)
   c) City wants to make sure it has option to coordinate with its own on-call engineer or allow the developer to find its own traffic engineer
      i) If developer finds own engineer, then it needs to be clear that developer will also pay for review of study by City's on-call engineer
      ii) City also wants to make sure it scoping
      iii) Provisions for requiring neighborhood through trips study (separate level of traffic study) . . . could be included as part of TIS or just a separate study
         (1) Useful to add language that this study could be done as its own study
   d) Curt would like to see being able to quantify off-site improvements so that they are off-site credible (including when it is safety-focused, such as neighborhood traffic management)
      i) Quantify as early as possible and include on CIP (be responsive)

- ii) DKS recommended an annual neighborhood program . . . may be good to update this project list as projects are planned and needs identified
- e) 16 ft street width is pavement, but still identifies 20 ft clearance for emergency response
- f) Access management plan language (when spacing would not meet standards)
  - i) Hard to do, so exception process is important and should be clearly outlined
  - ii) There is also language about taking access off of lower classified roadways
  - iii) City has option to push harder based on volume of traffic on driveways (commercial uses vs. single family home)
  - iv) Chapter 7 has additional information that is not currently in Chapter 10; therefore, should modify the table in Chapter 10 to match Table 7-2
  - v) Make it clear whether it is for one or both sides of roadway and whether spacing is measured from center-to-center or edge-to-edge
- g) Street alignment provisions related to setbacks
  - i) Issues is for roads that don't exist
    - (1) If something is substandard, then it is common knowledge that new or re-development
    - (2) easement/right-of-way
  - ii) How to bring it up to standards
  - iii) How to turn it into right-of-way
  - iv) Right-of-way acquisition could be SDC credible
  - v) Option 1: general comment including the word "may"
  - vi) Option 2: spend more time to know specific needs of specific roadways
  - vii) The current general language could work for now as a placeholder
  - viii) Figure out where right-of-way is and just buy it

Review of Recent Public Meetings

1) Business owner meeting – went well
   - a) Mostly attended by city staff and counselors

2) Business owner location visits – Matilda did not get significant pushback
   - a) Most people were at first concerned, but realized that something is needed
   - b) This couple and their business
     - i) Very concerned about parking being changed and losing stalls

3) Open house
   - a) One group of citizens expressed significant concern about having Grant as one-way street flowing towards the highway due to number of businesses
   - b) Bicycle-related comments were good but there are some areas that are not ideal but workable (e.g., connections to Safeway, width of sidewalk south of OR 99E near Molalla Forest Ridge Trail)

Review of PowerPoint presentation

1) Multi-use trail on north side of railroad track
   - a) Determine whether to use parking area or railroad right-of-way
   - b) Need to have discussions with both ODOT Rail and railroad company

i) Should coordinate this sooner than later so that this project can be ready to go when funding becomes available

2) Hope to do sidewalk along Fairgrounds by the end of the year
   a) Constrained right-of-way on 3rd and 4th
   b) Maybe do one-way loop for one block (to be able to fit sidewalks)
   c) Discuss in TSP (similar to how Berg Parkway Extension is discussed)

3) What to do for downtown Canby regarding bike lanes?
   a) High volumes (10,000 ADT) on Grant and Ivy, so need bike lanes if going to route
   b) Problematic with diagonal parking, but is fine if it is back-in angle parking (or parallel parking)
   c) One option is to have parallel route (such as Holly)
   d) So, for now, say there are the following options (can be determined later):
      i) Parallel route
      ii) Back-in angle parking with bike lane
      iii) Parallel parking with bike lane

4) SE 2nd Avenue alignment doesn't have local support
   a) Whether it is constructed or not doesn't affect alternative flow option

5) Reversed Flow Revisited
   a) Doesn't work for transit
   b) Ivy serves major generators, even though not necessarily the number of downtown businesses
   c) Endpoints are a concern and would add significant cost
      i) Roundabout would be needed at both endpoints (preferred over traffic signals, though signals would also likely work)
   d) Concern about tying counterclockwise flow back in on north
      i) If uses Knights Bridge Road
         (1) Concern about not being to head east all the way to Holly or Ivy
         (2) Requires taking houses
         (3) Still a residential street

6) Overall one-way flow concept
   a) 6th is a good initial option (show as option in TSP so that citizens are aware)
      i) May work fine and never need to move to Knights Bridge Road
      ii) Offset intersection just north on Grants may need to be right-in/right-out

7) Truck route conversation in industrial area
   a) Walnut was only built to 32 ft with parking on one side (likely not adequate as backbone to industrial area)
   b) Could connect to Mulino/Haines roundabout instead of at Walnut
   c) Need to avoid SE 1st Ave as truck route
      i) This is easier to do if Otto also connects to Walnut (better distributes traffic)

ii) Could optionally disconnect SE 1st Ave so that Mulino/Haines/Otto Roundabout is only 4 legs
(1) Residences would then have cul-de-sac
d) Don't show Haines Road as truck route either

8) Cross-section standards
a) Curt wants to know why we are tweeking the standards . . . is this necessary?
b) Industrial roadways are wide enough to allow narrower driveways
i) Industrial developers pushed for narrower width on Walnut
ii) Counsel should weigh in on and make decision on right-of-way widths
c) Other roadway cross-section standards are what DKS considers to be best practices, especially for new roadways
i) Low impact widths are also identified in the table
ii) Could add more discussion in TSP if needed to address some of these issues
iii) Canby typically uses very even numbers and tries to keep travel widths in right-of-way but may put sidewalks in easements

Next Meetings
1) City Counsel
a) DKS will review main findings and focus on issues that are particularly in need of additional community consensus
b) Angelo to review main code changes and how they influence City processes (similar to the discussion in this meeting); will coordinate later to nail down details

Appendix B: Background Document Review Memorandum

TECHNICAL MEMORANDUM #2

TO: Matilda Deas, City of Canby
Sonya Kazen, Oregon Department of Transportation

FROM: Chris Maciejewski, P.E., DKS Associates
Brad Coy, E.I.T., DKS Associates
Matt Hastie, Angelo Planning Group

DATE: April 5, 2010

SUBJECT: **Background Document Review** P09042-002-002

This memorandum was prepared to be used as a resource during the Canby Transportation System Plan (TSP) update to help ensure that the TSP update builds off of past effort, addresses any outstanding issues, and fits into the larger regional context.

This resource is divided into two parts. First, it lists key issues and recommendations identified in prior studies and plans that have findings or guidelines relevant to the Canby TSP update. This list highlights areas where existing local plans will guide the TSP development and identifies deficiencies to be addressed. Second, this memorandum provides detailed documentation of the applicable sections of those prior studies and plans. The purpose of the documentation is to be a resource where all relevant information can be found so that this memorandum can be referenced when information is needed instead of searching the prior studies and plans.

Key Issues and Recommendations

The following table lists the key issues and recommendations identified in prior studies and plans that have findings or guidelines relevant to the Canby TSP update. The table also lists where or when these issues and recommendations will be applicable to the TSP update (i.e., which chapter or during what part of the process).

Key Issues from Prior Studies and Plans to Address in TSP Update

Items to Address in Update	When or Where to Address
Canby Public Facilities Plan (April 2006)	
Transportation goals and policies	Use to develop goals and policies (Ch. 2) and to guide the general development of the TSP update (maintenance, improvements, and financing) . . . (Ch. 5 to 10)
Description of facilities	Update and incorporate into existing conditions (Ch. 3)
General financing plan	Consider and compare with updated financial analysis (Ch. 10)

Table continued on next page.

(Continued) Key Issues from Prior Studies and Plans to Address in TSP Update

Issue to Address in Update	When or Where to Address
Canby TSP (Adopted April 2000)	
General issues (blockages/delays at rail crossings, discontinuous sidewalks, roadway maintenance backlog, County streets within City UGB)	Discuss in existing conditions (Ch. 3) and address in multi-modal alternatives analysis (master plans in Ch. 5 to 7)
Evaluation goals for TSP alternatives	Use to develop goals and policies (Ch. 2), evaluate multi-modal alternatives (Ch. 5 to 9), and update City code
County identified improvements	Consider when analyzing multi-modal alternatives (master plans in Ch. 5 to 9)
Recommended improvements	Reconsider when analyzing alternatives (Ch. 5 to 9)
Pedestrian and bicycle policies	Use to develop goals and policies (Ch. 2) and pedestrian and bicycle plans (Ch. 6 and 7)
Access management policies, operating standards, neighborhood traffic control, and traffic demand management, functional classification (and assigned roadways), street cross-sections	Update and include in Motor Vehicle Plan (Ch. 5)
High speed rail standards	Update and include in Rail Plan (Ch. 9)
Finance plan	Consider for updated financial analysis (Ch. 10)
Canby Comprehensive Plan (1984 Original/2007 Updated)	
Transportation goals and policies	Use to develop goals and policies (Ch. 2), evaluate alternatives (Ch. 5 to 9), and update City code
Recommended improvements	Reconsider when analyzing alternatives (Ch. 5 to 9)
Draft NE Canby Concept Plan (June 2005)	
Land use and transportation concepts for NE Canby (including roadway locations, improvements, and general standards)	Incorporate into future forecasting (TM 3) and alternatives analysis (Ch. 5 to 9)
Industrial Area Master Plan (October 1998)	
Land use and transportation concepts for Canby Pioneer Industrial Area (including future roadway alignments, circulation plan, land use density, cross sections, and transit stop recommendations)	Incorporate into future forecasting (TM 3) and alternatives analysis (Ch. 5 to 9)
Goal 5 Inventory	
Safe harbor 75 feet from river	Consider when analyzing alternatives (Ch. 5 to 9)
Canby Transit Plan	
In process of being completed, but will parallel TSP	Ensure goals and policies are consistent (Ch. 2), include findings in existing and future conditions (Ch. 3 and 4) and Transit Master Plan (Ch. 8), and ensure compatibility with other master plans (Ch. 5, 6, 7, and 9)
Canby Wetland and Riparian Map	
Locations of wetlands and soil types	Consider when analyzing alternatives (master plans contained in Ch. 5 to 9)

Table continued on next page.

(Continued) Key Issues from Prior Studies and Plans to Address in TSP Update

Issue to Address in Update	When or Where to Address
City of Canby Trails Plan	
Conceptual locations for multi-use paths, bike lanes, and bike routes	Consider for pedestrian and bicycle alternatives analysis (master plans in Ch. 6 and 7)
Canby Urban Renewal District	
Urban Renewal District geographic area	Consider as potential funding source for improvements located within URD (Ch. 10)
City of Canby Municipal Code	
Title 16, Planning & Zoning	Consider and use as basis for determining where code updates are needed (near end of TSP update process)
City of Canby Revenues and Expenditures	
Past City revenue and expenditure streams	Discuss with existing conditions (Ch. 3) and use as basis for financial analysis (Ch. 10) and to determine future financial resources available for capital improvements (i.e., TSP alternatives analysis, Ch. 5 to 9)
Clackamas County Capital Improvement Projects (Fiscal Years 2006/07 to 2010/11)	
Five-year Transportation Capital Improvement Program (CIP); only has one Canby project (bicycle)	Consider when analyzing bicycle alternatives (Ch. 7)
Clackamas County Comprehensive Plan: Chapter 5 Transportation Systems Plan (Latest Revision in January 2009)	
General County goals and policies	Use to develop goals and policies (Ch. 2) and to encourage County participation in TSP update process
County operating standards and policies	Use as County road operating standard for existing, future, and alternatives motor vehicle operations analysis (Ch. 3 to 5)
County road building policies	Consider when analyzing alternatives on roadways outside of Canby UGB (Ch. 5 to 9)
County 20-Year Capital Improvement Needs	Reconsider improvements (Ch. 5 to 9)
County functional classification	Consider when analyzing alternatives (Ch. 5 to 9)
Scenic roads (map)	Consider for alternatives analysis (Ch. 5 to 7)
Planned County bikeway network (map)	Consider for bicycle alternatives analysis (Ch. 7)
Oregon Transportation System Planning Guidelines 2008	
Step-by-step guidance for TSP preparation	Use as basis for overall project scoping and analysis methodology
Policy guidance on transportation and land use issues	Use as resource during entire TSP update
Oregon Transportation Plan (September 2006)	
Identification of policies, strategies, and key initiatives to address the core challenges and opportunities facing transportation in Oregon	Use to develop goals and policies (Ch. 2) and to ensure consistency with state-wide plans

Table continued on next page.

(Continued) Key Issues from Prior Studies and Plans to Address in TSP Update

Issue to Address in Update	When or Where to Address
Oregon Bicycle and Pedestrian Plan (1995, part of OTP)	
Identification of policies, strategies, and key initiatives to address the core challenges and opportunities facing pedestrian and bicycle transportation in Oregon	Use to develop goals and policies (Ch. 2) and to ensure consistency with state-wide plans
1999 Oregon Highway Plan (updates through August 2006, part of OTP)	
Identification of policies, strategies, and key initiatives to address the core challenges and opportunities facing the highway system in Oregon	Use to develop goals and policies (Ch. 2) and to ensure consistency with state-wide plans and collaboration between government agencies
State highway classification system and mobility standards for OR 99E	Use applicable OR 99E standards for motor vehicle operations analysis (Ch. 3 to 5), determination of feasible OR 99E alternatives (Ch. 5 to 8), and to consider Special Transportation Area designation
Oregon State Transportation Improvement Program (STIP) (2008-2011 and 2010-2013 Draft)	
ODOT's short term capital improvement program, including funding and scheduling information for transportation projects (only Canby project is repair of logging bridge over OR 99E)	Assume completion of project in future alternatives analysis.
ODOT Safety Priority Index System (SPIS) (2008)	
Identification of OR 99E/Ivy St as top 5% SPIS location and OR 99E/Pine St as top 15% SPIS location	Incorporate findings into existing conditions analysis (Ch. 3) and consider safety improvements when performing alternatives analysis (Ch. 5 to 8)
2003 ODOT Highway Design Manual and Amendments (2003, with revisions in 2004 and 2005-2006)	
Provides design uniform standards and procedures for ODOT facilities (i.e., OR 99E)	Consider HDM requirements for OR 99E improvements when performing alternatives analysis, determining cross-section, designing project, and estimating costs. (Ch. 5 to 8)
Oregon Transportation Planning Rule (TPR) (OAR 660-012)	
Implements state planning Goal 12, which must be addressed in each city and county comprehensive plan in Oregon	Use as basis for overall project scoping and to confirm at the end of the process that TSP update and implementing ordinances comply with this rule
Oregon Access Management Rule (OAR 734-051)	
Identifies access spacing standards and regulatory procedures for OR 99E	Consider access management improvements when performing alternatives analysis (Ch. 5 to 8). Also, ensure consistency of updated access spacing standards and implementing ordinances (Ch. 5 and Ch. 11).
Historic Traffic Counts in Canby	
Recent counts at the following study intersections: • OR 99E/Pine Street • OR 99E/Sequoia Parkway • South Hazel Dell Way/Sequoia Parkway	Use for existing conditions analysis (Ch. 3) and as count base for future forecasting (TM 3)
Historic Resources in Canby (from City Ordinance and Oregon Historic Preservation Plan (2009))	
A list of historic locations in and near Canby	Consider all historic locations when performing alternatives analysis (Ch. 5 to 8)

Table continued on next page.

(Continued) Key Issues from Prior Studies and Plans to Address in TSP Update

Issue to Address in Update	When or Where to Address
Oregon State Rail System Maps	
Railroad classifications and passenger routes	Discuss with existing conditions (Ch. 3)
ODOT Intercity Passenger Rail Study (June 2009 Draft)	
Existing rail service on Union Pacific mainline through Canby (i.e., number of daily freight and passenger trains)	Discuss with existing conditions (Ch. 3)
Preliminary finding that passenger rail service can be shifted to the Oregon Electric line (which does not run through Canby)	Discuss with future needs (Ch. 4)
ODOT Rail Crossing Rules	
Crossing rules, applications, and examples	Consider for alternatives that include a rail crossing. Use to determine cross-section, project design, and cost estimating. (Ch. 5 to 8)
Safe stopping distance (ODOT Rail regulates out to these distances on approaches to crossings)	Discuss with existing conditions (Ch. 3) and use to determine which projects will need ODOT Rail input
ODOT Rail Plan (2001, part of OTP)	
Integration of rail freight and passenger elements into land use and transportation planning, including working with private companies and public sector agencies to operate rail system in safe manner	Include ODOT Rail in the entire TSP process, especially regarding rail issues. Provide Ch. 3 to 9 for their review. Also, consult rail carriers as necessary (based on direction from ODOT Rail)
Impact of road construction projects that involve a new rail crossing or that alter or are near existing at-grade crossings (checklist provided)	Use checklist when analyzing alternatives to determine if ODOT Rail should be consulted about a given alternative and involved in the project development process
List of ways to improve at-grade rail crossing safety	Consider when analyzing alternatives (Ch. 5 to 9)
Department policy regarding Union Pacific mainline (i.e., no more at-grade public or private crossings and that efforts should be made to close unnecessary crossings or provide for future grade separations)	Consider when analyzing alternatives (Ch. 5 to 9)
List of ways to minimize conflict and improve access	Consider when analyzing alternatives (Ch. 5 to 9)
Discussion of Oregon Pacific Railroad uses	Discuss with existing conditions (Ch. 3).

Background Documents

The background documents that were reviewed included plans, strategies, studies, and data associated with the City of Canby's transportation systems. Documents were obtained from the City, Clackamas County, the Oregon Department of Transportation (ODOT), and Lancaster Engineering (the City's on-call Traffic Engineer). A list of the documents reviewed and the page in this memorandum where each document is summarized is provided below:

City of Canby Transportation System Plan (TSP)

Adopted April 19, 2000

The current City of Canby Transportation System Plan (TSP) was adopted in 2000 as an update to the original 1994 TSP. The plan discusses key transportation issues being faced by the city, lists improvements previously identified in prior city and Clackamas County plans, establishes evaluation criteria to determine a preferred alternative, and identifies additional improvements needed. The plan assumes that the city will grow from its 1993 population of approximately 9,560 residents to over 20,000 residents by the year 2015.

General Issues

Some of the main issues raised in the previous TSP that are still outstanding or have only partially been addressed are listed below. The current TSP update will address these outstanding concerns:

- Severe blockages and delays can occur when railroad crossings are blocked during peak hour traffic periods
- Many of the sidewalks are discontinuous (or exist on only one side of the street) and do not fully connect residential areas with schools, parks and retail (shopping) activities
- The backlog of street maintenance rehabilitation and repair work within the City of Canby was estimated at $4,100,000. A network budget analysis indicated that an annual budget of $216,000 would be necessary to maintain the pavement system at its then current condition through the year 2013. Therefore, a $250,000 annual budget ($200,000 for road rehabilitation and $50,000 for repair work) was recommended to reduce the current backlog of rehabilitation and repair work.

Evaluation Goals

The TSP identified criteria to evaluate the transportation system alternatives. These criteria will be considered for incorporation into the transportation goals and policies in the current TSP update.

Mobility/Circulation/Safety

- Develop transportation system to facilitate all travel modes
- Ensure sufficient capacity to accommodate future travel demand (vehicular, bicycle, pedestrian, etc.) along Canby's collector and arterial streets, and along OR 99E
- Improve vehicular-pedestrian crossing of Southern Pacific R.R.
- Identify the potential for improving the local circulation system, in an effort to reduce reliance on OR 99E
- Provide mobility to the transportation disadvantaged
- Ensure an adequate truck route network to reduce commercial/neighborhood conflicts
- Resolve the future OR 99E future cross-section design and sidewalk requirements
- Refine County development strategy for collector/arterial street development within the UGB

Capital Improvement

- Maximize cost effectiveness of transportation improvements
- Ensure sustained funding for transportation projects

Community Goals

- Protect Canby's "small town" quality of life
- Encourage safe and efficient vehicle, bicycle, pedestrian and transit crossing of the Southern Pacific R.R., especially if high speed passenger rail service is provided in the future
- Improve pedestrian and bicycle access and safety, especially between residential developments and pedestrian/bicycle trip generators (i.e. schools, parks, etc.)
- Enhance the vitality of the Canby downtown area

Economic Development

- Balance local access to OR 99E with the need to serve statewide traffic needs, while encouraging business activities.

Improvements Identified by Prior City or County Plans

The TSP lists improvements previously identified in prior city and Clackamas County plans. The current TSP update will determine how to address the outstanding improvements listed below:

Clackamas County 5-Yr Transportation Capital Improvement Program (1998/99 - 2002/03)

- **Township Road/RR Crossing (between Redwood Street and Walnut Street):** Construct new railroad crossing.
- **Holly Street (from Territorial Road to the Canby Ferry):** Widen to include two travel lanes and bike lanes.
- **Canby Ferry:** Construct docking improvements.

Clackamas County 20-Year Long-Range Transportation Plan (1998-2018)

- **Arndt Road Extension (between OR 99E and Knights Bridge Road):** Construct a new 5-lane road. (0.75 miles)
- **Arndt Road (between Knights Bridge Road and I-5 Cutoff):** Widen to 5 lanes. (3.1 miles)
- **South Ivy Street/Township Road Intersection:** Install traffic signal.
- **Territorial Road (between OR 99E and Holly Street):** Widening to three lanes.

Other Comprehensive Improvements Identified

- **Pine Street (between OR 99E and 13th Avenue):** Sections have been constructed, but fully construct as development occurs.
- **Redwood Street (between Pine Street and 13th Avenue):** Construct as development occurs.
- **Birch Street:** Extend in a straight alignment to the north of Territorial Road.
- **10th Avenue (between Birch Street and Grant Street):** Construct roadway connection.

Recommended Improvements

Improvements were recommended to ensure acceptable future traffic operations through the 2015 planning horizon year. The current TSP update will determine how to address the outstanding improvements listed below:

Capacity Improvements

- **North Ivy Street (between NW 1st Avenue and OR 99E):** Widen to three-lane arterial construction standards, with sidewalks, bike lanes, and an additional turn lane (either dual lefts of a separate right-turn lane) at the OR 99E approach. (0.05 mile, $0.1 million)

- **North Ivy Street (between 3rd Avenue and the new Ivy Street extension):** Widened and restripe to two-lane arterial construction standards (including bike lanes and sidewalks) and remove parking. (0.7 mile, $0.37 million)
- **North Ivy Street (between NW 1st Avenue and OR 99E):** Stripe a north/south bike route.
- **South Ivy Street (between OR 99E and SW 2nd Avenue):** Widen to three-lane arterial construction standards, with sidewalks and bike lanes (Clackamas County jurisdiction). ($0.09 million)
- **South Ivy Street (between SW Township Road and South 13th Avenue):** Widen to three-lane arterial construction standards, with sidewalks and bike lanes (Clackamas County jurisdiction). ($0.65 million)
- **South Ivy Street/Township Road Intersection:** Install traffic signal when warranted ($0.16 million)
- **South Ivy Street/OR 99E Intersection:** Upgrade traffic signal ($0.20 million)
- **North Territorial Road (Un-widened sections between Holly Street and OR 99E):** Widen remaining sections to three-lane arterial construction standards, with sidewalks and bike lanes. (1.6 mile, $1.94 million)
- **NW Knights Bridge Road (between Holly Street and Ash Street):** Widen to three-lane arterial construction standards, with sidewalks, bike lanes, and a center turn lane or median (tapering to two lanes with bike lanes and sidewalks at City limits). This project is scheduled for construction in the spring of 2010 and will be reconstructed between existing curb lines with no center turn lane. (0.64 mile, $1.19 million)
- **NW Baker Dr:** Extend south to OR 99E and construct to two-lane collector street construction standards with bike lanes and sidewalks on both sides of street with an overcrossing of the rail lines paralleling OR 99E. (0.3 mile, $6.2 million)
- **NE Redwood Street (East side of street between OR 99E and Territorial Road):** Widen to two-lane collector street construction standards with bike lanes, sidewalks, and no parking. Some sections of street have been constructed, especially on west side. Any existing on-street parking needs to be removed. Also widen OR 99E and Territorial Road approaches to three lanes. ($0.96 million)
- **NE Pine Street (between OR 99E and Territorial Road):** Widen to 40-foot curb-to-curb width with two-lanes, bike lanes and sidewalks on both sides of the street, and parking on one side of the street. ($0.74 million)
- **NW 1st Avenue (between NW Douglas Street and NW Elm Street):** Close roadway when the NW Elm Street/1st Avenue intersection becomes an unacceptable impediment to safe and efficient traffic flow on NW Elm Street. (in 10-15 years, $0.1 million)
- **NE 3rd Avenue (between Locust Street and NE 4th Avenue) and NE 4th Avenue (between NE 3rd Avenue and Pine Street):** Widen to two-lane collector construction standards with bike lanes and sidewalks on both sides and no parking. (0.4 mile, $0.8 million)

- **SW 2nd Avenue (between Elm Street and Ivy Street):** Widen to full two-lane collector street construction standards with parking on one side of the street. ($0.63 million)
- **SW 2nd Avenue/Ivy Street Intersection:** Realign east or west leg so that both legs align. ($0.3 million)
- **SW 2nd Avenue (between Birch Street and Elm Street):** Remove parking on one side and restripe to add bike lanes.
- **SE Otto Road (between OR 99E and SE Haines Road):** Widen to three-lane collector construction standards, lining up with SE Mulino Road at Haines Road. (0.6 mile, $1.5 million)
- **SE Otto Road/OR 99E Intersection:** Construct traffic signal. ($0.25 million)
- **OR 99E:** Perform access management plan to determine number of lanes (including bicycle lanes), traffic control, and highway access. It is anticipated that OR 99E will eventually be reconstructed to include a five-lane cross-section with bicycle lanes and sidewalks.
- **Bremer Road/Otto Road/1st Avenue Intersection:** Construct to City standards. (in 16-20 years)

<u>Non-Capacity Improvements</u>

- **North 10th Avenue (between Grant Street and Birch Street):** Construct a roadway extension to neighborhood connector construction standards. (0.2 mile, $0.46 million)
- **North 10th Avenue (between Locust Street and Pine Street):** Widened pavement from 24 feet to 40 feet (current curb-to-curb width) to meet adequacy standards and restripe to provide two travel lanes, two bike lanes, and parking on one side. (0.4 mile, $0.18 million)
- **NE 9th Pl (between Pine Street and Redwood Street):** Construct a roadway extension to collector construction standards and provide parking pockets in the area of current development if deemed necessary. (0.3 mile, $0.83 million including right-of-way)
- **NW Birch Street (between Territorial Road and NW 22nd Avenue):** Realign and construct to neighborhood connector construction standards with sidewalks on both sides of the street. This connection would only become necessary if new development occurs, and its cost would be expected to be borne by new development.
- **SE 17th Avenue (between South Ivy Street and the Redwood Street extension):** Construct new roadway to neighborhood connector construction standards with sidewalks on both sides of the street. (0.5 mile, $0.91 million)
- **Territorial Road (between Birch Street and Holly Street):** Widen to neighborhood connector construction standards with sidewalks. (0.4 mile, $0.53 million including right-of-way)
- **South Redwood Street (between SE 13th Avenue and SE 17th Avenue):** Construct new roadway to neighborhood connector construction standards. (0.3 mile, $0.56 million)

- **Maple Street:** Widen pavement to 36 feet to meet neighborhood connector construction standards (much of Maple Street is currently curbed on one side with 24 feet of pavement width). Also provide sidewalks. ($0.56 million)
- **Future Industrial Area Streets:** The 1998 Canby Industrial Area Master Plan identifies the conceptual network of future streets planned to serve the area bounded by SE 1st Avenue, Mulino Road, SE 13th Avenue, and the Molalla Forest Road. This network includes 5.3 miles of planned streets and is anticipated to cost $11.8 million, with $9.9 million for collectors and $1.9 million for local streets (local streets are not counted in the section total). This network is planned for construction as necessitated by new development, and these costs are expected to be borne by this new development.

<u>Pedestrian Improvements</u>

- Install a multi-use path on the north side of the railroad tracks (north of OR 99E) from Redwood Street to Ivy Street

<u>Bicycle Improvements</u>

- Install bike lanes on the following street segments:
    - NE 2nd Avenue from Ivy Street to the dead-end at Thriftway
    - NE 2nd Avenue from Elm Street to Cedar Street
    - NE 3rd Avenue from Holly Street to Pine Street/OR 99E intersection (complete between North Ivy Street and North Locust Street)
    - NE 5th Avenue from Cedar Street to Elm Street
    - North Elm Street from OR 99E to 5th Avenue

Policies

In addition to identifying specific improvements, general policies were also identified. The current TSP update may incorporate these policies or adjust them as desired:

<u>Pedestrian Improvements</u>

- Install sidewalks on both sides of all streets (including planter strips). Sidewalks along newly constructed street sections will be included in those construction projects
- Require new developments abutting Molalla Forest Road multi-use pathway to provide a pedestrian/bicycle connection between the path, the development, and a public street
- Install multi-use pathways connecting new developments expected to generate substantial pedestrian traffic and the existing transportation system

<u>Bicycle Facilities</u>

- Install bike lanes on all arterials and collectors by 2020
- Stripe bike lanes on other streets where existing pavement widths allow
- Use neighborhood connectors as bike routes with shared travel lanes

Access Management

- Manage access on the existing and future major street system as new development occurs following the construction standards for access on all streets within the City of Canby street system, as listed in Table 4-1.

Access Management Standards (TSP Table 4-1)

Functional Classification	Minimum Spacing	Residential Use	Commercial and Industrial Use
Arterial	300 feet	No direct access for private drives serving fewer than five dwellings	Shared access driveways required if spacing standard not met; encouraged otherwise. Major street left turn lanes determined through review.
Collector	150 feet	Shared access driveways are encouraged where appropriate to meet spacing standards.	Shared access driveways are encouraged. Major street left turn lanes determined through review.
Neighborhood Connector	75 feet	Shared access driveways are encouraged where necessary for spacing.	Maximum of one 45-foot wide access per 200 foot of frontage or fraction thereof.

- Access management policies were prepared for OR 99E and included as Appendix G. The policies were intended to be used in combination with the state access regulations under Oregon Administrative Rules 734-051 for Transportation Operations (“Division 51”). Included are the revised code language and a list of actions that are necessary for the City’s access management program. The policies’ intent is to provide a balance between maintaining functional integrity and preserving access to businesses. A letter from the ODOT Region 1 manager is also included in Appendix G; it is dated August 12, 1999, and indicates that ODOT has no intention of closing driveways or installing medians except when property redevelops or there is an unusually high accident rate. Appendix G includes policies for the following access management elements: Canby/ODOT collaborative permitting process, driveway configuration and consolidation, median placement, traffic signals, internal driveway connections, and pedestrian connections. It also includes a list of possible access management strategies to promote safety and a summary of ADT and accident data along OR 99E through Canby.

Operating Standards

- The City of Canby should adopt additional standards that specifically address when detailed traffic analysis is required, what elements of analysis will be required for each case, and what constitutes an acceptable analysis.
- LOS D is to be considered the minimum acceptable LOS for signalized and all-way-stop-controlled intersections and street segments.
- LOS E is considered to be the minimum acceptable LOS for two-way-stop-controlled intersections.

Other

- **Neighborhood Traffic Control:** Consider use of curb extensions, pavement treatments at pedestrian crossings, speed humps, traffic circles, and diverters at strategic locations to lower travel speeds and improve pedestrian safety
- **Traffic Demand Management:** Encourage telecommunications as an alternative mode to the automobile for work travel commuting
- **County Streets within City UGB:** Work with Clackamas County to transfer County public streets within the Canby Urban Growth Boundary (UGB) to the City. These streets should be developed to the urban street standards.
- **High Speed Rail:** Work with ODOT and the Union Pacific Railroad to identify the appropriate location, function, and design of local street crossings of the rail line in the event that high speed passenger rail service is developed and operated through Canby
- **Regional Planning:** Participate with ODOT and Clackamas County in the revision of their transportation system plans, and coordinate land development outside of the Canby area to ensure provision of a transportation system that serves the needs of all users

Functional Classification

The four functional classes assigned to City roadways are arterial, collector, neighborhood connector, and local. OR 99E was not assigned a city functional classification; instead, its ODOT classification was indicated. All arterials and collectors are to have bicycle lanes, sidewalks, and planting strips. Signals should only be installed at arterial/arterial and arterial/collector intersections. On-street parking may be provided on collector, neighborhood connector, and local roads. Street characteristics by functional class were provided in Appendix Table F-1, reproduced below.

Street Characteristics by Functional Classification (TSP Appendix Table F-1)

Characteristic	Functional Classification				
	Arterial	**Collector**	**Neighborhood Connector**	**Local Street**	**Alley**
Planned Travel Speed[a]	25-45 mph	25-35 mph	25 mph	15-25 mph	10 mph
Forecast ADT	2,500 - 15,000	1,000 - 9,000	500 - 2,500	1,000 max	250 max
Curb-to-curb width[b] (two way)	50 ft.	46 ft.	30 - 36 ft.	28 - 32 ft.	Not Apply
Parking	Not typical	Permissible	Yes	Yes	No
Traffic calming	Not typical[c]	Permissible/ not typical	Permissible	Permissible	Not Typical
Minimum Centerline Radius	450 feet	275 feet	175 feet	100 feet	40 feet
Design Sight Distance	400 feet	250 feet	150 feet	150 feet	50 feet
Street Lighting Mounting Height	35 feet	30 feet	25 feet	20 feet	N/A
Preferred adjacent land use	High intensity	Med to high intensity	Med to low intensity	Low intensity	Low intensity
Access control (See Table 4-1)	Yes	Some	Little	No	No
Through-traffic connectivity	Primary function	Typical function	Not typical function	Discouraged	Discouraged
Maximum grade	7%	8%	9%	10%	10%

[a] Arterial speeds in the central business or other commercial districts in urban areas may be 20-25 mph. Traffic calming techniques, signal timing, and other efforts may be used to keep traffic within the desired managed speed ranges for each Functional Class. Design of a corridor•s vertical and horizontal alignment will focus on providing an enhanced degree of safety for the managed speed.

[b] Street design for each development shall provide for emergency and fire vehicle access. Neighborhood street widths of less than 32 feet may be applied as a development condition through the subdivision and/or planned development process. The condition may require the developer to make the choice between improving the street to the 32 ft. standard or constructing the narrower streets with parking bays placed intermittently along the street length. Fire suppression systems may be required for developments with narrow street accesses.

[c] Curb extensions may be used on arterials and collectors with parking to facilitate pedestrian crossing.

Finance Plan

The financial plan recommendations were based the types of projects identified and who had jurisdiction of the facilities. The breakdown of the funding sources and how the funds would be used are listed in the table below.

Financial Plan Recommendations (from TSP Pages 5 to 10)

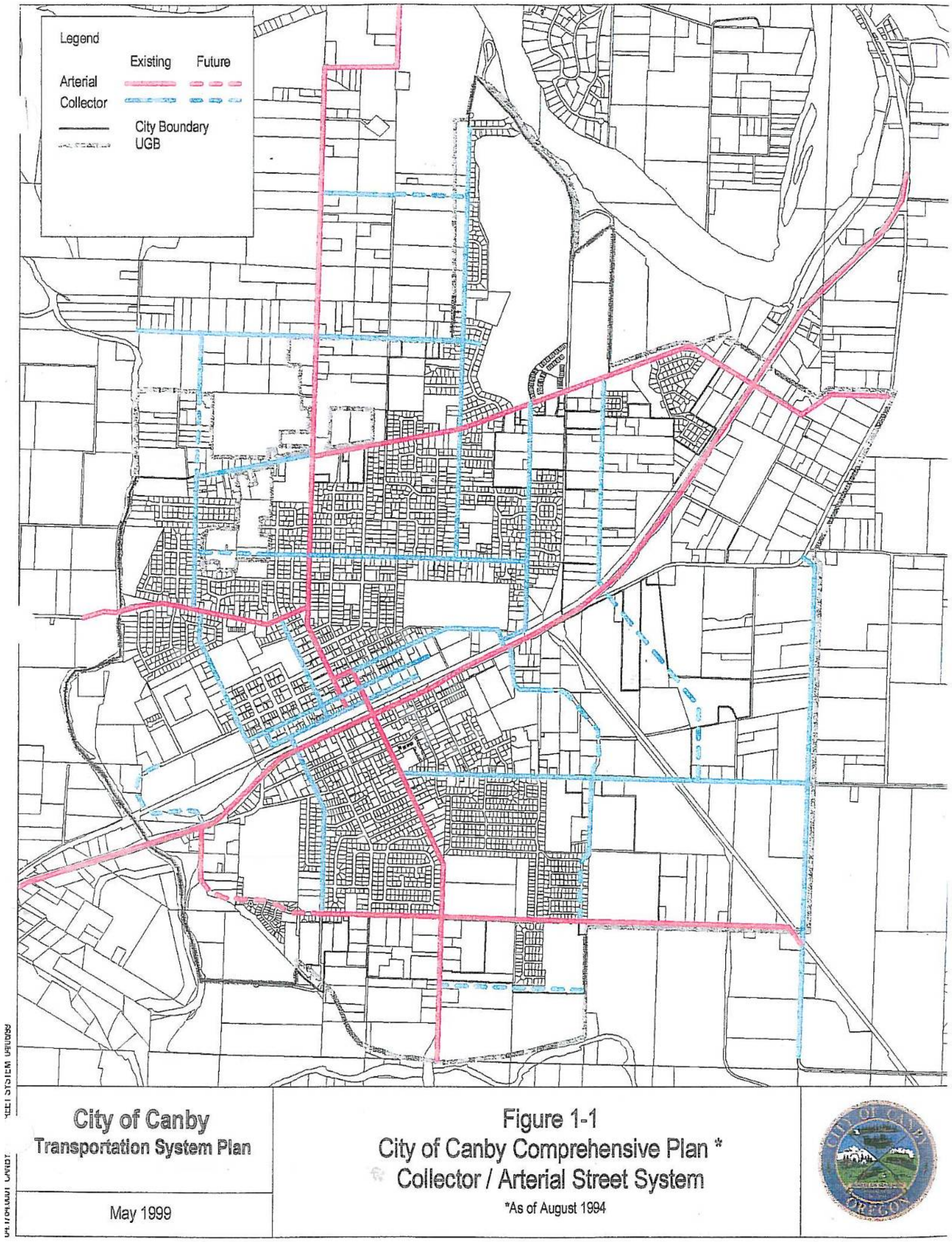
Funding Source	Cost (millions)	Use of Funds
Clackamas County	$0.5	Street widening and upgrade projects for arterial and collector streets in the County's jurisdiction
State of Oregon	$7.9	Grade-separated rail line crossing at Berg Parkway and OR 99E
Local Improvement Districts	$0.5	Numerous sidewalk projects throughout the community
Developer Contributions	$21.0	Specific improvements (mainly new collector streets) needed to serve new developments
System Development Charges	$14.9	General system capacity-increasing improvements (e.g., street widening and upgrade of arterial and collector streets)
City of Canby	$2.4	Remaining projects
Total	**$47.2**	

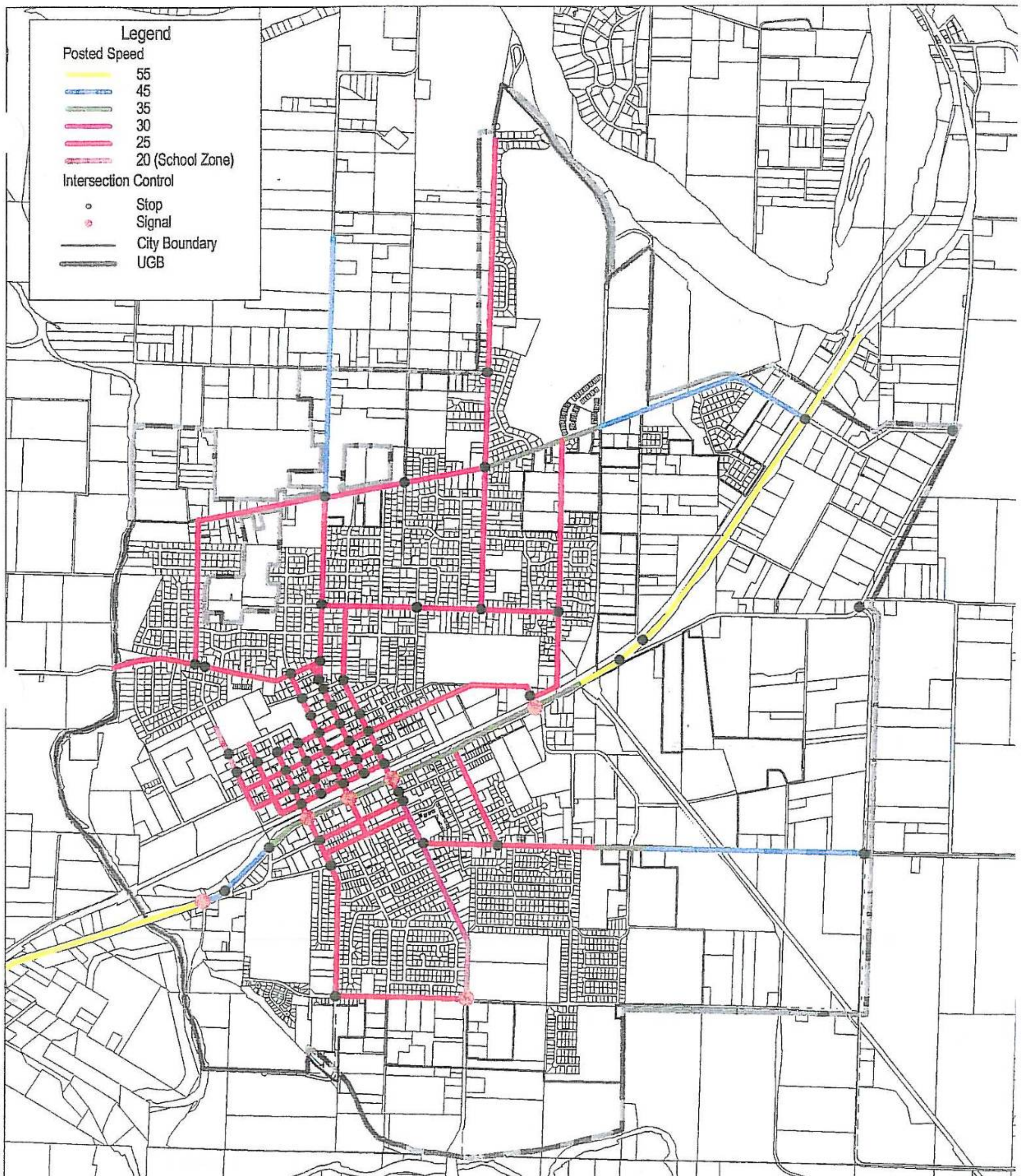
Various potential funding sources available to the City of Canby were identified for use in funding the City's portion of TSP projects. Descriptions of funding sources and their associated advantages and disadvantages were provided. The sources identified included the following:

- State gasoline tax (City was receiving about $520,000 annually)
- Local gasoline tax (was not in use)
- Regional gasoline tax (Clackamas County did not have one in use)
- User fees (i.e., systems utility fee) (was not in use)
- Property taxes
- Serial levies (used for various transportation improvements in the early 1980's)
- Local sales tax (was not in use)
- Debt funding (i.e., bonds)
- Economic development grants or loans
- System development charges (was not in use)

It was recommended that user fees, state assistance, and gas taxes should be considered. However, it was indicated that the City could cover its portion of improvements with transportation bonds, which would be funded from property taxes (approximately $0.78 per $1,000 of assessed valuation). Two issues that were identified for consideration were the Measure 5/47 property tax limitation and public input, given that nearly all of the financing options would require public approval.

Key Figures


Legend
Existing
Future
Arterial
Collector
City Boundary
UGB
City of Canby
Transportation System Plan
May 1999
Figure 1-1
City of Canby Comprehensive Plan *
Collector / Arterial Street System
*As of August 1994

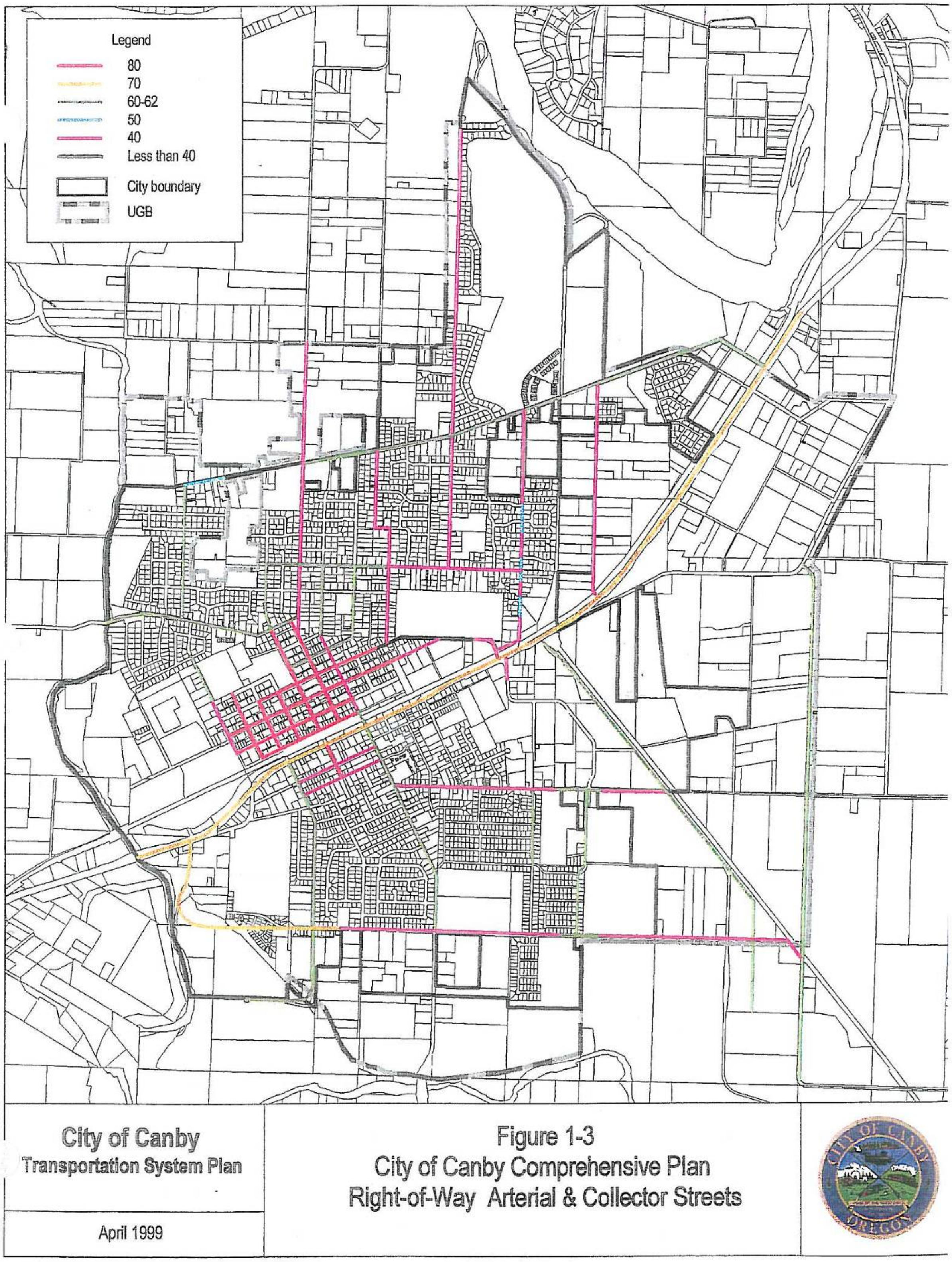


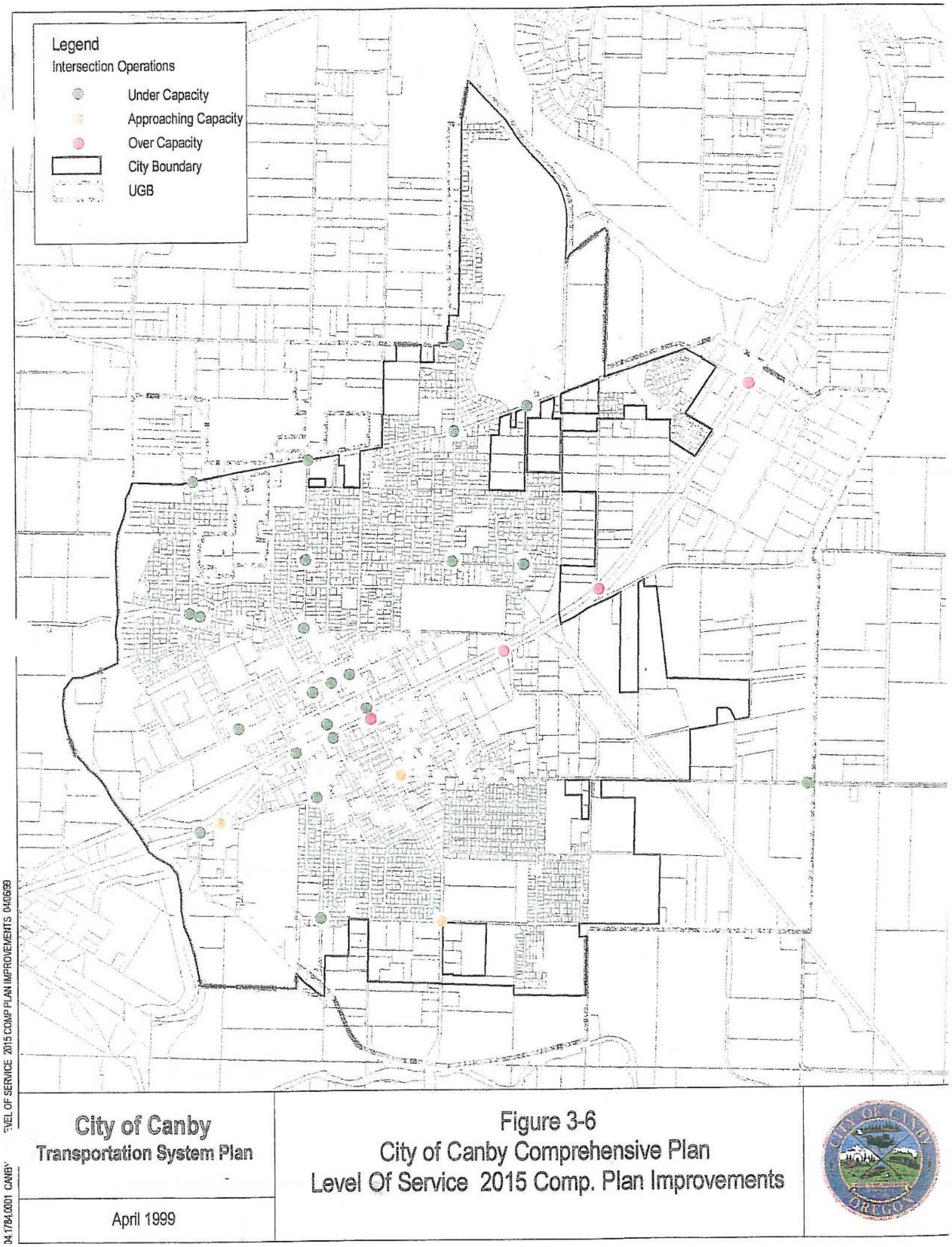
04.1784.0001 CANBY TRAFFIC CONTROL TRAFFIC 07/15/99

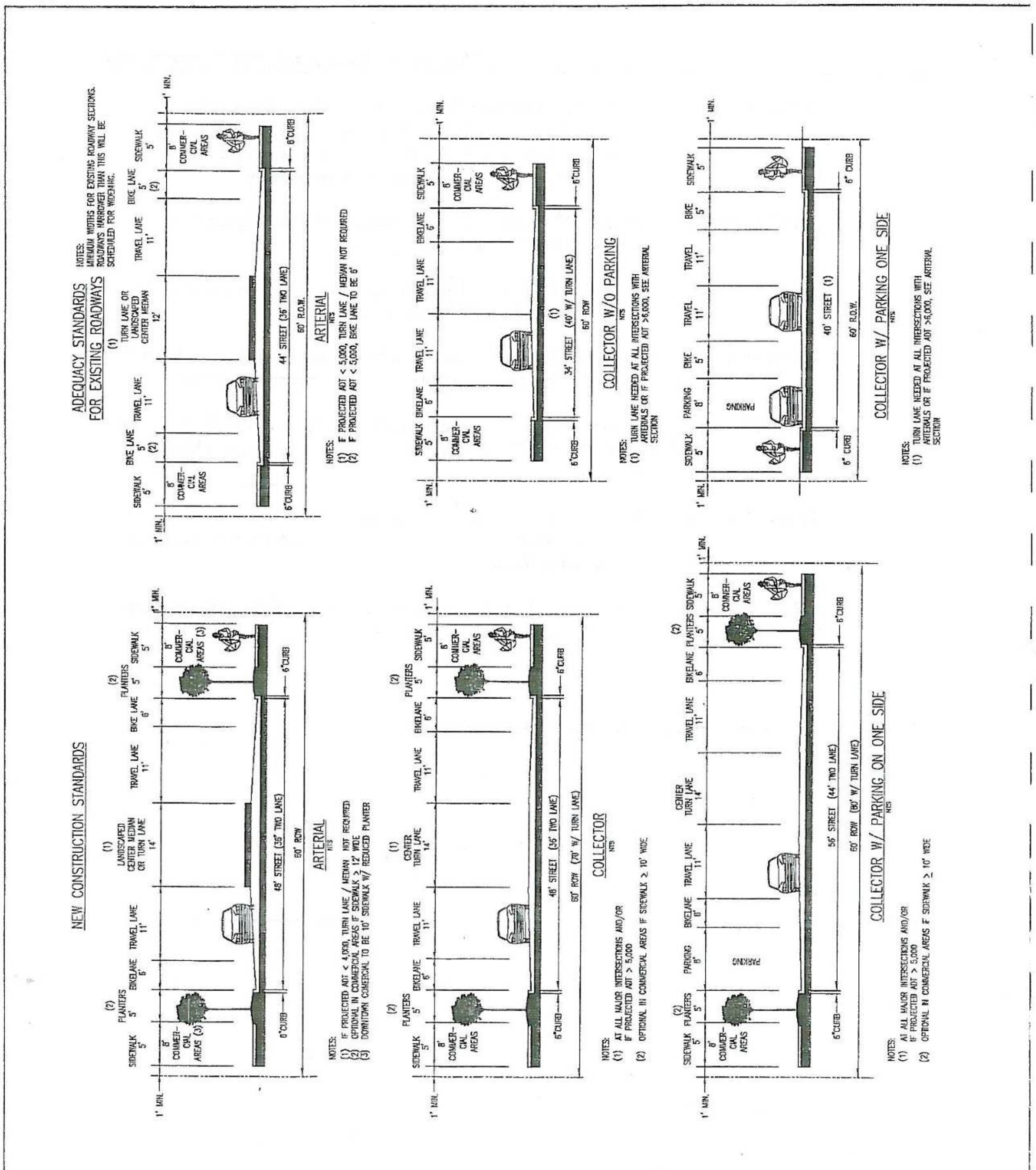
City of Canby
Transportation System Plan

April 1999

Figure 1-2
City of Canby Comprehensive Plan
Traffic Control


Legend
80
70
60-62
50
40
Less than 40
City boundary
UGB
04.1784.0001 CANBY ROW.PRT 07/15/99
City of Canby
Transportation System Plan
April 1999
Figure 1-3
City of Canby Comprehensive Plan
Right-of-Way Arterial & Collector Streets
CITY OF CANBY
OREGON


Legend
Intersection Operations
Under Capacity
Approaching Capacity
Over Capacity
City Boundary
UGB
04.1784.0001 CANBY LEVEL OF SERVICE 2015 COMP PLAN IMPROVEMENTS 04/06/99
City of Canby
Transportation System Plan
April 1999
Figure 3-6
City of Canby Comprehensive Plan
Level Of Service 2015 Comp. Plan Improvements

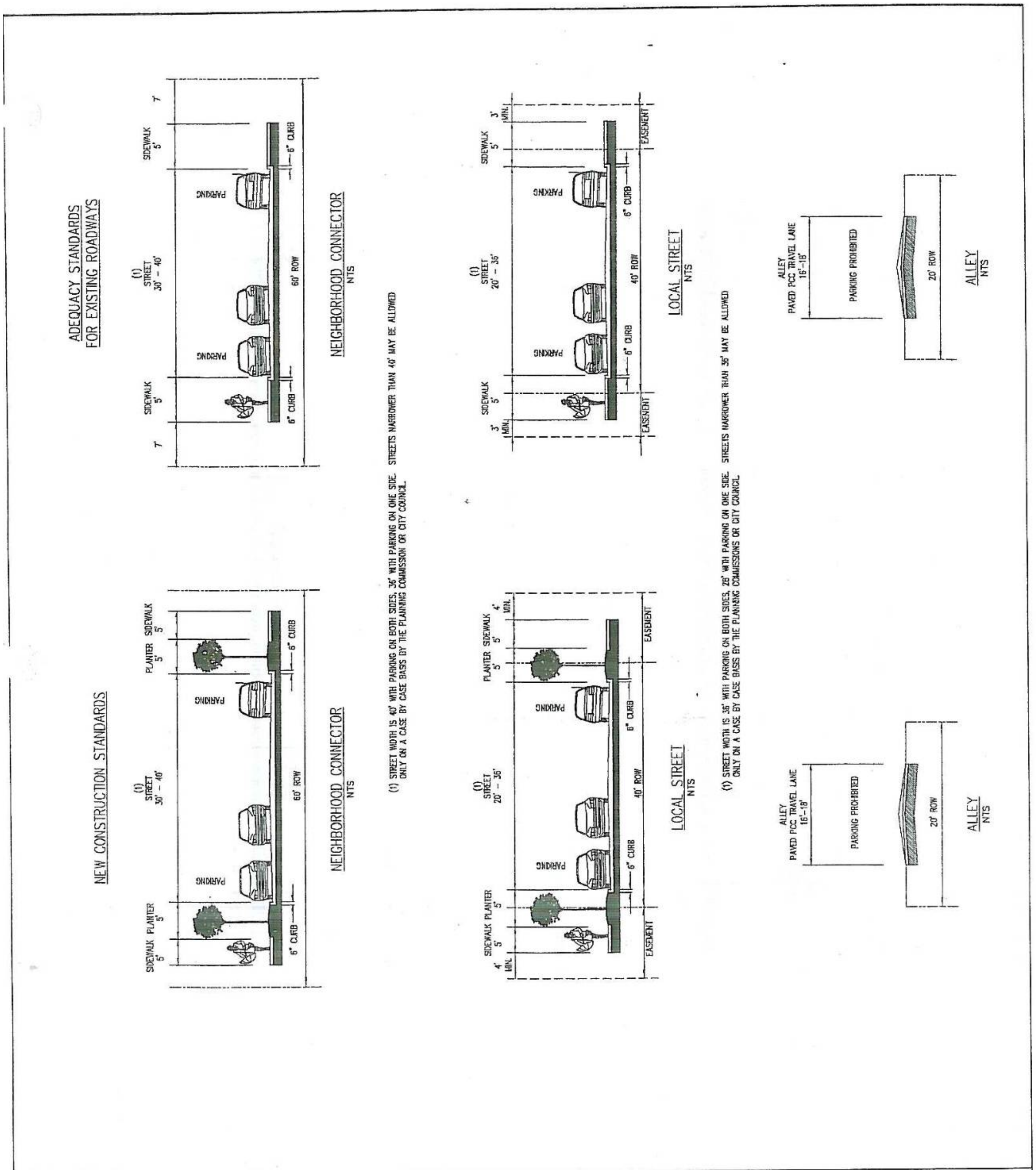


City of Canby
Transportation System Plan

JANUARY 2000

Figure 4-1a
City of Canby Transportation System Plan
Recommended Street Standards

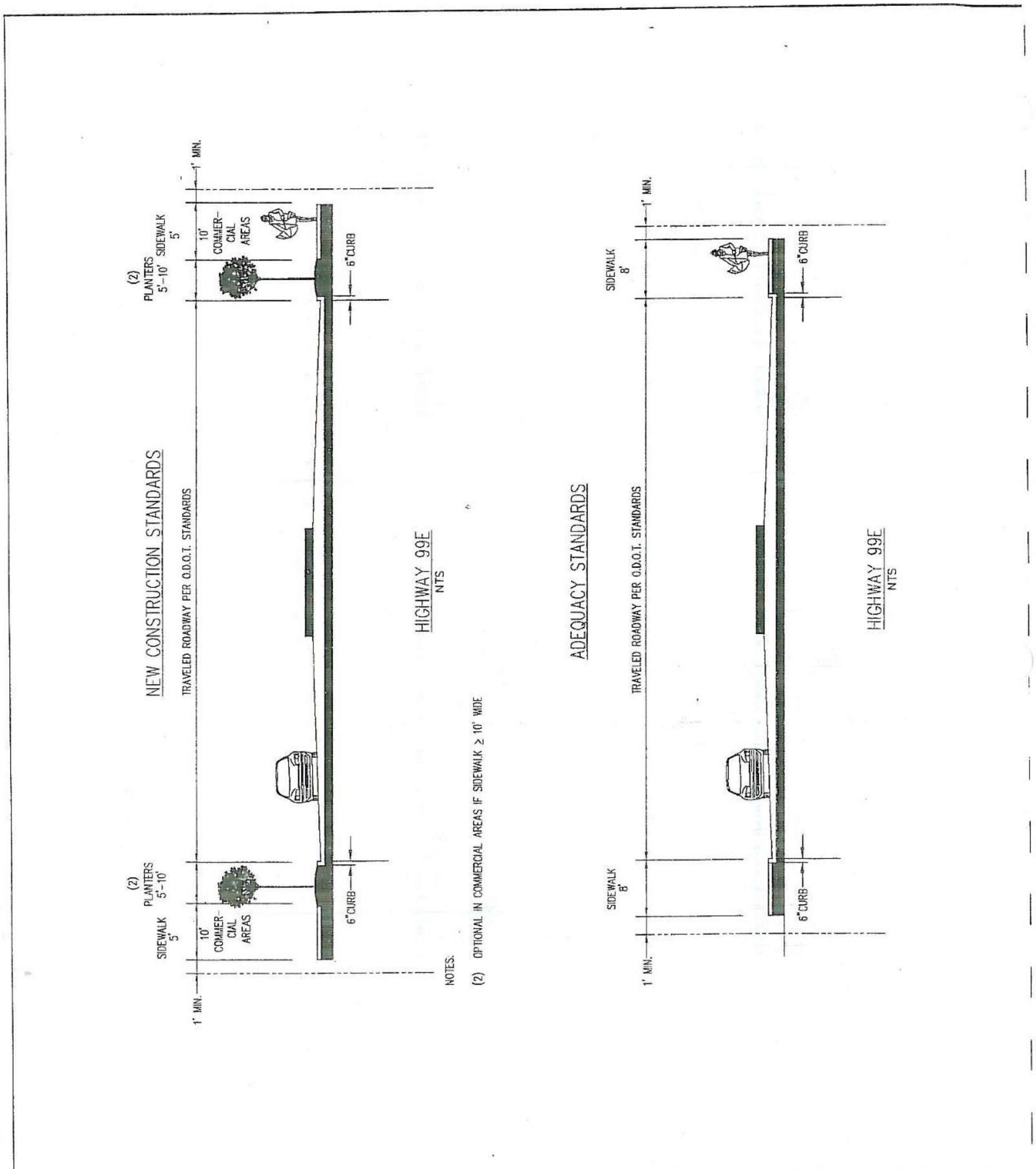
09STSTD3 04/24/2000 11:37



City of Canby
Transportation System Plan

JANUARY 2000

Figure 4-1b
City of Canby Transportation System Plan
Recommended Street Standards



City of Canby
Transportation System Plan

JANUARY 2000

Figure 4-1c
City of Canby Transportation System Plan
Recommended Street Standards

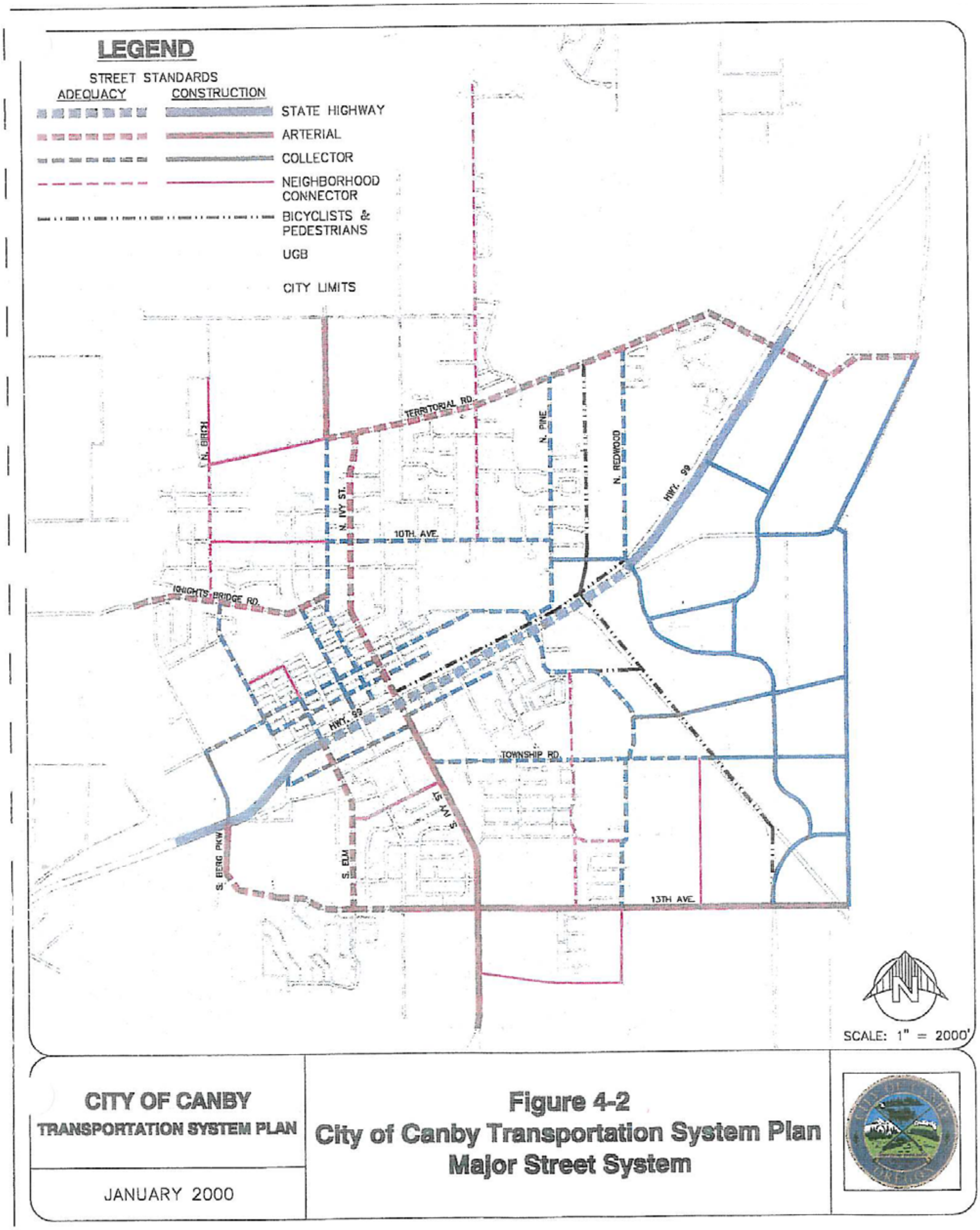


Figure 4-2
City of Canby Transportation System Plan
Major Street System

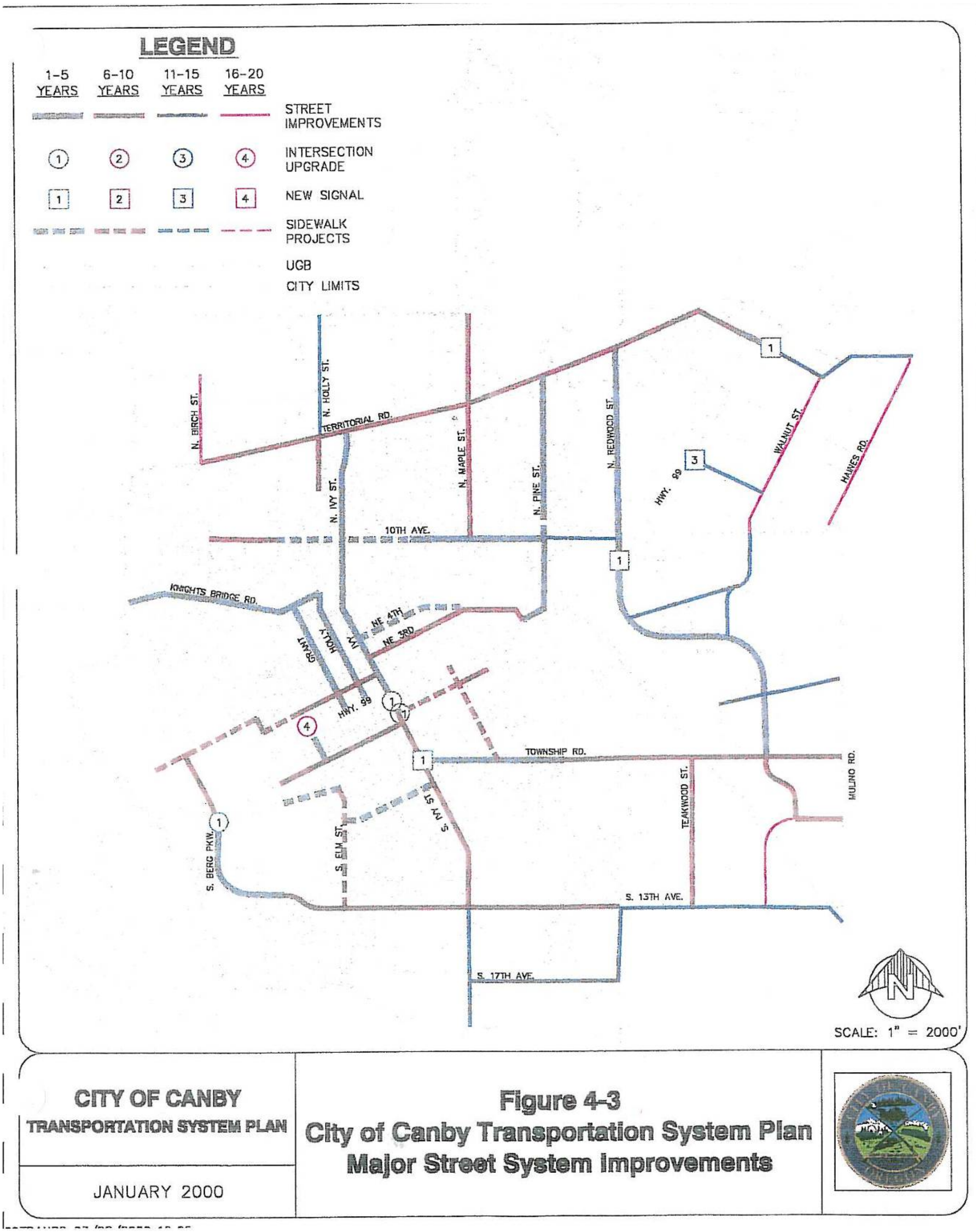


Figure 4-3
City of Canby Transportation System Plan
Major Street System Improvements

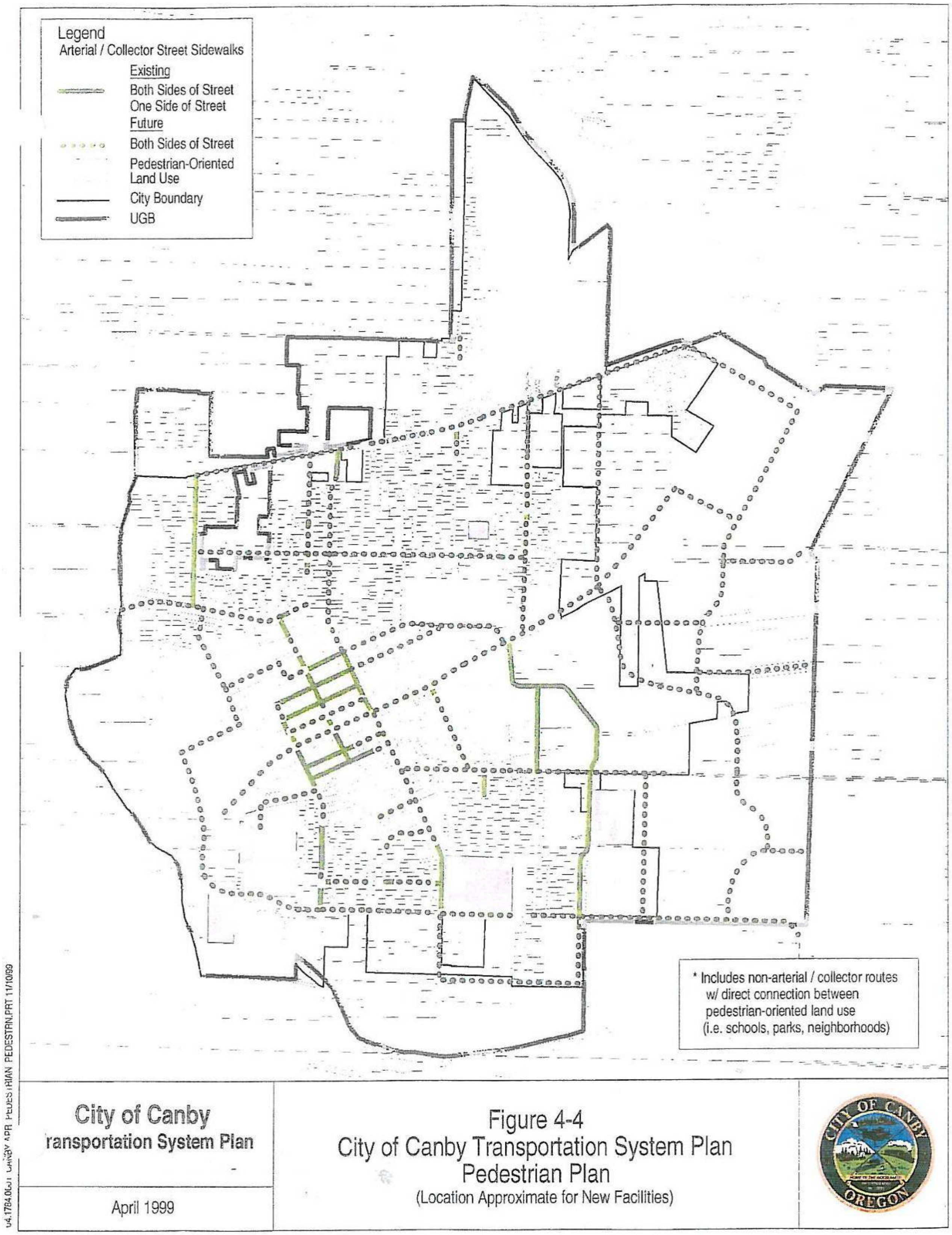


Figure 4-4
City of Canby Transportation System Plan
Pedestrian Plan
(Location Approximate for New Facilities)

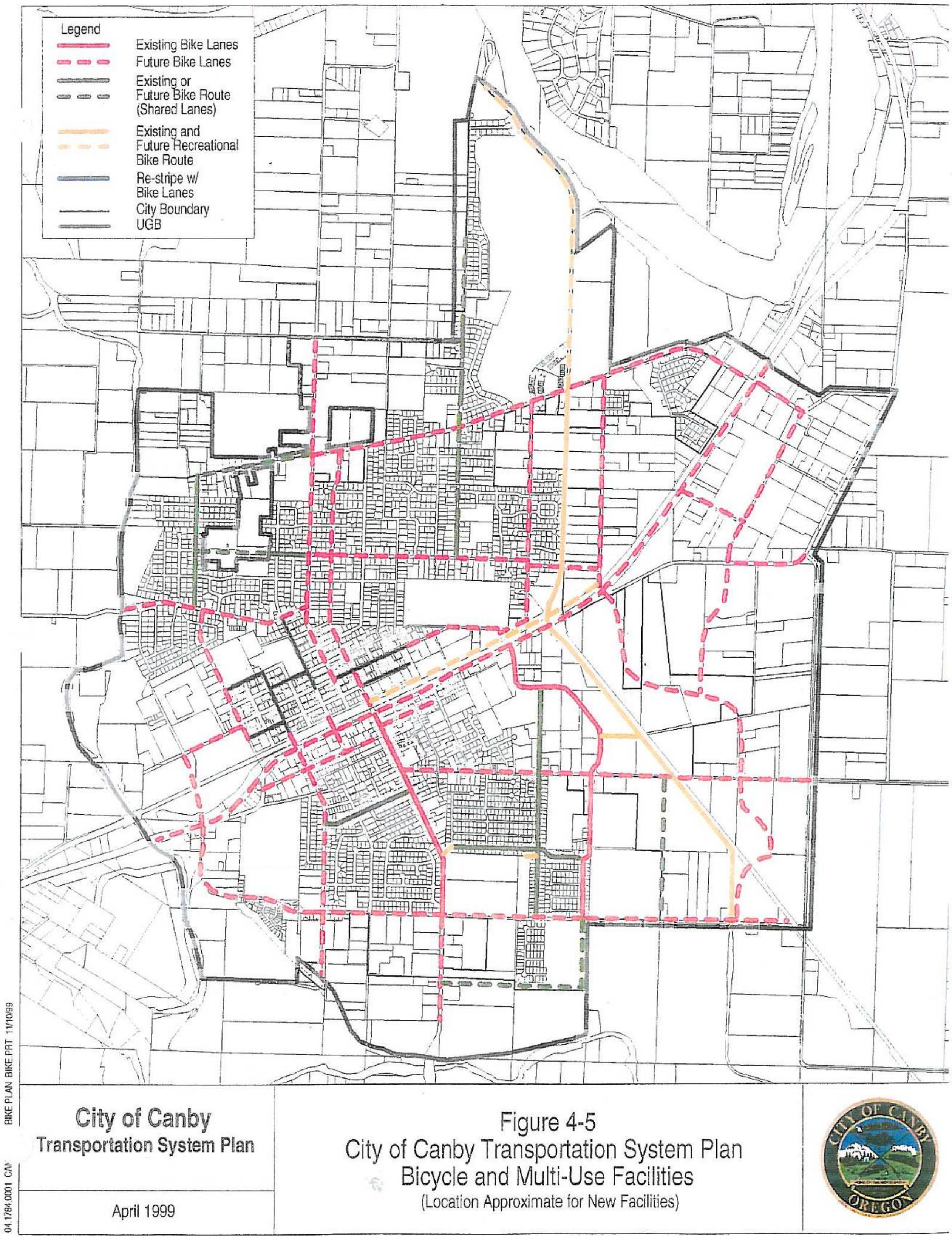


Figure 4-5
City of Canby Transportation System Plan
Bicycle and Multi-Use Facilities
(Location Approximate for New Facilities)

City of Canby Comprehensive Plan

Originally published in 1984, Updated January 2007

The transportation element of the City of Canby Comprehensive Plan was part of the original 1984 publication and was not updated in 2007, which is when the Public Facilities and Service Element was added to the plan. The transportation element identifies key goals and network characteristics as well as policies directed at accommodating "the transportation needs of an eventual community of 20,000 persons."

The goal of the transportation element of the comprehensive plan is "to develop and maintain a transportation system which is safe, convenient, and economical." The plan discusses how transportation is important both to connect the City of Canby to the surrounding region and to facilitate movement within the city. It also recognizes the importance of having a multi-modal system. It states the following:

> "While the automobile and the truck will probably continue to be the main forms of transportation for passengers and goods, mass transit, walking, bicycles and other forms of transportation will take on much more important roles. This will mean: (1) a re-evaluation of the role that mass transit plays; (2) we need to develop a self-sufficiency in terms of employment and housing to reduce commuter trips; (3) land uses will have to be concentrated so that shorter trips are necessary; (4) more emphasis will need to be given to bike and pedestrian routes and other alternative forms of transportation."

The perspective expressed in the comprehensive plan is that "Canby is a community with definite plans for its future . . . [and] is working to expand housing opportunities, to encourage industrial development, and to provide public facilities and services." It is also stated that "all of these planning efforts necessitate improvements in the transportation systems." Some general improvements include the removal of barriers in the sidewalk system, the construction of new arterial roads and other improvements, and the political support from regional transportation policies. The comprehensive plan recognizes that its "various policies and implementation strategies are primarily geared to basic level improvement to, or maintenance of, the transportation systems," but that innovative solutions should also be considered in the future. Some alternatives that may warrant future consideration are "a complete loop road surrounding the City or a realignment of Highway 99E."

The comprehensive plan identifies 12 main findings, each with an associated policy and implementation measures. These findings are summarized in the table on the following page. It was also noted in the Comprehensive Plan that "many of the local streets which are most in need of repair are actually County roads, over which the city has no official jurisdiction." The TSP update will consider and incorporate all findings and projects that are still relevant.

Comprehensive Plan Findings (Discussion on Pages 93 to 103)

Finding	Policy	Implementation Summary
(1) Upgrading of city and county streets is needed to accommodate higher future traffic volumes	Canby shall provide the necessary improvement to city streets, and will encourage the county to make the same commitment to local county roads, in an effort to keep pace with growth	(A) Major upgrading and improvements are needed at S. Ivy Street, S. Elm St, S.E. Township Rd, N.W. Territorial Rd, N. Pine St, N.E. and N.W. 3rd Ave, N.E. 10th Ave, N. Maple St, N. Redwood St, N. Holly St (north of Territorial Rd), and N.E. 4th St. (B) Continue maintenance (C) Encourage formation of Local Improvement Districts (D) City staff to conduct preliminary surveying and engineering to accommodate improvement of all streets (E) Use city ordinances to prevent dead-end streets
(2) Major new roads are needed in areas that have not yet been developed	Canby shall work cooperatively with developers to assure that new streets are constructed in a timely fashion to meet the city's growth needs	(A) The following major new streets are needed: S.W. Berg Parkway extension across planned overpass to connect with N.W. Baker Dr and N.W. 2nd Ave extension to connect with N.E. 4th Ave near fairgrounds (B) Encourage formation of Local Improvement Districts (C) Utilize any and all feasible means to finance the construction of new roads and other transportation services (D) Study alternative roadway alignments and prevent the construction of any structures which would hinder the later development of the road (E) Consider further reduction of 50-ft standard residential street right-of-way, unless the additional width is needed for bike lane purposes
(3) Safety and operational concerns should not be overlooked at key intersections	Canby shall attempt to improve its problem intersections, in keeping with its policies for upgrading or new construction of roads	(A) Include in the Capital Improvement Program improvements at the following intersections: Ivy St/Hwy 99E and Township Rd/railroad crossing (B) Develop alternative improvement plans (C) Use accident reports to determine which intersections, if any, have safety concerns to address in the future
(4) The existing sidewalk network is inadequate	Canby shall work to provide an adequate sidewalk and pedestrian pathway system to serve all residents	(A) Include in the Capital Improvement Program a sidewalk development master plan that prioritizes improvement locations (B) Encourage formation of Local Improvement Districts for sidewalk improvement (C) Allow for increase flexibility in sidewalk design but continue to strictly enforce construction requirements
(5) The railroad track is a barrier that affects public safety	Canby shall actively work toward the construction of a functional overpass or underpass to allow for traffic movement between the north and south sides of town	(A) Include in the Capital Improvement Program a planning project that considers alternative locations an basic designs of an overpass or underpass (B) Seek state and federal grant assistance or utilize the option of general obligation bond funding to finance the project

Table continued on next page.

(Continued) Comprehensive Plan Findings (Discussion on Pages 93 to 103)

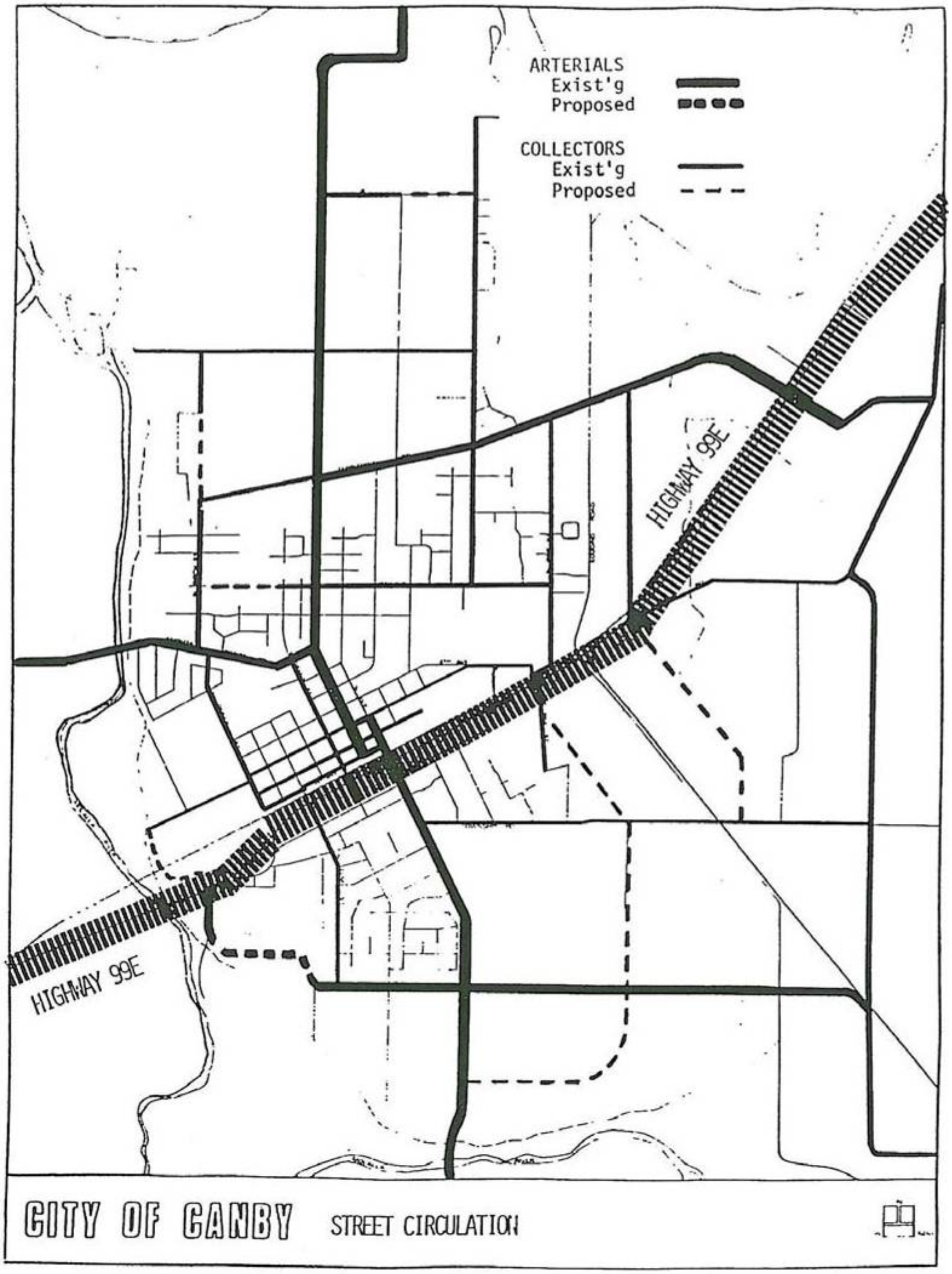
Finding	Policy	Implementation Summary
(6) Dead-end streets without adequate turnarounds are unsafe	Canby shall continue in its efforts to assure that all new developments provide adequate access for emergency response vehicles and for the safety and convenience of the general public	(A) Strictly enforce city ordinance requirements to prevent dead-end street that do not have adequate turnaround (B) Prevent "half street" developments (C) Ensure new development have adequate access while discouraging unnecessary traffic through residential neighborhoods (D) Require developers to leave public street stubs to accommodate future development
(7) Bicycling is becoming a more popular alternative mode of transportation and additional facilities are needed	Canby shall provide appropriate facilities for bicycles and, if found to be needed, for other slow moving energy efficient vehicles	(A) Require developers to provide sufficient right-of-way and physical improvements to accommodate bike lanes (B) Increase public awareness of cyclists using the road (C) Enforce traffic regulations for both motorists and cyclists (D) Connect Canby's bicycle network to surrounding region (E) Include in the Capital Improvement Program a bicycle path development master plan that identifies and prioritizes bike route improvement locations
(8) Railroad access can benefit Canby's future development	Canby shall work cooperatively with the Oregon Department of Transportation and the Southern Pacific Railroad Company in order to assure the safe utilization of the rail facilities	(A) Seek improvement to warning devices at the following rail crossings: N. Redwood St/Southern Pacific line and Township Rd/"Molalla Spur" (B) Develop communication system to allow railroad personal to notify City police and fire dispatchers directly when they are about to block a major crossing point (C) Require developments along rail lines to plan site to allow for rail service without blocking motor vehicle traffic
(9) There are limited nearby air facilities	Canby shall support efforts to improve and expand nearby air transport facilities	(A) Notify the Federal Aviation Agency and the State Division of Aeronauts of Canby's recognition of the need for, and support of, improvements to nearby airports, heliports and landing strips (B) Place special emphasis upon support for expansion of airports where Canby can expect to derive economic benefits from such improvements
(10) Canby lacks sufficient transit service	Canby shall work to expand mass transit opportunities on both a regional and intra-city basis	(A) Work closely with Tri-Met to assure that Canby's growing needs are understood and adequately addressed (B) Support "Loaves and Fishes" service to the elderly (C) Support transportation services for the handicapped (D) City should act as liaison with other agencies and other communities engaged in supplying mass transit (E) Establish and coordinate a car-pool/van-pool system for commuters traveling to Portland or Salem

Table continued on next page.

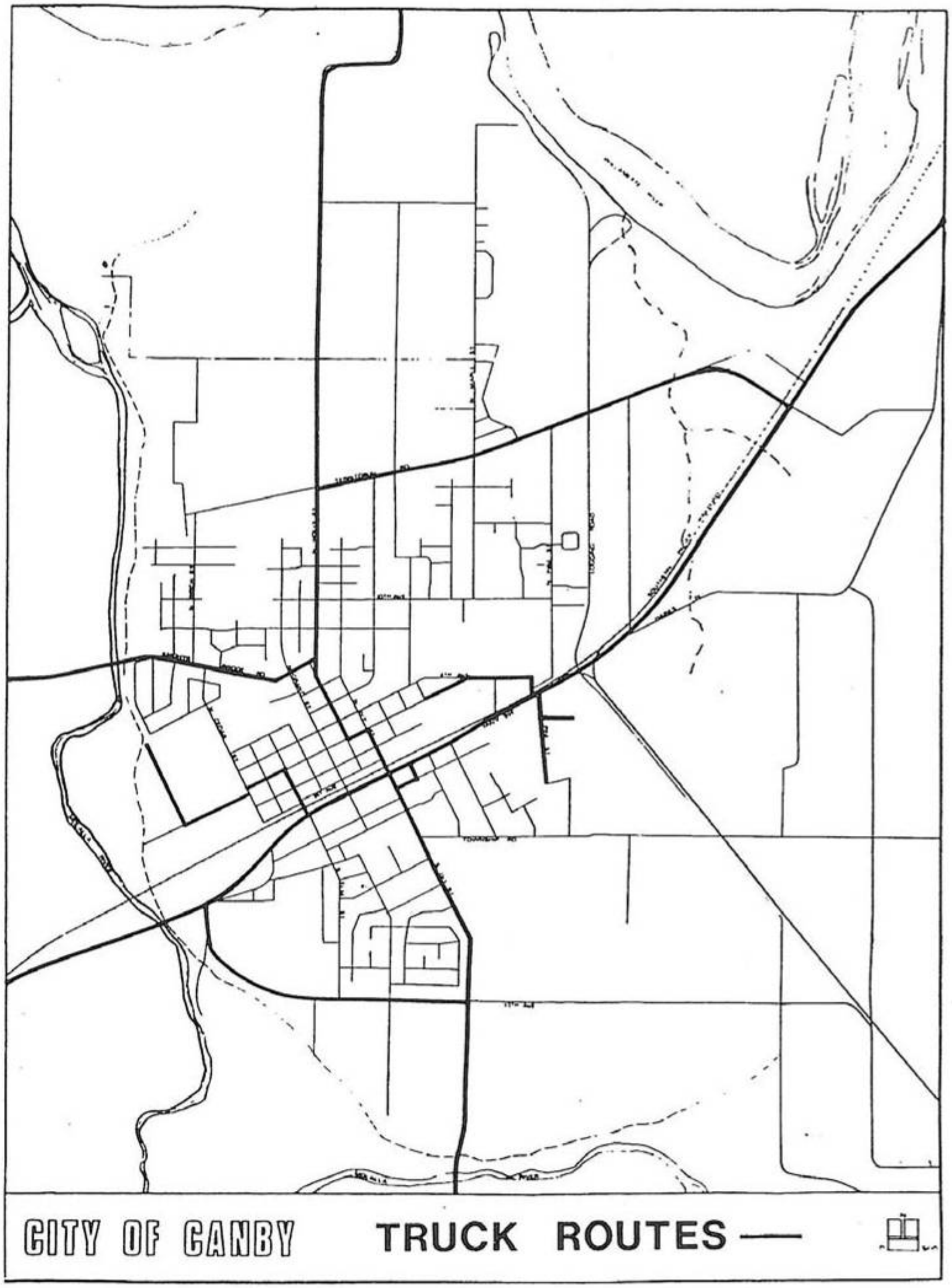
(Continued) Comprehensive Plan Findings (Discussion on Pages 93 to 103)

Finding	Policy	Implementation Summary
(11) Willamette River has potential transportation significance	Canby shall work with private developers and public agencies to maintain the transportation, environmental, and recreational significance of the Willamette River	(A) Contact Port of Portland, Clackamas County, the Metropolitan Service District, and various State agencies which have jurisdiction over the river, requesting that the City be notified of, and given the opportunity to comment on, any development or utilization proposals affecting the area between Wilsonville and Oregon City
(12) OR 99E and connecting county roads facilitate regional travel	Canby shall actively promote improvements to state highways and connecting county roads which affect access to the city	(A) Work with the State Division of Highway in setting priorities for improvements and lobby for adequate maintenance (B) Contact Clackamas and Marion County road departments requesting information on forthcoming plans to improve any of the three major routes connecting Canby and I-5 (C) Encourage planned unit developments along Hwy 99E and consider adoption of site planning standards and criteria for access to Hwy 99E as a means of avoiding strip commercial problems

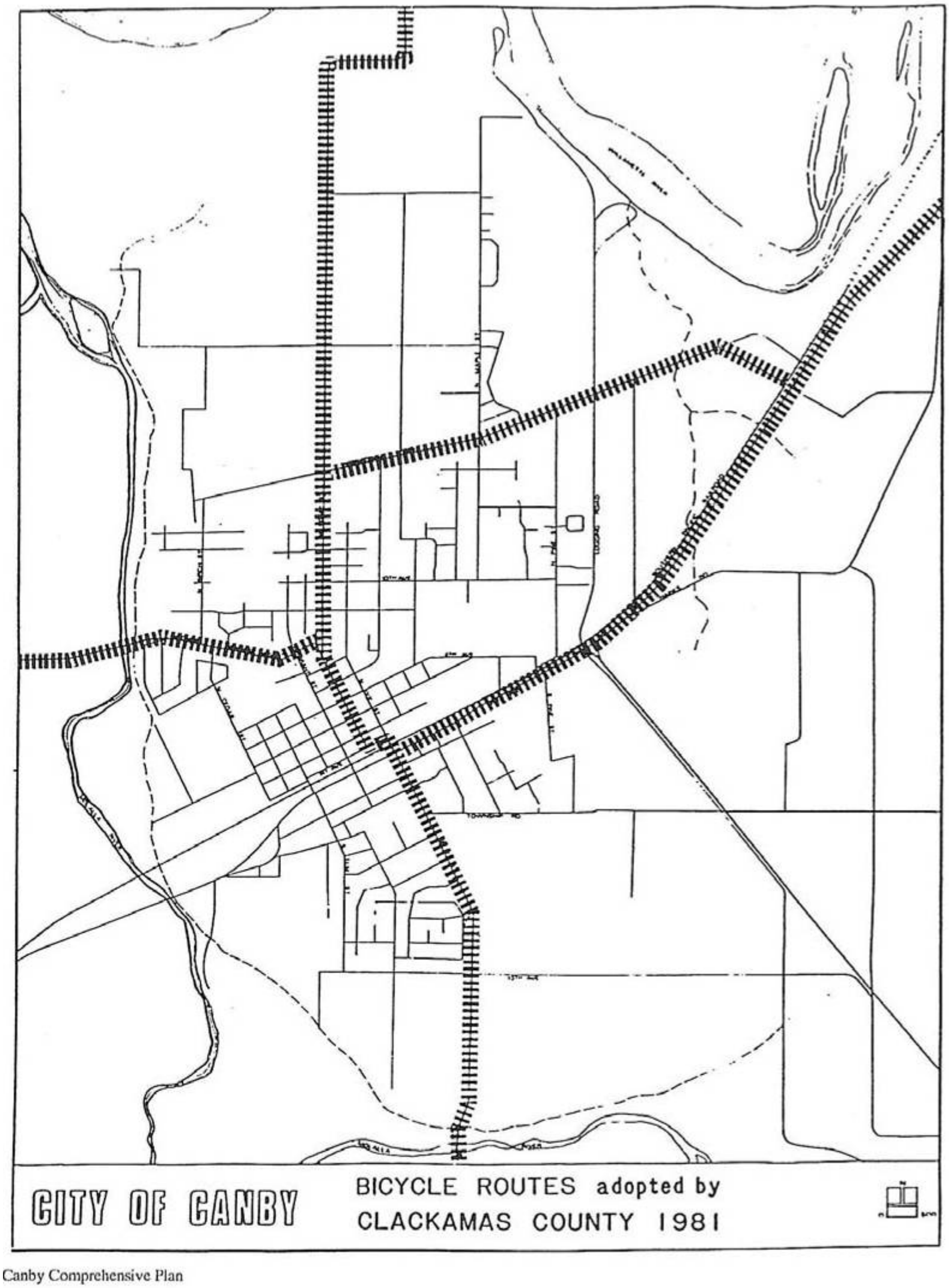
Maps of the street network were also provided in the Comprehensive Plan. These included the functional classification, truck routes, and bicycle routes and are reproduced below. Zoning maps are also reproduced below.



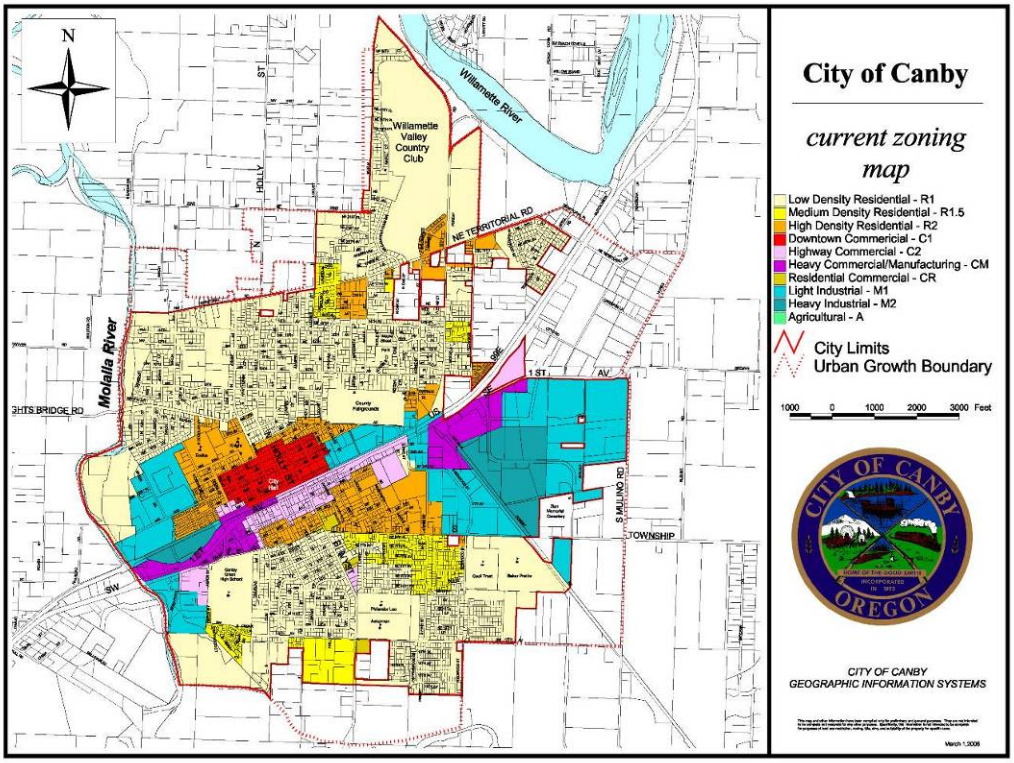
Canby Comprehensive Plan

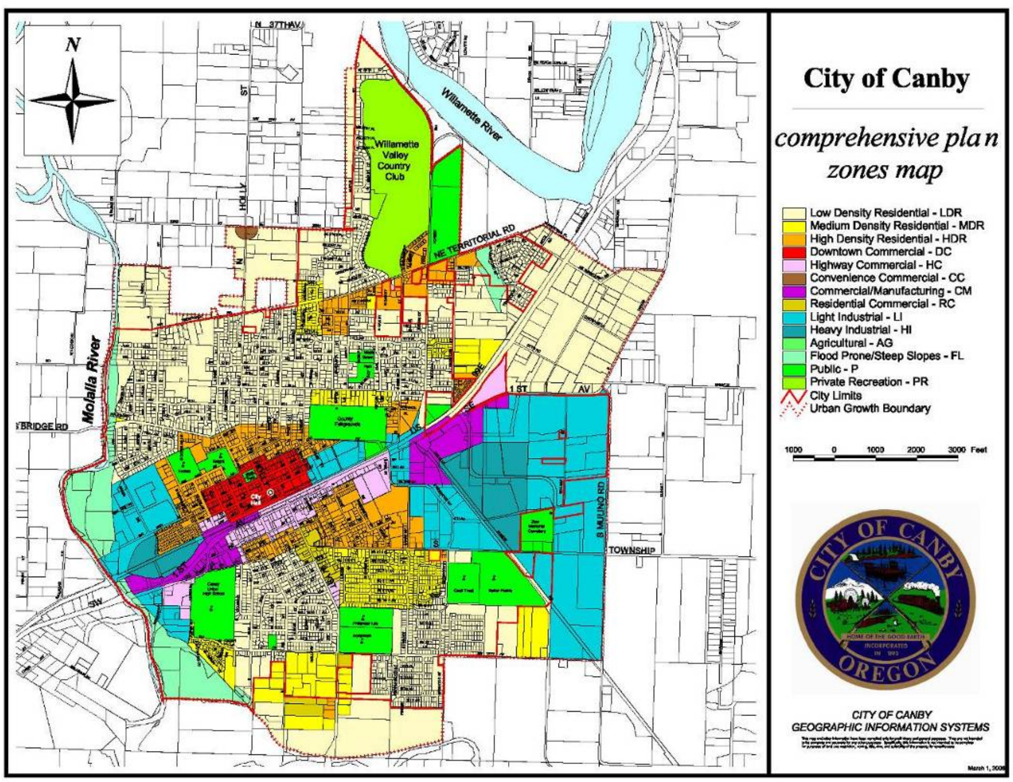


Canby Comprehensive Plan



Canby Comprehensive Plan


City of Canby
current zoning map
Low Density Residential - R1
Medium Density Residential - R1.5
High Density Residential - R2
Downtown Commericial - C1
Highway Commercial - C2
Heavy Commercial/Manufacturing - CM
Residential Commercial - CR
Light Industrial - M1
Heavy Industrial - M2
Agricultural - A
City Limits
Urban Growth Boundary
1000 0 1000 2000 3000 Feet
CITY OF CANBY
GEOGRAPHIC INFORMATION SYSTEMS
Willamette River
Molalla River
Willamette Valley Country Club
NE TERRITORIAL RD
S MULINO RD
TOWNSHIP


City of Canby
comprehensive plan zones map
Low Density Residential - LDR
Medium Density Residential - MDR
High Density Residential - HDR
Downtown Commercial - DC
Highway Commercial - HC
Convenience Commercial - CC
Commercial/Manufacturing - CM
Residential Commercial - RC
Light Industrial - LI
Heavy Industrial - HI
Agricultural - AG
Flood Prone/Steep Slopes - FL
Public - P
Private Recreation - PR
City Limits
Urban Growth Boundary
1000 0 1000 2000 3000 Feet
CITY OF CANBY
GEOGRAPHIC INFORMATION SYSTEMS
Willamette River
Molalla River
Willamette Valley Country Club
NE TERRITORIAL RD
S MULINO RD
TOWNSHIP

City of Canby Public Facilities Plan

April 2006, Prepared by Cogan Owens Cogan

The Canby Public Facilities Plan (PFP) is intended to further the purposes of Statewide Planning Goal 11. It includes goals and policies, descriptions of facilities, the capital improvement plan for future construction, and the general financing plan.

Goals and Policies

Goal 4 of the PFP relates to the city transportation network. The stated goal is "to assure the adequate provision of transportation services to meet the needs of the residents and property owners of Canby." The three policies and implementation measures associated with Goal 4 are listed below.

Policy No. 1 – Canby shall maintain, repair or replace existing transportation system elements, as needed, to continue providing an adequate level of transportation services.

- Install new signals or upgrade existing signals.
- Construct or upgrade sidewalks and paths.
- Install bike lanes as part of future street improvements.

Policy No. 2 - Canby shall maintain, repair, replace or expand its transportation system to meet future transportation service needs.

- Construct, widen, or otherwise upgrade arterial streets, collector streets, and neighborhood connectors.
- Improve the intersections identified in the Transportation System Plan.
- Complete bicycle, pedestrian and other improvements, consistent with the City's Transportation System Plan.

Policy No. 3 – Canby shall adopt and periodically update a capital improvement program for major transportation projects, and utilize all feasible means of financing any needed transportation system improvements in an equitable manner.

- Develop a Transportation System Plan that provides a capital improvement plan for the transportation system. The City of Canby adopted a Transportation System Plan in 2000. The plan identifies short-term and long-term transportation system improvements and includes a transportation financing plan. Capital improvement projects cited in the Plan are listed in section 3 of this Public Facilities Plan.
- Capital improvement costs will be paid for through state, regional and local gasoline taxes, user fees, property taxes, serial levies, local sales tax, debt funding, economic development funding and system development charges as identified in the TSP.
- Explore adoption of a combined street maintenance fee/gas tax.

Descriptions of Facilities

The main roads are OR 99E (state highway through the city), Territorial Road (major east/west arterial in the northern part of the city), South 13th Avenue (major east/west arterial in the southern part of the city), Ivy Street (major north/south arterial). The Southern Pacific Railroad parallels OR 99E and is a major barrier to north/south travel across the city.

Other transportation components include Canby Area Transit (CAT) bus service, AMTRAK passenger rail service, and the Canby Ferry. Air service is provided nearby at the Portland International Airport (PDX), Aurora State Airport (local), and Mulino Airport (local). There are also pipelines in and through Canby, including transmission lines for electricity, cable television and telephone services, and pipeline transport of water, sewer and natural gas.

Regarding safety, "no major traffic safety problems have been identified. However, the absence of sidewalks in some areas and lack of continuity in others creates a potential safety hazard for pedestrians in those locations. An absence of bicycle lanes or routes also creates potential hazards for cyclists. The City currently is developing a bicycle route plan for collector and arterial streets that will include posted routes as well as bicycle lanes and a recreational bicycle route network."

Capital Improvement Plan

The Capital Improvement Plan (CIP) identifies similar projects as the adopted Canby TSP (with some additions), and provides more project details and updated costs. The cost overview is provided in the table below.

Overview of Capital Improvement Project Costs (Table on Page 22)

Transportation Facility	Short-term (Yr. 1 – 5)	Medium-term (Yr. 6 – 10)	Long-term (Yr. 11 – 20)	Total
New Streets	$18,794,000	$14,246,400	$11,895,100	$44,935,500
Street Widening/Upgrading	$7,715,700	$24,932,200	$11,901,900	$44,549,800
Traffic Signal Projects	$3,148,700	$503,000	$0	$3,970,500
Sidewalk Projects	$261,100	$816,500	$0	$1,077,600
Transportation Total	**$29,919,500**	**$40,498,100**	**$23,797,000**	**$94,533,400**

General Financing Plan

The total cost of only the adopted Canby TSP transportation improvements was estimated to be $47.2 million. The State of Oregon and Clackamas County are expected to fund $8.4 million of the improvements, which are under their jurisdictions. Therefore, the City of Canby, its residents, and developers would be responsible for the remaining $38.8 million. The PFP assumes the breakdown shown in the table. These assumptions differ slightly from those indicated in the 2000 TSP.

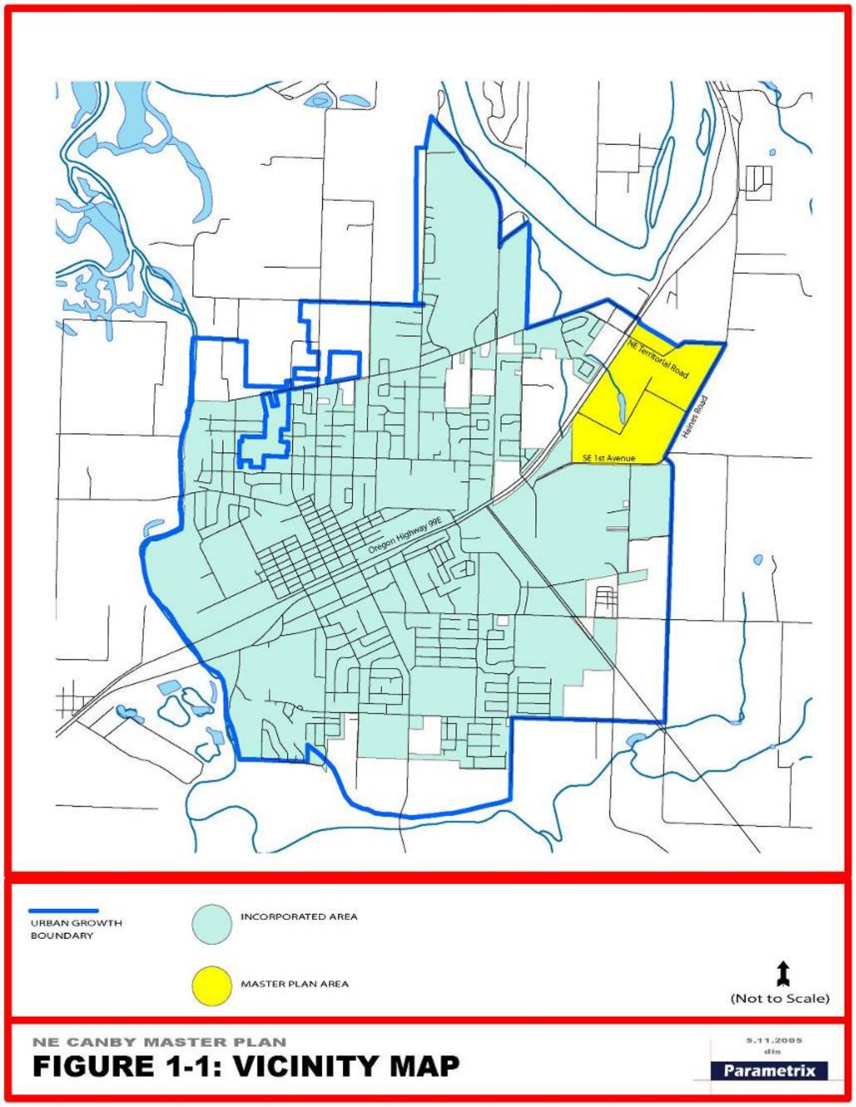
Financial Plan Recommendations (Discussion on Pages 24 to 25)

Funding Source	Cost (millions)	Use of Funds
City of Canby	$1.3	Mostly maintenance
Clackamas County	$0.6	Its share of the Hwy 99E/Territorial Rd traffic signal
State of Oregon	$7.9	Its share of several projects on Hwy 99E
Local Improvement Districts	$0.5	Sidewalk projects
Grants	$1.1	Certain street projects
Developer Contributions	$21.0	Frontage improvements
System Development Charges	$14.8	Capacity increasing improvements
Total	**$47.2**	

Draft NE Canby Concept Plan

June 8, 2005, Prepared by Parametrix

The current draft of the NE Canby Concept Plan develops a comprehensive land use and transportation plan for a 205-acre area in the northeast section of the City of Canby's urban growth boundary (which is shown in Figure 1-1). The plan has not been adopted due to unresolved transportation issues. To resolve these issues, the TSP Update plans to incorporate the proposed NE Canby Concept Plan land uses into the future forecasts and then determining what projects are needed to allow all applicable operating standards to be met.

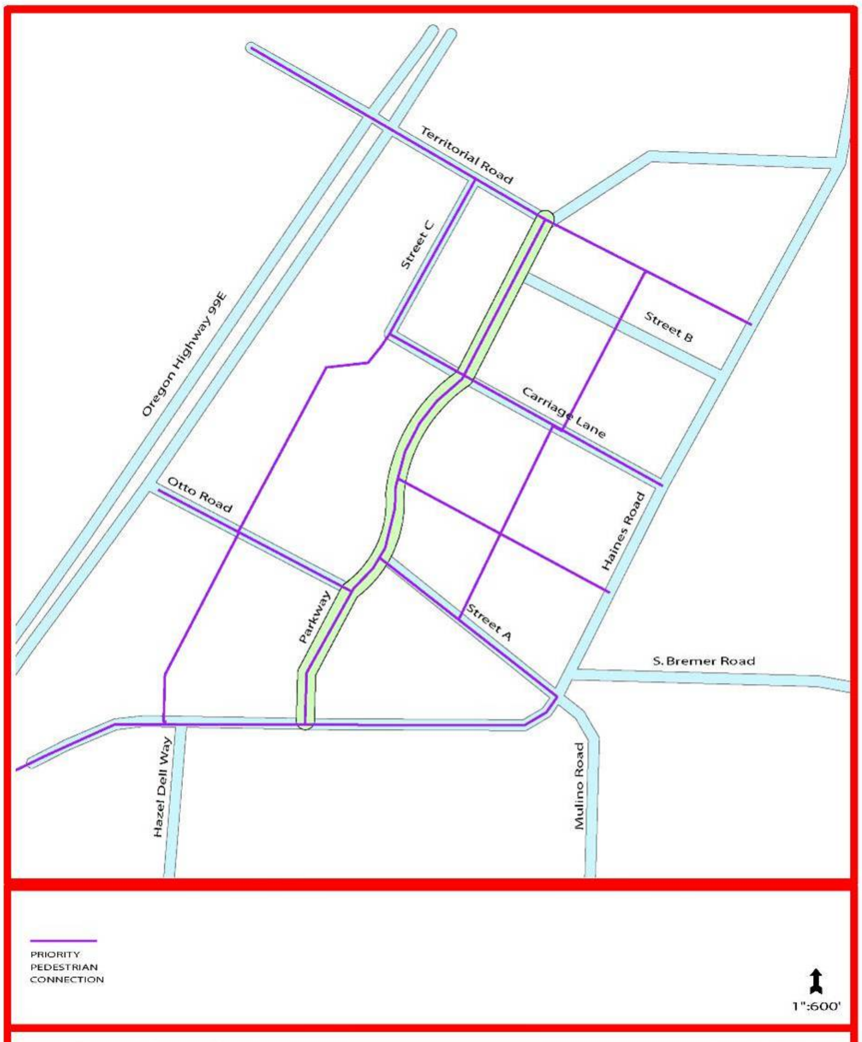


NE CANBY MASTER PLAN

FIGURE 1-1: VICINITY MAP

The intent of the NE Canby Concept Plan is to "respect existing residents while laying the framework for urbanization that will result in a distinctive neighborhood." The plan establishes a framework to guide public and private development in the area, with the majority of the site to be used as "flexible residential" with some high density residential, mixed-use, and institutional uses closer to OR 99E. General design standards and discussion are provided in the plan and include guidance regarding parking, driveways/garages, street trees and other landscaping, and traffic buffers. Guidelines for street cross-section (by functional class) and connectivity (600 feet from parallel route) are also provided for the streets on the site. Planning level cost estimates for the roadway network are also provided.

The transportation element of the plan plays an important role because the placement and design of roadways helps create a “livable and unique community.” The two main goals of the transportation element are to (1) create an attractive pedestrian and bicycling environment and (2) support development of a distinctive residential community. To support pedestrian and bicycling activity, sidewalks are planned for every street in the NE Canby Concept Plan Area. In addition, pedestrian walkways should be provided in order to maintain connectivity and facility spacing with no more than 400 feet between adjacent sidewalks and/or walkways. General locations of pedestrian connections are shown in Figure 7-9.



NE CANBY MASTER PLAN
FIGURE 7-9: PEDESTRIAN PLAN

The automobile circulation plan for the Concept Plan area is shown in Figure 7-1. The principle transportation facility planned for the area is a new residential parkway that runs across the length of the site in a diagonal direction from southwest to northeast. The intent of the parkway is to provide “an attractive pedestrian environment in a park-like setting.”

There are also two principle connections between the site and OR 99E: Otto Road is currently a small driveway that tees into the highway, and Territorial Road is an arterial with a traffic signal at OR 99E. Otto Road and the OR 99E/Otto Road intersection will be improved to a three-lane roadway and traffic signal, respectively, and the associated projects were included in the prior Canby TSP. Because Otto Road is located over 1,000 feet away from the nearest intersection, it meets OR 99E access spacing standards.

FIGURE 7-1: CIRCULATION PLAN

Mitigation projects were identified in conjunction with the concept plan at three locations. The various mitigation alternatives at the three locations are listed below:

Oregon 99E/Pine Street (Two Mitigation Options)

- Develop east/west left turn lanes that could improve signal phasing at this location and provide additional capacity for traffic on this street, thus freeing up additional green time for the heavy volumes on the state highway.
- Add right turn lanes on Oregon 99E to provide additional capacity for these turning movements and improved operations for the through traffic movement.

Oregon 99E/Otto Road

- Install a traffic signal. Peak hour warrants per the Manual of Uniform Traffic Control Devices were evaluated based on projected traffic volumes for the Concept Plan. This evaluation indicates that the peak hour warrants would be met with substantial leeway.

South Haines Road at 1st Avenue/Mulino Road (Three Mitigation Options)

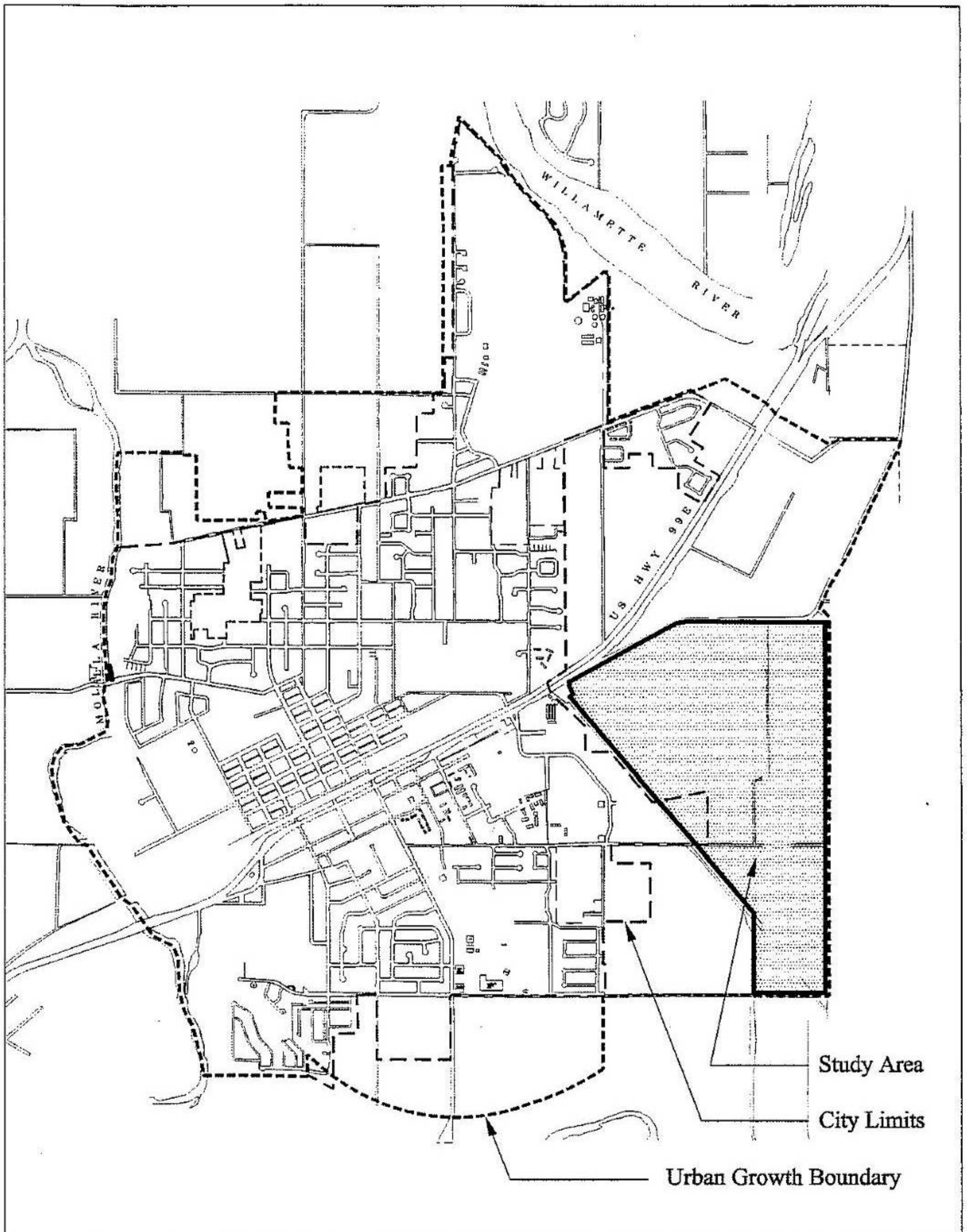
- Install a traffic signal. Peak hour warrants would be met if the heavy northbound right-turning movement from South Mulino Road to South Haines Road is considered. Without this volume, peak hour warrants would not be met.
- Install a roundabout to serve SE 1st Avenue, South Mulino Road, South Haines Road and a new east/west road serving the NE Canby study area (potentially an extension of Otto Road). This roundabout would likely operate at an acceptable level of service under either land development alternative.
- Completely reconstruct the intersection to accommodate a shift in through traffic movement away from a SE 1st Avenue/South Haines Road alignment to a more direct connection (e.g. not requiring turns) between South Mulino Road and South Haines Road (with turns onto and off of SE 1st Avenue). The provision of a more direct connection along Haines Road/Mulino Road would better accommodate traffic traveling to and from the Canby Pioneer Industrial Park and may help to reduce through traffic volumes along Oregon 99E, thus relieving the over-capacity situation expected for that facility. A full study of appropriate intersection treatment at this intersection should be undertaken prior to initiating any improvements.

Industrial Area Master Plan

October 1998

There are approximately 400 acres of potential industrial land within the Canby Urban Growth Boundary (UGB) near Sequoia Parkway on the east side of the City. The location of this area is shown in the Vicinity Map figure. The purpose of the Master Plan is “to provide an attractive, efficiently organized industrial employment center within the City of Canby.” To achieve this purpose, the plan recommends future roadway alignments, utility requirements, and site design guidelines.

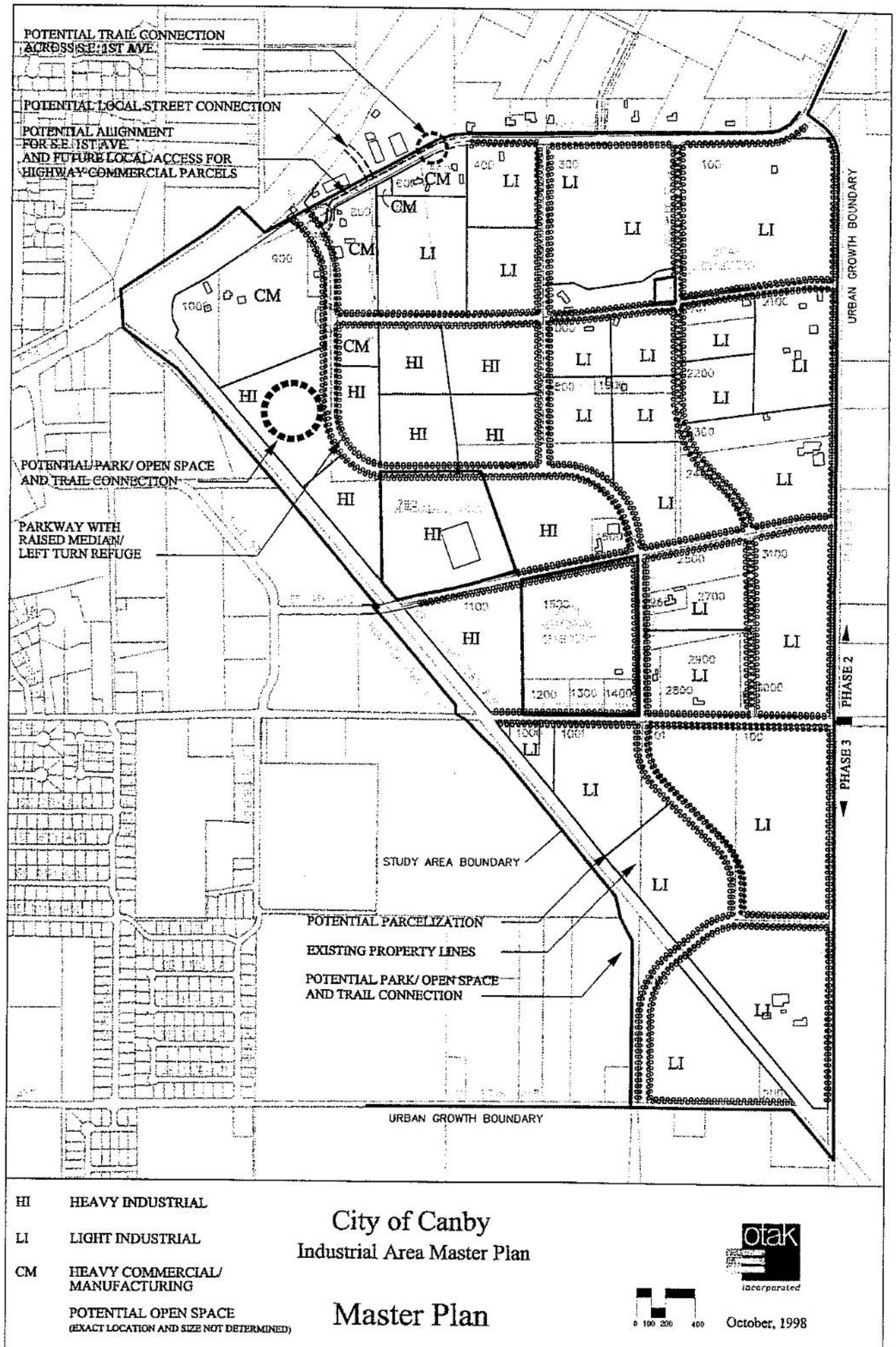
The Vicinity Map figure is on the next page. Following the Vicinity Map figure, the Industrial Area Master Plan is then shown.



City of Canby
Industrial Area Master Plan

Vicinity Map

otak Incorporated
October, 1998



City of Canby Industrial Area Master Plan

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Circulation Plan

The Circulation Plan for the industrial area identifies four major objectives. These objectives are as follows:

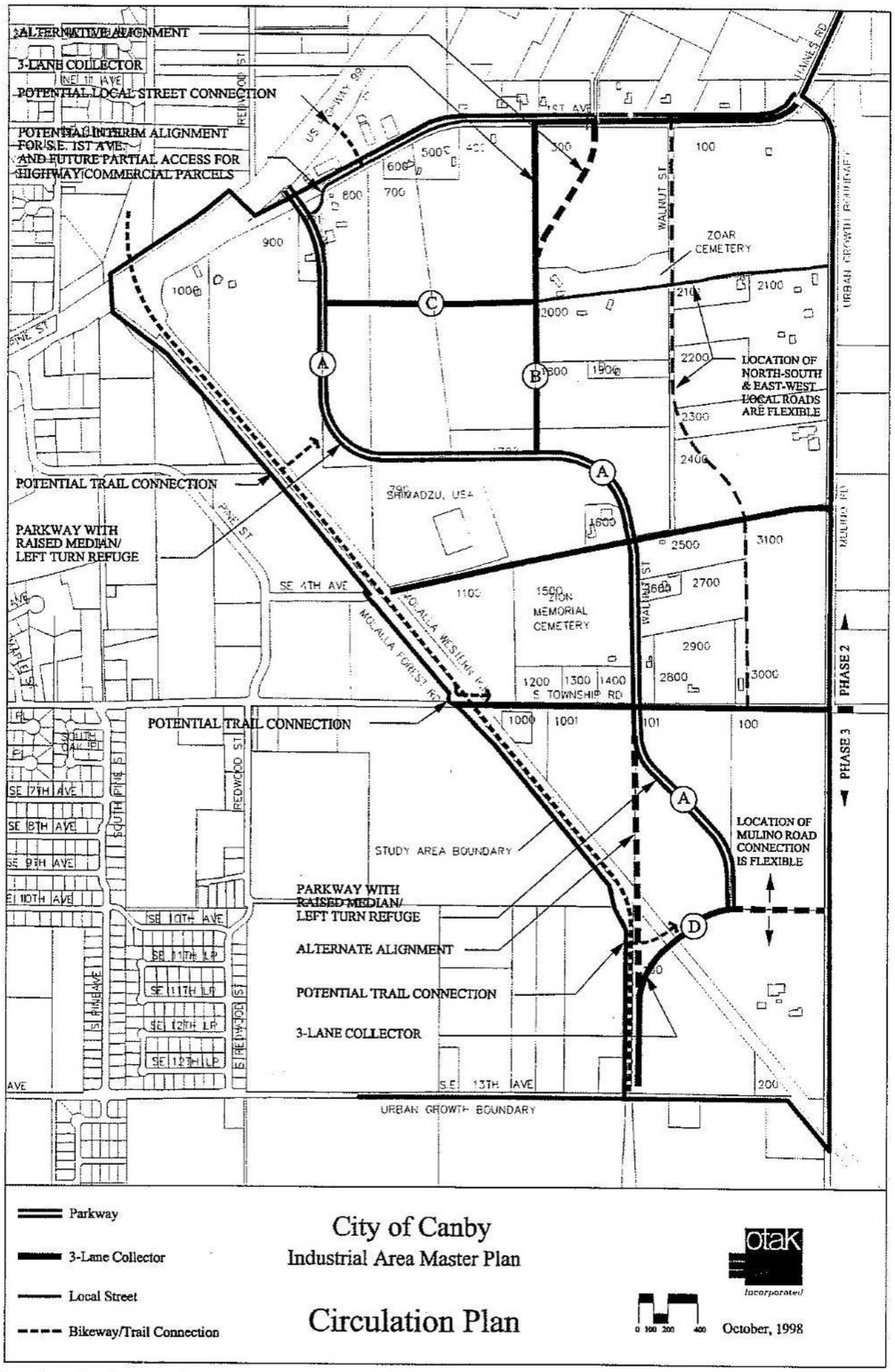
- Provide efficient internal circulation as well as access to OR 99E
- Provide a connection to SE 13th Avenue
- Provide for possible future connections through the area to the east and north
- Follow existing property lines as much as possible

Priority should be given to maintaining the street connectivity identified in the plan, while allowing for flexibility in specific street alignments. Some of the main connectivity elements corresponded to the 1998 Canby TSP, which showed a north/south three-lane collector road through the study area linking OR 99E with existing roads south and east of the city. In addition, SE 13th Avenue was also designated as an arterial that would eventually link up with OR 99E west of the city, creating a bypass route for traffic to and from I-5 that avoids the downtown area. Given the existing 2009 conditions, however, this would require truck traffic to pass through residential neighborhoods, school zones, and park areas.

Since 1998, Sequoia Parkway has been constructed as the three-lane collector road and intersects OR 99E across from Redwood Street. Details are provided regarding the intended design of Sequoia Parkway. In addition, because of the how closely spaced the SE 1st Avenue access and OR 99E/Sequoia Parkway would be, details regarding SE 1st Avenue realignment and possible turn restrictions are provided in the plan.

Regarding the connection between the industrial site and SE 13th Avenue to the south, either South Township Road or Mulino Road could be used. If South Township Road was used, it would need to cross the Molalla Western Railroad track either at-grade or above grade. For Mulino Road to be used, substantial costs would be expected to improve the Mulino Road/SE 13th Avenue intersection due to the horizontal and vertical road alignments, the undercrossing of the railroad, and the presence of a small drainage and wetland area.

A figure showing the Circulation Plan is included on the following page. Five workshop plans were also developed and are shown following the Circulation Plan figure.



City of Canby Industrial Area Master Plan

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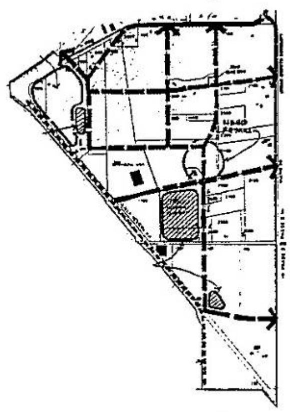
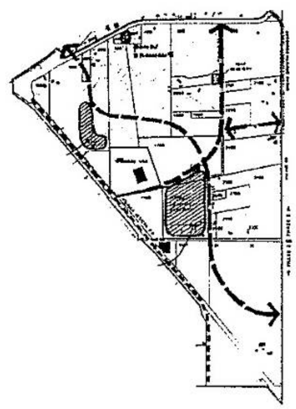
Industrial Area Master Plan

Continued

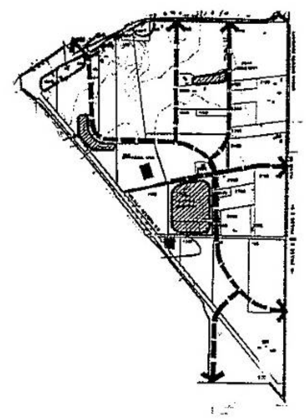
Workshop Plans



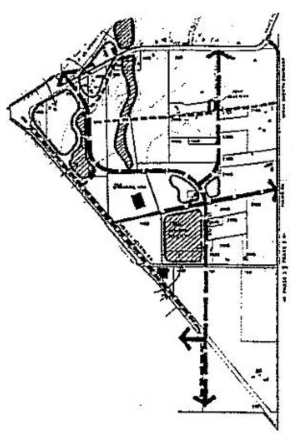
Workshop Plan 1



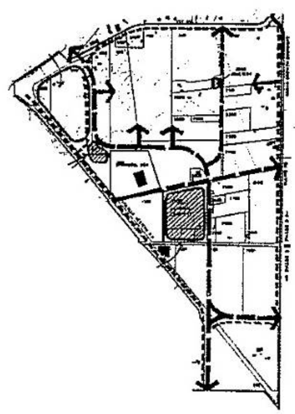
Workshop Plan 2



Workshop Plan 3



Workshop Plan 4



Workshop Plan 5

Cross-Section Design Guidelines

Street cross-sections are also provided for the parkway, collector streets, local streets, and Mulino Road-1st Avenue. Right-of-way improvements are also identified and address street trees, light standards, landscaping, and signage.

Transit

The ideal bus stop locations would be along Sequoia Parkway and would not be expected to have exclusive pull-outs. Bus stop shelters could be accommodated, and the suggested distance between stops would be between one-quarter and one-half mile.

Open Spaces Accommodating Trails and Pedestrian Activity Centers

Three open spaces are being considered within the industrial area. These areas would accommodate trails that connect the industrial area to the adjacent land uses. They would also be pedestrian activity centers where residents could enjoy recreation activities. Locations are shown on the Industrial Area Master Plan figure.

SE 1st Avenue Property Owners Meeting

Appendix 2 includes the minutes from a meeting with SE 1st Avenue property owners. Transportation concerns that were addressed include (1) interim and final alignments and connections of SE 1st Avenue, (2) circulation of truck traffic, and (3) alignment of the east/west collector. Resolution and action items are included in the appendix.

Goal 5 Inventory

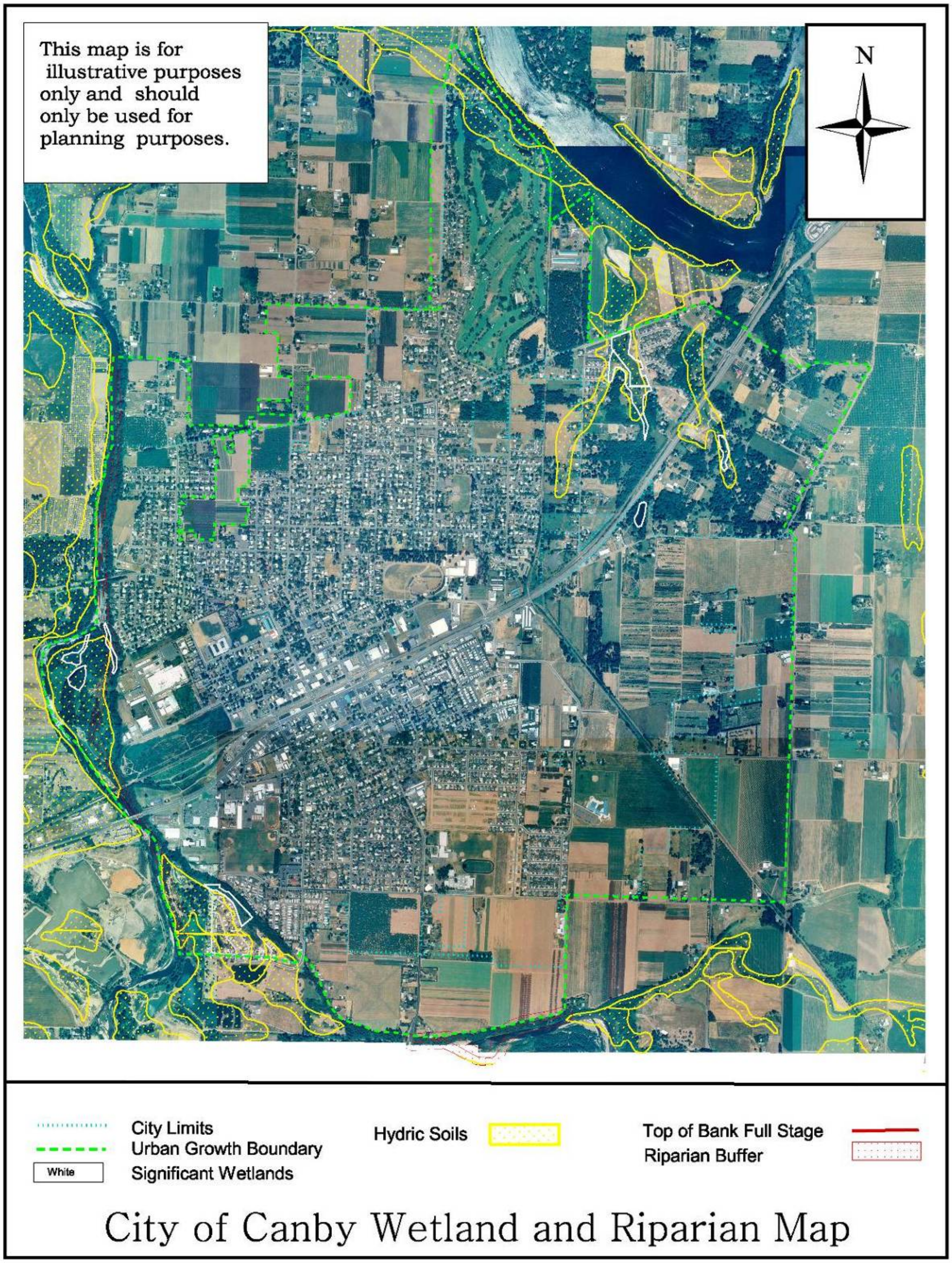
City staff indicated that the only Goal 5 Inventory for the City is a safe harbor 75 feet from the Molalla and Willamette Rivers.

Canby Transit Plan

Currently, Canby Area Transit (CAT) is developing a transit plan. It has not yet been completed.

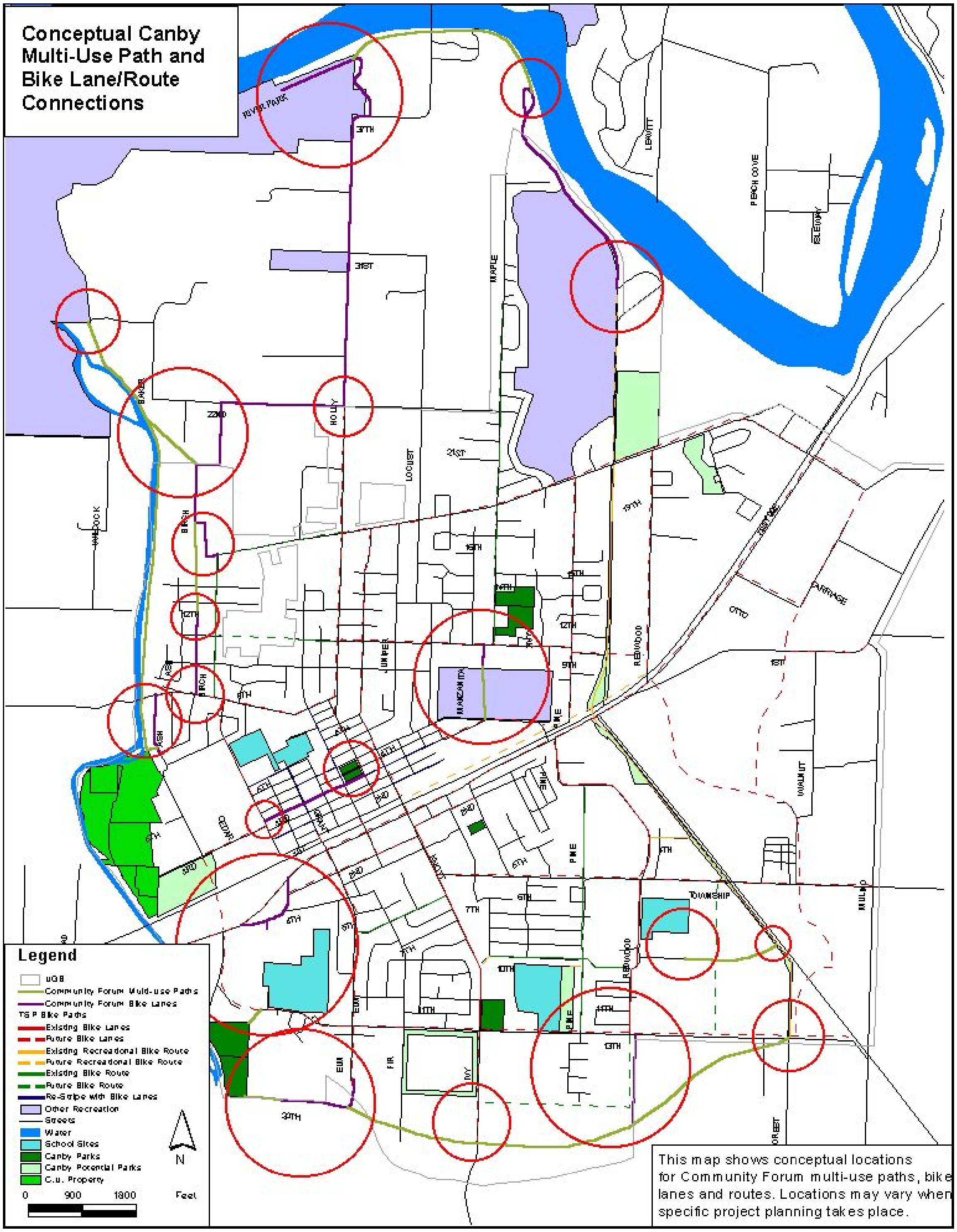
City of Canby Wetland and Riparian Map

A wetland and riparian map was provided by the City and is shown below.



City of Canby Trails Plan

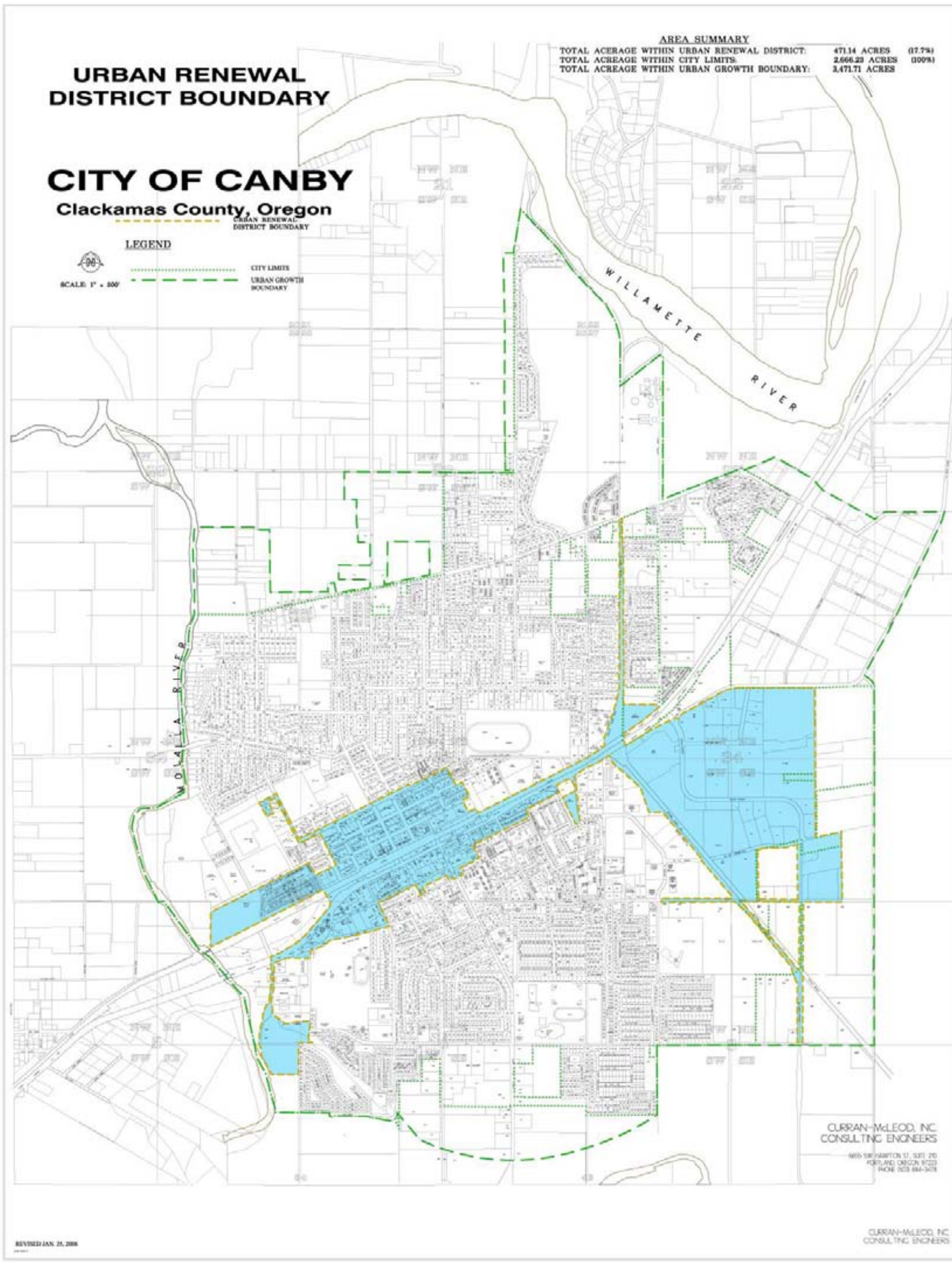
A map of conceptual multi-use paths, bike lanes, and bike route connections was provided by the City and is shown below.



Canby Urban Renewal Plan

Adopted November 3, 1999

Canby established an Urban Renewal Plan "to eliminate blighting influences found in the Renewal Area, to implement goals and objectives of the City of Canby Comprehensive Plan, and to implement development strategies and objectives for the Canby Urban Renewal Area." The project boundary encompasses the boundaries shown below.



The various sections of the Urban Renewal Plan that address traffic and transportation concerns are documented below:

Section 300.B – Goals and Objectives

Goal 2: Maintain effective, efficient and safe traffic system for vehicular and pedestrian users

- Provide suitable and competent vehicle traffic circulation throughout the district.
- Create convenient and safe bicycle and pedestrian travel ways and remove pedestrian access barriers throughout the district.
- Provide new and upgraded collector roads within the district.

Goal 4: Improve attractive visual amenities for customers and community members

- Provide user friendly and eye pleasing streets, pedestrian ways and green ways throughout the district.
- Furnish new and improved pedestrian areas and parks throughout the district.

Section 500 – Project Activities to Support Future Development

Project activities to treat causes of blight and support future development (letter corresponds to plan):

- Construct and improve streets, curbs and sidewalks in the project area (a)
- Construct or improve pedestrian and bicycle circulation systems (c)
- Acquisition and disposition of land for public improvements, rights-of-way, utility improvements, and private development (d)

Section 600 – Applicable Projects

Street Construction and Circulation Improvements

- Construct and improve streets throughout the project area. Projects include but are not limited to the following:
    - Landscaping
    - Construction, reconstruction, repair, or replacement of:
        - Streets
        - Sidewalks
        - Bike amenities
        - Pedestrian amenities
        - Public transit facilities
    - Acquisition of land, right of ways, easements and other land rights

City of Canby Revenues and Expenditures

Transportation related revenues and expenditures for the City of Canby over the last five years were provided by City staff. Averages for each revenue source and expenditure are shown in the following tables. The tables also list the revenues from two new sources that were recently enacted (i.e., local gas tax and street maintenance fee).

Average Transportation Related Revenues for City of Canby over Last Five Years

Transportation Revenue Source	Description	Average Annual Amount
State/Federal Funds		
State Highway Fund (gas taxes)	Dispersed annually to cities and counties throughout Oregon based on relative population and number of registered vehicles. Must be used for road-related expenses.	$655,000
Federal Fund Exchange	Federal money channeled through the State. Not intended for maintenance but can be used for any improvements in roadway right-of-way. Provided to City as a reimbursement following qualifying expenditures.	$170,000
Grants	One-time, project specific grants.	$210,000
City Funds		
Local Gas Tax	Tax collected on gasoline sales in City to be used for road-related expenses. Recently enacted (2009 was first year of revenue).	$235,000
Construction Excise Tax	Tax issued on construction permits.	$75,000
Erosion Control or Street Repair Fee's	Charges for services.	$15,000
Miscellaneous Revenue	Minor sources not accounted for elsewhere.	$15,000
Interest Revenue	Interest earned from Street Fund and Street Revenue Fund balance.	$10,000
Street Maintenance Fee	Reoccurring fee charged to all utility users based on expected traffic generation. Must be used for maintenance expenses. Recently enacted (2009 was first year of revenue).	$255,000
Urban Renewal (transportation related improvements)	Borrowed money for improvements (including transportation) in specified geographical area (see section on Urban Renewal Fund). Future taxes from properties in improved area will be used to repay loans (i.e., tax increment financing).	$565,000
Transportation System Development Charges (SDCs)	One-time fee charged to new developments based on land use and size. Must be used for roadway capacity improvements.	$480,000
	TOTAL ANNUAL TRANSPORTATION REVENUE	**$2,685,000**

Average Transportation Related Expenditures for City of Canby over Last Five Years

Transportation Expenditure	Description	Average Annual Amount
General Maintenance and Operations		
Personal Services	Contribution to staff wages and benefits.	$360,000
Material and Services	Office expenses, roadway maintenance and construction supplies, contractor work, and consulting engineer fees	$205,000
Capital Outlay Equipment	Cost of equipment used by City staff.	$20,000
Maintenance	General roadway maintenance and repair.	$75,000
Capital Improvements		
Transportation System Development Charges (SDCs)	See description provided in Revenues table.	$345,000
Federal Fund Exchange	See description provided in Revenues table.	$170,000
Grants	See description provided in Revenues table.	$210,000
Other Capital Projects		$255,000
Urban Renewal (transportation related improvements)	See description provided in Revenues table.	$565,000
Operating Transfer to General Fund	Street Fund contributions to other City needs.	$65,000
Operating and Reserve Transfer To Fleet	Street Fund contributions to other City needs.	$90,000
Operating Transfer to Technical Services	Street Fund contributions to other City needs.	$5,000
	TOTAL ANNUAL TRANSPORTATION EXPENDITURE	**$2,365,000**

As shown in the tables, in an average year in the recent past (when the two new revenue sources are included), the City has received $2,685,000 in revenue and spent $2,365,000 in expenditures, which corresponds to a $320,000 surplus. This does not necessarily indicate that future years will continue to have a surplus.

City of Canby Oregon Adopted Budget 2009-2010

The adopted budget indicates that in the 2008-2009 fiscal year (ending June 30, 2009), there was an unanticipated shortfall that resulted from the volatility of the economy in the final months of the fiscal year. This shortfall caused the Street Fund to expend some reserves. To prevent further use of reserves, the FY 09-10 proposed budget includes reducing personnel costs by reassigning two city staff positions to other departments. It is unclear whether this will only reduce costs in the short-term, but any future budget amounts should be viewed with this change in mind. Also, it was indicated that State gas tax receipts continue to decline, and the 6 cent gas tax increase recently approved by the legislature will not be if effect this year.

City of Canby Municipal Code - Title 16, Planning & Zoning

Title 16 of the Municipal Code provides standards and requirements for development and land division actions in Canby. Those standards and requirements that may be applicable to the Canby TSP update are summarized below.

Division III - Zoning

Chapter 16.08 - General Provisions

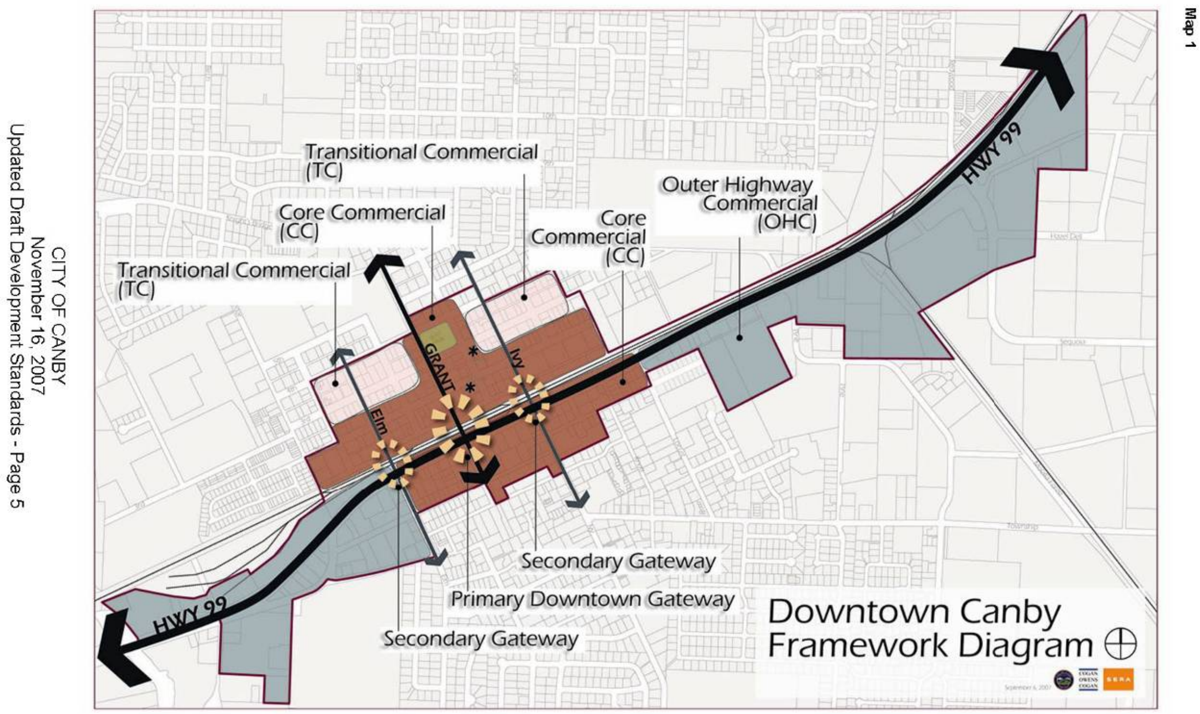
- *16.08.130 Standard transportation improvements.* This section outlines transportation improvements that are permitted, either outright or as a conditional use, in all zones. The section does not apply to projects that are specifically identified in the TSP, for which the city has already completed the required land use processes and goal compliance findings. The language in this section was added as part of a previous TSP update to bring the code into compliance with the Oregon Transportation Planning Rule (TPR).

Chapter 16.10 - Off-Street Parking and Loading

- *16.10.070 Parking lots and access.* Part B, Access pertains to the provision and maintenance of vehicular and pedestrian access from private property to a public street. This section states that Canby encourages joint/shared access where feasible. Sidewalks are required to be constructed to city standards along all street frontages, except where inadequate right-of-way width dictates a different standard. Minimum access requirements are provided in Table 16.10.070(B)(8).
- *16.10.080 - Streets.* This section serves as a placeholder for a street tree ordinance and will likely be deleted as part of a recent code update project.
- *16.10.100 Bicycle parking.* Standards for bicycle parking, including number of spaces required, dimensions and design, and location are provided in this section. Table 16.10.100 lists the minimum required number of bicycle parking spaces by use category.

Chapter 16.22 through Chapter 16.30 - Commercial Zones

- The development standards in the commercial zones have sidewalk width requirements for properties with frontage along OR 99E.
- There are three sub-areas near downtown and along OR 99E where development standards are applied differently; these include the Core, Transitional, and Outer Highway Commercial Areas. These sub-areas are shown in the next figure. The Core Commercial Area includes a primary downtown gateway (at Grant Street) and two secondary downtown gateways (at Ivy Street and Elm Street). Transportation improvements at these locations should reflect the gateway concept. The design focus of the Outer Highway Commercial Area is “less about creating a high-quality pedestrian experience, and more about ensuring that automobile-oriented design is built to the highest standard possible.”



- Newly adopted commercial design and development standards also include standards associated with the location of parking and vehicular and pedestrian access to new developments

<u>Chapter 16.35 - Industrial Area Overlay Zone</u>

- *16.35.050 Development standards.* This section contains some standards for street access and street right-of-way improvements, with a reference to the Industrial Area Master Plan. It also contains provisions for pedestrian connections and shared access drives.

<u>Chapter 16.46 Access Limitations on Project Density</u>

- *16.46.010 Number of units in residential development.* The intent of these provisions is to ensure sufficient vehicle access for residential development. The number of residential units allowed in a development is dependent upon the number of access points.
- *16.46.040 Joint and cross access.* This section contains standards and requirements for developments that do not meet access spacing requirements.
- *16.46.090 Shared access onto state highway.* This section establishes some limitations for shared access onto state highway facilities.

<u>Chapter 16.49 - Site and Design Review</u>

- *16.49.040 Criteria and standards.* The design matrix in Table 16.49.040 contains scoring criteria for development applications. Criteria include the distance between an access and an intersection, access drive widths, and pedestrian connections to the public right-of-way.

- *16.49.065 Bicycle and pedestrian facilities.* These standards primarily pertain to on-site connections, but there is a provision for walkway connections to the public street for every 300 feet of street frontage.
- *16.49.120 Parking lot landscaping standards.* This section includes standards for landscaping and buffering of parking areas and site perimeter areas.

Division IV - Land Division Regulation

Chapter 16.56 - General Provisions

- *16.56.010 Purpose.* Included with the purpose statement is the provision of adequate transportation facilities, including roads and bicycle/pedestrian facilities. The city will also ensure that the costs of developing roads, utilities and public areas serving new developments will be substantially absorbed by the benefited persons as opposed to the citizens of the city at large.

Chapter 16.64 - Subdivision Design Standards

- *16.64.010 Streets.* This section contains standards and requirements for street location, street alignment, future street extension, cul-de-sacs, access, alleys, and intersection. For right-of-way widths, it refers to the standards in Division VII, Street Alignments. Subsection N also contains provisions for streets adjacent to OR 99-E or a railroad right-of-way.
- *16.64.015 Access.* General standards for access to the public roadway system are outlined in this section.
- *16.64.020 Blocks.* This section establishes maximum block lengths, which vary based on zone and street classification.
- *16.64.030 Easements*. Subsection (C) requires a mid-block pedestrian way for any block over 600 feet in length.
- *16.64.070 Improvements.* Subsection (C), Streets contains standards for the provision of streets and other transportation improvements as part of subdivision development. Subsection (G) states that sidewalks are required to be constructed on both sides of a public street unless alternative pedestrian routes are available. Subsection (H) allows the commission to require bicycle lanes or paths as appropriate to extend the planned bicycle network.

Division VII - Street Alignments

Chapter 16.86 - Regulations

- *16.86.010 Purpose.* This chapter is intended to insure adequate space in appropriate locations for the planned expansion, extension, or realignment of public streets.
- *16.86.020 General provisions.* This section references the street circulation map of the Comprehensive Plan to determine street classification and appropriate right-of-way width. It also requires that bikeways and bike lanes be provided along arterial and collector streets, consistent with the TSP.

- *16.86.030 Street widening.* This section contains a list of street segments that are planned for widening to 40 feet.
- *16.86.040 Recommended roadway standards.* The street cross-sections based on street classification are located in this section. This section will likely be deleted as part of a recent code update project. Instead, roadway standards will be located in the Public Works Standards and will be referenced in this section.
- *16.86.050 Reduced roadway width standards.* This section allows a reduction to the minimum required roadway width for neighborhood collector and local streets if certain criteria are met, as approved by the Planning Commission or City Council. As noted above, as part of a recent Code Update project, standards for roadway width are proposed to be located in the Public Works Standards at the discretion of the city's Public Works Director and assuming minimum standards and criteria are met.

Division VIII - General Standards

Chapter 16.88 - General Standards and Procedures

- *16.88.190 Conformance with Transportation System Plan.* Subsection (A) establishes the threshold for determining when a plan or land use amendment "significantly affects" a transportation facility. Subsection (B) requires that amendments that do have a significant affect on a transportation facility be consistent with the TSP. Subsection (C) states that the city may require a Traffic Impact Study to determine compliance with the TSP.

Clackamas County Capital Improvement Projects

Fiscal Years 2006/07 to 2010/11

Clackamas County schedules a five-year Transportation Capital Improvement Program (CIP) and has a TSP 20-year Transportation Capital Improvement Plan project list. There are two projects in Canby that are included in the five-year CIP for fiscal years 2006/07 to 2010/11. These are shown in the table below and both have already been completed. The 20-year CIP is the list of projects identified in the County Comprehensive Plan, Chapter 5 Transportation (TSP), which is discussed in a prior section of this Background Documents Review memorandum.

Clackamas County 5-Year Capital Improvement Program (Fiscal Years 2006/07 to 2010/11)

Map #	Project	Section	Description	Program Year
272	Hwy 99E **(COMPLETED)**	Hwy 99E / Territorial Rd. intersection	Signalize intersection; improve RR crossing. ODOT is lead agency and funding the project. County costs are for staff time only.	2005/06
705	13th Ave bike lanes in Canby **(COMPLETED)**	Teakwood to Molalla Forest Road	Widen for bike lanes	2006/07

Clackamas County Comprehensive Plan: Chapter 5
Latest Text Revision on 1/17/09

Chapter 5 of the Clackamas County Comprehensive Plan is the transportation element of the plan and is the County's adopted Transportation Systems Plan (TSP). Chapter 5 lists the County transportation polices, standards, and identified projects. It focuses primarily on the County's responsibilities, though recognizes that the State and various cities own and maintain roads within the County. Some of the main County goals, policies, and strategies that relate to the City of Canby and the Canby TSP update (some study intersections are under County jurisdiction) are identified below.

General Transportation Goals

- Work in partnership with neighboring and affected agencies in transportation planning to ensure effective and efficient results.

Efficiency and Finance Policies

- Investigate and cooperate with other jurisdictions in establishing a transportation financing plan.

Operating Standard Policies

- All arterials and collectors not in Regional Centers shall be evaluated for performance to Level-of-Service "D" as the acceptable operating standard, except as established below. All capital construction shall be designed to achieve Level-of-Service "D" or better. (4/28/05)
    - Review of high-employment developments shall use a performance evaluation operating standard of Level-of-Service "E". (4/28/05)
    - Review of developments proposed on property with a Comprehensive Plan designation of Campus Industrial, Business Park, Light Industrial, General Industrial or Rural Industrial shall use a performance evaluation operating standard of Level-of-Service "E", except within the Clackamas Industrial Area where no performance evaluation operating standard shall apply. (1/25/07)

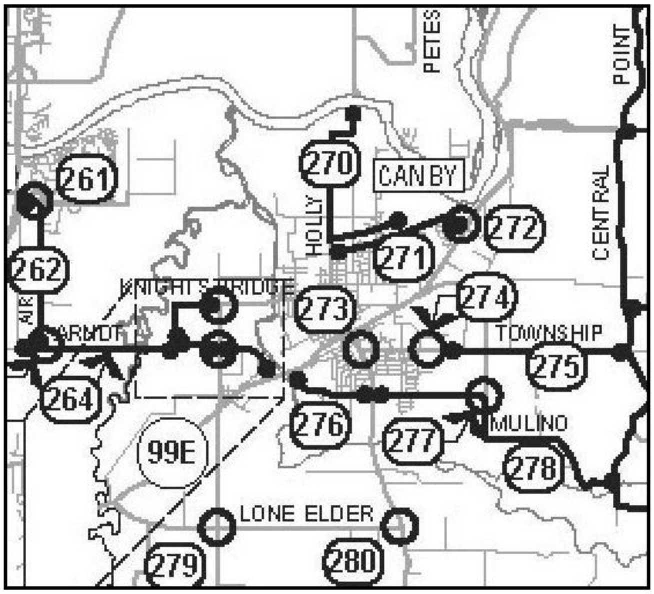
Road Building Policies

- County road capital improvement projects outside UGBs may be designed and constructed to improve safety and bring the roads up to County standards. When projects are located within current rights-of way, no conflicts with Goals 3 or 4 are anticipated. If the design of a project requires expansion of right-of-way into lands planned for Forest or Agricultural use, a goal exception may be necessary.
- Road projects located outside UGBs shall be planned to support the existing development pattern and through traffic needs, and are not planned to support or promote urbanization. Such projects will comply with Goal 11 (Transportation) to provide a safe and efficient transportation system meeting the needs of the rural area.

Various tables and maps relating to the transportation network are included in the Chapter 5 of the Clackamas County Comprehensive Plan. The applicable sections that relate to the City of Canby were extracted and are shown in the following tables and figures. Table V-1 includes a list of the 20-year capital improvement needs. Next, a figure shows the 20-year Transportation System Plan projects in the vicinity of the City of Canby (not all improvements are called-out in the figure). A second figure shows the Clackamas County roadway classifications in the vicinity of the City of Canby, and a table summarizing roadway classifications and guidelines is provided. Other figures provided include scenic roads, rural transit routes, planned bikeway network, and airport locations.

Clackamas County 20-Year Capital Improvement Needs (from Table V-1)

Map #	Project	Section	Description
264	Arndt Road	Canby-Hubbard Highway to Knights Bridge Road	Four lane widening with median, left-turn lanes
265	Arndt Road	Barlow Road to Knights Bridge Road	Remove or decrease horizontal curves, widen lanes and shoulders to County standards
266	Barlow Road	Arndt/Barlow Road intersection	Widen intersection
267	Arndt Road	Knights Bridge to 99E	New (5) lane road
268	Knights Bridge Road	Arndt Road to Barlow Road	Remove or decrease horizontal curves at Arndt Road and 0.47 miles west of Barlow Road
269	Knights Bridge Road	Knights Bridge/Barlow Road intersection	Install traffic signal and westbound left-turn lane
270	Holly/Territorial Road	Logging Road to Canby Ferry	Bike lanes
271	Territorial Road	99E to Holly Road	Reconstruct and widen (rural)
272	Territorial Road	Territorial Road/OR 99E intersection	Install traffic signal, realign grade (COMPLETED)
273	Township Road	Township/Ivy Road intersection	Install traffic signal
274	Township Road	Railroad crossing between Redwood and Walnut	Construct new railroad crossing
275	Township Road	Central Point Road to Canby City limit	Reconstruct and widen (rural)
276	Berg Parkway	OR 99E to Ivy Street	New two lane extension (COMPLETED)
277	Mulino Road	Mulino Road to 13th Ave, intersection 23	Relocate intersection to south away from railroad trestle, change of stop control to 13th Ave
278	Mulino Road (13th St segment)	Ivy Street to Highway 213	Widen to (3) lanes
Regional and State Projects			
	OR 99E	Territorial Road/99E intersection	Install traffic signal (COMPLETED)
	OR 99E	Barlow Road to Marion County Line	Four lane widening with median, left-turn lanes from m.p. 24.05
	OR 99E	Barlow Road/99E intersection	Add turn lanes at Barlow Road

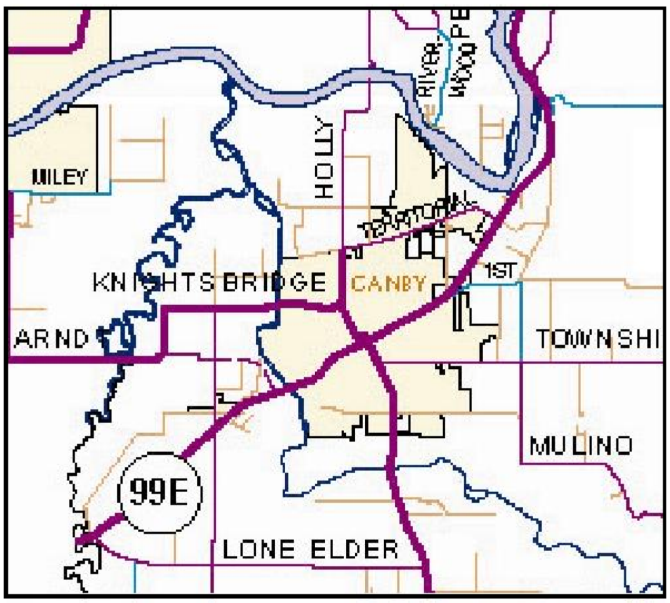


TRANSPORTATION SYSTEM PLAN
20 Year Projects

ROAD IMPROVEMENT
INTERSECTION IMPROVEMENT
BRIDGE IMPROVEMENT

CLACKAMAS COUNTY COMPREHENSIVE PLAN ● MAP V-1b

The inset map on the left is only the section of MAP V-1b that is applicable to the City of Canby. It was extracted for purposes of Canby TSP Background Document Review.



FUNCTIONAL CLASSIFICATION

EXISTING ROAD | PROPOSED ROAD
FREEWAY/EXPRESSWAY
MAJOR ARTERIAL
MINOR ARTERIAL
COLLECTOR
CONNECTOR
LOCAL

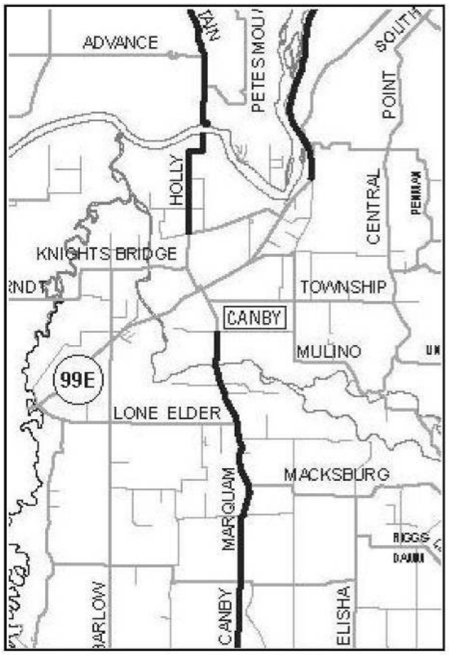
CLACKAMAS COUNTY COMPREHENSIVE PLAN ● MAP V-2b

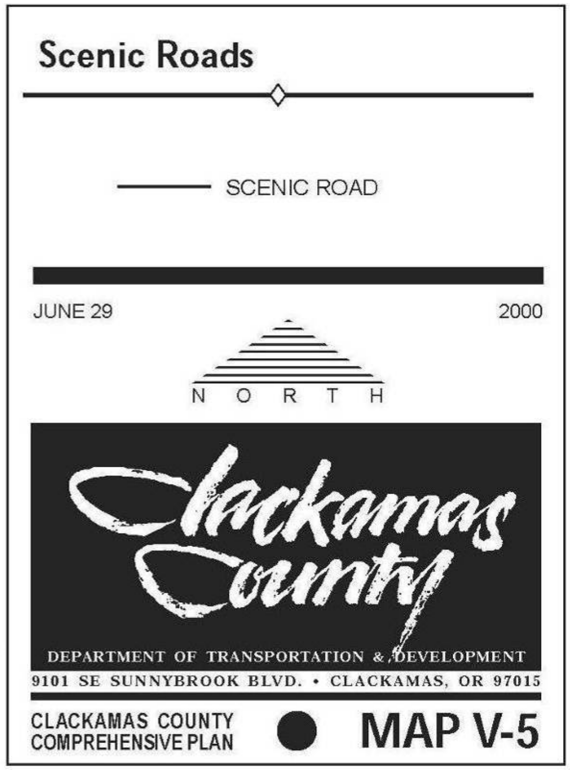
The inset map on the left is only the section of MAP V-2b that is applicable to the City of Canby. It was extracted for purposes of Canby TSP Background Document Review.

Clackamas County Roadway Classifications and Guidelines (from Table V-2)

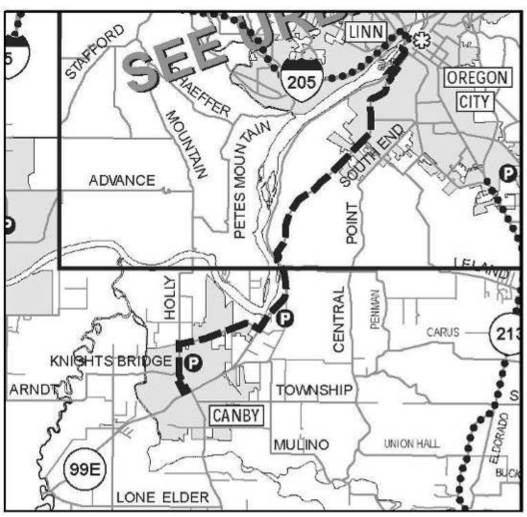
Functional Classification	Purpose	Land Access	Roadside Parking
Freeway/ Expressway	Serves interregional and intraregional trips. Carries heavy volume at high speed.	Extremely limited**	Emergency Only
Major arterial	Carries local and through traffic to and from destinations outside local communities and connects cities and rural centers. Moderate to heavy volume; moderate to high speed.	Restricted**	Restricted
Minor Arterial	Connects collectors to higher order roadways. Carries moderate volume at moderate speed.	Restricted if an alternative is available	Generally restricted
Collector	Principle carrier within neighborhoods or single land use areas. Links neighborhoods with major activity centers, other neighborhoods, and arterials. Generally not for through traffic. Low to moderate volume; low to moderate speed. New collectors should intersect minor arterials rather than major arterials.	Generally allowed* Residential driveways are limited.	Generally allowed*
Connector	Collects traffic from and distributes traffic to local streets within neighborhoods or industrial districts. Usually longer than local streets. Low traffic volumes and speeds. Primarily serves access and local circulation functions. Not for through traffic. Traffic calming measures may be appropriate. A connector should connect to a collector or minor arterial.	Allowed	Allowed if width is sufficient
Local	Provides access to abutting property and connects to higher order roads. New local roads should intersect collectors, connectors, or, if necessary, minor arterials. Traffic calming measures may be appropriate. Not for through traffic.	Allowed	Allowed if width is sufficient
Alley	May be public or private, to provide access to the rear of property. Alleys should intersect local roads or connectors. Not for through traffic.	Allowed	Generally not allowed

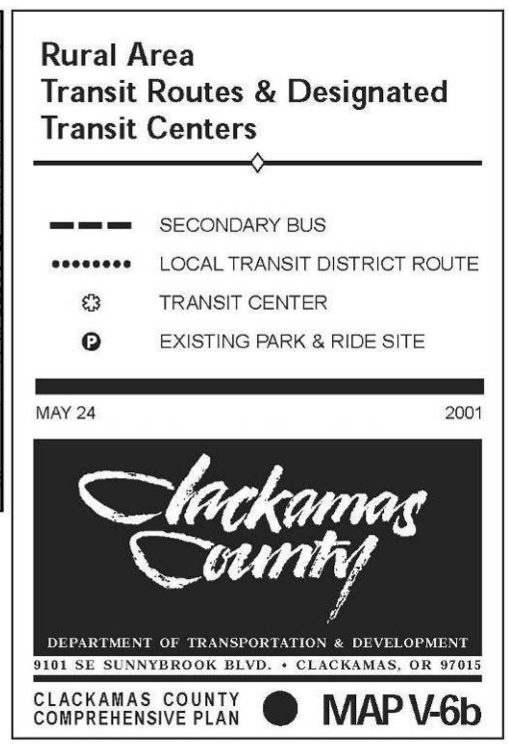
* May be restricted on collectors with high volume, high access, impaired visibility, or other significant problems.
** The County accepts the State's access control standards for State facilities.



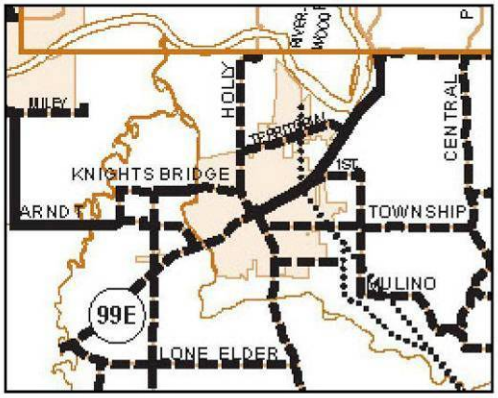


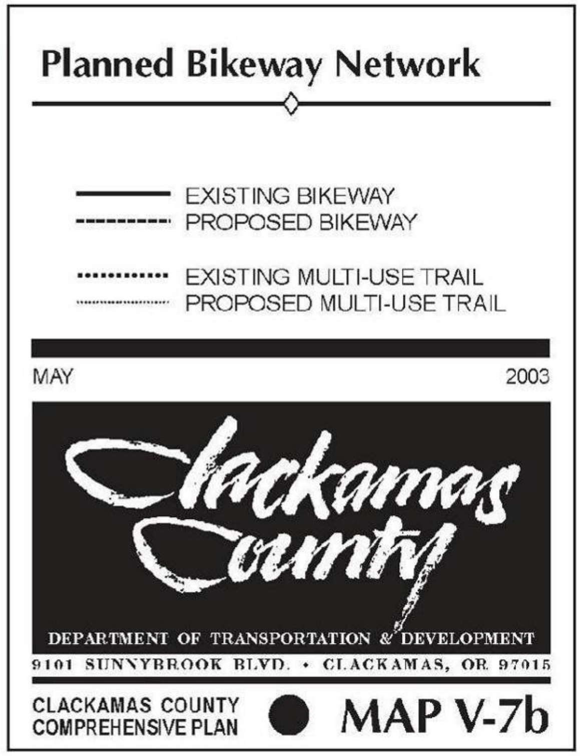
The above inset map is only the section of MAP V-5 that is applicable to the City of Canby. It was extracted for purposes of Canby TSP Background Document Review.



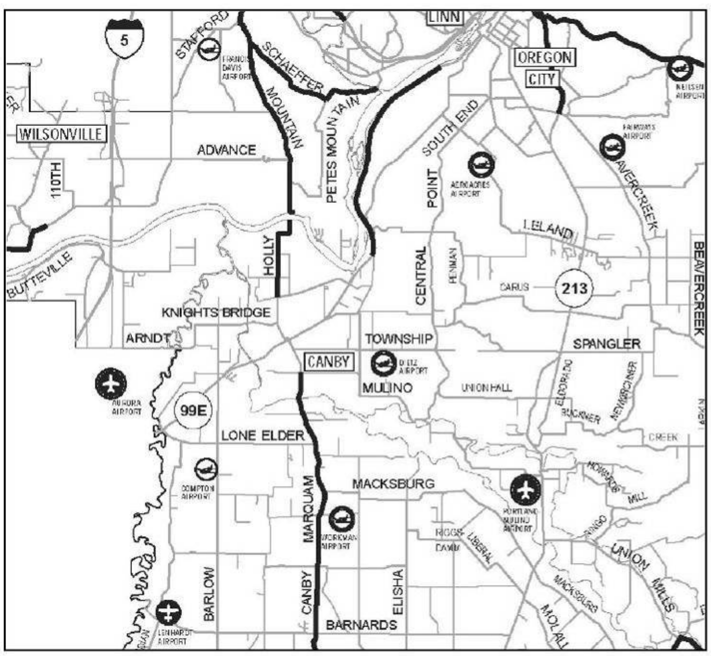


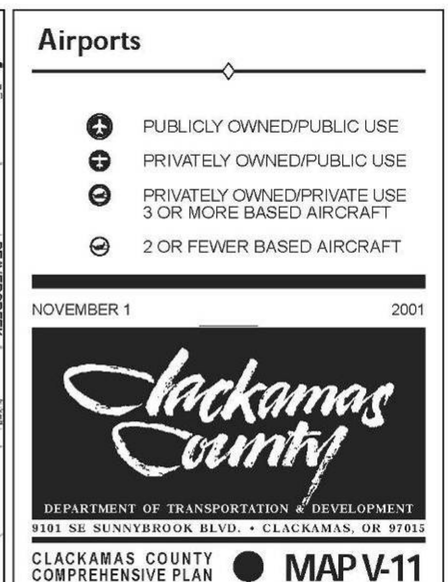
The above inset map is only the section of MAP V-6b that is applicable to the City of Canby. It was extracted for purposes of Canby TSP Background Document Review.





The above inset map is only the section of MAP V-7b that is applicable to the City of Canby. It was extracted for purposes of Canby TSP Background Document Review.





The inset map to the left is only the section of MAP V-1 that is applicable to the City of Canby. It was extracted for purposes of Canby TSP Background Document Review.

Oregon Transportation System Planning Guidelines 2008

May 2008

This document provides guidance for the preparation and update of Transportation System Plans required under the Transportation Planning Rule OAR 660-012-000 through 660-012-0070. It updates the previous TSP guidance document, which was prepared by ODOT in 2001, and includes "step-by-step guidance for plan preparation [and] has been refocused to place greater emphasis on the linkage between local needs and the availability of transportation funding." It also includes appendices that provide additional guidance regarding mobility standards, financing, and the Oregon Transportation Plan (OTP).

The four chapters included in the Transportation System Planning Guidelines 2008 document, along with the key pieces of information that can be found or questions that are answered in each chapter, are listed below:

- Chapter 1: A System Planning Overview
  - What is a Transportation System Plan (TSP)?
  - Who has to do a TSP?
  - Who has to Update a TSP?
  - Why is a TSP Important?
  - What does a TSP Include?
  - What Should a TSP Accomplish?
  - What *Must* a TSP Accomplish?
  - What Steps Should be Followed to Develop or Update a TSP?
- Chapter 2: Guidance for the Preparation of Transportation System Plan (TSP) Updates
  - Step 1 Determine if an update is needed and the scope of the project
  - Step 2 Prepare an assessment
  - Step 3 Address recent regulatory, policy, and statutory changes
- Chapter 3: Step-by-Step Guidance for (first-time) Plan Preparation
  - Step 1: Determine if preparing a new TSP or updating an existing TSP is necessary.
  - Step 2: Draft a project statement of work (SOW).
  - Step 3: Based on the statement of work prepare/identify timeline, staffing requirements, oversight responsibility and budget.
  - Step 4: Assign staff or hire a consultant with necessary expertise.
  - Step 5: Clearly define what needs to be done to prepare the plan.
  - Step 6: Develop a stakeholder/public involvement program (plan/strategy).
  - Step 7: Develop goals and objectives and evaluation criteria.
  - Step 8: Review plans, policies, regulations and standards.
  - Step 9: Inventory the Transportation System.
  - Step 10: Describe current conditions and identify deficiencies.
  - Step 11: Determine future travel demand, capacity, deficiencies and needs.
  - Step 12: Develop and evaluate transportation system alternatives that address deficiencies and meet needs.
  - Step 13: Select a Preferred Transportation System.
  - Step 14: Prepare the TSP.

  - Step 15: Develop a transportation improvement program and a transportation finance program.
  - Step 16: Adopt the TSP.

- Chapter 4: Extensive appendices covering a wide range of policy guidance on transportation and land use issues
  - 1. Transportation Planning Acronyms
  - 2. Information Resources
  - 3. Oregon Transportation Plan
  - 4. Oregon Highway Plan Applicability
  - 5. Highway Mobility Standards
  - 6. Transportation Planning Rule
  - 7. Transportation Growth and Management
  - 8. Guide to Transportation Finance for Transportation System Plans in Oregon
  - 9. Transportation Systems Management & Operations
  - 10. Traffic Volume Forecasting Methodologies
  - 11. Federal Functional Classification
  - 12. Access Management
  - 13. Environmental Considerations for TSPs
  - 14. Freight
  - 15. Aviation
  - 16. Rail
  - 17. Public Transportation
  - 18. Degree of Project Readiness Preferred for Project Funding/Project Readiness Matrix

Oregon Transportation Plan

Adopted September 20, 2006

The Oregon Transportation Plan (OTP) is a comprehensive plan that addresses the future transportation needs of the State of Oregon through the year 2030. It considers all modes of transportation, including airports, bicycle and pedestrian facilities, highways and roadways, pipelines, ports and waterway facilities, public transportation, and railroads.

Seven goals with associated policies and strategies are provided in the plan to address the core challenges and opportunities facing transportation in Oregon. The seven goals are:

- Goal 1 – Mobility and Accessibility
- Goal 2 – Management of the System
- Goal 3 – Economic Vitality
- Goal 4 – Sustainability
- Goal 5 – Safety and Security
- Goal 6 – Funding the Transportation System
- Goal 7 – Coordination, Communication and Cooperation

There are also six key initiatives identified to reflect the desired direction of the plan and to frame the plan implementation. These initiatives are:

- Maintain the existing transportation system to maximize the value of the assets. If funds are not available to maintain the system, develop a triage method for investing available funds.
- Optimize system capacity and safety through information technology and other methods.
- Integrate transportation, land use, economic development and the environment.
- Integrate the transportation system across jurisdictions, ownerships and modes.
- Create a sustainable funding plan for Oregon transportation.
- Invest strategically in capacity enhancements.

In addition, the OTP includes the following elements that affect Canby and that were also reviewed as part of this Background Document Review memorandum:

- Bicycle and Pedestrian Plan (Adopted 1995)
- Highway Plan (Adopted 1999, Reaffirmed 2006)

Oregon Bicycle and Pedestrian Plan

Adopted 1995, Included in September 2006 Oregon Transportation Plan

The provision of safe and accessible bicycling and walking facilities in an effort to encourage increased levels of bicycling and walking is the goal of the Oregon Bicycle and Pedestrian Plan, which is an element of the Oregon Transportation Plan (OTP) that was most recently adopted in September 2006. The Plan provides actions that will assist local jurisdictions in understanding the principals and policies that ODOT follows in providing bike and walkways along state highways. In order to reach the plan’s objectives, the strategies for system design are outlined, including:

- Providing bikeway and walkway systems and integrating with other transportation systems.
- Providing a safe and accessible biking and walking environment.
- Developing educational programs that improve bicycle and pedestrian safety.

The document includes the Policy & Action Plan and the Bikeway & Walkway Planning Design, Maintenance & Safety. The Policy & Action section contains background information, legal mandates and current conditions, goals, actions and implementation strategies ODOT proposes to improve bicycle and pedestrian transportation. The Bikeway & Walkway Planning Design, Maintenance & Safety section assists ODOT, cities and counties in designing, constructing and maintaining pedestrian and bicycle facilities. Design standards are recommended and information on safety is provided. The Canby TSP will implement the design standards for all bicycling and pedestrian facilities located in the City of Canby in accordance with the Oregon Bicycle and Pedestrian Plan. Additionally, needs assessment and possible alignment alternatives will be based on the goals outlined in the Policy and Action section.

1999 Oregon Highway Plan (OHP)

August 2006 Version (Includes Amendments Nov. 1999 through Jan. 2006)

The basic framework for the Oregon Highway Plan (OHP) is a refinement and application of the goals and policies stated in the Oregon Transportation Plan applied to the state highway system. The OHP gives policy and investment direction to large scale facility plans and TSP's, but is not intended to direct specific projects and modal alternatives.

Specific OHP policies with bearing on transportation planning and the Canby TSP update include the following.

Policy 1A – State Highway Classification System

- The Pacific Highway (OR 99E) runs through Canby and is classified as a Regional Highway.

Policy 1B: Land Use and Transportation

- Land use and transportation planning and development needs to be coordinated between state, regional, county, and city agencies.

Policy 1F: Highway Mobility Standards

- Highway mobility standards are based on various factors, including highway classification and designations, whether it is within a metropolitan planning organization (MPO) or urban growth boundary (UGB), and the posted speed. The section of OR 99E being studied is a Regional Highway designated as a truck route (but not a freight route) and runs through the Canby and Barlow UGB's. On the outer edges of Canby, the speed limit is posted at 55 mph. The speed limit then transitions to 45 mph and finally to 35 mph through the main part of town. Table 6 from the OHP indicates the applicable mobility standards based on the location and posted speed of a given highway segment. The applicable entries of Table 6 are provided in the following table.

ODOT Mobility Standards[a] Applicable for OR 99E through Canby (from Table 6)

Highway Category	Inside Canby or Barlow UGB		Outside UGB	
	≤35 mph posted speed	*≥45 mph posted speed*	*Unincorporated Community*	*Rural Lands*
Regional Highway	0.85	0.75	0.75	0.70

[a] ODOT operating standards obtained from August 2005 version of Table 6.

Policy 1G: Major Improvements

- Efficiency and other management measures must be instituted before adding capacity.

Policy 2A: Partnerships

- The limited resources available for transportation planning and development should be efficiently and effectively used by coordinating City of Canby efforts with ODOT, Clackamas County, and other agencies.

Policy 2B: Off-System Improvements

- The State is to provide financial assistance for local road projects when the projects are cost-effective in improving state facility conditions.

Policy 2D: Public Involvement

- The City should offer opportunities for effective public involvement in transportation planning and project development.

Policy 2F: Traffic Safety

- Increase the safety of the state transportation system through engineering, education, enforcement, and emergency services.

Goal 3 (Access Management) is critical in transportation planning efforts that involve state transportation facilities. This goal is implemented through OAR 734-051, which is reviewed later in this Background Document Review Memorandum. Goal 4 (Travel Alternatives) and Goal 5 (Environmental and Scenic Resources) also apply to the TSP update, if in limited ways. Goal 5, with an aim to go beyond what is required by other state and federal regulations, calls for natural resources to be maintained and even improved by transportation planning and projects involving state facilities.

Oregon State Transportation Improvement Program (STIP)

2008 – 2011 STIP and 2010 – 2013 Draft STIP

The current adopted (2009-2011) Statewide Transportation Improvement Program (STIP) serves as ODOT's short term capital improvement program and provides funding and scheduling information for transportation projects for both ODOT and the metropolitan planning organizations in the state. Projects funded in the STIP reflect and advance the Oregon Transportation Plan for highways, public transportation, and for freight, passenger rail, bicycle, and pedestrian facilities. One project within the City of Canby boundaries was identified within the adopted 2009-2011 STIP. It is listed in the table below along with key characteristics. No projects were identified in the 2010-2013 draft STIP.

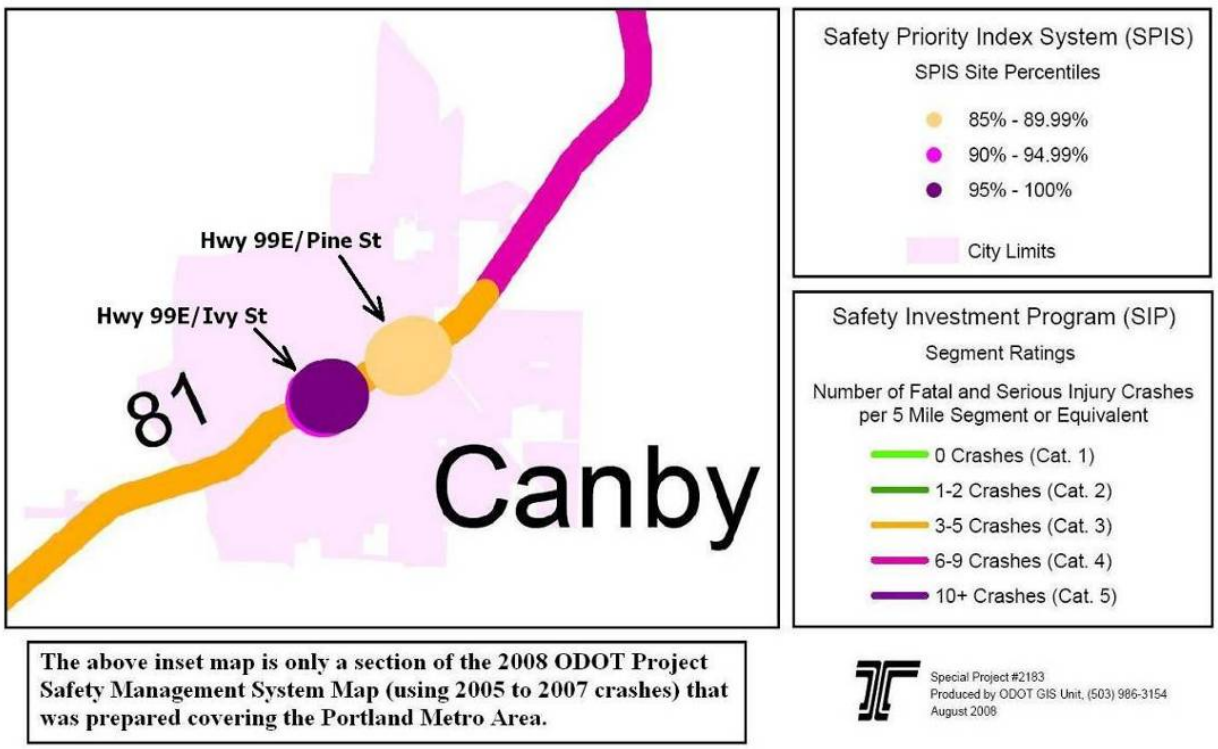
Name	Description	Total Cost	Schedule
Logging Trail Rd, OR99E Bridge (Canby)	Repair/recoat logging bridge over Hwy 99E, Canby local earmark proposed	$170,000	Design in 2006, Construct in 2008

ODOT Safety Priority Index System (SPIS)

Prepared in 2008 from 2005 to 2007

The Safety Priority Index System (SPIS) is a method developed by ODOT for identifying potential safety problems on state highways. SPIS scores are developed based upon crash frequency, severity, and rate. A prioritized list is created for each region (the top 10 percent of statewide SPIS sites) and the top five percent are investigated by the five Region Traffic manager's offices. There is one intersection in Canby (i.e., OR 99E/Ivy Street) that is in the top 5 percent of statewide SPIS sites. In addition, the OR 99E/Pine Street intersection was identified to be in the 85th to 89th percentile of statewide SPIS sites.

In addition to the SPIS, the Safety Investment Program (SIP) is a tool used to identify accident history in 0.10 mile or variable length segments on state highways. As shown in the figure below, in the City of Canby, OR 99E has a Category 3 SIP rating because from 2005 to 2007 it had three to five fatal or serious injury crashes per 5 mile segment.



2003 ODOT Highway Design Manual and Amendments

2003, with revisions in 2004 and 2005-2006

The Highway Design Manual (HDM) provides uniform standards and procedures for ODOT and is in general agreement with the 2001 American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*. Some key areas where guidance is provided are the location and design of new construction, major reconstruction, and resurfacing, restoration or rehabilitation (3R) projects.

The HDM is to be used for all projects located on state highways. For the City of Canby, this includes OR 99E. The manual should be used in determining design requirements as they relate to state highways in the TSP update.

Oregon Transportation Planning Rule (TPR) (OAR 660-012)

The State of Oregon adopted 19 statewide planning goals that must be implemented in a comprehensive plan for each city (with a population over 2,500 individuals) and county in the state. In addition to identifying how land, air, and water resources of each specific jurisdiction will be utilized, a review and needs analysis must be completed for improving public facilities.

One of the 19 goals is the Transportation Planning Rule (Goal 12). To comply with this rule, Canby must adopt a Transportation System Plan (TSP) that complies with the State TSP. The overarching goals to be accomplished by the TPR are to:

- Reduce dependence on the automobile and the number of people driving alone.
- Establish a stronger connection between land use and transportation planning.

Local TSPs are expected to examine possible land use solutions to transportation problems and identify multi-modal, system management and demand management strategies to address transportation needs. This entails the development of modal plans, including pedestrian, bicycle, motor vehicle and transit. These plans must strive to provide an integrated transportation network and include an inventory of current infrastructure, provide a gap analysis and identify how these gaps are going to be filled. The areas of analysis addressed in the TPR for a transportation system plan include:

- Roadway capacity and level-of-service
- Transit capacity and capacity utilization
- Bicycle and pedestrian system capacity
- Adjustment of turning movement volumes produced by travel demand forecasting models
- Estimation of future transportation needs (person travel), reflecting:
    - Population and employment forecasts consistent with comprehensive plans
    - Measures to reduce reliance on the automobile
    - Increased residential, commercial and retail development densities
    - Location of neighborhood shopping centers near residential areas
    - Better balance between jobs and housing
    - Maximum parking limits for office and institutional developments
    - Appropriate levels of transportation facilities to serve land uses identified in transportation plans
    - Increases in average automobile occupancy
    - Increases in modal shares of non-automobile modes
    - TDM programs
    - Land use and subdivision regulation
    - Estimation of future goods movement
    - Access management

These strategies (including any that were previously incorporated into the adopted Canby TSP) will be reconsidered in the TSP update. In addition, the Oregon Land Conservation and Development Commission adopted amendments to sections of the TPR – OAR 660-12-0050 and -0055 – in 2005. The amendments clarify planning requirements for amending local TSPs when land use plan amendments are proposed. The TSP update should reflect this new rule requirement.

Oregon Access Management Rule (OAR 734-051)

The purpose of Oregon's Access Management Rule is to control the issuing of permits for access to state highways, state highway rights of way and other properties under the State's jurisdiction. In addition, the ability to close existing approaches, set spacing standards and establish a formal appeals process in relation to access issues is also identified.

These rules enable the State to set policy and direct location and spacing of intersections and approaches on state highways, ensuring the relevance of the functional classification system and preserving the efficient operation of state routes. Regulating access can:

- Protect resource lands
- Preserve highway capacity
- Ensure safety for segments of state routes with sharp curves, steep grades or obstructed sight distance.

The access management standards adopted by ODOT and applicable to the City of Canby are summarized in the table below.

Applicable ODOT Access Management Standards (from 1999 OHP, Appendix C, Table 14)

Highway Category[a]	**Spacing Standards**[b] **(by Posted Speed)**			
	≥55 mph	*40,45 mph*	*30,35 mph*	*≤25 mph*
Regional Highway (rural)	990 feet	750 feet	600 feet	450 feet
Regional Highway (urban)	990 feet	750 feet	425 feet	350 feet

[a] *The Pacific Highway (OR 99E) is classified by ODOT as a Regional Highway.*
[b] *Measurement of the approach road spacing is from center to center on the same side of the roadway.*

Source: 1999 Oregon Highway Plan, Appendix C, Table 14

ODOT applies the Urban access standards for OR 99E within the City of Canby UGB. These standards will be used in the Canby TSP to analyze the current access conditions along OR 99E, determine existing deficiencies, and provide direction for establishing a connectivity plan. These standards will be applied to all rights-of-way under the State's jurisdiction in the Canby.

Historical Traffic Counts in Canby

Historical traffic counts were obtained from Lancaster Engineering and were compared with the recent traffic counts for consistency. In addition, historical traffic counts were used instead of the recent counts at the following three study intersections:

- OR 99E/Pine Street
- OR 99E/Sequoia Parkway
- South Hazel Dell Way/Sequoia Parkway

The traffic counts were balanced to be consistent with the recent traffic counts and will be provided in Chapter 3 of the updated TSP.

Historic Resources in Canby

City Ordinance and Oregon Historic Preservation Plan (2009)

The City of Canby has adopted a list of historic locations by ordinance. In addition, the Oregon State Historic Preservation Office (SHPO) is the state office that deals with historic building and archaeological site issues. The Oregon SHPO oversees nominations of Oregon's significant historic properties to the National Register of Historic Places, which is the nation's official list of buildings, structures, districts, sites, and objects significant in American history, architecture, archaeology and culture. For the City of Canby and surrounding area, there are ten historic locations that are identified in either the City ordinance or the National Register list. These are shown in the table below, and consideration will be given to these historical locations in the Canby TSP update.

Historical Locations In and Near Canby

Description	Address	Location	Source
	888 NE 4th Ave	Within Canby City Limits	City Ordinance
	234 NW 5th Ave	Within Canby City Limits	City Ordinance
	375 NW 3rd Ave	Within Canby City Limits	City Ordinance
	139 SW 2nd Ave	Within Canby City Limits	City Ordinance
	508 NW 3rd Ave	Within Canby City Limits	City Ordinance
William Knight House	525 SW 4th Ave	Within Canby City Limits	National Register
Herman Anthony Farm	10205 S New Era Rd	East of Canby, Near New Era	National Register
Macksburg Lutheran Church	10190 S Macksburg Rd	South of Canby, Near Macksburg	National Register
Kraft-Brandes-Culbertson Farmstead	2525 N Baker Dr	North of Canby, Near Molalla River State Park	National Register
William Barlow House	24670 S Hwy 99E	West of Canby, Near Barlow	National Register

Developer Traffic Studies for Sites in Canby

Several recent traffic studies have been performed by Lancaster Engineering and have identified transportation improvements that are needed to mitigate development impacts. The mitigation measures identified along with other applicable findings are listed in the table below.

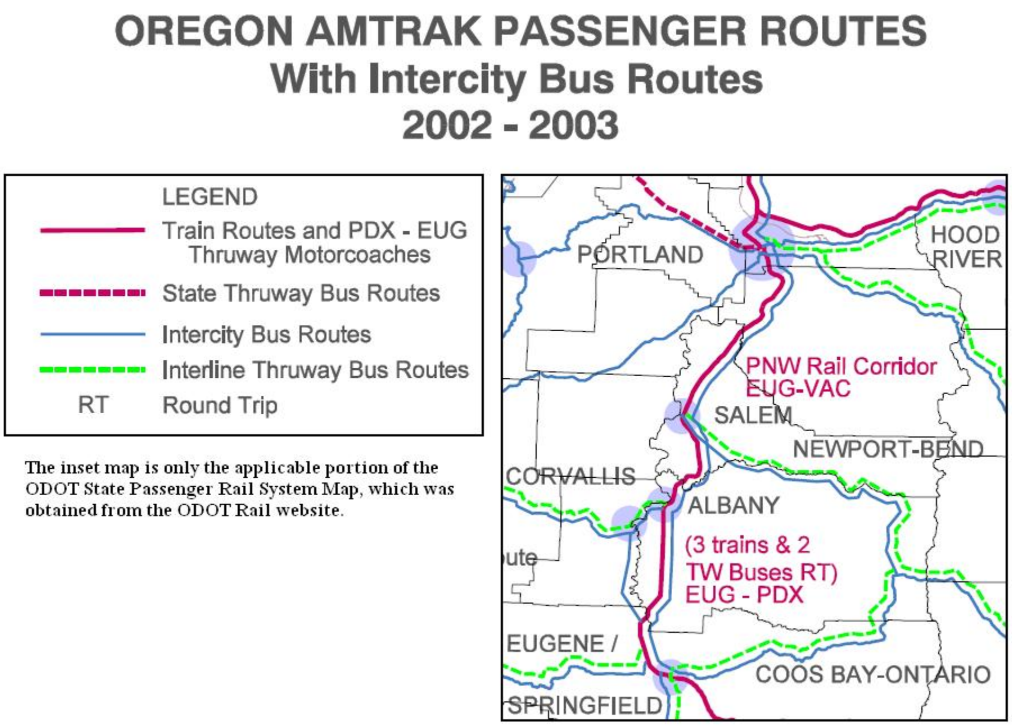
Mitigation Measures Identified in Recent Developer Traffic Studies

Location	Mitigation Measure or Other Finding	Traffic Study
Hwy 99E/Elm St	Southbound right-turn lane	NW 3rd and Cedar Zone Change (Oct. 2003)
Elm St/2nd Ave	Install all-way stop control	NW 3rd and Cedar Zone Change (Oct. 2003)
Along Cedar St	Examine any potential access to determine adequate sight distance	NW 3rd and Cedar Zone Change (Oct. 2003)
SE 1st Ave/Hazel Dell Ave	Change traffic control to stop traffic on the eastbound and northbound approaches	Lewelling Property Subdivision Access Management Study (Nov. 2008)
SE 1st Ave/S Walnut St	Allocate right-of-way for a westbound left-turn lane, in case future volumes warrant its installation	Zimmer Property Partition Access Management Study (Nov. 2008)
Hazel Dell Ave/ Sequoia Pkwy	The traffic signal that was previously proposed as a potential mitigation did not meet warrants. Therefore, it is not recommended.	Wilco Development – Traffic Report/Traffic Signal Warrant Analysis (Oct. 2007)
Sequoia Pkwy south of Hazel Dell Ave	Future development on the parcel to the south should be limited to one driveway or shared access with the proposed site.	Wilco Development – Traffic Report/Traffic Signal Warrant Analysis (Oct. 2007)
S Ivy St (200 ft south of Hwy 99E)	Restrict proposed access to only allow right-in/right-out movements by installing median along S Ivy St, provide a minimum road width of 47 ft, 4 in. curb-to-curb, and potentially restrict parking along west side of S Ivy St (to achieve acceptable sight distance at access)	Professional Center – Proposed Access Plan (Nov. 2006)
Township Rd/site access west of Locust St	Restrict on-street parking on both sides of Township Rd between Locust St and the site access to allow waiting vehicles to go around left-turning vehicles and prevent queuing	Township Trails Subdivision Traffic Impact Study (Mar. 2004)
S Ivy St/site access	A left-turn lane on S Ivy St may be needed, depending on number of parcels to be served by the site access, which was not yet determined	Dinsmore Annexation Traffic Impact Study (June 2008)
Southwest of S Ivy St/SW 13th Ave intersection	Prepare a Master Plan that provides a planned street system for the area to ensure coordination between future development	Dinsmore Annexation Traffic Impact Study (June 2008)
NE 3rd Ave/site access	Restrict on-street parking within 50 feet of site access	Canby Cinema Traffic Impact Study (Oct. 2008)
N Ivy St/NE 1st Ave	Restrict various movements or close intersection (no specifics provided)	Canby Cinema Traffic Impact Study (Oct. 2008)

Oregon State Rail System Maps

The applicable portions of the freight and passenger rail system maps for Oregon are shown below.

The inset map is only a portion of the ODOT State Freight Rail System Map (June 2009), which was obtained from the ODOT Rail website.



The inset map is only the applicable portion of the ODOT State Passenger Rail System Map, which was obtained from the ODOT Rail website.

Even though the Thruway passenger bus route is shown to follow the railroad between Salem and Portland, ODOT Rail indicated that it stays on I-5 into Portland and does not actually pass through Canby.

ODOT Intercity Passenger Rail Study

ODOT Rail and Parsons Brinckerhoff, June 2009 Draft

The following two paragraphs from the Executive Summary provide a good summary of the study's preliminary findings. These findings are only preliminary because the study is currently in draft form. The Union Pacific (UP) mainline currently has passenger rail service and runs through Canby but does not stop in Canby. The Oregon Electric (OE) alignment does not run through Canby. Figure 1 from the study is also provided on the right and shows the two alternative rail lines.

Purpose of Study

"This study evaluates the feasibility of moving Portland-to-Eugene intercity passenger rail service from the current Union Pacific (UP) mainline railroad route to a parallel rail route known as the Oregon Electric (OE) alignment. Currently, the Oregon Department of Transportation (ODOT) sponsors two Amtrak trains and three intercity Thruway buses daily between Portland and Eugene. Passenger trains operate on the UP mainline track. Service integrity for these passenger train offerings has been a persistent challenge, in part due to the inherent difficulty of integrating passenger operations into a heavily-used, single-track freight mainline operation."

Study Findings

"The study concludes that with associated improvements and mitigation of environmental and land use impacts, it is feasible to shift Portland-to-Eugene intercity passenger rail service from the UP rail line to the OE rail line. This shift, along with the corresponding track improvements, would in turn benefit freight rail operations on both the OE and the UP routes."

ODOT Rail Crossing Rules

Crossing rules, applications, and examples can be found on the ODOT Rail website at the following link (as of December 8, 2009):

http://www.oregon.gov/ODOT/RAIL/crosssafe.shtml

A safe stopping distance (SSD) table is one of the resources provided because ODOT Rail regulates out to the stopping sight distance (SSD) on all approaches to a crossing, up to a maximum of 500 feet out and no less than 100.

TABLE 1
SAFE STOPPING DISTANCES (SSD)
(The SSD is measured 15 feet from nearest rail)
(OAR 741-100-0020)

Vehicle Approach Speed	SSD
15 mph	80 feet
20 mph	115 feet
25 mph	155 feet
30 mph	200 feet
35 mph	250 feet
40 mph	305 feet
45 mph	360 feet
50 mph	425 feet
55 mph	495 feet
60 mph	570 feet
65 mph	645 feet

Source: Based on an equation from A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation officials, 2001, Fourth Edition, pg 112.

ODOT Rail Plan

Adopted 2001, Included in September 2006 Oregon Transportation Plan

The Oregon Rail Plan is a comprehensive assessment of the state's rail planning, freight rail, and passenger rail systems (not including light rail or other rail transit type services). It documents and describes various federal and state rail planning requirements and highlights specific goals and policies. It also reviews the development of the state freight and passenger rail systems and identifies needed improvements. Segments of the plan that were considered to be the most relevant to the Canby TSP Update are summarized or reproduced below:

Oregon Rail Plan Vision Statement

> *"The State of Oregon should have an enhanced intercity rail passenger service as part of a balanced transportation system. The rail passenger system shall operate efficiently, provide access to potential users, and comply with federal and state environmental and land use standards. Convenient connections should be developed with air, intercity bus and transit that integrate trains into a passenger network linking all areas of the state, nation and world.*
>
> *"High safety and compliance standards are required for the operating, construction and maintenance of the Oregon Rail System. The State of Oregon should develop adequate funding sources, both public and private, to finance the modernization of both rail passenger and freight service. Implementation should take place as rapidly as permitted by financial, design, construction, equipment and market considerations.*
>
> *"The State of Oregon will work with carriers, shippers and other groups to maintain and improve access to the national rail freight system, maintain a competitive environment for rail customers, strengthen the retention of local rail service, and assure a level playing field for all modes.*
>
> *"The State of Oregon will work with other state agencies, regional and local jurisdictions and the general public to integrate rail freight and passenger elements into land use and transportation planning processes. This will include working with private companies and public sector agencies to operate the rail system in safe manner for the users of the system and public in general."(page VS-2)*

OTP Policies and Actions

- "The overriding purpose for the state's involvement in rail planning is to assure that Oregon will be served by an efficient rail network which is integrated into the state transportation network. A primary function of the transportation network is to provide for the efficient movement of people and goods throughout the state." (page 10)
- General goals and policies are provided. (pages 10-17)

Specific Processes Applicable to Potential Canby TSP Improvements

- "Whenever any road work (including construction of a sidewalk) is proposed within 500 feet of a railroad track, the party responsible for the project should consult ODOT Rail Division regarding the proposed project. Staff has developed a checklist for Rail Division involvement to aid a public authority in determining when ODOT Rail needs to be involved in the project. The checklist appears below."

Impact of Highway Construction Projects on Railroad-Highway Grade Crossings			
Yes	No	Unk	Checklist Item
			1. Will the project alter or construct sidewalks, bike lanes, bike paths or roadway within 500 feet of a railroad track? 2. Will the project change the roadway approaches to a grade crossing within 500 feet of the crossing? 3. Will the project involve relocation, construction or closure of any grade crossings? 4. Will the project increase or decrease vehicle traffic at a grade crossing? 5. Will the project encroach on the railroad's right-of-way (ROW)? The typical ROW for a railroad is 50 feet on each side of the centerline of the tracks. 6. Will the project change the vertical curvature of the roadway approaching any railroad track? Will the project change the elevation of an adjacent side street near the grade crossing? 7. Will the project involve installation of new vehicle traffic signals or changes to existing traffic signals within 500 feet of a grade crossing?

  "If the answer is "Yes" to any of the above, the project may require a crossing order from the Rail Division. The Division must be consulted and involved in the project development process. The Division endeavors to complete processing of crossing applications within four to six months from the date an application is filed. If the project involves construction of new crossing signal devices, the lead time is not less than one year from the date the railroad company orders the equipment until it is installed." (pages 23-24)

- "On [the UP main line between Eugene and Portland, which is the designated Northwest High Speed Rail Corridor], ODOT Rail Division has complete authority over private crossings in addition to public crossings." (page 24)

- **"New Crossing Construction:** Whenever a party files an application for a new crossing, it is ODOT policy to review the application to assure the crossing is required for the public safety, necessity, convenience and general welfare. If the applicant satisfies that condition, ODOT then determines if it is possible to construct a separated (overpass or underpass) crossing and close adjacent grade crossings. The safety standard for a new grade crossing is higher than that which is applied to an existing public crossing. The Division strongly believes a new public grade crossing should be equipped with flashing lights and automatic gates. An applicant for the crossing must be able to demonstrate the proposed crossing will be safe and accessible to all modes of public travel. The cost of constructing a new grade crossing can be substantial. The cost of maintaining active warning devices is also substantial, which requires an ongoing commitment from the railroad involved. The Division believes it is in the best interest of all concerned to only create those crossings that are required by the public safety, necessity, and convenience and general welfare." (page 24)

- **"Alteration of Existing Public Crossings:** Alterations to existing crossings can be initiated by a public road authority, a railroad, or by the Division's staff investigation process. The cost of necessary safety improvements is borne by the party initiating the change to the crossing. The statutes allow the parties to agree on a funding strategy. However, unless the parties agree otherwise, the initiating party bears the cost of the alterations. Maintenance of the crossing, the roadway approaches, signs and signals is normally assigned to the party that installs the device or constructs that portion of the crossing." (page 24)

<u>Rail Considerations in Local Land Use Planning</u>

- "Railroads operate in a very competitive climate and should not be expected to give away business willingly. Since cities can exercise few regulatory powers over railroads, they cannot force railroads to comply with much of their planning. Communities, therefore, should prepare those portions of their comprehensive plans dealing with railroads in consultation with the carriers." (page 32)
- "**Improving Safety:** Safety is the most important conflict to mitigate in most urban areas. There is also a direct relationship between traffic density and crossing accidents. In addition, safety is a problem between those trespassing on railroads and train movements. There are a variety of ways to improve safety at grade crossings that may be applied individually or in combination. These alternatives include the following:
    - Close the crossing
    - Separate the grades by an overpass or underpass
    - Install warning devices, such as flashers and gates
    - Make site improvements which improve visibility for vehicles
    - Improve the roadway surface crossing the tracks for smoother skid-resistant movements of vehicles
    - Provide illumination for better visibility at night
    - Lower the speed limit of motor vehicles
    - Reroute trains to trackage with fewer crossings or lines with better crossing protection." (pages 31-32)
- "The Oregon portion of the federally designated High Speed Rail (HSR) corridor runs from the Columbia River (Portland) to Eugene. South of Portland's Union Station the designated HSR corridor is the Union Pacific Railroad's main line [i.e., the mainline through Canby]. It is also in this part of the corridor that ODOT has been given jurisdiction over not only public crossings, but also all private crossings. Department policy is that there will be no more at-grade public or private crossings on this line, and that efforts should be made to close unnecessary crossings or provide for future grade separations." (page 32)

- "**Minimizing Conflict and Increasing Access:** Careful planning can mitigate conflict and improve access. Local jurisdictions should consider the following when developing the transportation system plan elements of their comprehensive plans:
  - Avoid or minimize the number of future grade crossings when considering community expansion, industrial expansion and street plans.
  - Avoid creating intersections of major streets and railroads, whenever possible.
  - Locate new parallel streets and roads at least 500 feet from the railroad, rather than immediately adjacent, in order to allow for industrial development between the tracks and the highway. In addition, major intersections that are adjacent to the railroad tracks may call for expensive traffic signalization and railroad signal preemption facilities.
  - Recognize rail passenger stops in the comprehensive plans. Locate rail passenger terminals so that there is convenient access and sufficient parking space near the terminal. Coordinate the location with appropriate regional and state plans.
  - Coordinate local and intercity bus service with intercity rail service.
  - Recognize intermodal freight and passenger terminals and facilities and access to them in the comprehensive plan. Designate future facilities in locations consistent with appropriate regional and state plans.
  - When planning for passenger train facilities, consult the OTP, state Rail Plans and the major passenger carrier." (page 33)

<u>**Specific References to Canby**</u>

- "The OP [Oregon Pacific Railroad] operates over SP's [Southern Pacific Rail Corporation] former Molalla Branch from Canby to Molalla. Major shippers include a lumber mill and feed mill grain operation at Liberal."
- ***Portland-Canby [Commuter Corridor]:*** Commuter rail service was one of the transportation alternatives considered in Metro's South Corridor Study involving transportation options in the north part of Clackamas County. Capital costs for this corridor are estimated to be in the range of $170 million. In April, 2001 the Steering Committee for the South Corridor Study decided not to pursue the commuter rail option as one of the transportation alternatives."

<u>**Other Potentially Significant Topics**</u>

- Thruway Bus Service (page 94)
- Rail Passenger Stations, including Thruway stops (pages 107-108)

Appendix C: HCM Delay and Level of Service Information

TRAFFIC LEVELS OF SERVICE

Analysis of traffic volumes is useful in understanding the general nature of traffic in an area, but by itself indicates neither the ability of the street network to carry additional traffic nor the quality of service afforded by the street facilities. For this, the concept of *level of service* has been developed to subjectively describe traffic performance. Level of service can be measured at intersections and along key roadway segments.

Level of service categories are similar to report card ratings for traffic performance. Intersections are typically the controlling bottlenecks of traffic flow and the ability of a roadway system to carry traffic efficiently is generally diminished in their vicinities. Levels of Service A, B and C indicate conditions where traffic moves without significant delays over periods of peak travel demand. Level of service D and E are progressively worse peak hour operating conditions and F conditions represent where demand exceeds the capacity of an intersection. Most urban communities set level of service D as the minimum acceptable level of service for peak hour operation and plan for level of service C or better for all other times of the day. The *Highway Capacity Manual* provides level of service calculation methodology for both intersections and arterials.[1] The following two sections provide interpretations of the analysis approaches.

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1 *2000 Highway Capacity Manual*, Transportation Research Board, Washington D.C., 2000, Chapters 16 and 17.

UNSIGNALIZED INTERSECTIONS (Two-Way Stop Controlled)

Unsignalized intersection level of service is reported for the major street and minor street (generally, left turn movements). The method assesses available and critical gaps in the traffic stream which make it possible for side street traffic to enter the main street flow. The *2000 Highway Capacity Manual* describes the detailed methodology. It is not unusual for an intersection to experience level of service E or F conditions for the minor street left turn movement. It should be understood that, often, a poor level of service is experienced by only a few vehicles and the intersection as a whole operates acceptably.

Unsignalized intersection levels of service are described in the following table.

Level of Service	Expected Delay	(Sec/Veh)
A	Little or no delay	0-10.0
B	Short traffic delay	>10.1-15.0
C	Average traffic delays	>15.1-25.0
D	Long traffic delays	>25.1-35.0
E	Very long traffic delays	>35.1-50.0
F	Extreme delays potentially affecting other traffic movements in the intersection	> 50

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

SIGNALIZED INTERSECTIONS

For signalized intersections, level of service is evaluated based upon average vehicle delay experienced by vehicles entering an intersection. Control delay (or signal delay) includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. In previous versions of this chapter of the HCM (1994 and earlier), delay included only stopped delay. As delay increases, the level of service decreases. Calculations for signalized and unsignalized intersections are different due to the variation in traffic control. The *2000 Highway Capacity Manual* provides the basis for these calculations.

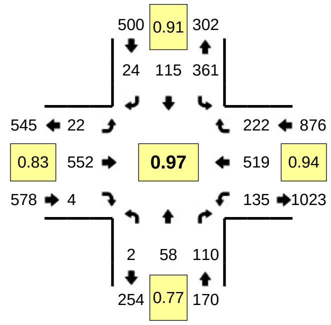
Level of Service	Delay (secs.)	Description
A	≤10.00	**Free Flow/Insignificant Delays:** No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Most vehicles do not stop at all. Progression is extremely favorable and most vehicles arrive during the green phase.
B	10.1-20.0	**Stable Operation/Minimal Delays:** An occasional approach phase is fully utilized. Many drivers begin to feel somewhat restricted within platoons of vehicles. This level generally occurs with good progression, short cycle lengths, or both.
C	20.1-35.0	**Stable Operation/Acceptable Delays:** Major approach phases fully utilized. Most drivers feel somewhat restricted. Higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level, and the number of vehicles stopping is significant.
D	35.1-55.0	**Approaching Unstable/Tolerable Delays:** The influence of congestion becomes more noticeable. Drivers may have to wait through more than one red signal indication. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. The proportion of vehicles not stopping declines, and individual cycle failures are noticeable.
E	55.1-80.0	**Unstable Operation/Significant Delays:** Volumes at or near capacity. Vehicles may wait though several signal cycles. Long queues form upstream from intersection. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are a frequent occurrence.
F	≥80.0	**Forced Flow/Excessive Delays:** Represents jammed conditions. Queues may block upstream intersections. This level occurs when arrival flow rates exceed intersection capacity, and is considered to be unacceptable to most drivers. Poor progression, long cycle lengths, and v/c ratios approaching 1.0 may contribute to these high delay levels.

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

Appendix D: Traffic Counts and Seasonal Adjustment Calculations

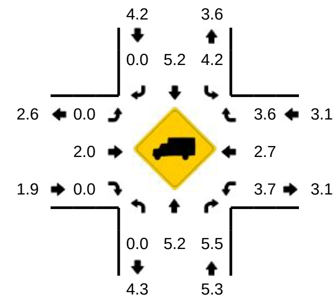
Type of peak hour being reported: User-Defined — Method for determining peak hour: Total Entering Volume

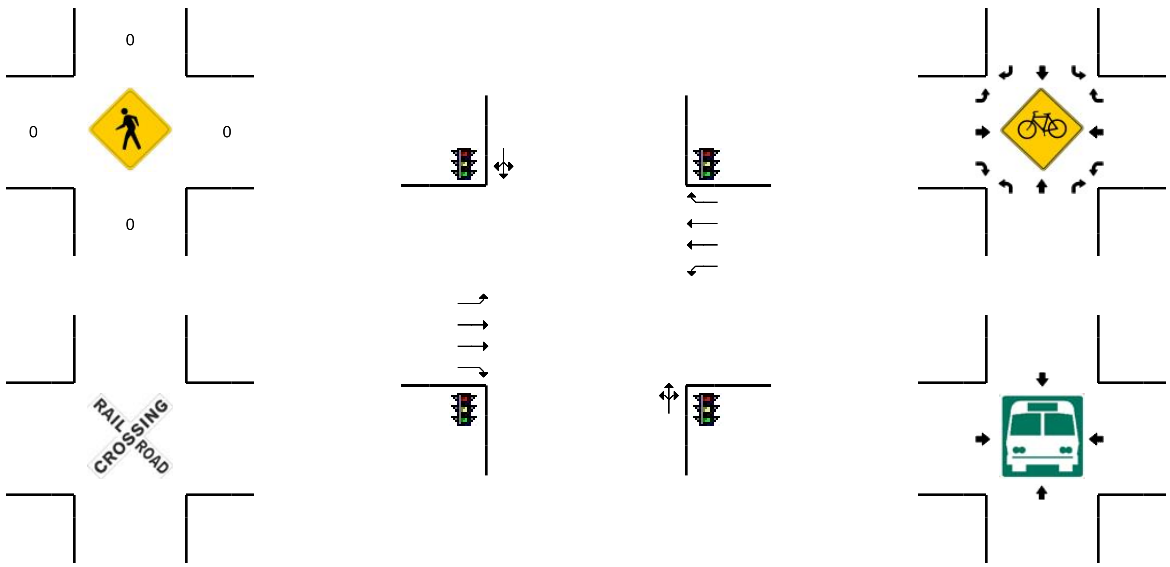
LOCATION: S Barlow Rd -- Hwy 99E — **QC JOB #:** 10422801
CITY/STATE: Canby, OR — **DATE:** 4/8/2009



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES





5-Min Count Period Beginning At	S Barlow Rd (Northbound) Left	Thru	Right	U	S Barlow Rd (Southbound) Left	Thru	Right	U	Hwy 99E (Eastbound) Left	Thru	Right	U	Hwy 99E (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	2	6	11	0	28	9	2	0	1	38	0	0	12	42	16	0	167	
4:05 PM	0	7	2	0	27	7	1	0	2	48	0	0	13	50	20	0	177	
4:10 PM	2	9	13	0	25	8	0	0	1	42	1	0	10	62	23	0	196	
4:15 PM	0	9	5	0	38	14	2	0	0	35	0	0	9	36	14	0	162	
4:20 PM	0	0	4	0	31	12	5	0	4	65	2	0	16	51	17	0	207	
4:25 PM	0	8	13	0	26	10	0	0	4	44	1	0	11	40	18	0	175	
4:30 PM	0	6	10	0	38	8	2	0	4	40	0	0	16	45	13	0	182	
4:35 PM	0	3	9	0	22	5	5	0	1	35	1	0	10	34	16	0	141	
4:40 PM	0	2	10	0	31	8	8	0	0	55	1	0	8	51	21	0	195	
4:45 PM	0	4	8	0	17	7	1	0	2	60	0	0	5	44	18	0	166	
4:50 PM	1	4	8	0	32	13	0	0	2	55	0	0	11	46	10	0	182	
4:55 PM	0	3	7	0	23	12	1	0	0	40	1	0	16	45	18	0	166	2116
5:00 PM	1	13	12	0	34	10	1	0	3	33	0	0	15	43	24	0	189	2138
5:05 PM	0	2	10	0	33	8	4	0	1	48	1	0	7	44	20	0	178	2139
5:10 PM	0	5	12	0	35	12	1	0	4	30	0	0	11	51	18	0	179	2122
5:15 PM	0	7	7	0	32	7	0	0	0	42	0	0	11	43	16	0	165	2125
5:20 PM	0	4	9	0	33	11	0	0	4	58	0	0	10	42	24	0	195	2113
5:25 PM	0	5	8	0	31	14	1	0	1	56	0	0	15	31	24	0	186	2124
5:30 PM	0	0	4	0	27	13	0	0	1	46	1	0	11	41	11	0	155	2097
5:35 PM	1	5	4	0	28	7	2	0	0	42	0	0	11	28	20	0	148	2104
5:40 PM	0	5	12	0	43	9	0	0	0	32	0	0	8	34	17	0	160	2069
5:45 PM	0	0	4	0	36	14	1	0	0	39	0	0	10	37	11	0	152	2055
5:50 PM	0	4	4	0	35	18	2	0	0	38	0	0	7	38	12	0	158	2031
5:55 PM	0	3	13	0	31	10	1	0	4	33	0	0	7	26	20	0	148	2013

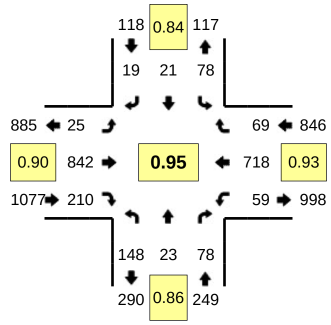
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	4	80	136	0	408	120	24	0	32	444	4	0	132	552	248	0	2184
Heavy Trucks	0	0	4		4	4	0		0	4	0		4	24	16		60
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

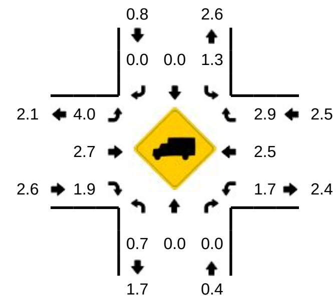
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

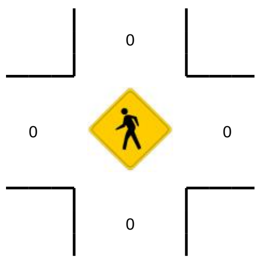
LOCATION: Berg Pkwy -- Hwy 99E | **QC JOB #:** 10422802

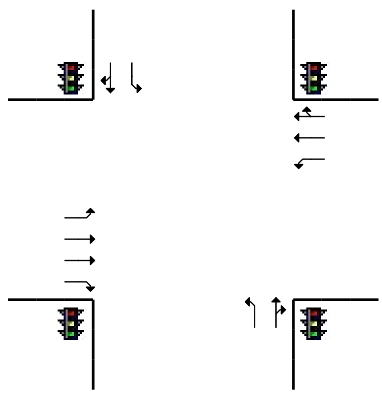
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

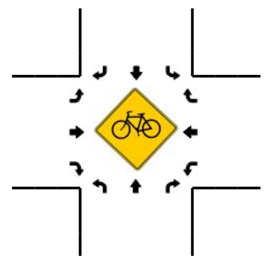


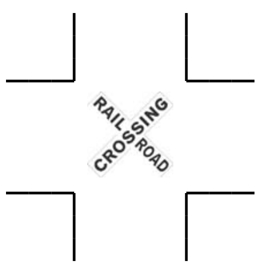
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

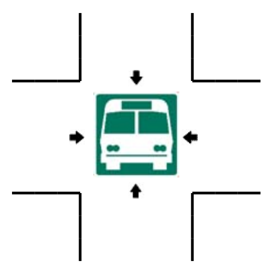












5-Min Count Period Beginning At	Berg Pkwy (Northbound) Left	Thru	Right	U	Berg Pkwy (Southbound) Left	Thru	Right	U	Hwy 99E (Eastbound) Left	Thru	Right	U	Hwy 99E (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	13	0	6	0	6	2	0	0	3	63	11	0	4	61	9	0	178	
4:05 PM	15	3	11	0	9	0	2	0	2	67	12	0	4	71	5	0	201	
4:10 PM	18	5	3	0	6	0	6	0	3	62	15	0	5	70	9	0	202	
4:15 PM	12	2	5	0	6	3	3	0	2	65	18	0	9	57	7	0	189	
4:20 PM	12	2	4	0	6	2	1	0	0	73	22	0	6	49	9	0	186	
4:25 PM	10	2	8	0	7	4	2	0	1	67	14	0	8	50	5	0	178	
4:30 PM	10	7	11	0	4	5	1	0	3	86	15	0	3	52	6	0	203	
4:35 PM	17	3	9	0	8	1	1	0	1	59	7	0	4	59	7	0	176	
4:40 PM	7	1	7	0	6	4	3	0	0	75	15	0	1	59	5	0	183	
4:45 PM	12	3	3	0	7	1	0	0	2	66	12	0	9	63	7	0	185	
4:50 PM	15	2	4	0	9	2	1	0	2	80	18	0	6	57	5	0	201	
4:55 PM	12	3	9	0	4	1	1	0	3	65	13	0	4	55	8	0	178	2260
5:00 PM	14	1	4	0	3	2	0	0	2	71	10	0	2	77	6	0	192	2274
5:05 PM	8	1	3	0	9	1	2	0	4	58	25	0	4	60	6	0	181	2254
5:10 PM	14	1	3	0	8	2	0	0	0	70	16	0	5	64	4	0	187	2239
5:15 PM	9	0	7	0	8	0	5	0	1	60	18	0	6	49	4	0	167	2217
5:20 PM	18	1	10	0	6	2	3	0	3	85	31	0	8	61	10	0	238	2269
5:25 PM	12	0	8	0	6	0	2	0	4	67	30	0	7	62	1	0	199	2290
5:30 PM	6	6	9	0	7	3	0	0	1	67	20	0	4	42	11	0	176	2263
5:35 PM	12	1	6	0	9	3	0	0	0	54	15	0	5	53	8	0	166	2253
5:40 PM	8	3	8	0	5	4	1	0	3	65	18	0	4	44	8	0	171	2241
5:45 PM	7	0	6	0	8	3	2	0	2	64	13	0	4	44	4	0	157	2213
5:50 PM	10	1	5	0	5	3	1	0	0	60	17	0	7	88	10	0	207	2219
5:55 PM	7	2	5	0	6	1	0	0	1	56	17	0	2	50	4	0	151	2192

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	156	4	100	0	80	8	40	0	32	848	316	0	84	688	60	0	2416
Heavy Trucks	0	0	0		4	0	0		0	8	12		0	8	0		32
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/5/2009 4:28 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: User-Defined

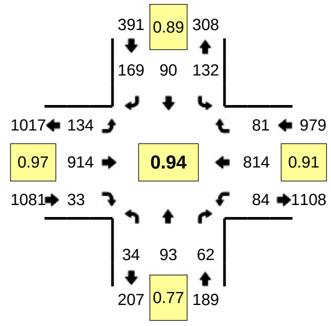
Method for determining peak hour: Total Entering Volume

LOCATION: Elm St -- Hwy 99E

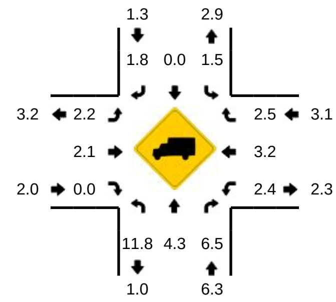
CITY/STATE: Canby, OR

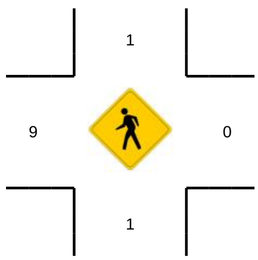
QC JOB #: 10422803

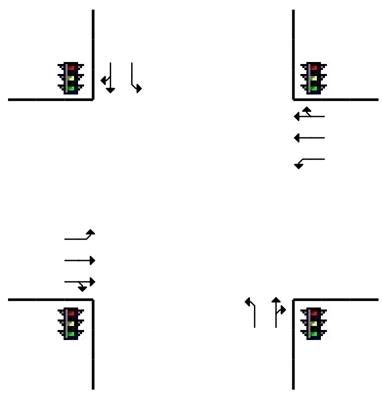
DATE: 4/8/2009

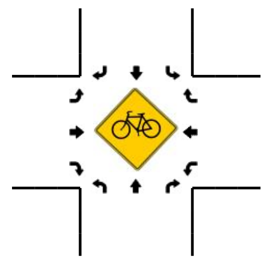


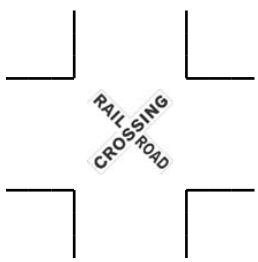
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

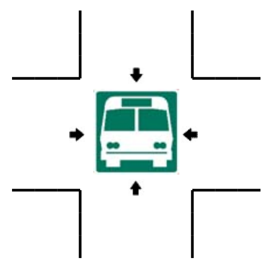












5-Min Count Period Beginning At	Elm St (Northbound) Left	Thru	Right	U	Elm St (Southbound) Left	Thru	Right	U	Hwy 99E (Eastbound) Left	Thru	Right	U	Hwy 99E (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	10	6	3	0	9	7	20	0	13	68	3	0	3	58	17	0	217	
4:05 PM	4	8	1	0	12	9	21	0	11	82	2	0	5	72	8	0	235	
4:10 PM	4	10	3	0	11	10	26	0	14	52	4	0	2	74	7	0	217	
4:15 PM	4	9	7	0	11	7	20	0	13	67	2	0	7	64	15	0	226	
4:20 PM	2	7	4	0	9	11	19	0	16	74	3	0	13	60	5	0	223	
4:25 PM	1	5	4	0	8	11	16	0	12	76	2	0	5	58	12	0	210	
4:30 PM	2	17	4	0	9	7	17	0	16	83	1	0	11	59	7	0	233	
4:35 PM	3	7	4	0	16	14	15	0	10	78	6	0	5	77	3	0	238	
4:40 PM	6	14	4	0	7	11	11	0	10	70	1	0	5	65	10	0	214	
4:45 PM	1	6	9	0	13	8	15	0	8	79	4	0	6	70	8	0	227	
4:50 PM	2	10	3	0	15	9	13	0	9	74	3	0	11	73	8	0	230	
4:55 PM	0	6	9	0	10	9	13	0	12	89	2	0	6	81	7	0	244	2714
5:00 PM	3	5	8	0	7	6	13	0	12	71	2	0	9	62	6	0	204	2701
5:05 PM	1	5	5	0	12	10	16	0	7	68	1	0	7	80	5	0	217	2683
5:10 PM	6	1	5	0	11	6	20	0	13	70	3	0	9	54	8	0	206	2672
5:15 PM	2	6	2	0	12	3	11	0	11	68	5	0	4	56	10	0	190	2636
5:20 PM	5	10	4	0	10	3	16	0	11	76	3	0	6	72	4	0	220	2633
5:25 PM	3	6	5	0	10	4	9	0	15	88	2	0	5	65	5	0	217	2640
5:30 PM	4	5	5	0	17	8	12	0	6	74	0	0	7	52	6	0	196	2603
5:35 PM	3	10	5	0	8	5	12	0	9	70	3	0	6	66	8	0	205	2570
5:40 PM	4	6	8	0	8	7	8	0	7	67	4	0	5	44	8	0	176	2532
5:45 PM	1	8	4	0	10	4	7	0	12	84	2	0	3	65	6	0	206	2511
5:50 PM	6	13	6	0	4	7	11	0	15	57	0	0	6	51	6	0	182	2463
5:55 PM	4	6	2	0	10	1	8	0	8	59	2	0	5	56	11	0	172	2391

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	12	88	84	0	152	104	164	0	116	968	36	0	92	896	92	0	2804
Heavy Trucks	4	4	0		0	0	0		4	28	0		4	24	4		72
Pedestrians		0				4				8				0			12
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

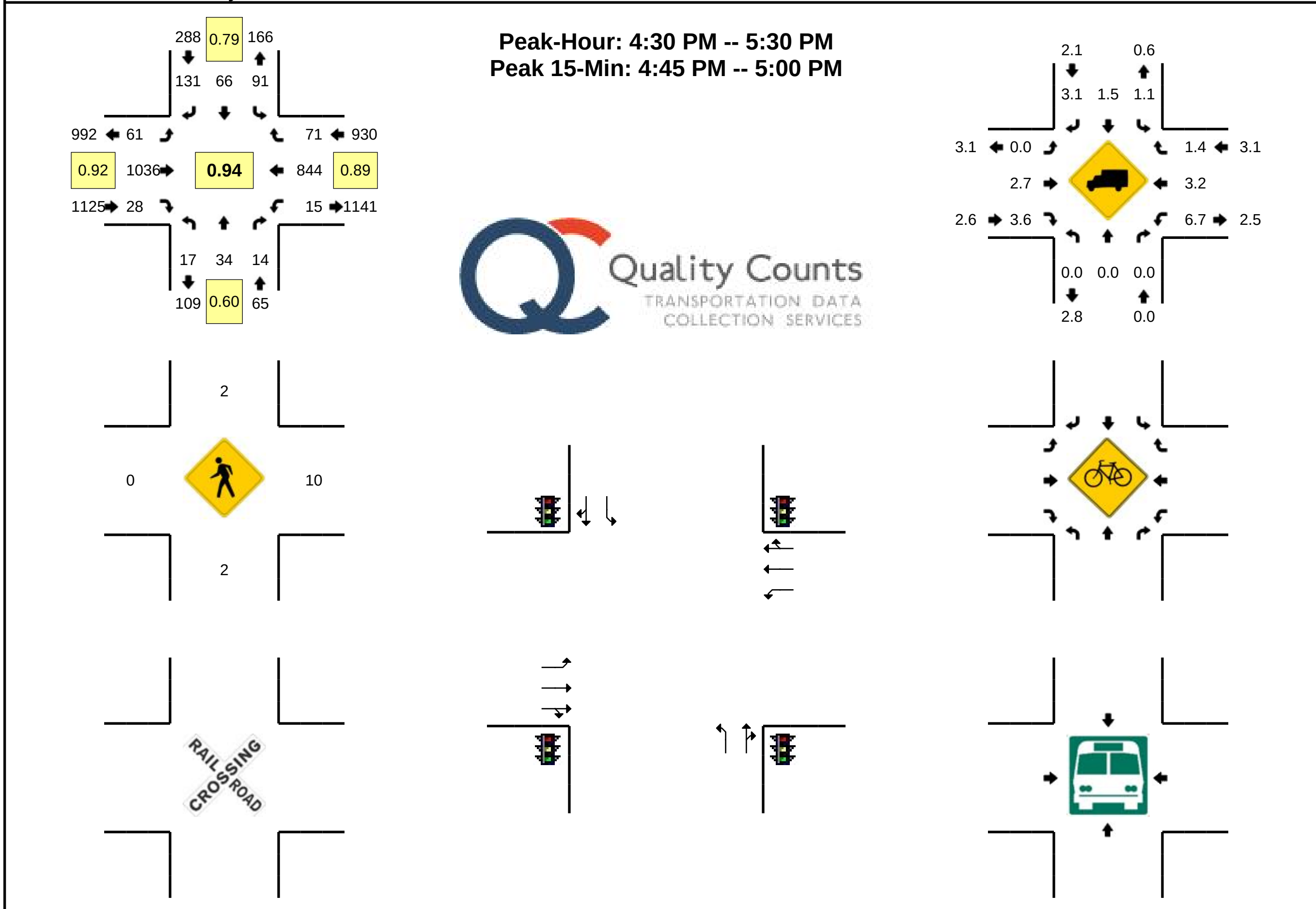
Report generated on 8/5/2009 4:28 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: Grant St -- Hwy 99E
CITY/STATE: Canby, OR

QC JOB #: 10422804
DATE: 4/8/2009



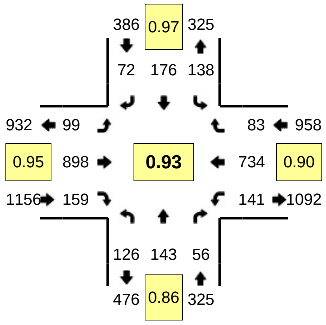
5-Min Count Period Beginning At	Grant St (Northbound) Left	Thru	Right	U	Grant St (Southbound) Left	Thru	Right	U	Hwy 99E (Eastbound) Left	Thru	Right	U	Hwy 99E (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	2	4	0	0	6	5	9	0	1	71	0	0	0	71	7	0	176	
4:05 PM	4	1	3	0	13	5	11	0	10	77	3	0	1	73	7	0	208	
4:10 PM	1	0	2	0	12	10	12	0	9	64	2	0	4	71	6	0	193	
4:15 PM	4	2	0	0	12	7	14	0	10	78	2	0	2	75	1	0	207	
4:20 PM	8	2	5	0	6	8	7	0	3	76	2	0	0	60	8	0	185	
4:25 PM	2	2	2	0	5	3	14	0	5	75	2	0	1	68	6	0	185	
4:30 PM	2	5	2	0	10	3	9	0	8	88	2	0	1	60	10	0	200	
4:35 PM	3	0	0	0	8	6	10	0	6	92	2	0	1	80	7	0	215	
4:40 PM	3	7	2	0	10	4	14	0	2	86	1	0	1	58	5	0	193	
4:45 PM	4	7	1	0	1	3	11	0	2	98	2	0	1	65	4	0	199	
4:50 PM	0	2	0	0	7	7	12	0	3	86	2	0	4	84	4	0	211	
4:55 PM	0	3	0	0	5	6	13	0	10	96	6	0	3	82	6	0	230	2402
5:00 PM	1	2	3	0	6	10	6	0	4	73	1	0	0	70	7	0	183	2409
5:05 PM	0	0	2	0	13	7	15	0	9	85	2	0	0	74	5	0	212	2413
5:10 PM	2	2	1	0	12	6	16	0	2	83	2	0	1	65	4	0	196	2416
5:15 PM	2	1	2	0	8	7	3	0	7	75	3	0	1	66	8	0	183	2392
5:20 PM	0	3	1	0	6	3	9	0	3	85	1	0	1	75	7	0	194	2401
5:25 PM	0	2	0	0	5	4	13	0	5	89	4	0	1	65	4	0	192	2408
5:30 PM	0	2	1	0	7	4	10	0	9	94	2	0	3	56	1	0	189	2397
5:35 PM	1	3	2	0	7	6	7	0	2	75	2	0	0	62	5	0	172	2354
5:40 PM	0	0	0	0	10	3	10	0	3	85	1	0	1	48	1	0	162	2323
5:45 PM	1	1	4	0	5	4	9	0	2	89	2	0	2	62	9	0	190	2314
5:50 PM	5	1	1	0	15	2	10	0	3	70	3	0	0	45	4	0	159	2262
5:55 PM	2	4	0	0	5	3	8	0	5	68	1	0	3	61	4	0	164	2196

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	16	48	4	0	52	64	144	0	60	1120	40	0	32	924	56	0	2560
Heavy Trucks	0	0	0		4	0	0		0	36	0		4	32	0		76
Pedestrians		0				8				0				8			16
Bicycles																	
Railroad																	
Stopped Buses																	

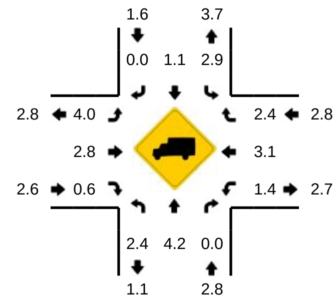
Comments:

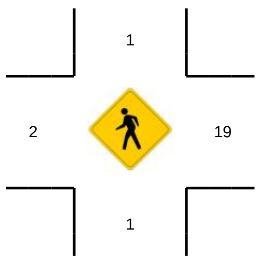
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

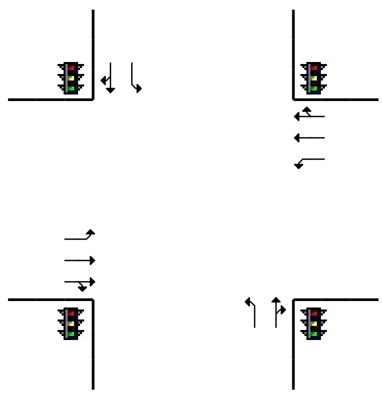
LOCATION: Ivy St -- Hwy 99 E | **QC JOB #:** 10422805
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

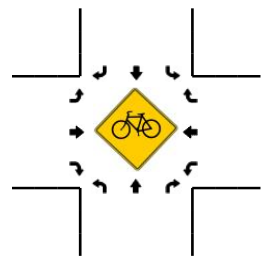


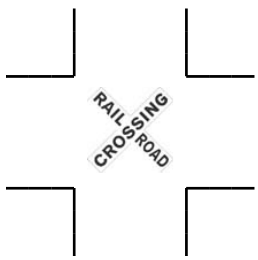
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

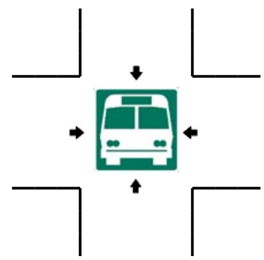












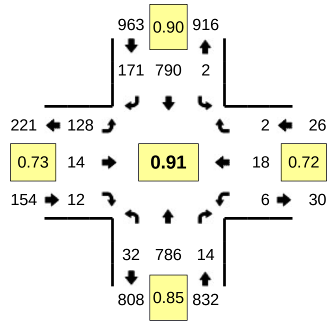
5-Min Count Period Beginning At	Ivy St (Northbound)				Ivy St (Southbound)				Hwy 99 E (Eastbound)				Hwy 99 E (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	15	15	5	0	15	19	2	0	7	65	10	0	7	62	13	0	235	
4:05 PM	12	16	4	0	9	10	6	0	5	70	18	0	18	59	13	0	240	
4:10 PM	10	17	5	0	11	15	4	0	5	66	13	0	12	62	10	0	230	
4:15 PM	14	13	6	0	8	11	9	0	6	70	14	0	6	56	8	0	221	
4:20 PM	10	19	3	0	11	13	6	0	6	72	12	0	11	52	12	0	227	
4:25 PM	8	15	5	0	14	15	14	0	5	56	17	0	9	62	6	0	226	
4:30 PM	8	9	5	0	13	15	8	0	11	79	9	0	4	50	6	0	217	
4:35 PM	14	17	4	0	16	17	10	0	1	72	12	0	10	65	5	0	243	
4:40 PM	7	12	2	0	7	8	2	0	12	90	14	0	12	57	7	0	230	
4:45 PM	13	14	7	0	10	20	4	0	9	73	13	0	16	61	8	0	248	
4:50 PM	11	14	4	0	10	16	9	0	7	74	12	0	12	63	9	0	241	
4:55 PM	14	10	8	0	9	14	7	0	8	91	8	0	12	79	7	0	267	2825
5:00 PM	11	15	5	0	11	17	6	0	3	75	8	0	15	60	9	0	235	2825
5:05 PM	9	11	2	0	14	15	5	0	11	73	17	0	15	61	5	0	238	2823
5:10 PM	12	11	4	0	12	11	2	0	6	76	14	0	10	60	7	0	225	2818
5:15 PM	8	7	2	0	15	20	5	0	4	65	19	0	14	58	7	0	224	2821
5:20 PM	13	15	6	0	12	10	10	0	14	61	16	0	7	70	5	0	239	2833
5:25 PM	6	8	7	0	9	13	4	0	13	69	17	0	14	50	8	0	218	2825
5:30 PM	9	6	5	0	9	12	3	0	6	74	15	0	16	49	8	0	212	2820
5:35 PM	7	15	6	0	15	16	3	0	6	74	13	0	9	53	8	0	225	2802
5:40 PM	5	14	3	0	10	10	3	0	7	75	15	0	21	46	7	0	216	2788
5:45 PM	8	15	5	0	7	12	3	0	7	75	18	0	9	60	8	0	227	2767
5:50 PM	5	11	3	0	5	15	4	0	9	64	17	0	16	39	10	0	198	2724
5:55 PM	9	14	4	0	11	19	7	0	5	58	15	0	12	60	9	0	223	2680

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	152	152	76	0	116	200	80	0	96	952	132	0	160	812	96	0	3024
Heavy Trucks	4	4	0		4	4	0		0	40	0		4	32	0		92
Pedestrians		0				4				4				24			32
Bicycles																	
Railroad																	
Stopped Buses																	

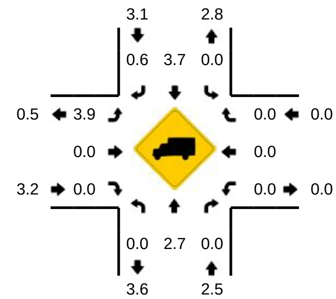
Comments:

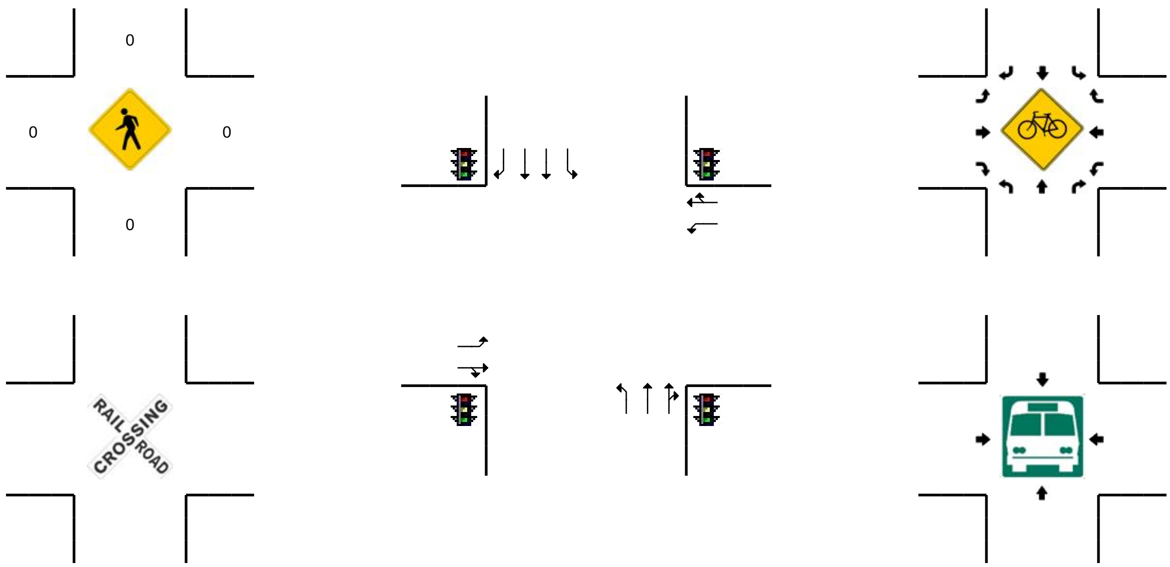
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: Hwy 99 -- NE Territorial Rd **QC JOB #:** 10422806
CITY/STATE: Canby, OR **DATE:** 4/8/2009



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 5:05 PM -- 5:20 PM





5-Min Count Period Beginning At	Hwy 99 (Northbound) Left	Thru	Right	U	Hwy 99 (Southbound) Left	Thru	Right	U	NE Territorial Rd (Eastbound) Left	Thru	Right	U	NE Territorial Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	59	1	0	0	55	14	0	10	2	3	0	0	2	0	0	146	
4:05 PM	1	58	1	0	0	56	13	0	5	1	4	0	1	2	2	0	144	
4:10 PM	1	65	1	0	0	59	8	0	7	1	2	0	2	0	0	0	146	
4:15 PM	1	46	2	0	0	58	11	0	9	0	1	0	3	1	0	0	132	
4:20 PM	1	66	1	0	0	64	17	0	8	1	2	0	1	0	0	0	161	
4:25 PM	1	50	1	0	0	68	13	0	4	2	1	0	0	0	0	0	140	
4:30 PM	5	42	1	0	0	53	11	0	8	2	1	0	0	0	0	0	123	
4:35 PM	2	70	2	0	0	50	13	0	9	2	0	0	0	3	0	0	151	
4:40 PM	3	70	1	0	0	80	15	0	6	0	1	0	0	2	0	0	178	
4:45 PM	3	62	2	0	0	59	16	0	26	3	1	0	0	3	0	0	175	
4:50 PM	1	60	1	0	0	79	14	0	9	0	2	0	1	1	1	0	169	
4:55 PM	1	62	1	0	0	76	12	0	9	1	2	0	0	0	0	0	164	1829
5:00 PM	4	62	1	0	0	65	13	0	8	0	0	0	1	0	0	0	154	1837
5:05 PM	4	75	1	0	0	52	13	0	12	0	0	0	2	2	0	0	161	1854
5:10 PM	2	67	2	0	1	79	12	0	9	2	1	0	0	4	0	0	179	1887
5:15 PM	1	92	1	0	1	72	18	0	12	1	1	0	0	1	0	0	200	1955
5:20 PM	4	54	1	0	0	60	25	0	10	1	2	0	1	1	0	0	159	1953
5:25 PM	2	70	0	0	0	65	9	0	10	2	1	0	1	1	1	0	162	1975
5:30 PM	2	62	2	0	0	69	16	0	10	0	2	0	0	1	0	0	164	2016
5:35 PM	2	76	1	0	0	59	18	0	14	0	2	0	1	1	0	0	174	2039
5:40 PM	3	58	1	0	0	46	8	0	12	1	1	0	0	1	0	0	131	1992
5:45 PM	2	48	1	0	0	65	15	0	14	0	2	0	1	0	1	0	149	1966
5:50 PM	1	47	1	0	0	60	6	0	13	0	1	0	2	1	0	0	132	1929
5:55 PM	3	54	0	0	0	45	12	0	8	0	3	0	0	1	0	0	126	1891

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	28	936	16	0	8	812	172	0	132	12	8	0	8	28	0	0	2160
Heavy Trucks	0	28	0		0	20	4		0	0	0		0	0	0		52
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/5/2009 4:28 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: User-Defined

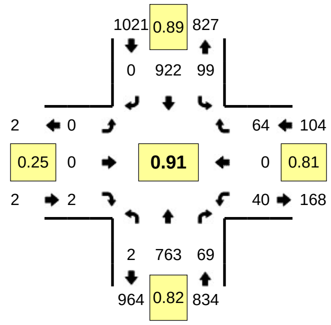
Method for determining peak hour: Total Entering Volume

LOCATION: Hwy 99E -- Haines Rd

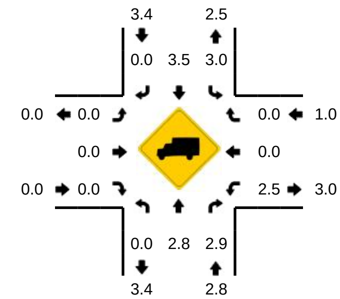
QC JOB #: 10422807

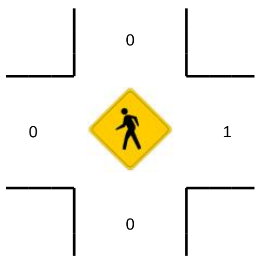
CITY/STATE: Canby, OR

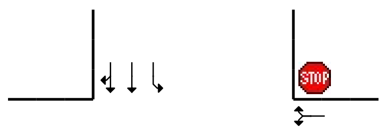
DATE: 4/8/2009

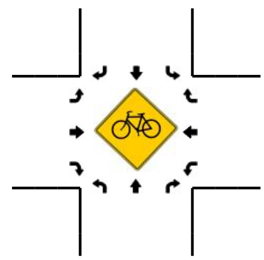


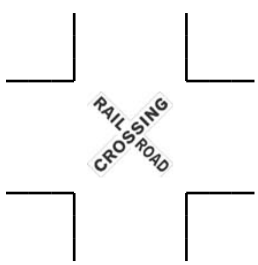
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:40 PM -- 4:55 PM

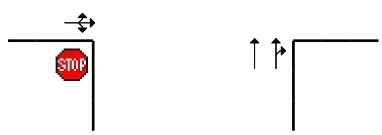


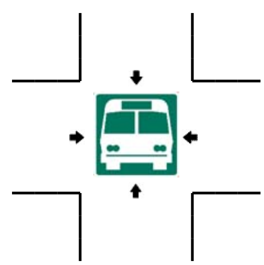












5-Min Count Period Beginning At	Hwy 99E (Northbound) Left	Thru	Right	U	Hwy 99E (Southbound) Left	Thru	Right	U	Haines Rd (Eastbound) Left	Thru	Right	U	Haines Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	49	6	0	9	66	0	0	0	0	0	0	8	0	5	0	143	
4:05 PM	1	77	5	0	10	62	0	0	0	0	0	0	1	0	6	0	162	
4:10 PM	0	56	4	0	8	60	0	0	0	0	0	0	4	0	8	0	140	
4:15 PM	0	56	8	0	5	77	0	0	0	0	1	0	1	0	6	0	154	
4:20 PM	2	54	9	0	14	69	0	0	0	0	0	0	4	0	3	0	155	
4:25 PM	0	59	5	0	5	76	0	0	0	0	0	0	2	0	2	0	149	
4:30 PM	0	40	3	0	3	63	0	0	0	0	0	0	4	0	5	0	118	
4:35 PM	1	69	6	0	11	68	0	0	0	0	0	0	2	0	6	0	163	
4:40 PM	0	80	7	0	10	83	0	0	0	0	0	0	6	0	9	0	195	
4:45 PM	0	81	9	0	9	69	0	0	0	0	0	0	3	0	3	0	174	
4:50 PM	0	54	7	0	12	92	0	0	0	0	1	0	1	0	5	0	172	
4:55 PM	0	64	5	0	9	84	0	0	0	0	1	0	1	0	3	0	167	1892
5:00 PM	0	68	7	0	5	74	0	0	0	0	0	0	4	0	4	0	162	1911
5:05 PM	1	63	6	0	6	59	0	0	0	0	0	0	5	0	5	0	145	1894
5:10 PM	0	89	8	0	10	83	0	0	0	0	0	0	3	0	10	0	203	1957
5:15 PM	0	51	3	0	7	90	0	0	0	0	0	0	4	0	4	0	159	1962
5:20 PM	0	52	4	0	8	90	0	0	0	0	0	0	4	0	4	0	162	1969
5:25 PM	0	52	4	0	9	67	0	0	0	0	0	0	3	0	6	0	141	1961
5:30 PM	0	68	10	0	5	71	0	0	0	0	0	0	6	0	7	0	167	2010
5:35 PM	0	62	13	0	7	72	0	0	0	0	0	0	1	0	4	0	159	2006
5:40 PM	0	49	8	0	8	68	0	0	0	0	1	0	6	0	3	0	143	1954
5:45 PM	0	58	7	0	7	74	0	0	0	0	0	0	3	0	4	0	153	1933
5:50 PM	0	54	7	0	7	58	0	0	0	0	0	0	5	0	3	0	134	1895
5:55 PM	0	55	5	0	7	78	0	0	0	0	0	0	3	0	4	0	152	1880

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	860	92	0	124	976	0	0	0	0	4	0	40	0	68	0	2164
Heavy Trucks	0	12	4		0	32	0		0	0	0		4	0	0		52
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

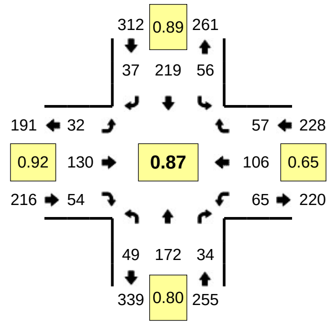
Comments:

Report generated on 8/5/2009 4:28 PM

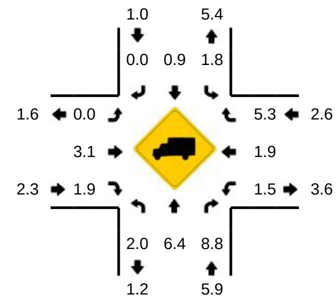
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

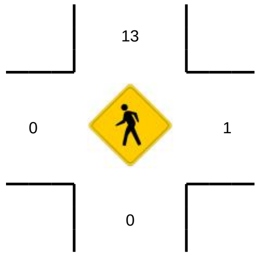
Type of peak hour being reported: User-Defined   Method for determining peak hour: Total Entering Volume

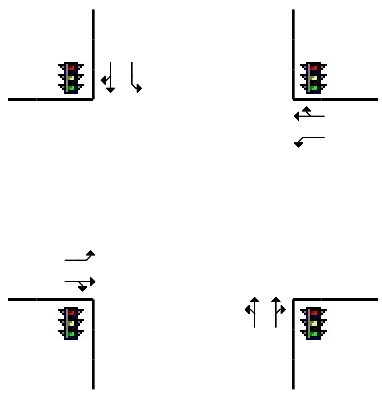
LOCATION: S Ivy St -- SE 13th Ave   **QC JOB #:** 10422827
CITY/STATE: Canby, OR   **DATE:** 4/8/2009

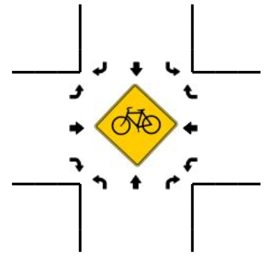


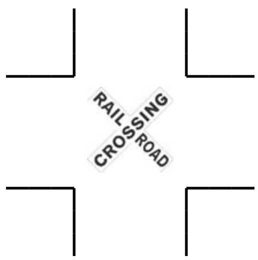
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

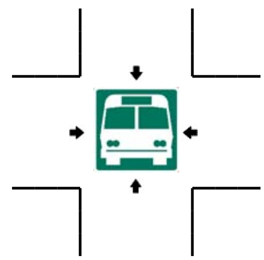












5-Min Count Period Beginning At	S Ivy St (Northbound) Left	Thru	Right	U	S Ivy St (Southbound) Left	Thru	Right	U	SE 13th Ave (Eastbound) Left	Thru	Right	U	SE 13th Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	3	14	3	0	5	20	2	0	2	14	4	0	3	6	6	0	82	
4:05 PM	2	18	8	0	3	21	0	0	5	15	5	0	6	7	2	0	92	
4:10 PM	0	20	2	0	3	19	6	0	1	10	11	0	4	12	6	0	94	
4:15 PM	3	15	2	0	3	13	2	0	0	16	4	0	7	8	5	0	78	
4:20 PM	2	17	4	0	3	19	1	0	4	9	9	0	3	15	2	0	88	
4:25 PM	4	13	10	0	7	13	4	0	3	16	2	0	9	6	3	0	90	
4:30 PM	2	18	3	0	7	14	1	0	2	16	0	0	12	15	11	0	101	
4:35 PM	3	20	3	0	6	20	2	0	4	13	7	0	6	14	12	0	110	
4:40 PM	1	19	6	0	3	16	4	0	2	2	8	0	7	7	4	0	79	
4:45 PM	4	21	2	1	5	18	6	0	2	14	4	0	6	4	6	0	93	
4:50 PM	2	18	6	0	3	23	3	0	3	9	3	0	6	8	4	0	88	
4:55 PM	5	12	2	0	6	21	3	0	2	4	8	0	5	4	2	0	74	1069
5:00 PM	4	11	2	0	3	21	2	0	3	10	7	0	2	4	2	0	71	1058
5:05 PM	7	8	2	0	7	16	1	0	3	13	5	0	6	12	3	0	83	1049
5:10 PM	4	10	3	0	5	22	3	0	3	12	3	0	3	10	3	0	81	1036
5:15 PM	4	12	1	0	3	20	6	0	4	13	3	0	5	7	4	0	82	1040
5:20 PM	2	13	1	0	3	13	3	0	3	13	5	0	3	10	4	0	73	1025
5:25 PM	10	10	3	0	5	15	3	0	1	11	1	0	4	11	2	0	76	1011
5:30 PM	1	9	4	0	6	18	2	0	4	18	0	0	2	7	1	0	72	982
5:35 PM	5	19	5	0	3	15	2	0	2	9	6	0	8	4	5	0	83	955
5:40 PM	3	7	4	0	4	25	4	0	3	9	9	0	6	8	4	0	86	962
5:45 PM	3	12	3	0	6	14	3	0	1	15	4	0	4	4	7	0	76	945
5:50 PM	4	17	7	0	5	14	5	0	7	8	7	0	7	4	4	0	89	946
5:55 PM	3	6	2	0	8	23	6	0	0	11	8	0	3	6	8	0	84	956

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	24	228	48	0	64	200	28	0	32	124	60	0	100	144	108	0	1160
Heavy Trucks	0	28	4		0	0	0		0	16	4		0	4	4		60
Pedestrians		0				36				0				4			40
Bicycles																	
Railroad																	
Stopped Buses																	

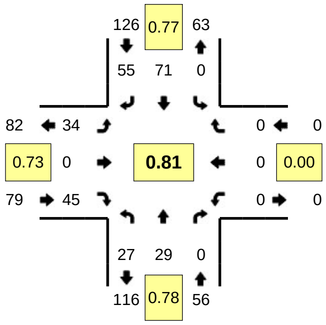
Comments:

Report generated on 8/5/2009 4:29 PM   SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

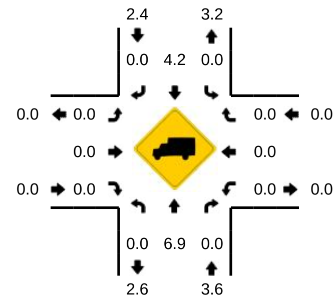
Type of peak hour being reported: User-Defined — Method for determining peak hour: Total Entering Volume

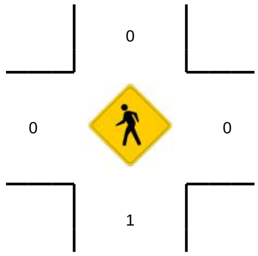
LOCATION: S Mulino Rd -- SE 13th Ave — **QC JOB #:** 10422828

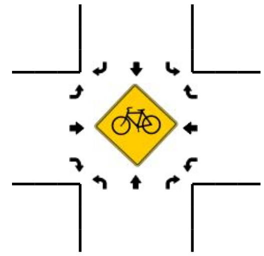
CITY/STATE: Canby, OR — **DATE:** 4/8/2009

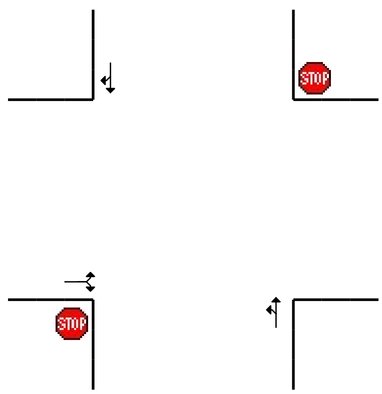


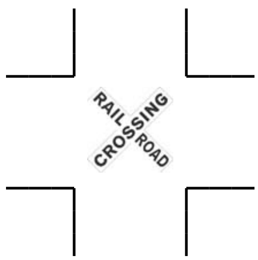
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

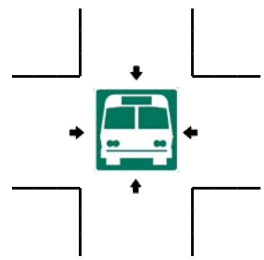












5-Min Count Period Beginning At	S Mulino Rd (Northbound) Left	Thru	Right	U	S Mulino Rd (Southbound) Left	Thru	Right	U	SE 13th Ave (Eastbound) Left	Thru	Right	U	SE 13th Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	1	3	0	0	0	5	8	0	5	0	2	0	0	0	0	0	24	
4:05 PM	2	2	0	0	0	9	3	0	3	0	7	0	0	0	0	0	26	
4:10 PM	4	0	0	0	0	4	7	0	5	0	4	0	0	0	0	0	24	
4:15 PM	2	2	0	0	0	9	3	0	1	0	1	0	0	0	0	0	18	
4:20 PM	2	1	0	0	0	4	9	0	1	0	4	0	0	0	0	0	21	
4:25 PM	2	4	0	0	0	5	8	0	1	0	2	0	0	0	0	0	22	
4:30 PM	1	2	0	0	0	6	6	0	3	0	2	0	0	0	0	0	20	
4:35 PM	1	5	0	0	0	5	2	0	11	0	6	0	0	0	0	0	30	
4:40 PM	1	3	0	0	0	9	9	0	1	0	3	0	0	0	0	0	26	
4:45 PM	1	7	0	0	0	5	6	0	4	0	2	0	0	0	0	0	25	
4:50 PM	1	1	0	0	0	8	4	0	0	0	5	0	0	0	0	0	19	
4:55 PM	5	2	0	0	0	4	3	0	3	0	1	0	0	0	0	0	18	273
5:00 PM	2	2	0	0	0	6	3	0	4	0	7	0	0	0	0	0	24	273
5:05 PM	4	1	0	0	0	5	6	0	1	0	2	0	0	0	0	0	19	266
5:10 PM	2	2	0	0	0	8	5	0	0	0	6	0	0	0	0	0	23	265
5:15 PM	6	2	0	0	0	3	3	0	4	0	3	0	0	0	0	0	21	268
5:20 PM	0	1	0	0	0	8	4	0	1	0	5	0	0	0	0	0	19	266
5:25 PM	3	1	0	0	0	4	4	0	2	0	3	0	0	0	0	0	17	261
5:30 PM	1	1	0	0	0	8	2	0	1	0	2	0	0	0	0	0	15	256
5:35 PM	1	1	0	0	0	6	2	0	2	0	2	0	0	0	0	0	14	240
5:40 PM	6	0	0	0	0	4	2	0	1	0	2	0	0	0	0	0	15	229
5:45 PM	1	3	0	0	0	4	5	0	5	0	3	0	0	0	0	0	21	225
5:50 PM	1	2	0	0	0	4	4	0	2	0	7	0	0	0	0	0	20	226
5:55 PM	2	2	0	0	0	5	5	0	0	0	3	0	0	0	0	0	17	225

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	12	60	0	0	0	76	68	0	64	0	44	0	0	0	0	0	324
Heavy Trucks	0	0	0		0	4	0		0	0	0		0	0	0		4
Pedestrians		4				0				0				0			4
Bicycles																	
Railroad																	
Stopped Buses																	

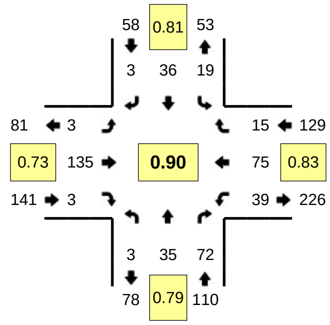
Comments:

Report generated on 8/5/2009 4:29 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

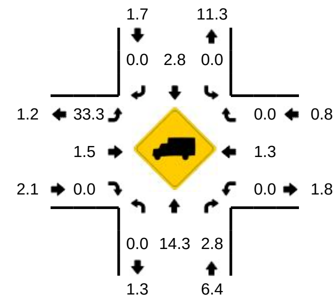
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

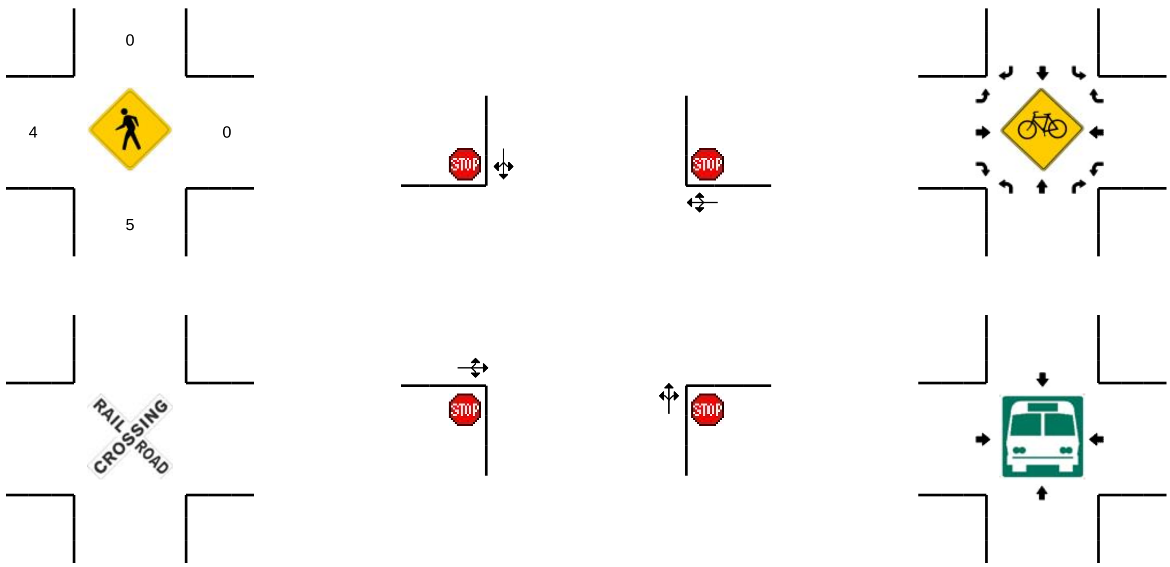
LOCATION: N Holly St -- NE Territorial Rd | **QC JOB #:** 10422808

CITY/STATE: Canby, OR | **DATE:** 4/8/2009



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM





5-Min Count Period Beginning At	N Holly St (Northbound) Left	Thru	Right	U	N Holly St (Southbound) Left	Thru	Right	U	NE Territorial Rd (Eastbound) Left	Thru	Right	U	NE Territorial Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	1	4	0	2	2	0	0	2	12	0	0	3	4	3	0	33	
4:05 PM	1	1	4	0	1	5	0	0	0	5	1	0	3	5	1	0	27	
4:10 PM	0	2	6	0	6	1	0	0	0	5	0	0	6	5	4	0	35	
4:15 PM	0	1	8	0	1	4	1	0	0	11	0	0	4	5	1	0	36	
4:20 PM	0	1	4	0	1	3	0	0	0	11	0	0	3	2	4	0	29	
4:25 PM	1	4	2	0	2	1	0	0	1	11	0	0	2	10	1	0	35	
4:30 PM	1	4	6	0	4	4	1	0	0	10	0	0	4	2	1	0	37	
4:35 PM	0	3	4	0	0	5	0	0	0	19	0	0	3	8	1	0	43	
4:40 PM	0	4	5	0	0	2	0	0	0	19	0	0	2	8	2	0	42	
4:45 PM	1	3	9	0	0	2	1	0	0	8	0	0	4	7	0	0	35	
4:50 PM	0	2	4	0	0	8	1	0	0	11	0	0	4	9	2	0	41	
4:55 PM	0	2	14	0	2	2	0	0	1	3	0	0	2	5	2	0	33	426
5:00 PM	0	3	2	0	3	2	0	0	0	11	0	0	4	11	0	0	36	429
5:05 PM	0	6	5	0	1	2	0	0	0	7	0	0	3	4	0	0	28	430
5:10 PM	0	1	5	0	2	2	0	0	0	10	1	0	1	8	0	0	30	425
5:15 PM	0	1	9	0	5	3	0	0	0	12	1	0	2	5	3	0	41	430
5:20 PM	1	4	5	0	1	1	0	0	2	10	1	0	5	2	3	0	35	436
5:25 PM	0	2	4	0	1	3	0	0	0	15	0	0	5	6	1	0	37	438
5:30 PM	0	1	6	0	2	1	1	0	3	15	0	0	4	6	2	0	41	442
5:35 PM	0	2	9	0	0	3	0	0	0	9	0	0	3	4	3	0	33	432
5:40 PM	0	3	3	0	3	1	0	0	0	10	0	0	7	7	3	0	37	427
5:45 PM	1	0	2	0	1	0	2	0	1	10	0	0	3	7	0	0	27	419
5:50 PM	0	2	3	0	0	3	2	0	1	12	0	0	5	4	0	0	32	410
5:55 PM	0	1	3	0	1	4	1	0	0	9	2	0	4	9	1	0	35	412

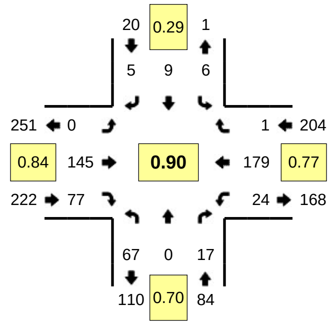
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	4	44	60	0	16	44	4	0	0	192	0	0	36	72	16	0	488
Heavy Trucks	0	0	4		0	0	0		0	4	0		0	4	0		12
Pedestrians		8				0				8				0			16
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

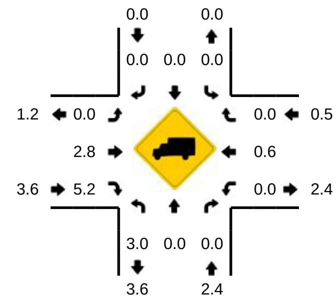
Report generated on 8/5/2009 4:28 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

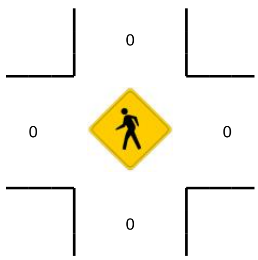
Type of peak hour being reported: User-Defined Method for determining peak hour: Total Entering Volume

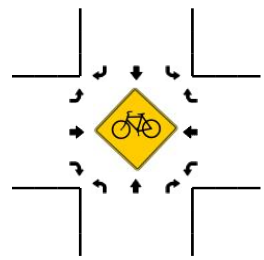
LOCATION: N Redwood St -- NE Territorial Rd **QC JOB #:** 10422809
CITY/STATE: Canby, OR **DATE:** 4/8/2009

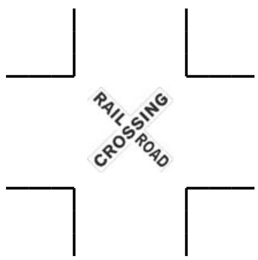


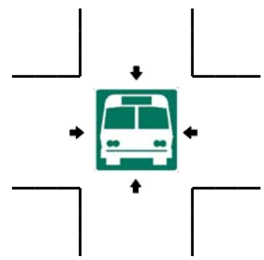
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:35 PM -- 4:50 PM











5-Min Count Period Beginning At	N Redwood St (Northbound) Left	Thru	Right	U	N Redwood St (Southbound) Left	Thru	Right	U	NE Territorial Rd (Eastbound) Left	Thru	Right	U	NE Territorial Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	3	1	1	0	0	0	0	0	1	9	8	0	1	20	0	0	44	
4:05 PM	5	0	2	0	0	0	0	0	3	8	3	0	1	13	0	0	35	
4:10 PM	4	0	1	0	0	0	1	0	0	13	7	0	1	6	0	0	33	
4:15 PM	2	1	0	0	1	0	1	0	0	9	6	0	1	10	0	0	31	
4:20 PM	4	1	1	0	0	0	0	0	0	5	5	0	1	16	0	0	33	
4:25 PM	5	0	1	0	0	0	0	0	0	8	8	0	1	12	0	0	35	
4:30 PM	0	0	1	0	4	6	3	0	0	9	3	0	0	12	0	0	38	
4:35 PM	8	0	0	0	1	1	2	0	0	15	8	0	2	15	0	0	52	
4:40 PM	4	0	1	0	0	0	0	0	0	22	5	0	2	11	0	0	45	
4:45 PM	7	0	4	0	0	0	0	0	0	11	5	0	3	21	0	0	51	
4:50 PM	6	0	2	0	0	0	0	0	0	14	3	0	2	12	0	0	39	
4:55 PM	10	0	1	0	0	1	0	0	0	10	7	0	4	9	0	0	42	478
5:00 PM	7	0	0	0	0	1	0	0	0	8	7	0	2	13	0	0	38	472
5:05 PM	9	0	2	0	0	0	0	0	0	15	7	0	1	12	1	0	47	484
5:10 PM	8	0	1	0	0	0	0	0	0	9	5	0	1	15	0	0	39	490
5:15 PM	4	0	2	0	0	0	0	0	0	7	9	0	1	18	0	0	41	500
5:20 PM	0	0	2	0	0	0	0	0	0	13	10	0	2	21	0	0	48	515
5:25 PM	4	0	1	0	1	0	0	0	0	12	8	0	4	20	0	0	50	530
5:30 PM	9	0	0	0	0	0	0	0	0	15	5	0	5	17	0	0	51	543
5:35 PM	6	0	1	0	0	0	0	0	0	2	8	0	2	10	0	0	29	520
5:40 PM	4	0	0	0	0	0	0	0	0	13	11	0	0	14	0	0	42	517
5:45 PM	7	0	0	0	0	0	0	0	0	8	1	0	2	19	0	0	37	503
5:50 PM	5	0	1	0	0	0	0	0	0	8	2	0	1	9	0	0	26	490
5:55 PM	4	0	2	0	0	0	0	0	0	9	7	0	1	19	0	0	42	490

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	76	0	20	0	4	4	8	0	0	192	72	0	28	188	0	0	592
Heavy Trucks	0	0	0		0	0	0		0	8	4		0	4	0		16
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/5/2009 4:28 PM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: S Knights Bridge Rd -- S Arndt Rd

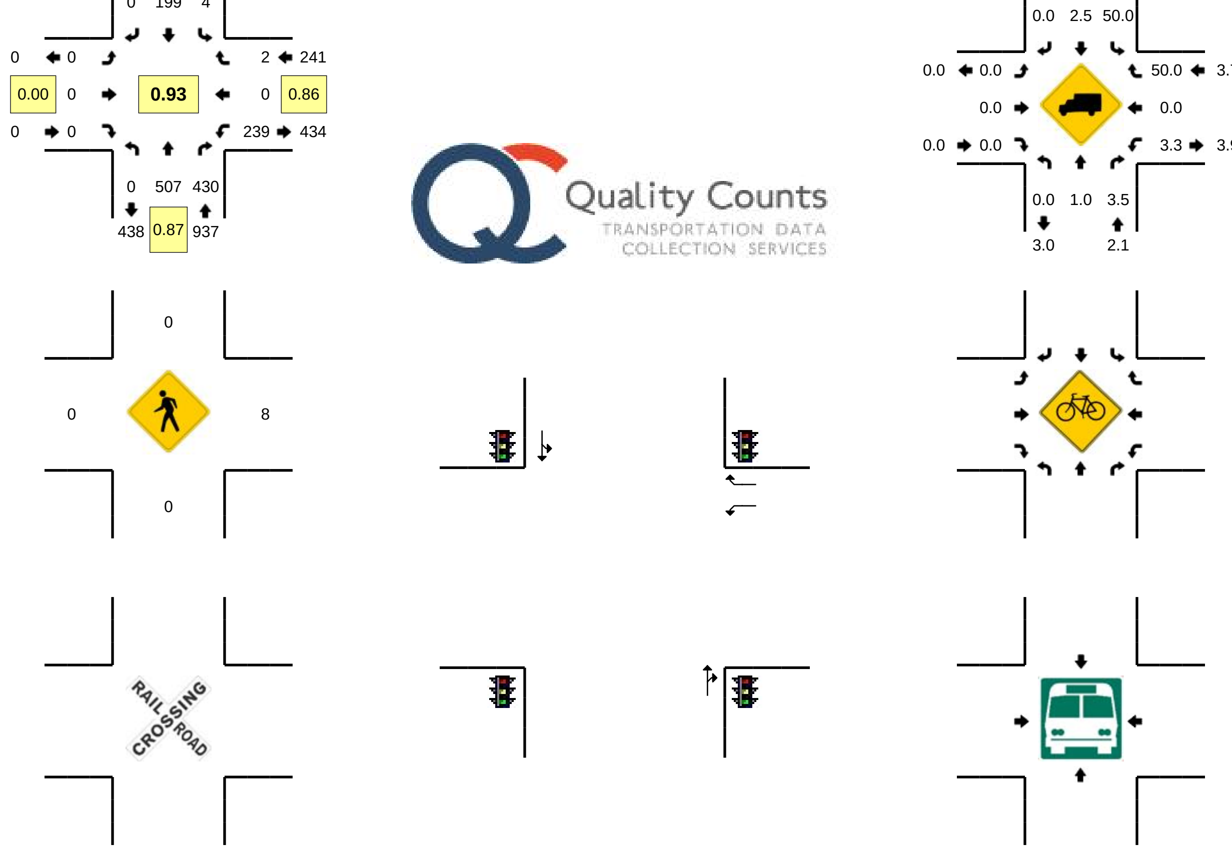
CITY/STATE: Canby, OR

QC JOB #: 10422810

DATE: 4/8/2009

Peak-Hour: 4:30 PM -- 5:30 PM

Peak 15-Min: 5:10 PM -- 5:25 PM



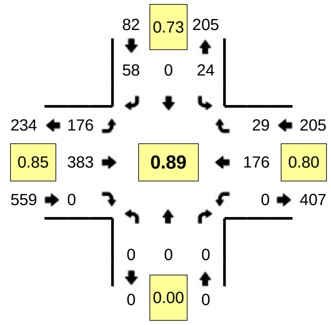
5-Min Count Period Beginning At	S Knights Bridge Rd (Northbound) Left	Thru	Right	U	S Knights Bridge Rd (Southbound) Left	Thru	Right	U	S Arndt Rd (Eastbound) Left	Thru	Right	U	S Arndt Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	28	36	0	0	16	0	0	0	0	0	0	24	0	0	0	104	
4:05 PM	0	28	31	0	0	23	0	0	0	0	0	0	20	0	0	0	102	
4:10 PM	0	43	38	0	0	15	0	0	0	0	0	0	19	0	0	0	115	
4:15 PM	0	29	37	0	0	12	0	0	0	0	0	0	28	0	0	0	106	
4:20 PM	0	33	34	0	0	17	0	0	0	0	0	0	16	0	2	0	102	
4:25 PM	0	39	46	0	0	14	0	0	0	0	0	0	15	0	0	0	114	
4:30 PM	0	39	33	0	0	15	0	0	0	0	0	0	11	0	0	0	98	
4:35 PM	0	71	30	0	0	20	0	0	0	0	0	0	19	0	2	0	142	
4:40 PM	0	40	28	0	0	20	0	0	0	0	0	0	23	0	0	0	111	
4:45 PM	0	40	37	0	2	10	0	0	0	0	0	0	26	0	0	0	115	
4:50 PM	0	22	33	0	0	16	0	0	0	0	0	0	17	0	0	0	88	
4:55 PM	0	33	38	0	2	13	0	0	0	0	0	0	15	0	0	0	101	1298
5:00 PM	0	36	39	0	0	22	0	0	0	0	0	0	30	0	0	0	127	1321
5:05 PM	0	34	27	0	0	19	0	0	0	0	0	0	19	0	0	0	99	1318
5:10 PM	0	42	51	0	0	17	0	0	0	0	0	0	20	0	0	0	130	1333
5:15 PM	0	41	33	0	0	20	0	0	0	0	0	0	15	0	0	0	109	1336
5:20 PM	0	58	43	0	0	8	0	0	0	0	0	0	22	0	0	0	131	1365
5:25 PM	0	51	38	0	0	19	0	0	0	0	0	0	22	0	0	0	130	1381
5:30 PM	0	35	33	0	0	13	0	0	0	0	0	0	21	0	0	0	102	1385
5:35 PM	0	39	49	0	0	17	0	0	0	0	0	0	15	0	0	0	120	1363
5:40 PM	0	27	47	0	0	17	0	0	0	0	0	0	25	0	0	0	116	1368
5:45 PM	0	42	47	0	2	14	0	0	0	0	0	0	13	0	0	0	118	1371
5:50 PM	0	47	36	0	0	12	0	0	0	0	0	0	15	0	0	0	110	1393
5:55 PM	0	25	25	0	2	7	0	0	0	0	0	0	14	0	0	0	73	1365

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	564	508	0	0	180	0	0	0	0	0	0	228	0	0	0	1480
Heavy Trucks	0	0	16		0	0	0		0	0	0		8	0	0		24
Pedestrians		0				0				0				8			8
Bicycles																	
Railroad																	
Stopped Buses																	

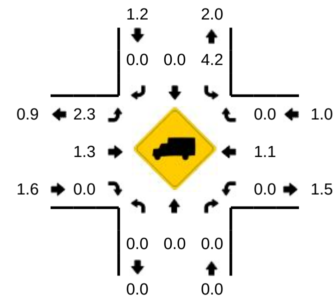
Comments:

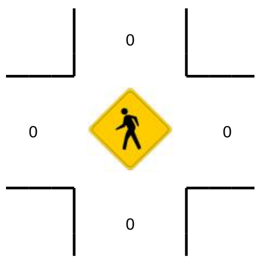
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

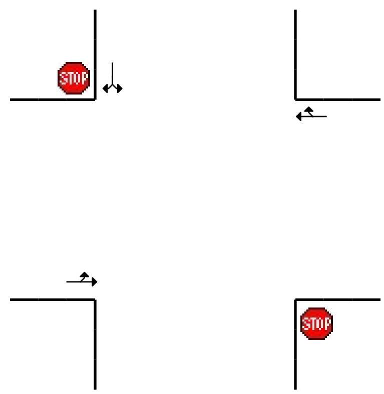
LOCATION: N Birch St -- N Knights Bridge Rd | **QC JOB #:** 10422811
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

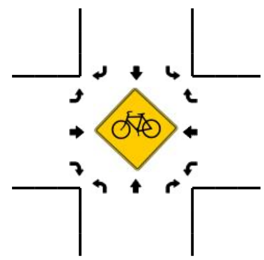


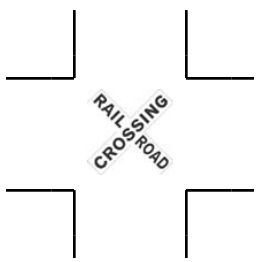
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

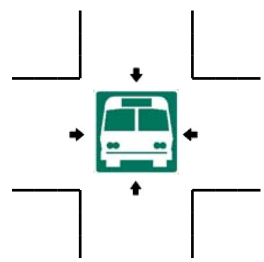












5-Min Count Period Beginning At	N Birch St (Northbound) Left	Thru	Right	U	N Birch St (Southbound) Left	Thru	Right	U	N Knights Bridge Rd (Eastbound) Left	Thru	Right	U	N Knights Bridge Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	0	0	0	2	0	7	0	7	15	0	0	0	18	1	0	50	
4:05 PM	0	0	0	0	3	0	7	0	7	23	0	0	0	15	3	0	58	
4:10 PM	0	0	0	0	3	0	2	0	10	35	0	0	0	15	2	0	67	
4:15 PM	0	0	0	0	3	0	9	0	10	31	0	0	0	16	2	0	71	
4:20 PM	0	0	0	0	1	0	1	0	11	16	0	0	0	13	2	0	44	
4:25 PM	0	0	0	0	1	0	6	0	15	35	0	0	0	12	0	0	69	
4:30 PM	0	0	0	0	1	0	12	0	14	31	0	0	0	16	2	0	76	
4:35 PM	0	0	0	0	1	0	6	0	22	45	0	0	0	7	1	0	82	
4:40 PM	0	0	0	0	3	0	5	0	12	40	0	0	0	18	2	0	80	
4:45 PM	0	0	0	0	4	0	3	0	10	31	0	0	0	13	0	0	61	
4:50 PM	0	0	0	0	2	0	7	0	8	25	0	0	0	12	3	0	57	
4:55 PM	0	0	0	0	4	0	4	0	9	29	0	0	0	17	3	0	66	781
5:00 PM	0	0	0	0	1	0	7	0	17	21	0	0	0	18	4	0	68	799
5:05 PM	0	0	0	0	2	0	3	0	13	30	0	0	0	18	1	0	67	808
5:10 PM	0	0	0	0	0	0	4	0	21	30	0	0	0	18	5	0	78	819
5:15 PM	0	0	0	0	1	0	4	0	18	22	0	0	0	14	3	0	62	810
5:20 PM	0	0	0	0	0	0	2	0	12	40	0	0	0	11	2	0	67	833
5:25 PM	0	0	0	0	5	0	1	0	20	39	0	0	0	14	3	0	82	846
5:30 PM	0	0	0	0	2	0	3	0	7	25	0	0	0	13	0	0	50	820
5:35 PM	0	0	0	0	1	0	3	0	13	27	0	0	0	12	5	0	61	799
5:40 PM	0	0	0	0	3	0	6	0	11	21	0	0	0	13	5	0	59	778
5:45 PM	0	0	0	0	4	0	5	0	11	21	0	0	0	10	3	0	54	771
5:50 PM	0	0	0	0	2	0	4	0	20	31	0	0	0	13	5	0	75	789
5:55 PM	0	0	0	0	3	0	6	0	7	28	0	0	0	10	1	0	55	778

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	0	0	0	20	0	92	0	192	464	0	0	0	164	20	0	952
Heavy Trucks	0	0	0		0	0	0		4	4	0		0	0	0		8
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

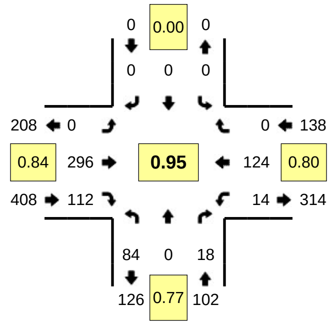
Comments:

Report generated on 8/5/2009 4:28 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

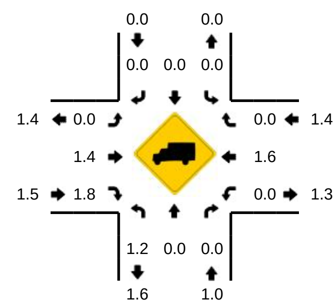
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

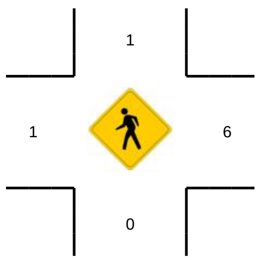
LOCATION: N Cedar St -- N Knights Bridge Rd | **QC JOB #:** 10422812

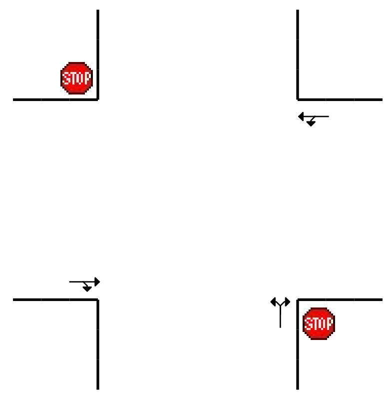
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

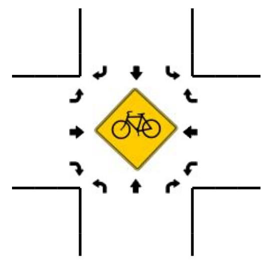


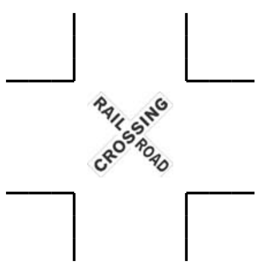
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

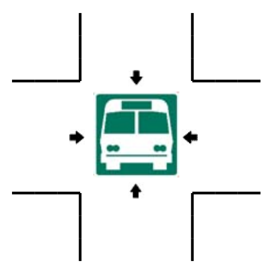












5-Min Count Period Beginning At	N Cedar St (Northbound) Left	Thru	Right	U	N Cedar St (Southbound) Left	Thru	Right	U	N Knights Bridge Rd (Eastbound) Left	Thru	Right	U	N Knights Bridge Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	11	0	4	0	0	0	0	0	0	15	1	0	1	8	0	0	40	
4:05 PM	8	0	1	0	0	0	0	0	0	19	8	0	2	10	0	0	48	
4:10 PM	7	0	1	0	0	0	0	0	0	27	10	0	1	10	0	0	56	
4:15 PM	7	0	0	0	0	0	0	0	0	28	9	0	0	11	0	0	55	
4:20 PM	5	0	2	0	0	0	0	0	0	12	5	0	1	11	0	0	36	
4:25 PM	8	0	2	0	0	0	0	0	0	29	7	0	0	5	0	0	51	
4:30 PM	7	0	1	0	0	0	0	0	0	21	10	0	0	11	0	0	50	
4:35 PM	4	0	2	0	0	0	0	0	0	29	13	0	0	5	0	0	53	
4:40 PM	8	0	1	0	0	0	0	0	0	38	8	0	0	12	0	0	67	
4:45 PM	3	0	1	0	0	0	0	0	0	23	11	0	1	10	0	0	49	
4:50 PM	5	0	0	0	0	0	0	0	0	19	8	0	1	10	0	0	43	
4:55 PM	9	0	3	0	0	0	0	0	0	23	10	0	3	11	0	0	59	607
5:00 PM	11	0	2	0	0	0	0	0	0	13	11	0	1	12	0	0	50	617
5:05 PM	7	0	1	0	0	0	0	0	0	23	7	0	2	12	0	0	52	621
5:10 PM	8	0	2	0	0	0	0	0	0	24	6	0	0	16	0	0	56	621
5:15 PM	9	0	2	0	0	0	0	0	0	19	7	0	1	8	0	0	46	612
5:20 PM	5	0	0	0	0	0	0	0	0	33	4	0	4	8	0	0	54	630
5:25 PM	8	0	3	0	0	0	0	0	0	31	17	0	1	9	0	0	69	648
5:30 PM	3	0	0	0	0	0	0	0	0	24	3	0	0	12	0	0	42	640
5:35 PM	10	0	3	0	0	0	0	0	0	24	4	0	0	7	0	0	48	635
5:40 PM	6	0	3	0	0	0	0	0	0	17	7	0	0	12	0	0	45	613
5:45 PM	4	0	3	0	0	0	0	0	0	20	6	0	2	11	0	0	46	610
5:50 PM	6	0	3	0	0	0	0	0	0	25	6	0	2	12	0	0	54	621
5:55 PM	0	0	2	0	0	0	0	0	0	23	7	0	1	10	0	0	43	605

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	76	0	16	0	0	0	0	0	0	352	124	0	0	112	0	0	680
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	0	0		4
Pedestrians		0				0				0				12			12
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/5/2009 4:28 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

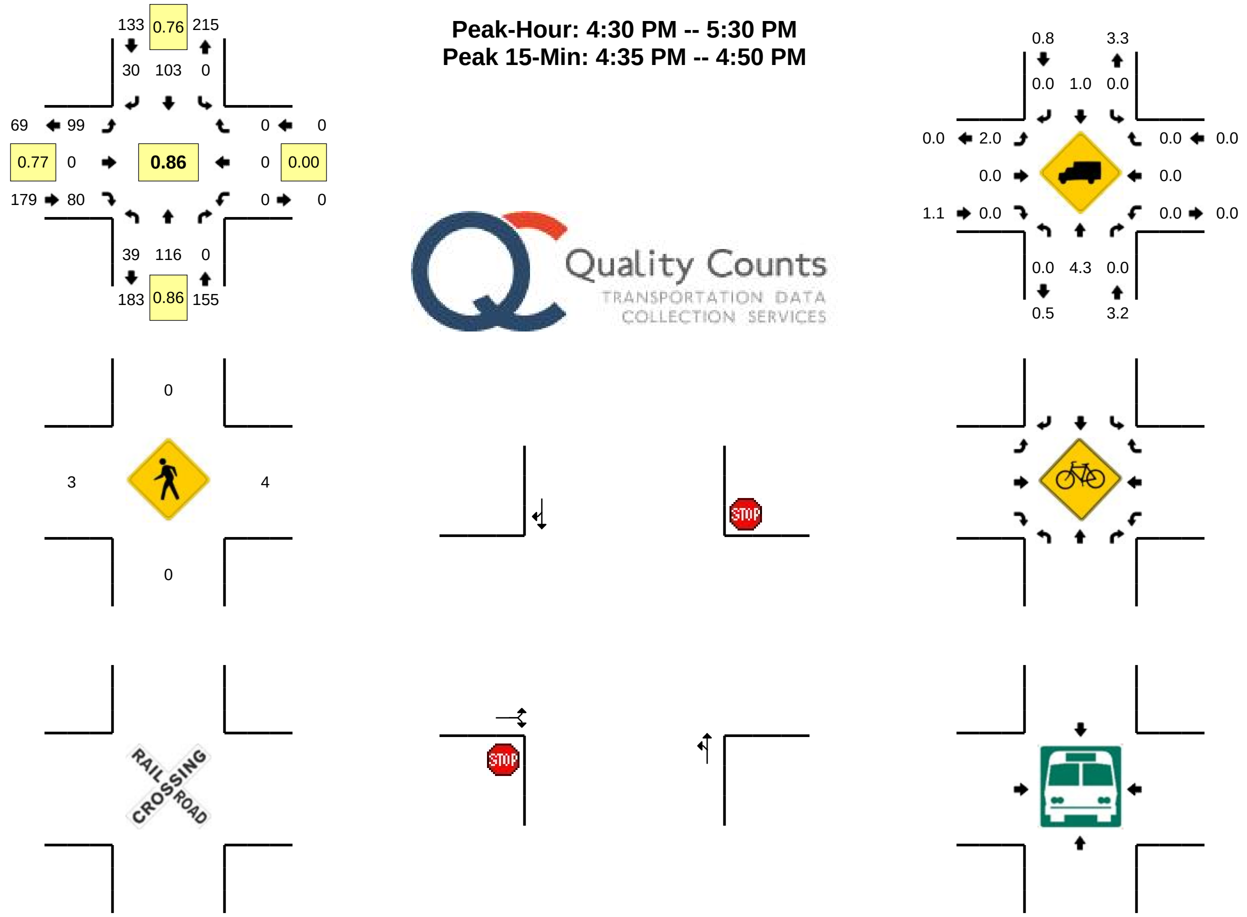
Type of peak hour being reported: User-Defined — Method for determining peak hour: Total Entering Volume

LOCATION: N Holly St -- N Knights Bridge Rd — **QC JOB #:** 10422813

CITY/STATE: Canby, OR — **DATE:** 4/8/2009

Peak-Hour: 4:30 PM -- 5:30 PM

Peak 15-Min: 4:35 PM -- 4:50 PM



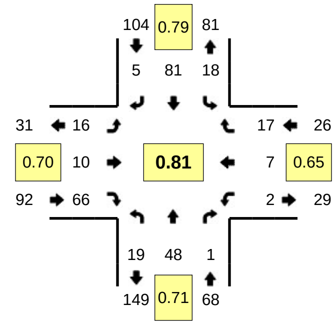
5-Min Count Period Beginning At	N Holly St (Northbound) Left	Thru	Right	U	N Holly St (Southbound) Left	Thru	Right	U	N Knights Bridge Rd (Eastbound) Left	Thru	Right	U	N Knights Bridge Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	3	9	0	0	0	9	4	0	6	0	5	0	0	0	0	0	36	
4:05 PM	1	5	0	0	0	7	2	0	6	0	2	0	0	0	0	0	23	
4:10 PM	6	11	0	0	0	9	1	0	8	0	7	0	0	0	0	0	42	
4:15 PM	6	6	0	0	0	13	1	0	6	0	6	0	0	0	0	0	38	
4:20 PM	2	7	0	0	0	8	8	0	10	0	5	0	0	0	0	0	40	
4:25 PM	1	7	0	0	0	7	2	0	8	0	9	0	0	0	0	0	34	
4:30 PM	1	7	0	0	0	11	3	0	7	0	7	0	0	0	0	0	36	
4:35 PM	2	6	0	0	0	17	0	0	8	0	10	0	0	0	0	0	43	
4:40 PM	6	9	0	0	0	9	4	0	11	0	11	0	0	0	0	0	50	
4:45 PM	3	11	0	0	0	9	1	0	5	0	13	0	0	0	0	0	42	
4:50 PM	7	6	0	0	0	14	1	0	7	0	4	0	0	0	0	0	39	
4:55 PM	2	15	0	0	0	6	6	0	9	0	7	0	0	0	0	0	45	468
5:00 PM	0	15	0	0	0	2	1	0	4	0	1	0	0	0	0	0	23	455
5:05 PM	2	10	0	0	0	6	3	0	5	0	4	0	0	0	0	0	30	462
5:10 PM	6	9	0	0	0	4	3	0	10	0	8	0	0	0	0	0	40	460
5:15 PM	4	9	0	0	0	5	3	0	8	0	7	0	0	0	0	0	36	458
5:20 PM	4	10	0	0	0	10	5	0	9	0	2	0	0	0	0	0	40	458
5:25 PM	2	9	0	0	0	10	0	0	16	0	6	0	0	0	0	0	43	467
5:30 PM	2	2	0	0	0	6	5	0	11	0	5	0	0	0	0	0	31	462
5:35 PM	4	8	0	0	0	3	2	0	8	0	4	0	0	0	0	0	29	448
5:40 PM	5	3	0	0	0	7	3	0	8	0	3	0	0	0	0	0	29	427
5:45 PM	4	2	0	0	0	5	4	0	5	0	4	0	0	0	0	0	24	409
5:50 PM	4	7	0	0	0	6	6	0	6	0	8	0	0	0	0	0	37	407
5:55 PM	2	1	0	0	0	6	2	0	18	0	4	0	0	0	0	0	33	395

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	44	104	0	0	0	140	20	0	96	0	136	0	0	0	0	0	540
Heavy Trucks	0	8	0		0	0	0		0	0	0		0	0	0		8
Pedestrians		0				0				4				0			4
Bicycles																	
Railroad																	
Stopped Buses																	

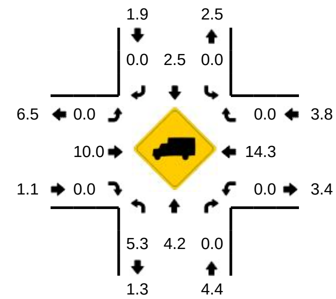
Comments:

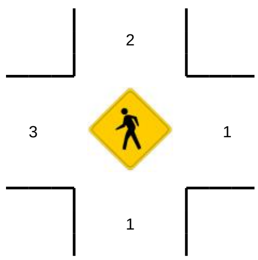
Type of peak hour being reported: User-Defined   Method for determining peak hour: Total Entering Volume

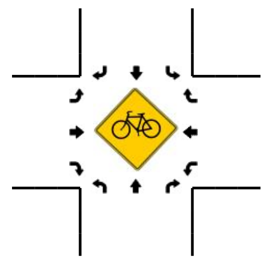
LOCATION: N Cedar St -- NW 3rd Ave   **QC JOB #:** 10422814
CITY/STATE: Canby, OR   **DATE:** 4/8/2009

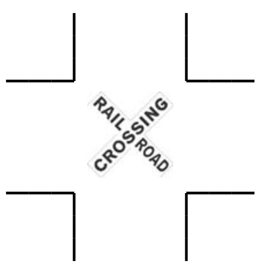


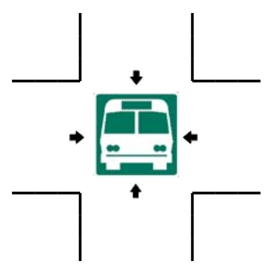
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM











5-Min Count Period Beginning At	N Cedar St (Northbound) Left	Thru	Right	U	N Cedar St (Southbound) Left	Thru	Right	U	NW 3rd Ave (Eastbound) Left	Thru	Right	U	NW 3rd Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	5	5	0	0	1	4	2	0	5	6	17	0	0	2	2	0	49	
4:05 PM	3	5	0	0	1	5	2	0	2	8	16	0	1	2	1	0	46	
4:10 PM	1	4	0	0	3	5	2	0	1	4	7	0	0	2	1	0	30	
4:15 PM	3	4	0	0	2	6	0	0	2	2	8	0	0	1	1	0	29	
4:20 PM	1	0	0	0	3	2	0	0	3	1	7	0	0	0	3	0	20	
4:25 PM	2	4	0	0	1	7	1	0	0	1	9	0	0	0	1	0	26	
4:30 PM	1	8	0	0	1	7	0	0	0	0	5	0	1	1	3	0	27	
4:35 PM	0	6	0	0	4	14	0	0	3	0	6	0	1	1	2	0	37	
4:40 PM	2	6	1	0	1	6	0	0	0	0	8	0	0	0	1	0	25	
4:45 PM	2	5	0	0	0	5	3	0	0	3	4	0	0	0	0	0	22	
4:50 PM	3	1	0	0	1	8	0	0	1	0	4	0	0	0	3	0	21	
4:55 PM	0	2	0	0	1	5	0	0	2	2	3	0	0	1	2	0	18	350
5:00 PM	2	5	0	0	4	7	1	0	3	2	10	0	0	2	1	0	37	338
5:05 PM	0	5	0	0	0	7	0	0	3	2	5	0	0	0	0	0	22	314
5:10 PM	1	3	0	0	0	4	0	0	1	0	7	0	0	1	3	0	20	304
5:15 PM	4	0	0	0	1	5	1	0	1	0	2	0	0	0	0	0	14	289
5:20 PM	4	4	0	0	1	3	0	0	0	0	7	0	0	1	2	0	22	291
5:25 PM	0	3	0	0	4	10	0	0	2	1	5	0	0	0	0	0	25	290
5:30 PM	0	2	0	0	0	7	1	0	1	2	6	0	0	1	0	0	20	283
5:35 PM	2	4	0	0	0	1	0	0	6	0	6	0	0	0	1	0	20	266
5:40 PM	0	3	0	0	2	1	2	0	0	0	1	0	0	0	2	0	11	252
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	230
5:50 PM	1	3	0	0	0	2	1	0	0	0	0	0	0	0	1	0	8	217
5:55 PM	0	3	0	0	2	2	1	0	3	0	4	0	0	0	0	0	15	214

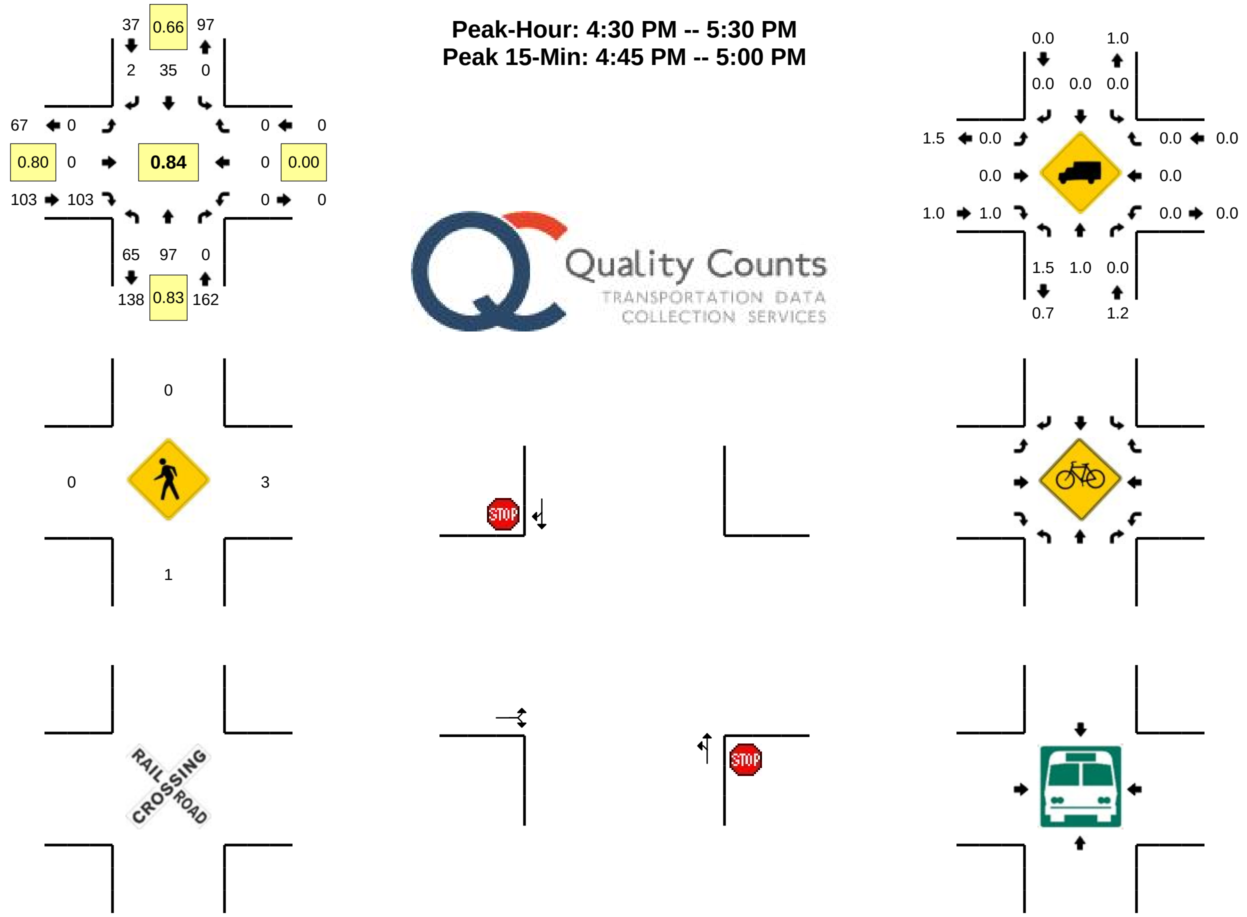
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	12	80	4	0	24	108	0	0	12	0	76	0	8	8	24	0	356
Heavy Trucks	0	4	0		0	0	0		0	0	0		0	0	0		4
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/5/2009 4:28 PM   SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

LOCATION: NE 4th Ave -- NE 3rd Ave   **QC JOB #:** 10422815
CITY/STATE: Canby, OR   **DATE:** 4/8/2009

Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:45 PM -- 5:00 PM



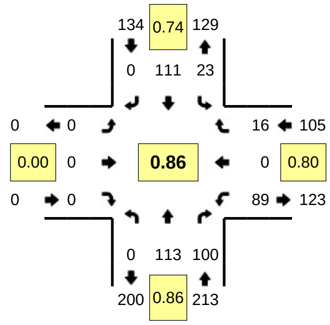
5-Min Count Period Beginning At	NE 4th Ave (Northbound) Left	Thru	Right	U	NE 4th Ave (Southbound) Left	Thru	Right	U	NE 3rd Ave (Eastbound) Left	Thru	Right	U	NE 3rd Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	6	8	0	0	0	2	0	0	0	0	14	0	0	0	0	0	30	
4:05 PM	3	5	0	0	0	7	0	0	0	0	7	0	0	0	0	0	22	
4:10 PM	6	6	0	0	0	6	0	0	0	0	10	0	0	0	0	0	28	
4:15 PM	8	9	0	0	0	1	0	0	0	0	13	0	0	0	0	0	31	
4:20 PM	9	6	0	0	0	7	0	0	0	0	2	0	0	0	0	0	24	
4:25 PM	4	10	0	0	0	3	0	0	0	0	6	0	0	0	0	0	23	
4:30 PM	8	4	0	0	0	4	0	0	0	0	10	0	0	0	0	0	26	
4:35 PM	8	7	0	0	0	6	0	0	0	0	9	0	0	0	0	0	30	
4:40 PM	2	6	0	0	0	2	1	0	0	0	8	0	0	0	0	0	19	
4:45 PM	4	12	0	0	0	5	0	0	0	0	11	0	0	0	0	0	32	
4:50 PM	7	12	0	0	0	4	0	0	0	0	13	0	0	0	0	0	36	
4:55 PM	6	8	0	0	0	0	0	0	0	0	8	0	0	0	0	0	22	323
5:00 PM	3	9	0	0	0	1	1	0	0	0	7	0	0	0	0	0	21	314
5:05 PM	6	7	0	0	0	3	0	0	0	0	7	0	0	0	0	0	23	315
5:10 PM	5	9	0	0	0	1	0	0	0	0	6	0	0	0	0	0	21	308
5:15 PM	6	6	0	0	0	2	0	0	0	0	7	0	0	0	0	0	21	298
5:20 PM	6	5	0	0	0	2	0	0	0	0	7	0	0	0	0	0	20	294
5:25 PM	4	12	0	0	0	5	0	0	0	0	10	0	0	0	0	0	31	302
5:30 PM	3	6	0	0	0	7	0	0	0	0	6	0	0	0	0	0	22	298
5:35 PM	4	6	0	0	0	5	0	0	0	0	4	0	0	0	0	0	19	287
5:40 PM	3	7	0	0	0	5	0	0	0	0	5	0	0	0	0	0	20	288
5:45 PM	7	6	0	0	0	9	0	0	0	0	9	0	0	0	0	0	31	287
5:50 PM	5	8	0	0	0	6	0	0	0	0	8	0	0	0	0	0	27	278
5:55 PM	5	9	0	0	0	4	0	0	0	0	5	0	0	0	0	0	23	279

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	68	128	0	0	0	36	0	0	0	0	128	0	0	0	0	0	360
Heavy Trucks	4	0	0		0	0	0		0	0	0		0	0	0		4
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

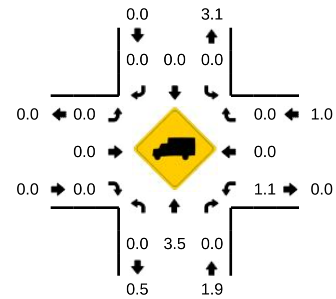
Comments:

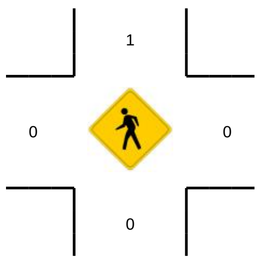
Type of peak hour being reported: User-Defined — Method for determining peak hour: Total Entering Volume

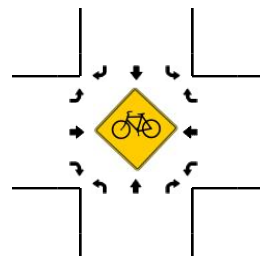
LOCATION: NE 4th Ave -- N Pine St — **QC JOB #:** 10422816
CITY/STATE: Canby, OR — **DATE:** 4/8/2009

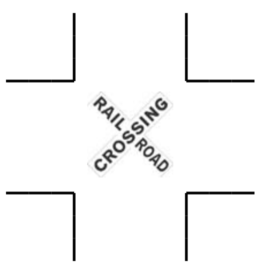


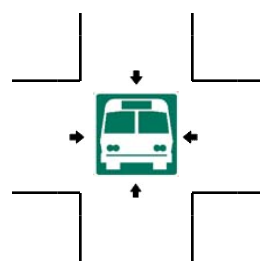
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:45 PM -- 5:00 PM











5-Min Count Period Beginning At	NE 4th Ave (Northbound) Left	Thru	Right	U	NE 4th Ave (Southbound) Left	Thru	Right	U	N Pine St (Eastbound) Left	Thru	Right	U	N Pine St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	12	12	0	2	6	0	0	0	0	0	0	13	0	1	0	46	
4:05 PM	0	16	9	0	1	7	0	0	0	0	0	0	6	0	1	0	40	
4:10 PM	0	12	11	0	2	10	0	0	0	0	0	0	6	0	0	0	41	
4:15 PM	0	14	9	0	2	8	0	0	0	0	0	0	5	0	1	0	39	
4:20 PM	0	10	12	0	1	10	0	0	0	0	0	0	7	0	2	0	42	
4:25 PM	0	14	8	0	2	18	0	0	0	0	0	0	8	0	2	0	52	
4:30 PM	0	12	9	0	1	15	0	0	0	0	0	0	7	0	0	0	44	
4:35 PM	0	9	11	0	1	11	0	0	0	0	0	0	5	0	2	0	39	
4:40 PM	0	8	7	0	2	8	0	0	0	0	0	0	8	0	2	0	35	
4:45 PM	0	13	8	0	4	10	0	0	0	0	0	0	6	0	1	0	42	
4:50 PM	0	10	9	0	2	17	0	0	0	0	0	0	9	0	2	0	49	
4:55 PM	0	13	9	0	3	9	0	0	0	0	0	0	6	0	0	0	40	509
5:00 PM	0	9	10	0	3	5	0	0	0	0	0	0	9	0	2	0	38	501
5:05 PM	0	10	10	0	0	10	0	0	0	0	0	0	6	0	0	0	36	497
5:10 PM	0	6	9	0	1	5	0	0	0	0	0	0	7	0	0	0	28	484
5:15 PM	0	11	6	0	2	10	0	0	0	0	0	0	8	0	4	0	41	486
5:20 PM	0	5	8	0	2	5	0	0	0	0	0	0	8	0	0	0	28	472
5:25 PM	0	7	4	0	2	6	0	0	0	0	0	0	10	0	3	0	32	452
5:30 PM	0	11	12	0	0	3	0	0	0	0	0	0	9	0	4	0	39	447
5:35 PM	0	12	9	0	3	10	0	0	0	0	0	0	4	0	3	0	41	449
5:40 PM	0	8	5	0	1	3	0	0	0	0	0	0	9	0	3	0	29	443
5:45 PM	0	10	3	0	0	3	0	0	0	0	0	0	12	0	2	0	30	431
5:50 PM	0	8	14	0	0	2	0	0	0	0	0	0	6	0	0	0	30	412
5:55 PM	0	7	5	0	0	3	0	0	0	0	0	0	3	0	2	0	20	392

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	144	104	0	36	144	0	0	0	0	0	0	84	0	12	0	524
Heavy Trucks	0	4	0		0	0	0		0	0	0		0	0	0		4
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/5/2009 4:28 PM — SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: N Grant St -- NW 1st Ave

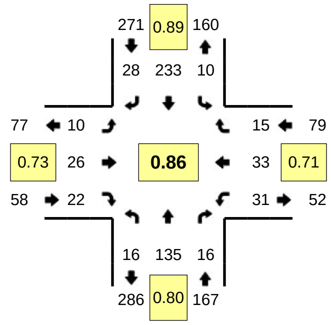
CITY/STATE: Canby, OR

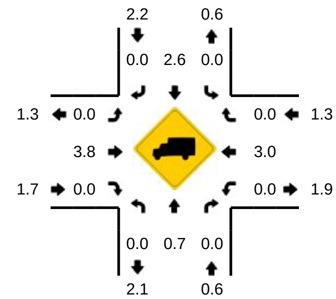
QC JOB #: 10422817

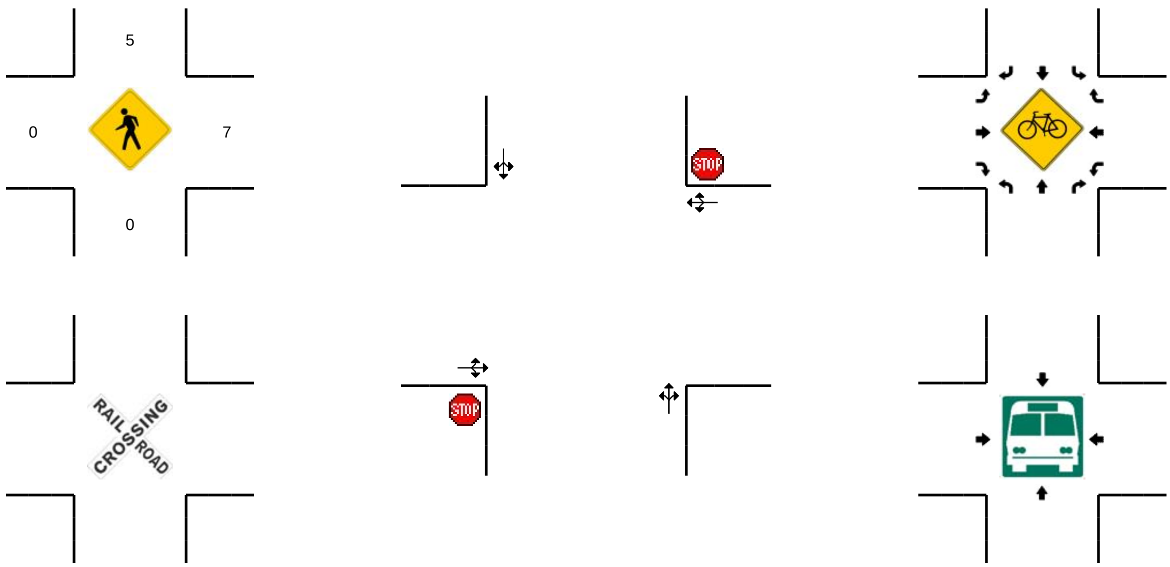
DATE: 4/8/2009

Peak-Hour: 4:30 PM -- 5:30 PM

Peak 15-Min: 4:05 PM -- 4:20 PM







5-Min Count Period Beginning At	N Grant St (Northbound)				N Grant St (Southbound)				NW 1st Ave (Eastbound)				NW 1st Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	9	0	0	0	21	0	0	1	1	2	0	3	5	1	0	46	
4:05 PM	2	14	3	0	3	19	0	0	0	4	1	0	6	6	0	0	58	
4:10 PM	2	12	0	0	2	24	1	0	0	2	1	0	5	7	2	0	58	
4:15 PM	1	7	4	0	0	21	3	0	4	0	8	0	2	2	0	0	52	
4:20 PM	2	11	1	0	2	14	1	0	0	1	5	0	4	2	1	0	44	
4:25 PM	1	7	2	0	1	17	0	0	0	1	2	0	5	2	0	0	38	
4:30 PM	3	19	2	0	2	19	3	0	1	7	1	0	0	1	0	0	58	
4:35 PM	2	10	2	0	1	20	1	0	1	3	3	0	2	4	1	0	50	
4:40 PM	0	12	2	0	2	25	3	0	0	4	0	0	2	9	1	0	60	
4:45 PM	1	10	1	0	0	11	0	0	1	1	2	0	3	4	2	0	36	
4:50 PM	1	5	1	0	1	22	1	0	0	0	2	0	2	1	1	0	37	
4:55 PM	4	14	1	0	0	22	4	0	0	2	1	0	1	2	0	0	51	588
5:00 PM	0	17	0	0	0	16	1	0	1	1	0	0	4	2	2	0	44	586
5:05 PM	2	8	2	0	0	26	3	0	2	2	6	0	4	0	2	0	57	585
5:10 PM	0	9	2	0	1	25	4	0	1	0	2	0	6	1	1	0	52	579
5:15 PM	2	13	0	0	1	15	1	0	2	2	1	0	3	5	2	0	47	574
5:20 PM	1	8	2	0	0	15	4	0	0	1	2	0	0	2	2	0	37	567
5:25 PM	0	10	1	0	2	17	3	0	1	3	2	0	4	2	1	0	46	575
5:30 PM	0	11	1	0	1	15	2	0	0	5	1	0	4	1	0	0	41	558
5:35 PM	4	9	0	0	1	14	2	0	3	1	5	0	2	0	2	0	43	551
5:40 PM	0	4	0	0	1	16	2	0	0	2	4	0	4	3	1	0	37	528
5:45 PM	1	11	0	0	1	13	1	0	1	3	3	0	1	2	2	0	39	531
5:50 PM	1	7	0	0	0	20	0	0	1	2	4	0	4	2	1	0	42	536
5:55 PM	2	6	2	0	2	10	1	0	0	3	1	0	5	2	3	0	37	522

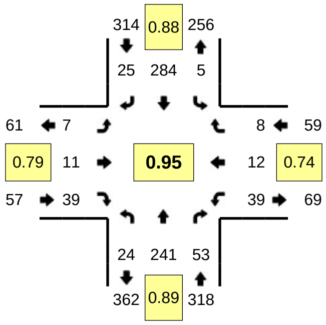
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	132	28	0	20	256	16	0	16	24	40	0	52	60	8	0	672
Heavy Trucks	0	0	0		0	4	0		0	0	0		0	8	0		12
Pedestrians		0				0				12				12			24
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

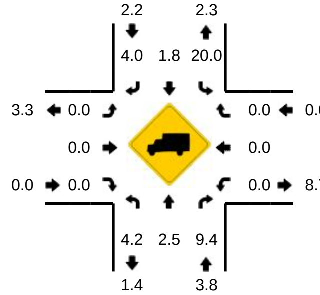
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

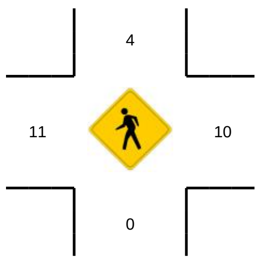
LOCATION: N Ivy St -- NW 1st Ave | **QC JOB #:** 10422818

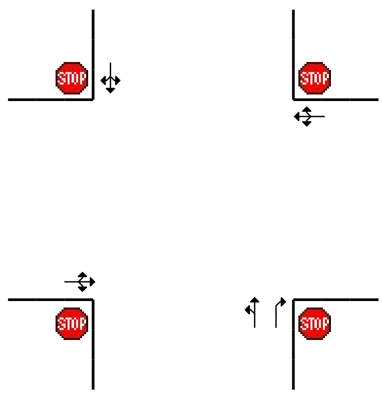
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

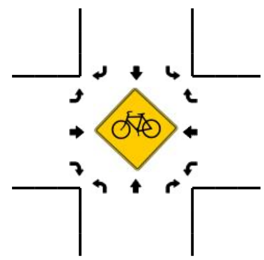


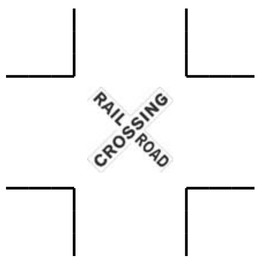
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

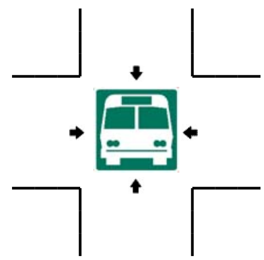












5-Min Count Period Beginning At	N Ivy St (Northbound) Left	Thru	Right	U	N Ivy St (Southbound) Left	Thru	Right	U	NW 1st Ave (Eastbound) Left	Thru	Right	U	NW 1st Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	3	29	6	0	0	23	0	0	0	1	1	0	4	3	0	0	70	
4:05 PM	3	23	7	0	0	19	4	0	1	2	7	0	2	3	0	0	71	
4:10 PM	2	27	4	0	0	23	2	0	0	1	0	0	1	2	0	0	62	
4:15 PM	2	21	4	0	0	27	1	0	0	1	2	0	5	2	0	0	65	
4:20 PM	2	24	12	0	2	18	4	0	0	0	2	0	7	0	0	0	71	
4:25 PM	4	19	5	0	1	34	1	0	0	0	1	0	4	0	2	0	71	
4:30 PM	1	17	6	0	0	28	0	0	1	3	3	0	3	0	1	0	63	
4:35 PM	3	17	4	0	1	31	2	0	0	0	3	0	3	1	0	0	65	
4:40 PM	2	19	6	0	1	20	2	0	0	1	2	0	0	0	0	0	53	
4:45 PM	2	23	6	0	0	29	3	0	0	1	1	0	5	1	1	0	72	
4:50 PM	5	20	6	0	1	24	1	0	0	0	2	0	6	0	1	0	66	
4:55 PM	1	22	2	0	0	24	0	0	0	0	5	0	5	0	0	0	59	788
5:00 PM	2	20	4	0	0	18	1	0	1	0	5	0	8	0	0	0	59	777
5:05 PM	1	19	3	0	0	23	3	0	0	0	6	0	2	2	1	0	60	766
5:10 PM	0	24	2	0	1	18	7	0	4	0	1	0	0	1	2	0	60	764
5:15 PM	3	14	2	0	0	27	3	0	1	1	5	0	3	2	1	0	62	761
5:20 PM	2	24	7	0	0	22	0	0	0	2	3	0	2	2	1	0	65	755
5:25 PM	2	22	5	0	1	20	3	0	0	3	3	0	2	3	0	0	64	748
5:30 PM	1	18	3	0	0	20	1	0	1	1	4	0	6	1	0	0	56	741
5:35 PM	0	22	0	0	3	21	5	0	1	0	0	0	0	0	5	0	57	733
5:40 PM	0	17	2	0	5	16	6	0	2	1	0	0	2	1	3	0	55	735
5:45 PM	0	16	2	0	4	16	7	0	4	1	1	0	0	1	2	0	54	717
5:50 PM	3	21	4	0	1	19	2	0	1	0	1	0	5	1	1	0	59	710
5:55 PM	2	24	5	0	1	26	0	0	2	2	4	0	5	2	0	0	73	724

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	32	260	56	0	4	308	16	0	0	4	32	0	64	4	8	0	788
Heavy Trucks	0	0	4		0	4	4		0	0	0		0	0	0		12
Pedestrians		0				8				16				16			40
Bicycles																	
Railroad																	
Stopped Buses																	

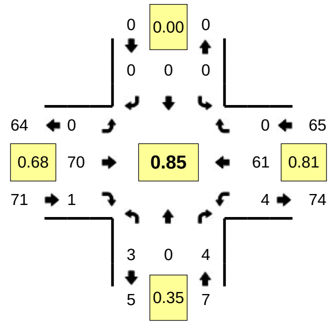
Comments:

Report generated on 8/5/2009 4:28 PM

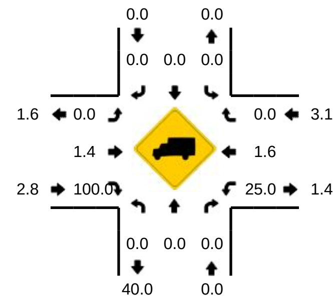
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

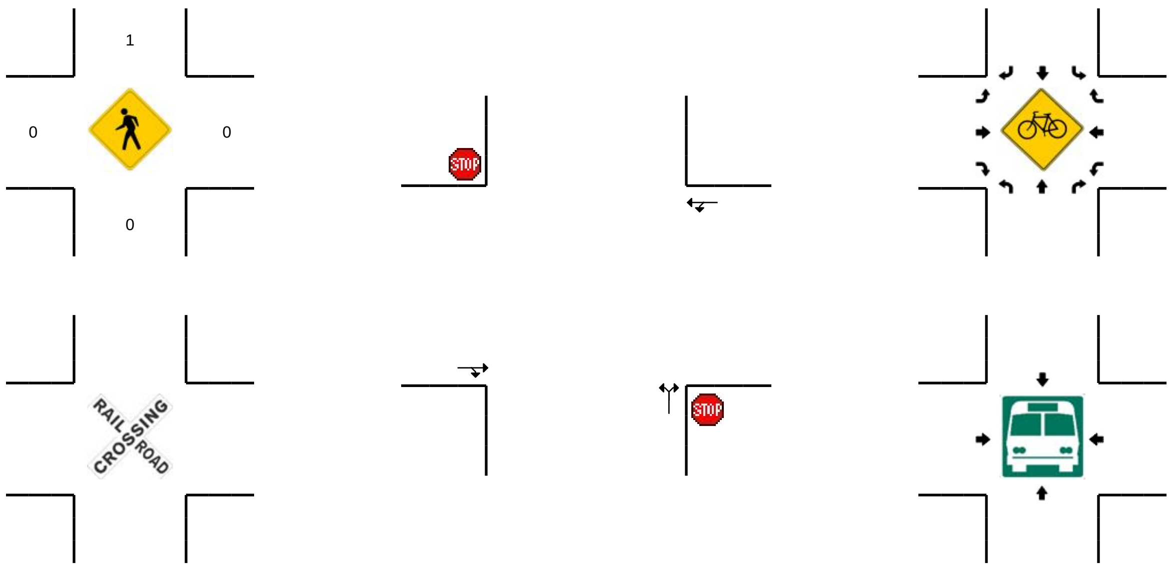
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: S Walnut St -- SE 1st Ave | **QC JOB #:** 10422819
CITY/STATE: Canby, OR | **DATE:** 4/8/2009



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:00 PM -- 4:15 PM





5-Min Count Period Beginning At	S Walnut St (Northbound) Left	Thru	Right	U	S Walnut St (Southbound) Left	Thru	Right	U	SE 1st Ave (Eastbound) Left	Thru	Right	U	SE 1st Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	0	1	0	0	0	0	0	0	10	0	0	1	5	0	0	17	
4:05 PM	0	0	4	0	0	0	0	0	0	6	0	0	0	3	0	0	13	
4:10 PM	0	0	0	0	0	0	0	0	0	4	0	0	1	7	0	0	12	
4:15 PM	0	0	1	0	0	0	0	0	0	5	0	0	0	3	0	0	9	
4:20 PM	0	0	0	0	0	0	0	0	0	9	0	0	0	3	0	0	12	
4:25 PM	1	0	0	0	0	0	0	0	0	3	1	0	3	4	0	0	12	
4:30 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	3	0	0	10	
4:35 PM	0	0	0	0	0	0	0	0	0	8	0	0	0	6	0	0	14	
4:40 PM	0	0	0	0	0	0	0	0	0	9	0	0	1	5	0	0	15	
4:45 PM	0	0	0	0	0	0	0	0	0	8	1	0	0	4	0	0	13	
4:50 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	7	0	0	11	
4:55 PM	0	0	2	0	0	0	0	0	0	7	0	0	0	5	0	0	14	152
5:00 PM	2	0	0	0	0	0	0	0	0	1	0	0	0	5	0	0	8	143
5:05 PM	1	0	0	0	0	0	0	0	0	6	0	0	1	4	0	0	12	142
5:10 PM	0	0	1	0	0	0	0	0	0	4	0	0	0	4	0	0	9	139
5:15 PM	0	0	1	0	0	0	0	0	0	4	0	0	0	5	0	0	10	140
5:20 PM	0	0	0	0	0	0	0	0	0	4	0	0	1	9	0	0	14	142
5:25 PM	0	0	0	0	0	0	0	0	0	8	0	0	1	4	0	0	13	143
5:30 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	2	0	0	9	142
5:35 PM	0	0	0	0	0	0	0	0	0	5	0	0	0	3	0	0	8	136
5:40 PM	0	0	0	0	0	0	0	0	0	8	0	0	0	4	0	0	12	133
5:45 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	4	0	0	11	131
5:50 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	4	0	0	11	131
5:55 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	8	0	0	15	132

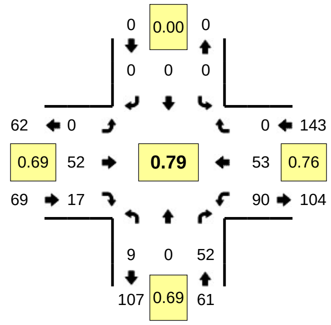
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	0	20	0	0	0	0	0	0	80	0	0	8	60	0	0	168
Heavy Trucks	0	0	0		0	0	0		0	0	0		4	0	0		4
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

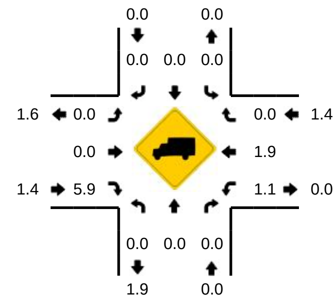
Report generated on 8/5/2009 4:28 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

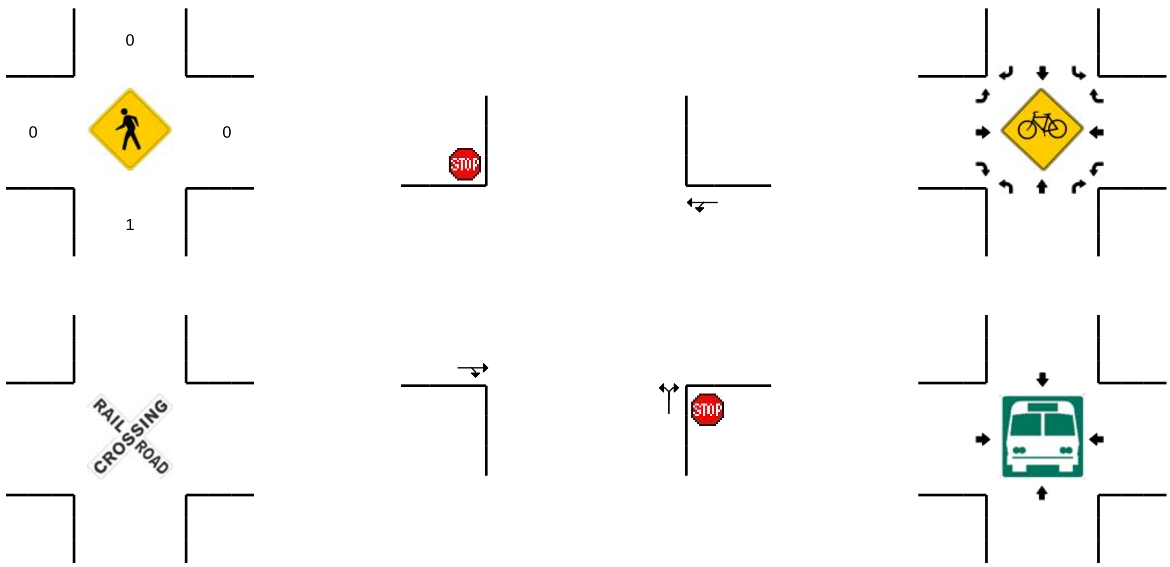
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: S Mulino Rd -- SE 1st Ave | **QC JOB #:** 10422820
CITY/STATE: Canby, OR | **DATE:** 4/8/2009



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:35 PM -- 4:50 PM





5-Min Count Period Beginning At	S Mulino Rd (Northbound) Left	Thru	Right	U	S Mulino Rd (Southbound) Left	Thru	Right	U	SE 1st Ave (Eastbound) Left	Thru	Right	U	SE 1st Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	0	4	0	0	0	0	0	0	8	0	0	8	4	0	0	24	
4:05 PM	1	0	4	0	0	0	0	0	0	13	0	0	5	2	0	0	25	
4:10 PM	2	0	3	0	0	0	0	0	0	2	2	0	6	7	0	0	22	
4:15 PM	1	0	4	0	0	0	0	0	0	5	1	0	6	3	0	0	20	
4:20 PM	0	0	2	0	0	0	0	0	0	6	2	0	10	4	0	0	24	
4:25 PM	0	0	1	0	0	0	0	0	0	4	1	0	4	6	0	0	16	
4:30 PM	1	0	3	0	0	0	0	0	0	5	2	0	5	3	0	0	19	
4:35 PM	1	0	6	0	0	0	0	0	0	5	1	0	7	5	0	0	25	
4:40 PM	1	0	6	0	0	0	0	0	0	7	4	0	13	4	0	0	35	
4:45 PM	0	0	5	0	0	0	0	0	0	7	1	0	9	4	0	0	26	
4:50 PM	0	0	2	0	0	0	0	0	0	0	3	0	10	7	0	0	22	
4:55 PM	0	0	1	0	0	0	0	0	0	6	2	0	4	4	0	0	17	275
5:00 PM	1	0	3	0	0	0	0	0	0	1	0	0	5	4	0	0	14	265
5:05 PM	0	0	12	0	0	0	0	0	0	6	0	0	5	3	0	0	26	266
5:10 PM	1	0	4	0	0	0	0	0	0	4	1	0	11	4	0	0	25	269
5:15 PM	2	0	3	0	0	0	0	0	0	5	0	0	6	2	0	0	18	267
5:20 PM	1	0	5	0	0	0	0	0	0	3	1	0	9	10	0	0	29	272
5:25 PM	1	0	2	0	0	0	0	0	0	3	2	0	6	3	0	0	17	273
5:30 PM	0	0	4	0	0	0	0	0	0	8	1	0	5	2	0	0	20	274
5:35 PM	0	0	2	0	0	0	0	0	0	4	0	0	4	3	0	0	13	262
5:40 PM	0	0	4	0	0	0	0	0	0	6	2	0	9	4	0	0	25	252
5:45 PM	1	0	2	0	0	0	0	0	0	5	2	0	6	4	0	0	20	246
5:50 PM	0	0	5	0	0	0	0	0	0	6	0	0	4	4	0	0	19	243
5:55 PM	1	0	4	0	0	0	0	0	0	7	1	0	10	6	0	0	29	255

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	8	0	68	0	0	0	0	0	0	76	24	0	116	52	0	0	344
Heavy Trucks	0	0	0		0	0	0		0	0	4		0	4	0		8
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

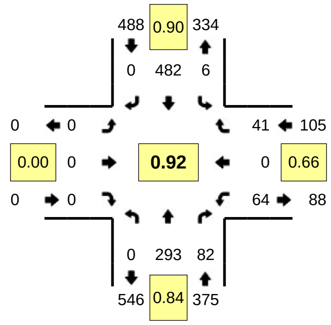
Comments:

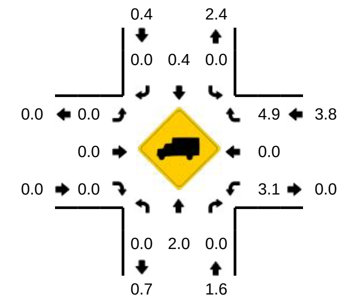
Report generated on 8/5/2009 4:28 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

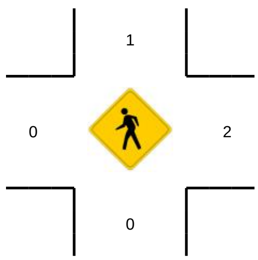
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

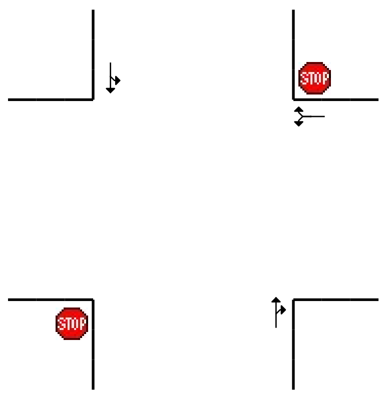
LOCATION: S Ivy St -- SE 2nd Ave | **QC JOB #:** 10422821
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

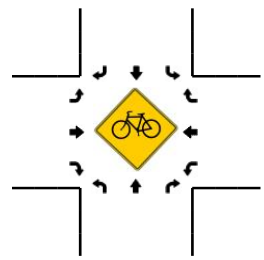
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

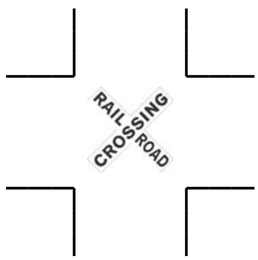


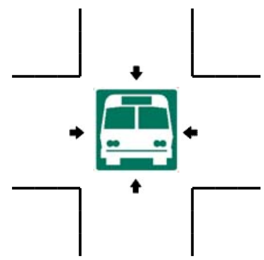












5-Min Count Period Beginning At	S Ivy St (Northbound) Left	Thru	Right	U	S Ivy St (Southbound) Left	Thru	Right	U	SE 2nd Ave (Eastbound) Left	Thru	Right	U	SE 2nd Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	43	5	0	1	40	0	0	0	0	0	0	6	0	3	0	98	
4:05 PM	0	25	6	0	0	44	0	0	0	0	0	0	3	0	2	0	80	
4:10 PM	0	28	6	0	0	42	0	0	0	0	0	0	3	0	2	0	81	
4:15 PM	0	30	12	0	0	29	0	0	0	0	0	0	5	0	3	0	79	
4:20 PM	0	30	7	0	4	34	0	0	0	0	0	0	1	0	4	0	80	
4:25 PM	0	26	5	0	0	29	0	0	0	0	0	0	2	0	3	0	65	
4:30 PM	0	34	8	0	2	28	0	0	0	0	0	0	1	0	3	0	76	
4:35 PM	0	26	7	0	1	35	0	0	0	0	0	0	4	0	2	0	75	
4:40 PM	0	23	11	0	0	35	0	0	0	0	0	0	7	0	4	0	80	
4:45 PM	0	29	7	0	0	49	0	0	0	0	0	0	3	0	3	0	91	
4:50 PM	0	25	10	0	0	39	0	0	0	0	0	0	5	0	3	0	82	
4:55 PM	0	33	7	0	0	45	0	0	0	0	0	0	2	0	2	0	89	976
5:00 PM	0	19	3	0	1	37	0	0	0	0	0	0	10	0	9	0	79	957
5:05 PM	0	19	7	0	1	41	0	0	0	0	0	0	6	0	3	0	77	954
5:10 PM	0	18	4	0	1	39	0	0	0	0	0	0	8	0	4	0	74	947
5:15 PM	0	21	5	0	0	54	0	0	0	0	0	0	6	0	3	0	89	957
5:20 PM	0	30	9	0	0	32	0	0	0	0	0	0	1	0	2	0	74	951
5:25 PM	0	16	4	0	0	48	0	0	0	0	0	0	11	0	3	0	82	968
5:30 PM	0	18	4	0	1	41	0	0	0	0	0	0	5	0	5	0	74	966
5:35 PM	0	27	4	0	0	38	0	0	0	0	0	0	7	0	1	0	77	968
5:40 PM	0	20	6	0	0	44	0	0	0	0	0	0	1	0	3	0	74	962
5:45 PM	0	24	7	0	0	39	0	0	0	0	0	0	6	0	3	0	79	950
5:50 PM	0	29	4	0	0	51	0	0	0	0	0	0	3	0	3	0	90	958
5:55 PM	0	18	8	0	0	42	0	0	0	0	0	0	3	0	1	0	72	941

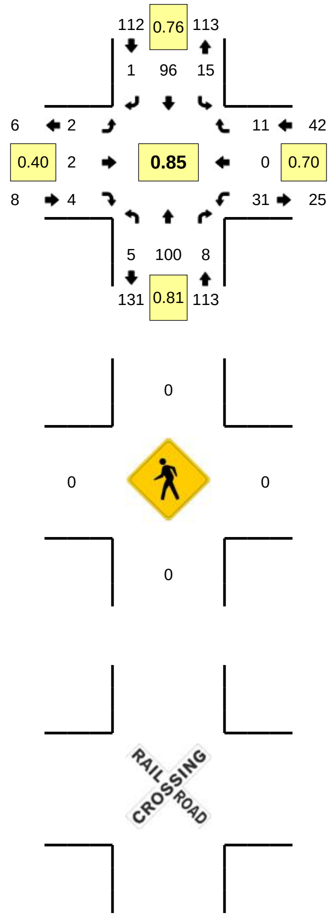
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	348	96	0	0	532	0	0	0	0	0	0	40	0	32	0	1048
Heavy Trucks	0	0	0		0	8	0		0	0	0		4	0	8		20
Pedestrians		0				4				0				4			8
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

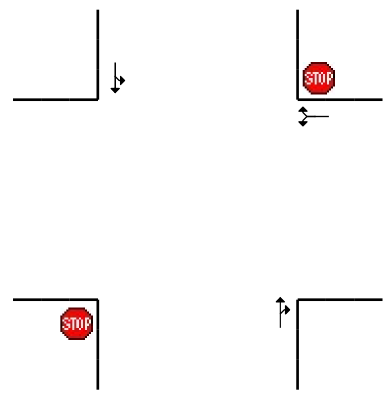
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

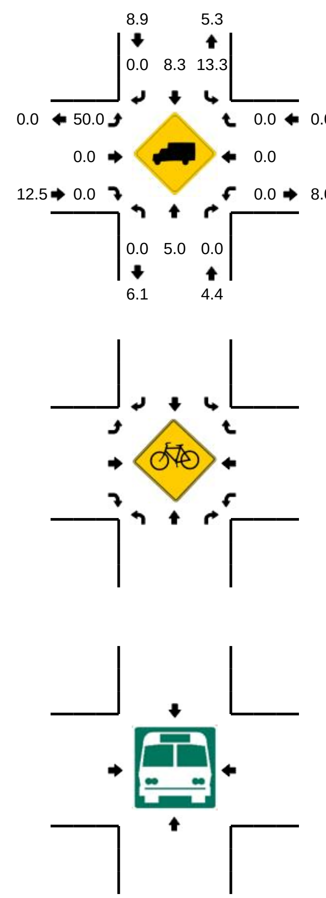
LOCATION: S Redwood St -- SE 4th Ave
CITY/STATE: Canby, OR

QC JOB #: 10422822
DATE: 4/8/2009



Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:55 PM -- 5:10 PM





5-Min Count Period Beginning At	S Redwood St (Northbound) Left	Thru	Right	U	S Redwood St (Southbound) Left	Thru	Right	U	SE 4th Ave (Eastbound) Left	Thru	Right	U	SE 4th Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	4	1	0	2	9	0	0	0	0	0	0	2	0	3	0	21	
4:05 PM	0	5	1	0	0	7	0	0	0	0	1	0	1	0	1	0	16	
4:10 PM	2	7	2	0	1	7	0	0	0	0	1	0	3	0	1	0	24	
4:15 PM	0	5	1	0	4	5	0	0	1	0	0	0	0	0	2	0	18	
4:20 PM	0	8	0	0	0	4	0	0	0	0	0	0	3	0	0	0	15	
4:25 PM	0	8	0	0	1	14	0	0	0	0	1	0	4	0	1	0	29	
4:30 PM	0	10	0	0	0	7	0	0	0	0	1	0	2	0	3	0	23	
4:35 PM	0	10	1	0	2	7	0	0	0	0	0	0	1	0	1	0	22	
4:40 PM	1	11	2	0	2	5	0	0	0	0	0	0	8	0	0	0	29	
4:45 PM	0	8	0	0	2	11	1	0	0	0	1	0	1	0	2	0	26	
4:50 PM	2	10	1	0	1	4	0	0	1	0	1	0	1	0	1	0	22	
4:55 PM	1	11	0	0	0	11	0	0	0	2	0	0	1	0	1	0	27	272
5:00 PM	0	9	0	0	4	12	0	0	0	0	0	0	2	0	1	0	28	279
5:05 PM	1	12	1	0	0	10	0	0	0	0	0	0	2	0	0	0	26	289
5:10 PM	0	6	1	0	1	6	0	0	0	0	1	0	7	0	1	0	23	288
5:15 PM	0	5	1	0	1	7	0	0	0	0	0	0	2	0	0	0	16	286
5:20 PM	0	5	0	0	1	10	0	0	1	0	0	0	2	0	1	0	20	291
5:25 PM	0	3	1	0	1	6	0	0	0	0	0	0	2	0	0	0	13	275
5:30 PM	0	2	1	0	0	10	0	0	0	0	0	0	1	0	2	0	16	268
5:35 PM	0	6	1	0	0	10	0	0	1	0	0	0	2	0	0	0	20	266
5:40 PM	0	4	3	0	0	7	0	0	0	0	1	0	5	0	2	0	22	259
5:45 PM	0	9	1	0	3	8	0	0	0	0	0	0	1	0	0	0	22	255
5:50 PM	0	9	1	0	0	9	0	0	0	0	0	0	3	0	1	0	23	256
5:55 PM	0	5	1	0	0	8	0	0	0	0	0	0	2	0	1	0	17	246

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	8	128	4	0	16	132	0	0	0	8	0	0	20	0	8	0	324
Heavy Trucks	0	8	0		4	24	0		0	0	0		0	0	0		36
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/5/2009 4:28 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

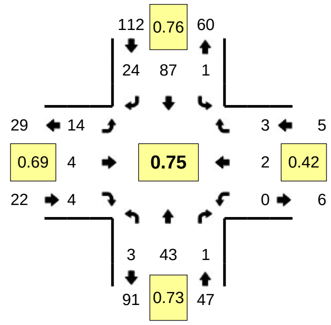
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

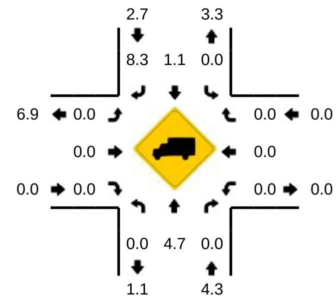
LOCATION: S Walnut Rd -- SE 4th Ave | **QC JOB #:** 10422823

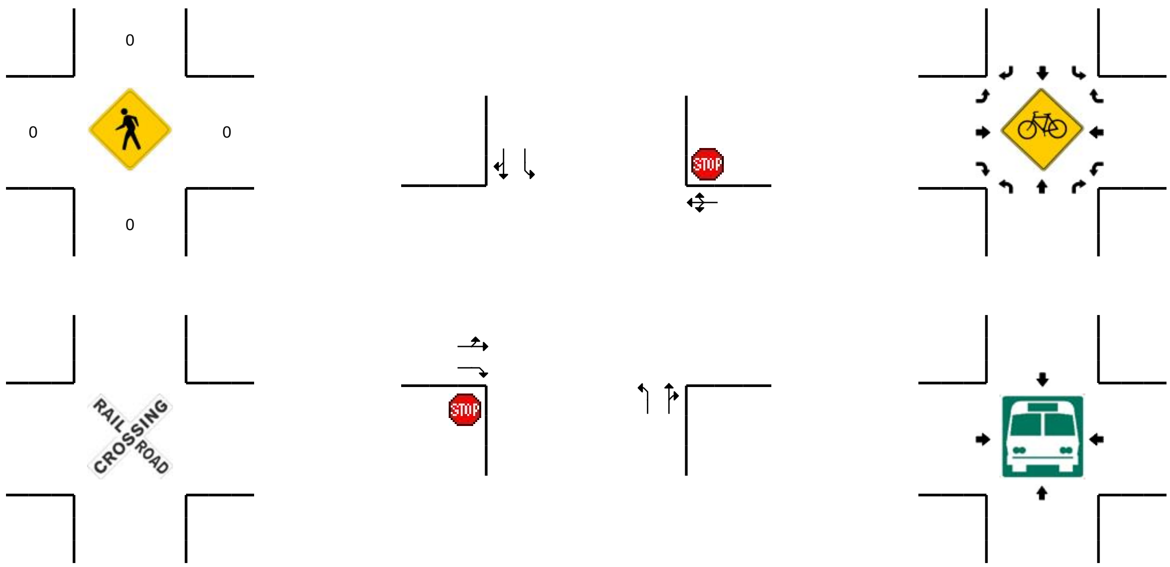
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

Peak-Hour: 4:30 PM -- 5:30 PM

Peak 15-Min: 4:30 PM -- 4:45 PM







5-Min Count Period Beginning At	S Walnut Rd (Northbound) Left	Thru	Right	U	S Walnut Rd (Southbound) Left	Thru	Right	U	SE 4th Ave (Eastbound) Left	Thru	Right	U	SE 4th Ave (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	1	5	0	0	0	6	1	0	3	0	0	0	0	1	0	0	17	
4:05 PM	1	3	0	0	0	10	2	0	0	4	1	0	0	0	0	0	21	
4:10 PM	0	2	0	0	1	5	2	0	4	1	0	0	0	0	0	0	15	
4:15 PM	0	2	0	0	0	8	0	0	1	0	0	0	0	0	0	0	11	
4:20 PM	1	3	0	0	0	5	6	0	0	0	1	0	0	0	0	0	16	
4:25 PM	0	3	0	0	0	10	1	0	1	0	1	0	0	1	1	0	18	
4:30 PM	1	4	1	0	0	11	1	0	0	0	0	0	0	0	0	0	18	
4:35 PM	0	5	0	0	0	9	1	0	5	0	0	0	0	0	0	0	20	
4:40 PM	0	5	0	0	0	8	7	0	2	0	0	0	0	1	1	0	24	
4:45 PM	0	4	0	0	0	4	1	0	1	0	0	0	0	0	1	0	11	
4:50 PM	1	3	0	0	0	6	1	0	1	0	1	0	0	0	0	0	13	
4:55 PM	0	5	0	0	0	5	1	0	1	2	0	0	0	0	1	0	15	199
5:00 PM	0	2	0	0	1	8	2	0	1	0	1	0	0	0	0	0	15	197
5:05 PM	0	3	0	0	0	3	1	0	1	0	0	0	0	0	0	0	8	184
5:10 PM	0	3	0	0	0	8	5	0	0	1	1	0	0	0	0	0	18	187
5:15 PM	0	5	0	0	0	10	0	0	2	1	0	0	0	0	0	0	18	194
5:20 PM	1	1	0	0	0	5	3	0	0	0	0	0	0	1	0	0	11	189
5:25 PM	0	3	0	0	0	10	1	0	0	0	1	0	0	0	0	0	15	186
5:30 PM	1	3	0	0	0	11	1	0	2	0	0	0	0	0	0	0	18	186
5:35 PM	0	3	0	0	0	13	1	0	1	0	0	0	1	0	0	0	19	185
5:40 PM	0	4	0	0	0	5	6	0	2	0	0	0	0	0	0	0	17	178
5:45 PM	0	2	1	0	0	13	1	0	3	0	0	0	0	0	0	0	20	187
5:50 PM	0	3	0	0	1	11	3	0	3	0	0	0	0	0	0	0	21	195
5:55 PM	1	6	0	0	0	5	2	0	0	0	1	0	0	0	0	0	15	195

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	4	56	4	0	0	112	36	0	28	0	0	0	0	4	4	0	248
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

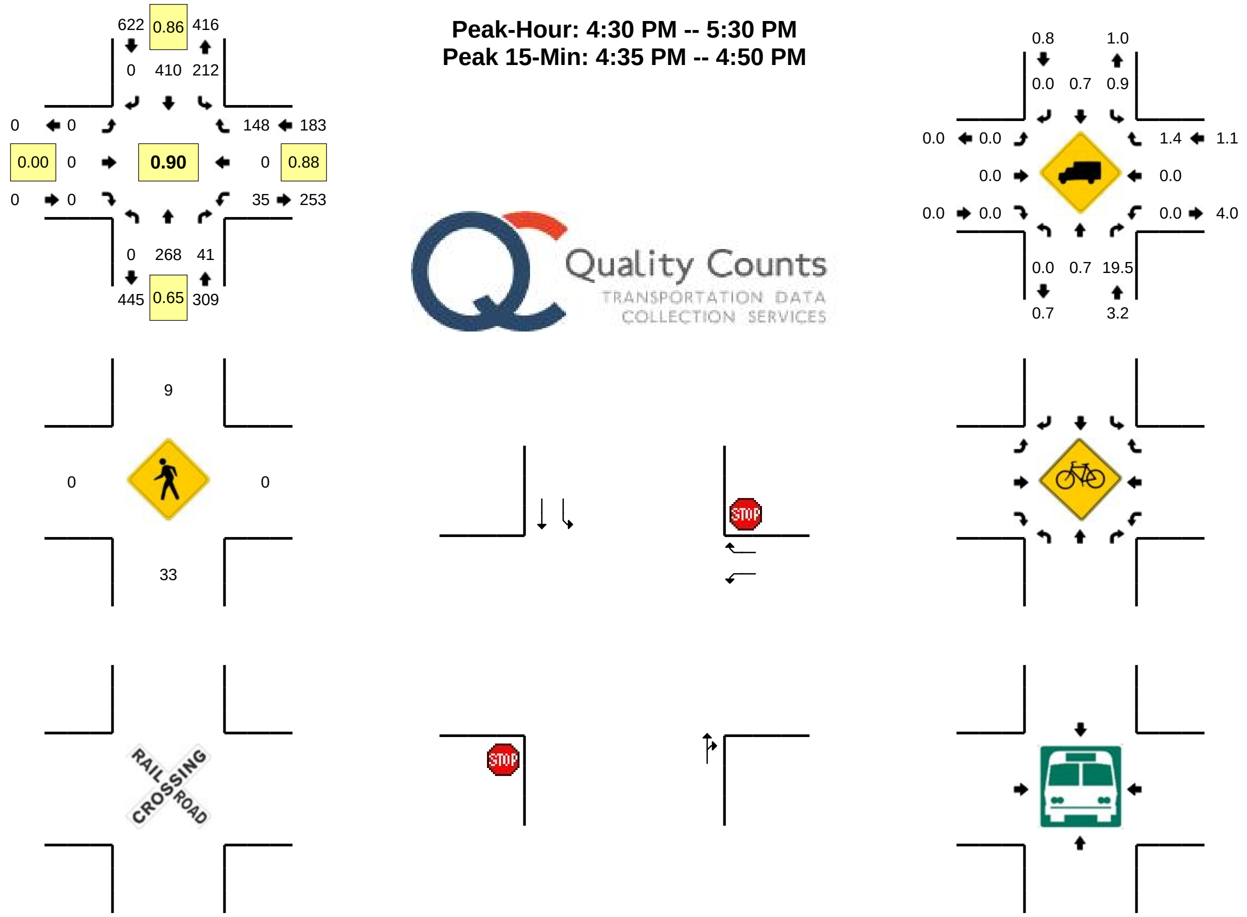
Report generated on 8/5/2009 4:29 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: S Ivy St -- S Township Rd | **QC JOB #:** 10422824

CITY/STATE: Canby, OR | **DATE:** 4/8/2009

Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:35 PM -- 4:50 PM



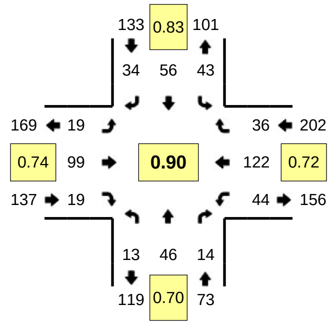
5-Min Count Period Beginning At	S Ivy St (Northbound) Left	Thru	Right	U	S Ivy St (Southbound) Left	Thru	Right	U	S Township Rd (Eastbound) Left	Thru	Right	U	S Township Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	31	2	0	13	36	0	0	0	0	0	0	4	0	11	0	97	
4:05 PM	0	22	5	0	19	31	0	0	0	0	0	0	2	0	17	0	96	
4:10 PM	0	30	4	0	19	33	0	0	0	0	0	0	4	0	13	0	103	
4:15 PM	0	30	0	0	15	22	0	0	0	0	0	0	3	0	21	0	91	
4:20 PM	0	24	1	0	11	34	0	0	0	0	0	0	0	0	15	0	85	
4:25 PM	0	20	4	0	20	25	0	0	0	0	0	0	2	0	10	0	81	
4:30 PM	0	36	4	0	10	24	0	0	0	0	0	0	2	0	15	0	91	
4:35 PM	0	37	12	0	10	38	0	0	0	0	0	0	4	0	11	0	112	
4:40 PM	0	27	2	0	14	29	0	0	0	0	0	0	7	0	11	0	90	
4:45 PM	0	26	0	0	24	37	0	0	0	0	0	0	5	0	14	0	106	
4:50 PM	0	20	5	0	17	36	0	0	0	0	0	0	0	0	11	0	89	
4:55 PM	0	23	4	0	13	35	0	0	0	0	0	0	2	0	19	0	96	1137
5:00 PM	0	13	4	0	20	29	0	0	0	0	0	0	0	0	11	0	77	1117
5:05 PM	0	20	2	0	24	41	0	0	0	0	0	0	1	0	14	0	102	1123
5:10 PM	0	13	1	0	18	33	0	0	0	0	0	0	3	0	8	0	76	1096
5:15 PM	0	20	2	0	24	41	0	0	0	0	0	0	5	0	13	0	105	1110
5:20 PM	0	23	3	0	19	25	0	0	0	0	0	0	3	0	7	0	80	1105
5:25 PM	0	10	2	0	19	42	0	0	0	0	0	0	3	0	14	0	90	1114
5:30 PM	0	24	4	0	18	31	0	0	0	0	0	0	4	0	8	0	89	1112
5:35 PM	0	21	6	0	22	33	0	0	0	0	0	0	4	0	11	0	97	1097
5:40 PM	0	20	4	0	18	38	0	0	0	0	0	0	5	0	6	0	91	1098
5:45 PM	0	19	3	0	20	28	0	0	0	0	0	0	8	0	9	0	87	1079
5:50 PM	0	23	9	0	14	38	0	0	0	0	0	0	3	0	16	0	103	1093
5:55 PM	0	14	2	0	19	39	0	0	0	0	0	0	5	0	17	0	96	1093

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	360	56	0	192	416	0	0	0	0	0	0	64	0	144	0	1232
Heavy Trucks	0	4	20		4	4	0		0	0	0		0	0	0		32
Pedestrians		36				0				0				0			36
Bicycles																	
Railroad																	
Stopped Buses																	

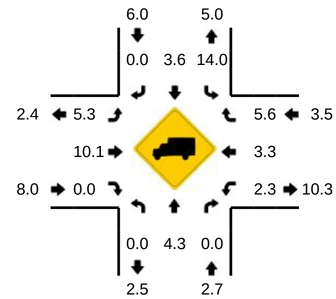
Comments:

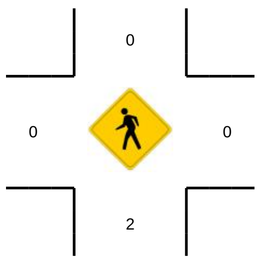
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

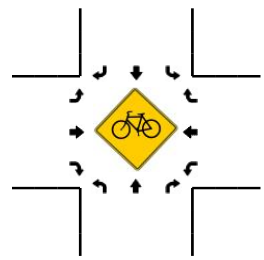
LOCATION: S Redwood St -- S Township Rd | **QC JOB #:** 10422825
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

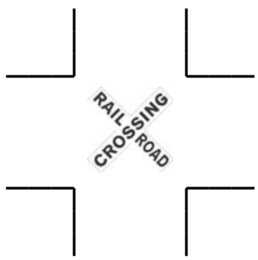


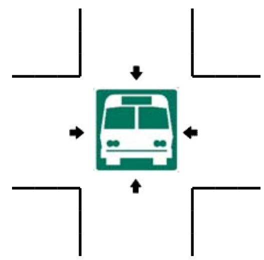
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM











5-Min Count Period Beginning At	S Redwood St (Northbound) Left	Thru	Right	U	S Redwood St (Southbound) Left	Thru	Right	U	S Township Rd (Eastbound) Left	Thru	Right	U	S Township Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	4	4	0	2	5	2	0	1	7	2	0	3	0	2	0	32	
4:05 PM	5	3	0	0	2	6	3	0	1	5	1	0	3	9	0	0	38	
4:10 PM	1	5	2	0	5	2	4	0	1	10	1	0	2	6	2	0	41	
4:15 PM	3	3	3	0	4	1	1	0	0	5	1	0	2	13	4	0	40	
4:20 PM	1	6	0	0	3	3	1	0	0	6	3	0	2	14	1	0	40	
4:25 PM	0	5	0	0	5	6	5	0	0	7	4	0	6	8	3	0	49	
4:30 PM	0	3	1	0	6	4	2	0	2	4	0	0	6	16	3	0	47	
4:35 PM	2	2	3	0	4	2	3	0	1	13	0	0	3	8	4	0	45	
4:40 PM	2	3	1	0	0	6	8	0	1	5	3	0	6	15	9	0	59	
4:45 PM	0	2	0	0	3	3	3	0	1	9	4	0	4	10	3	0	42	
4:50 PM	1	7	1	0	2	6	0	0	2	5	2	0	4	10	3	0	43	
4:55 PM	2	7	0	0	3	8	2	0	2	4	2	0	1	8	4	0	43	519
5:00 PM	1	5	2	0	6	5	2	0	2	14	1	0	4	10	3	0	55	542
5:05 PM	1	7	0	0	4	6	2	0	4	11	2	0	2	10	1	0	50	554
5:10 PM	1	3	1	0	2	6	7	0	0	10	2	0	4	3	3	0	42	555
5:15 PM	3	2	0	0	5	3	2	0	3	8	1	0	5	9	2	0	43	558
5:20 PM	0	3	1	0	5	5	2	0	0	11	0	0	3	8	1	0	39	557
5:25 PM	0	2	4	0	3	2	1	0	1	5	2	0	2	15	0	0	37	545
5:30 PM	0	1	1	0	3	6	1	0	1	9	4	0	4	7	0	0	37	535
5:35 PM	1	3	1	0	3	6	1	0	3	8	2	0	6	8	1	0	43	533
5:40 PM	1	4	2	0	5	4	3	0	0	15	1	0	2	9	1	0	47	521
5:45 PM	1	3	4	0	2	6	2	0	2	10	0	0	6	9	3	0	48	527
5:50 PM	0	8	1	0	4	3	2	0	1	7	4	0	4	8	1	0	43	527
5:55 PM	0	0	2	0	11	2	2	0	1	4	2	0	7	10	4	0	45	529

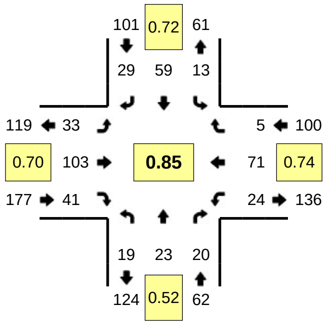
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	16	32	20	0	40	48	52	0	16	88	12	0	60	156	64	0	604
Heavy Trucks	0	0	0		8	0	0		0	32	0		0	4	0		44
Pedestrians		4				0				0				0			4
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

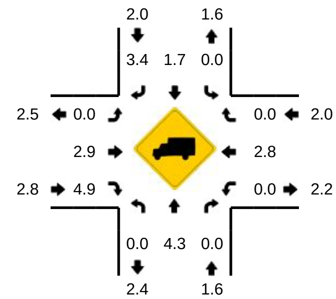
Report generated on 8/5/2009 4:29 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

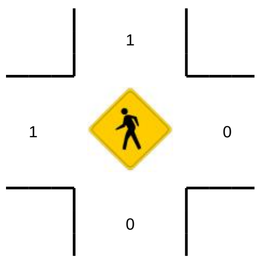
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

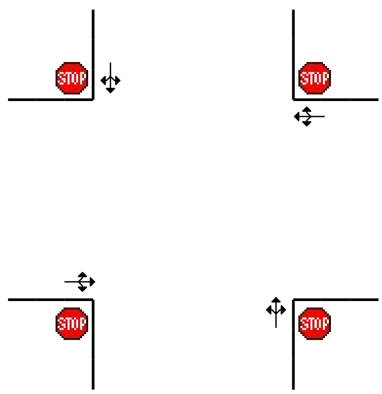
LOCATION: S Mulino Rd -- S Township Rd | **QC JOB #:** 10422826
CITY/STATE: Canby, OR | **DATE:** 4/8/2009

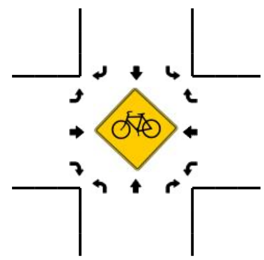


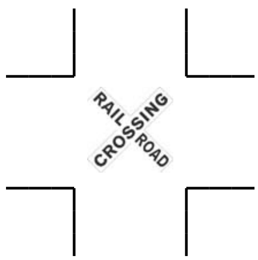
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

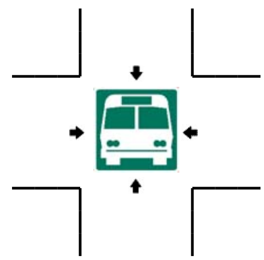












5-Min Count Period Beginning At	S Mulino Rd (Northbound) Left	Thru	Right	U	S Mulino Rd (Southbound) Left	Thru	Right	U	S Township Rd (Eastbound) Left	Thru	Right	U	S Township Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:00 PM	0	1	4	0	0	8	0	0	1	7	3	0	2	7	1	0	34	
4:05 PM	0	2	2	0	0	2	5	0	3	11	4	0	3	8	0	0	40	
4:10 PM	1	2	3	0	1	3	6	0	4	7	4	0	4	4	0	0	39	
4:15 PM	1	0	2	0	1	6	1	0	1	7	6	0	1	6	0	0	32	
4:20 PM	2	0	1	0	2	7	3	0	1	5	3	0	4	2	0	0	30	
4:25 PM	3	1	1	0	0	4	2	0	1	5	4	0	3	6	0	0	30	
4:30 PM	1	2	1	0	2	3	2	0	3	6	4	0	4	11	0	0	39	
4:35 PM	4	5	7	0	1	4	2	0	1	12	3	0	1	3	0	0	43	
4:40 PM	2	1	2	0	2	9	4	0	6	4	3	0	4	11	0	0	48	
4:45 PM	5	2	2	0	0	7	5	0	0	6	1	0	3	3	1	0	35	
4:50 PM	1	1	1	0	0	4	4	0	0	7	5	0	2	8	0	0	33	
4:55 PM	1	3	1	0	1	5	2	0	0	5	2	0	0	10	0	0	30	433
5:00 PM	1	2	0	0	1	3	2	0	5	12	7	0	4	1	0	0	38	437
5:05 PM	1	1	1	0	0	2	2	0	8	13	4	0	1	4	0	0	37	434
5:10 PM	1	2	0	0	1	7	3	0	2	8	4	0	2	5	2	0	37	432
5:15 PM	1	2	1	0	2	3	2	0	1	11	3	0	2	4	1	0	33	433
5:20 PM	1	1	2	0	2	6	1	0	4	10	3	0	1	6	1	0	38	441
5:25 PM	0	1	2	0	1	6	0	0	3	9	2	0	0	5	0	0	29	440
5:30 PM	0	0	1	0	3	2	1	0	2	13	6	0	1	6	0	0	35	436
5:35 PM	0	1	2	0	1	2	2	0	2	13	4	0	1	11	0	0	39	432
5:40 PM	1	0	1	0	2	6	2	0	4	14	1	0	0	10	0	0	41	425
5:45 PM	1	2	4	0	0	6	2	0	1	6	1	0	2	6	0	0	31	421
5:50 PM	2	0	1	0	0	2	2	0	3	7	3	0	2	10	1	0	33	421
5:55 PM	2	1	1	0	0	5	4	0	2	11	3	0	2	6	0	0	37	428

Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	28	32	40	0	20	64	32	0	40	88	40	0	36	100	0	0	520
Heavy Trucks	0	0	0		0	4	4		0	4	0		0	8	0		20
Pedestrians		0				0				0				0			0
Bicycles																	
Railroad																	
Stopped Buses																	

Comments:

Report generated on 8/5/2009 4:29 PM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Intersection Turning Movement
Summary Report

Location HIGHWAY 99E AT PINE STREET
Date 4/25/2006
Day of Week Tuesday
Time Begin 16:00
Reviewed By: DE

	Eastbound			Westbound			Northbound			Southbound			
Time Period	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Totals**
16:00 - 16:15	23	205	27	23	202	19	19	21	24	25	25	25	638
16:15 - 16:30	18	234	19	22	237	20	15	16	19	13	18	27	658
16:30 - 16:45	20	269	23	33	202	11	38	17	25	25	19	24	706
16:45 - 17:00	30	262	16	35	218	20	25	15	16	6	21	31	695
17:00 - 17:15	14	238	20	35	260	25	30	11	21	19	21	38	732
17:15 - 17:30	20	280	35	37	224	16	24	12	19	23	21	37	748
17:30 - 17:45	22	269	21	43	234	18	33	18	13	19	24	27	741
17:45 - 18:00	17	214	18	43	219	25	22	10	19	16	10	23	636
Movement Totals	164	1971	179	271	1796	154	206	120	156	146	159	232	5554
Enter Totals	2314			2221			482			537			
Exit Totals	2409			2098			570			477			

Two-Hour Totals

Light Trucks	7	41	2	5	47	10	4	4	9	5	4	1	139
Medium Trucks	6	5	4	0	4	0	0	3	2	1	1	0	26
Heavy Trucks	0	15	0	1	11	0	0	0	0	0	0	0	27
% Trucks	7.9%	3.1%	3.4%	2.2%	3.5%	6.5%	1.9%	5.8%	7.1%	4.1%	3.1%	0.4%	3.5%
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0

	South	West	East	North	
Pedestrians	13	10	0	0	23

Peak Hour Information

Peak Hour 16:45 17:45

	Eastbound			Westbound			Northbound			Southbound			
	Right	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Totals**
Movement Total	86	1049	92	150	936	79	112	56	69	67	87	133	2916
Peak Hour Factor	0.72	0.94	0.66	0.87	0.90	0.79	0.85	0.78	0.82	0.73	0.91	0.88	0.97

	Eastbound	Westbound	Northbound	Southbound
Enter Totals	1227	287	237	1165
Peak Hour Factor	0.92	0.89	0.93	0.91
Exit Totals	1294	252	298	1072
Peak Hour Factor	0.95	0.89	0.89	0.89

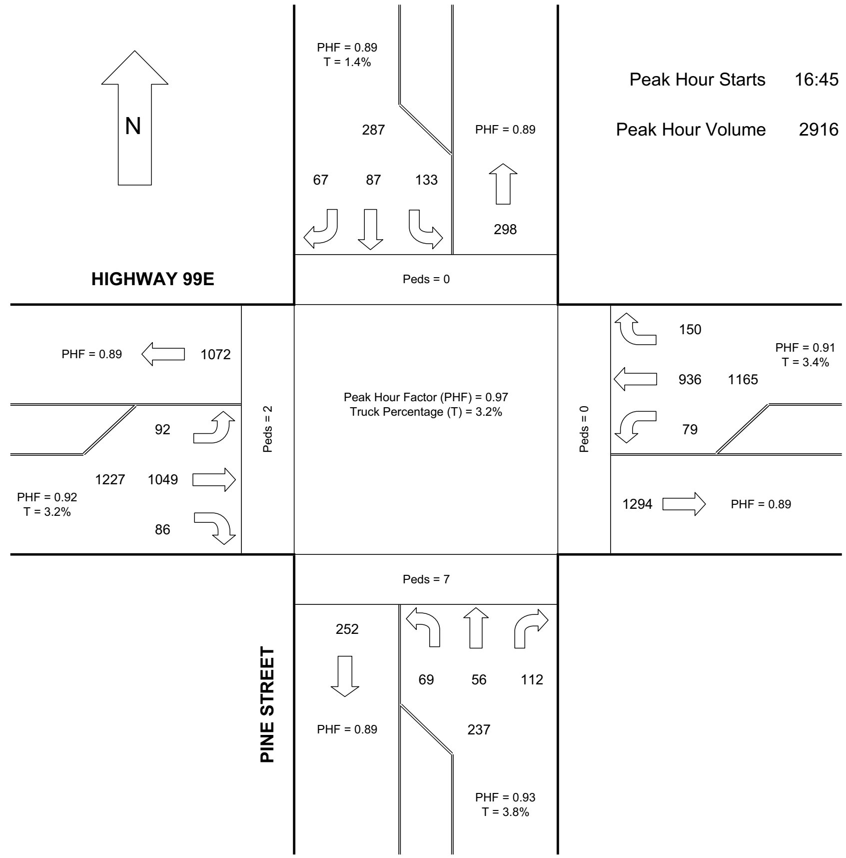
Light Trucks	4	23	2	2	25	6	3	2	4	3	1	0	75
Medium Trucks	2	2	0	0	1	0	0	0	0	0	0	0	5
Heavy Trucks	0	6	0	1	5	0	0	0	0	0	0	0	12
% Trucks	7.0%	3.0%	2.2%	2.0%	3.3%	7.6%	2.7%	3.6%	5.8%	4.5%	1.1%	0.0%	3.2%
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0

	South	West	East	North	
Pedestrians	7	2	0	0	9

Intersection Turning Movement
Peak Hour Diagram

Location HIGHWAY 99E AT PINE STREET
Date 4/26/2006
Day of Week Tuesday
Time Begin 16:00
Reviewed By: DE

Peak Hour Starts 16:45
Peak Hour Volume 2916



TRAFSTATS
PO Box 13699
Salem, OR 97309
Tel: (503) 646-2942
Fax: (503) 526-0628

Intersection Turning Movement

Summary Report

Location HIGHWAY 99 AT SEQUOIA PARKWAY
Date 5/10/2006
Day of Week Wednesday
Time Begin 16:00
Reviewed By: BV

	Eastbound			Westbound			Northbound			Southbound			
Time Period	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Totals
16:00 - 16:15	31	209	9	2	162	12	14	9	80	13	22	15	578
16:15 - 16:30	16	214	12	5	230	24	11	10	72	13	15	16	638
16:30 - 16:45	34	202	20	5	210	21	17	14	91	23	15	13	665
16:45 - 17:00	28	228	24	3	203	18	10	12	72	14	18	21	651
17:00 - 17:15	36	227	21	5	202	22	12	17	75	11	8	9	645
17:15 - 17:30	25	232	14	5	212	16	16	14	86	16	17	28	681
17:30 - 17:45	20	222	17	4	182	32	18	15	79	19	21	23	652
17:45 - 18:00	18	182	22	6	194	16	13	18	74	18	14	20	595
Movement Totals	208	1716	139	35	1595	161	111	109	629	127	130	145	5105
Enter Totals	2063			1791			849			402			
Exit Totals	1972			2351			283			499			

Two-Hour Totals

	Eastbound Right	Eastbound Thru	Eastbound Left	Westbound Right	Westbound Thru	Westbound Left	Northbound Right	Northbound Thru	Northbound Left	Southbound Right	Southbound Thru	Southbound Left	Totals
Light Trucks	5	33	0	0	43	7	5	0	13	3	3	3	115
Medium Trucks	2	12	0	0	9	0	2	0	2	1	0	0	28
Heavy Trucks	1	15	0	0	10	0	0	0	0	0	1	0	27
% Trucks	3.8%	3.5%	0.0%	0.0%	3.9%	4.3%	6.3%	0.0%	2.4%	3.1%	3.1%	2.1%	3.3%
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	4	0	0	0	0	0	0	0	4

	South	West	East	North	
Pedestrians	0	0	0	1	1

Peak Hour Information

Peak Hour 16:30 17:30

	Eastbound			Westbound			Northbound			Southbound			
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Totals
Movement Total	123	889	79	18	827	77	55	57	324	64	58	71	2642
Peak Hour Factor	0.85	0.96	0.82	0.90	0.98	0.88	0.81	0.84	0.89	0.70	0.81	0.63	0.97
Enter Totals	1091			193			436			922			
Peak Hour Factor	0.96			0.79			0.89			0.98			
Exit Totals	1015			258			154			1215			
Peak Hour Factor	0.92			0.92			0.90			0.94			
Light Trucks	2	14	0	0	18	2	2	0	7	1	1	1	48
Medium Trucks	2	9	0	0	4	0	0	0	0	1	0	0	16
Heavy Trucks	1	8	0	0	5	0	0	0	0	0	0	0	14
% Trucks	4.1%	3.5%	0.0%	0.0%	3.3%	2.6%	3.6%	0.0%	2.2%	3.1%	1.7%	1.4%	3.0%
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0

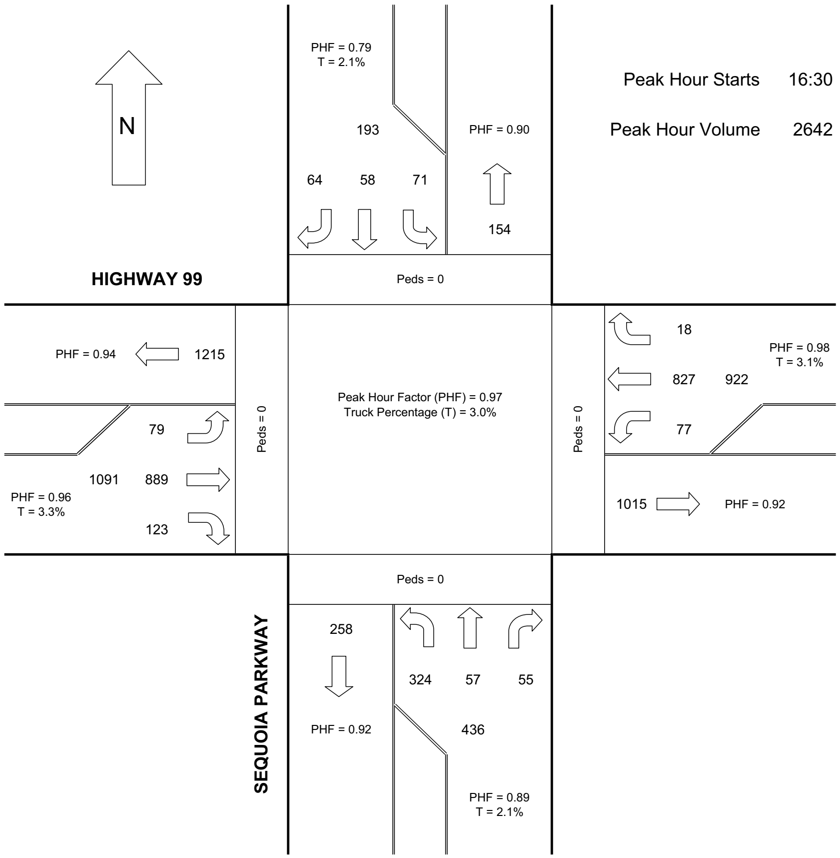
	South	West	East	North	
Pedestrians	0	0	0	0	0

TRAFSTATS
PO Box 13699
Salem, OR 97309

Intersection Turning Movement

Peak Hour Diagram

Location HIGHWAY 99 AT SEQUOIA PARKWAY
Date 5/10/2006
Day of Week Wednesday
Time Begin 16:00
Reviewed By: BV



Intersection Turning Movement

Summary Report

Location SE HAZEL DELL WAY AT SE SEQUOIA PARKWAY
Date 8/22/2007
Day of Week Wednesday
Time Begin 16:00
Reviewed By: DE

	Eastbound			Westbound			Northbound			Southbound			
Time Period	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Totals**
16:00 - 16:15	10	4	85	13	4	2	0	23	5	8	6	11	171
16:15 - 16:30	16	6	72	16	3	1	1	9	10	10	11	10	165
16:30 - 16:45	13	3	75	17	8	1	1	10	3	11	8	13	163
16:45 - 17:00	13	6	91	17	12	1	2	7	7	12	11	16	195
17:00 - 17:15	22	7	87	14	8	5	0	12	6	12	9	13	195
17:15 - 17:30	23	12	60	20	4	5	1	9	6	10	15	22	187
17:30 - 17:45	21	3	99	18	9	1	0	4	9	11	7	18	200
17:45 - 18:00	18	7	67	10	9	4	0	7	9	11	6	11	159
Movement Totals	136	48	636	125	57	20	5	81	55	85	73	114	1435
Enter Totals	820			202			141			272			
Exit Totals	167			197			842			229			

Two-Hour Totals

Light Trucks	0	0	15	8	0	1	0	2	1	0	2	1	30
Medium Trucks	0	0	1	1	1	0	1	1	0	0	3	1	9
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	1	0	1
% Trucks	0.0%	0.0%	2.5%	7.2%	1.8%	5.0%	20.0%	3.7%	1.8%	0.0%	8.2%	1.8%	2.8%
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	1	0	0	0	0	0	0	0	0	0	1	2

	South	West	East	North	
Pedestrians	0	0	0	0	0

Peak Hour Information

Peak Hour 16:45 17:45

	Eastbound			Westbound			Northbound			Southbound			
	Right	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Right**	**Thru**	**Left**	**Totals**
Movement Total	79	28	337	69	33	12	3	32	28	45	42	69	777
Peak Hour Factor	0.86	0.58	0.85	0.86	0.69	0.60	0.38	0.67	0.78	0.94	0.70	0.78	0.97

Enter Totals	444	114	63	156
Peak Hour Factor	0.90	0.95	0.88	0.83

Exit Totals	100	106	438	133
Peak Hour Factor	0.71	0.85	0.90	0.77

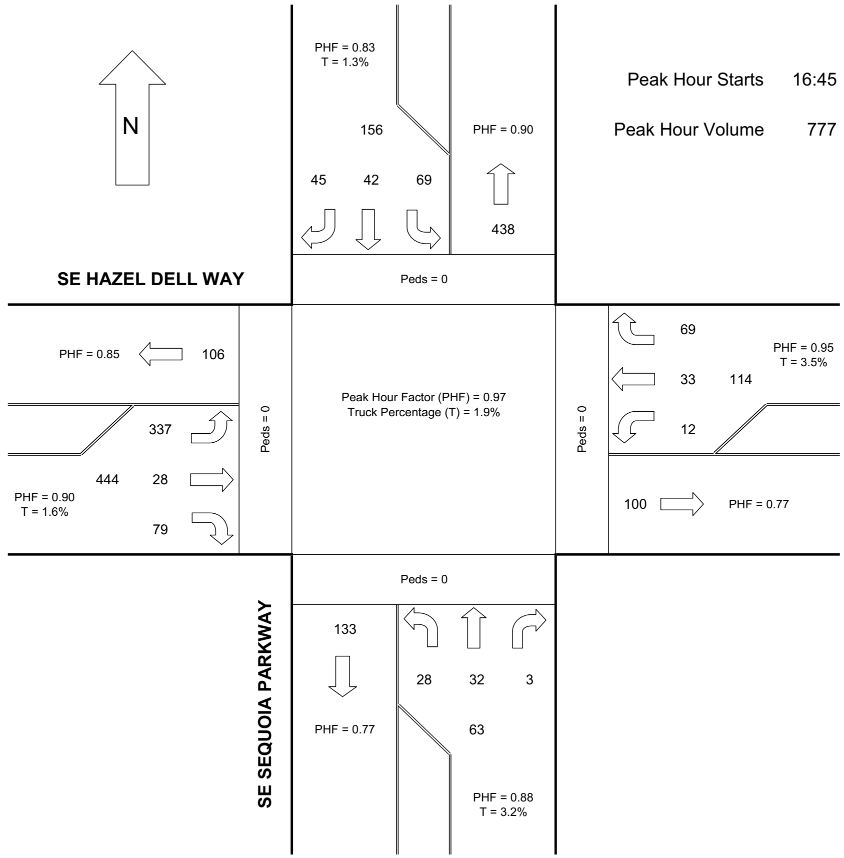
Light Trucks	0	0	6	3	0	0	0	0	1	0	1	0	11
Medium Trucks	0	0	1	0	1	0	1	0	0	0	1	0	4
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0.0%	0.0%	2.1%	4.3%	3.0%	0.0%	33.3%	0.0%	3.6%	0.0%	4.8%	0.0%	1.9%
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	1	0	0	0	0	0	0	0	0	0	1	2

	South	West	East	North	
Pedestrians	0	0	0	0	0

Intersection Turning Movement

Peak Hour Diagram

Location SE HAZEL DELL WAY AT SE SEQUOIA PARKWAY
Date 8/22/2007
Day of Week Wednesday
Time Begin 16:00
Reviewed By: DE



Intersection Turning Movement
Summary Report

Location S TOWNSHIP ROAD AT S WALNUT STREET
Date 5/8/2007
Day of Week Tuesday
Time Begin 16:00
Reviewed By: RES

Time Period	Eastbound Right	Eastbound Thru	Eastbound Left	Westbound Right	Westbound Thru	Westbound Left	Northbound Right	Northbound Thru	Northbound Left	Southbound Right	Southbound Thru	Southbound Left	Totals
16:00 - 16:15	0	32	3	2	28	0	0	0	0	11	0	11	87
16:15 - 16:30	0	33	3	7	27	0	0	0	0	10	0	8	88
16:30 - 16:45	0	32	6	2	37	0	0	0	0	7	0	15	99
16:45 - 17:00	0	38	6	5	35	0	0	0	0	12	0	8	104
17:00 - 17:15	0	36	6	0	33	0	0	0	0	10	0	7	92
17:15 - 17:30	0	37	5	1	31	0	0	0	0	14	0	15	103
17:30 - 17:45	0	49	6	3	33	0	0	0	0	10	0	5	106
17:45 - 18:00	0	24	4	5	33	0	0	0	0	11	0	11	88
Movement Totals	0	281	39	25	257	0	0	0	0	85	0	80	767
Enter Totals	320			282			0			165			
Exit Totals	361			342			64			0			

Two-Hour Totals

Light Trucks	0	1	0	0	5	0	0	0	0	1	0	2	9
Medium Trucks	0	3	0	0	1	0	0	0	0	1	0	0	5
Heavy Trucks	0	0	0	0	1	0	0	0	0	0	0	0	1
% Trucks	NA	1.4%	0.0%	0.0%	2.7%	NA	NA	NA	NA	2.4%	NA	2.5%	2.0%
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	2	0	0	1	0	0	0	0	0	0	0	3

	South	West	East	North	
Pedestrians	0	0	0	0	0

Peak Hour Information

Peak Hour 16:45 17:45

	Eastbound Right	Eastbound Thru	Eastbound Left	Westbound Right	Westbound Thru	Westbound Left	Northbound Right	Northbound Thru	Northbound Left	Southbound Right	Southbound Thru	Southbound Left	Totals
Movement Total	0	160	23	9	132	0	0	0	0	46	0	35	405
Peak Hour Factor	NA	0.82	0.96	0.45	0.94	NA	NA	NA	NA	0.82	NA	0.58	0.96

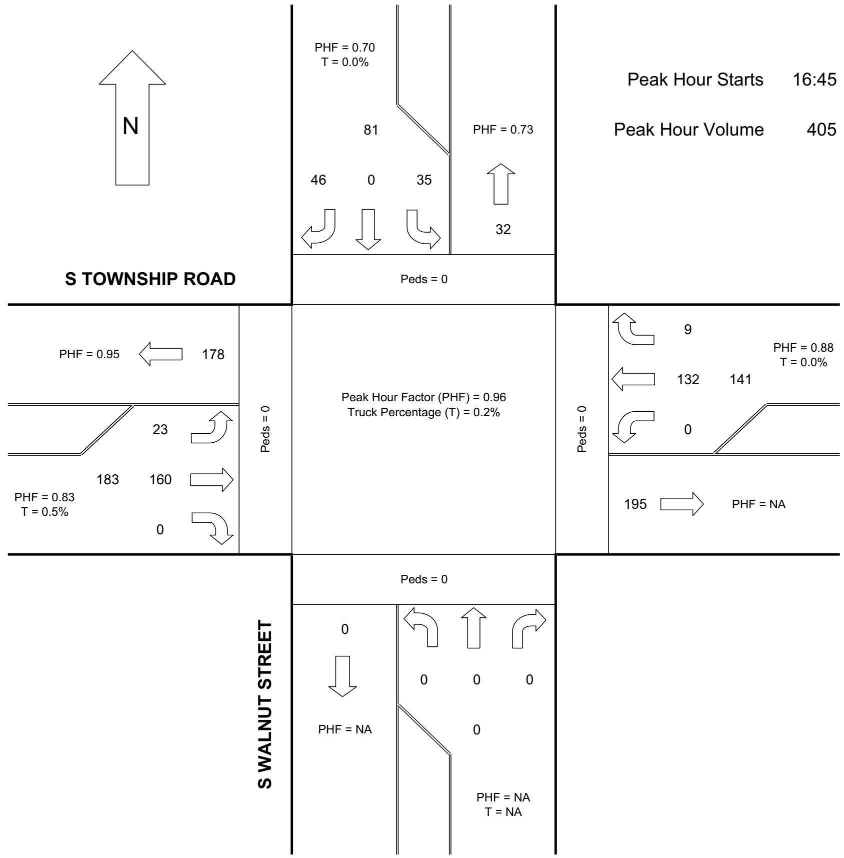
	Eastbound	Westbound	Northbound	Southbound
Enter Totals	183	141	0	81
Peak Hour Factor	0.83	0.88	NA	0.70
Exit Totals	195	178	32	0
Peak Hour Factor	0.90	0.95	0.73	NA

Light Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Medium Trucks	0	1	0	0	0	0	0	0	0	0	0	0	1
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	NA	0.6%	0.0%	0.0%	0.0%	NA	NA	NA	NA	0.0%	NA	0.0%	0.2%
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles	0	2	0	0	0	0	0	0	0	0	0	0	2

	South	West	East	North	
Pedestrians	0	0	0	0	0

Intersection Turning Movement
Peak Hour Diagram

Location S TOWNSHIP ROAD AT S WALNUT STREET
Date 5/8/2007
Day of Week Tuesday
Time Begin 16:00
Reviewed By: RES



Seasonal Adjustment Factor Calcuation for Highway 99E Traffic (To Determine 30th HV)

2009 SEASONAL TREND TABLE (First Half of Year)													Peak Period Seasonal Factor
	1-Jan	15-Jan	1-Feb	15-Feb	1-Mar	15-Mar	1-Apr	15-Apr	1-May	15-May	1-Jun	15-Jun	
INTERSTATE URBANIZED	1.082	1.000	0.964	0.928	0.925	0.922	0.917	0.913	0.919	0.925	0.914	0.903	0.8943
INTERSTATE NONURBANIZED	1.270	1.234	1.176	1.117	1.069	1.022	1.028	1.033	1.008	0.983	0.956	0.929	0.8661
COMMUTER	1.084	1.033	0.989	0.945	0.943	0.942	0.931	0.920	0.919	0.917	0.914	0.910	0.8988
COASTAL DESTINATION	1.240	1.198	1.142	1.085	1.067	1.049	1.060	1.071	1.043	1.015	0.988	0.961	0.8424
COASTAL DESTINATION ROUTE	1.519	1.455	1.363	1.271	1.227	1.183	1.197	1.211	1.139	1.066	1.021	0.976	0.7974
AGRICULTURE	1.198	1.178	1.108	1.038	1.027	1.017	0.996	0.975	0.955	0.935	0.928	0.921	0.8821
RECREATIONAL SUMMER	1.826	1.851	1.788	1.724	1.579	1.433	1.415	1.397	1.221	1.045	0.976	0.906	0.7506
RECREATIONAL SUMMER WINTER	1.381	1.158	1.258	1.358	1.353	1.348	1.551	1.753	1.696	1.639	1.409	1.179	0.8897
RECREATIONAL WINTER	1.848	0.843	0.930	1.018	1.038	1.058	1.311	1.563	2.199	2.835	2.321	1.807	0.8427
SUMMER	1.246	1.237	1.169	1.102	1.072	1.043	1.028	1.013	0.975	0.938	0.911	0.885	0.8345
SUMMER < 2500	1.356	1.408	1.334	1.260	1.193	1.125	1.087	1.050	0.985	0.921	0.891	0.861	0.8165

Interpolated value for April 8th (date of counts) 0.925

Average of Peak Seasonal Factors 0.899

$$\frac{X}{X} = \mathbf{1.030}$$

Appendix E: Existing Year HCM Output

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	26	22	31	33	15	16	139	16	10	244	28
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	12	30	26	36	38	17	19	162	19	12	284	33

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	67	92	199	328
Volume Left (vph)	12	36	19	12
Volume Right (vph)	26	17	19	33
Hadj (s)	-0.16	-0.01	-0.02	-0.01
Departure Headway (s)	5.1	5.2	4.7	4.6
Degree Utilization, x	0.10	0.13	0.26	0.42
Capacity (veh/h)	623	616	729	757
Control Delay (s)	8.7	9.0	9.3	10.8
Approach Delay (s)	8.7	9.0	9.3	10.8
Approach LOS	A	A	A	B

Intersection Summary			
Delay	9.9		
HCM Level of Service	A		
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	99	80	39	116	103	30
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	115	93	45	135	120	35
Pedestrians	3					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	366	140	158			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	366	140	158			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	81	90	97			
cM capacity (veh/h)	612	911	1431			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	208	180	155
Volume Left	115	45	0
Volume Right	93	0	35
cSH	717	1431	1700
Volume to Capacity	0.29	0.03	0.09
Queue Length 95th (ft)	30	2	0
Control Delay (s)	12.1	2.1	0.0
Lane LOS	B	A	
Approach Delay (s)	12.1	2.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

1088: S Township Rd & Ivy St

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	35	148	268	41	212	410
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	39	164	298	46	236	456
Pedestrians			9			33
Lane Width (ft)			12.0			12.0
Walking Speed (ft/s)			4.0			4.0
Percent Blockage			1			3
Right turn flare (veh)		8				
Median type	None					
Median storage veh)						
Upstream signal (ft)						1183
pX, platoon unblocked						
vC, conflicting volume	1256	354			343	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1256	354			343	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	76			81	
cM capacity (veh/h)	153	673			1221	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	203	343	236	456
Volume Left	39	0	236	0
Volume Right	164	46	0	0
cSH	800	1700	1221	1700
Volume to Capacity	0.25	0.20	0.19	0.27
Queue Length 95th (ft)	25	0	18	0
Control Delay (s)	16.7	0.0	8.7	0.0
Lane LOS	C		A	
Approach Delay (s)	16.7	0.0	2.9	
Approach LOS	C			

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

1099: SE 2nd Ave & Ivy St

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	64	41	293	82	6	482
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	45	318	89	7	524
Pedestrians	2		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						262
pX, platoon unblocked	0.88					
vC, conflicting volume	903	365			410	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	890	365			410	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	93			99	
cM capacity (veh/h)	273	672			1158	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	114	408	530
Volume Left	70	0	7
Volume Right	45	89	0
cSH	355	1700	1158
Volume to Capacity	0.32	0.24	0.01
Queue Length 95th (ft)	34	0	0
Control Delay (s)	19.9	0.0	0.2
Lane LOS	C		A
Approach Delay (s)	19.9	0.0	0.2
Approach LOS	C		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		

1165: Highway 99E & Elm St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.94		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	3242		1630	3181		1484	1570		1630	1530	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	3242		1630	3181		1484	1570		1630	1530	
Volume (vph)	138	941	34	87	838	83	35	96	64	136	93	174
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	147	1001	36	93	891	88	37	102	68	145	99	185
RTOR Reduction (vph)	0	2	0	0	7	0	0	25	0	0	67	0
Lane Group Flow (vph)	147	1035	0	93	972	0	37	145	0	145	217	0
Confl. Peds. (#/hr)	1		1	1		1	9					9
Heavy Vehicles (%)	2%	2%	0%	2%	3%	2%	12%	4%	6%	2%	0%	2%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	12.4	46.4		10.8	45.3		5.2	16.5		10.3	21.6	
Effective Green, g (s)	12.4	46.9		10.8	45.3		5.2	16.0		10.3	21.1	
Actuated g/C Ratio	0.12	0.47		0.11	0.45		0.05	0.16		0.10	0.21	
Clearance Time (s)	4.0	4.5		4.0	4.0		4.0	3.5		4.0	3.5	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	202	1520		176	1441		77	251		168	323	
v/s Ratio Prot	0.09	c0.32		0.06	c0.31		0.02	0.09		c0.09	c0.14	
v/s Ratio Perm												
v/c Ratio	0.73	0.68		0.53	0.67		0.48	0.58		0.86	0.67	
Uniform Delay, d1	42.2	20.7		42.2	21.5		46.1	38.9		44.2	36.3	
Progression Factor	1.00	1.00		0.57	0.36		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.2	2.5		1.6	2.2		2.7	2.4		33.3	4.7	
Delay (s)	53.3	23.2		25.7	10.0		48.8	41.2		77.5	40.9	
Level of Service	D	C		C	A		D	D		E	D	
Approach Delay (s)		26.9			11.3			42.6			53.3	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

1172: Highway 99E & Ivy St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.96		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1599	3154		1646	3175		1630	1608		1614	1654	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3154		1646	3175		1630	1608		1614	1654	
Volume (vph)	102	925	164	145	756	85	130	147	58	142	181	74
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	110	995	176	156	813	91	140	158	62	153	195	80
RTOR Reduction (vph)	0	14	0	0	9	0	0	14	0	0	16	0
Lane Group Flow (vph)	110	1157	0	156	895	0	140	206	0	153	259	0
Confl. Peds. (#/hr)	1		1	1		1	2		19	19		2
Heavy Vehicles (%)	4%	3%	1%	1%	3%	2%	2%	4%	0%	3%	1%	0%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	15.1	41.9		11.2	37.5		11.1	15.9		13.5	18.3	
Effective Green, g (s)	16.1	42.9		11.2	38.0		11.6	15.9		14.0	18.3	
Actuated g/C Ratio	0.16	0.43		0.11	0.38		0.12	0.16		0.14	0.18	
Clearance Time (s)	5.0	5.0		4.0	4.5		4.5	4.0		4.5	4.0	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.5	2.3	
Lane Grp Cap (vph)	257	1353		184	1207		189	256		226	303	
v/s Ratio Prot	0.07	c0.37		c0.09	0.28		0.09	0.13		c0.09	c0.16	
v/s Ratio Perm												
v/c Ratio	0.43	0.85		0.85	0.74		0.74	0.80		0.68	0.86	
Uniform Delay, d1	37.8	25.7		43.6	26.8		42.7	40.5		40.9	39.6	
Progression Factor	0.62	0.51		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	6.2		28.0	4.1		13.3	15.9		7.1	20.1	
Delay (s)	24.0	19.2		71.6	30.9		56.1	56.4		48.0	59.6	
Level of Service	C	B		E	C		E	E		D	E	
Approach Delay (s)		19.7			36.9			56.3			55.5	
Approach LOS		B			D			E			E	

Intersection Summary			
HCM Average Control Delay	34.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

1222: N 1st Ave & Ivy St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	7	11	45	45	12	8	24	257	53	5	307	25
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	7	12	47	47	13	8	25	271	56	5	323	26

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	66	68	296	56	167	188
Volume Left (vph)	7	47	25	0	5	0
Volume Right (vph)	47	8	0	56	0	26
Hadj (s)	-0.41	0.06	0.08	-0.55	0.06	-0.06
Departure Headway (s)	5.2	5.6	5.3	4.7	5.3	5.2
Degree Utilization, x	0.10	0.11	0.44	0.07	0.25	0.27
Capacity (veh/h)	614	569	658	735	654	673
Control Delay (s)	8.7	9.3	11.2	6.9	8.8	8.9
Approach Delay (s)	8.7	9.3	10.5		8.8	
Approach LOS	A	A	B		A	

Intersection Summary			
Delay	9.6		
HCM Level of Service	A		
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

1232: NE Territorial Rd & N Holly St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	3	135	3	39	75	15	3	35	72	19	36	3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	150	3	43	83	17	3	39	80	21	40	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	157	143	122	64
Volume Left (vph)	3	43	3	21
Volume Right (vph)	3	17	80	3
Hadj (s)	0.04	0.00	-0.28	0.07
Departure Headway (s)	4.6	4.5	4.4	4.8
Degree Utilization, x	0.20	0.18	0.15	0.09
Capacity (veh/h)	755	749	760	687
Control Delay (s)	8.7	8.5	8.2	8.3
Approach Delay (s)	8.7	8.5	8.2	8.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.5		
HCM Level of Service	A		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	145	77	24	179	1	67	0	17	6	9	5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	161	86	27	199	1	74	0	19	7	10	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	200			247			467	457	204	476	499	199
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	200			247			467	457	204	476	499	199
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			85	100	98	99	98	99
cM capacity (veh/h)	1384			1331			485	493	842	484	466	847

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	247	227	93	22
Volume Left	0	27	74	7
Volume Right	86	1	19	6
cSH	1384	1331	531	532
Volume to Capacity	0.00	0.02	0.18	0.04
Queue Length 95th (ft)	0	2	16	3
Control Delay (s)	0.0	1.1	13.2	12.1
Lane LOS		A	B	B
Approach Delay (s)	0.0	1.1	13.2	12.1
Approach LOS			B	B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	2	41	0	66	2	786	71	102	950	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	2	45	0	73	2	864	78	112	1044	0
Pedestrians					1							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1777	2215	522	1656	2176	472	1044			943		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1777	2215	522	1656	2176	472	1044			943		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	20	100	87	100			84		
cM capacity (veh/h)	41	37	505	56	39	543	674			716		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	2	118	434	510	112	696	348
Volume Left	0	45	2	0	112	0	0
Volume Right	2	73	0	78	0	0	0
cSH	505	126	674	1700	716	1700	1700
Volume to Capacity	0.00	0.94	0.00	0.30	0.16	0.41	0.20
Queue Length 95th (ft)	0	154	0	0	14	0	0
Control Delay (s)	12.2	130.2	0.1	0.0	11.0	0.0	0.0
Lane LOS	B	F	A		B		
Approach Delay (s)	12.2	130.2	0.0		1.1		
Approach LOS	B	F					

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.97		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1611		1733	1389		1699
Flt Permitted	0.95		1.00	1.00		0.99
Satd. Flow (perm)	1611		1733	1389		1685
Volume (vph)	239	2	507	430	4	199
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	257	2	545	462	4	214
RTOR Reduction (vph)	1	0	0	220	0	0
Lane Group Flow (vph)	258	0	545	242	0	218
Confl. Peds. (#/hr)				8	8	
Heavy Vehicles (%)	3%	50%	1%	4%	50%	2%
Turn Type				Perm	Perm	
Protected Phases	4		6			2
Permitted Phases				6	2	
Actuated Green, G (s)	11.4		20.4	20.4		20.4
Effective Green, g (s)	11.9		21.9	21.9		21.9
Actuated g/C Ratio	0.28		0.52	0.52		0.52
Clearance Time (s)	4.5		5.5	5.5		5.5
Vehicle Extension (s)	2.5		3.0	3.0		3.0
Lane Grp Cap (vph)	459		908	728		883
v/s Ratio Prot	c0.16		c0.31			
v/s Ratio Perm				0.17		0.13
v/c Ratio	0.56		0.60	0.33		0.25
Uniform Delay, d1	12.7		6.9	5.7		5.4
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	1.3		1.1	0.3		0.1
Delay (s)	14.0		8.0	6.0		5.6
Level of Service	B		A	A		A
Approach Delay (s)	14.0		7.1			5.6
Approach LOS	B		A			A

Intersection Summary			
HCM Average Control Delay	8.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	41.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.96		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3212		1554	3189		1662	1660		1646	1534	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	3212		1554	3189		1662	1660		1646	1534	
Volume (vph)	63	1067	29	15	869	73	18	35	14	94	68	135
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	67	1135	31	16	924	78	19	37	15	100	72	144
RTOR Reduction (vph)	0	1	0	0	5	0	0	14	0	0	76	0
Lane Group Flow (vph)	67	1165	0	16	997	0	19	38	0	100	140	0
Confl. Peds. (#/hr)	2		2	2		2			10	10		
Heavy Vehicles (%)	0%	3%	4%	7%	3%	1%	0%	0%	0%	1%	2%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	7.7	62.1		2.9	57.3		2.9	6.2		13.3	16.6	
Effective Green, g (s)	7.7	62.1		2.9	57.3		2.9	5.7		13.3	16.1	
Actuated g/C Ratio	0.08	0.62		0.03	0.57		0.03	0.06		0.13	0.16	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	3.5		4.0	3.5	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	128	1995		45	1827		48	95		219	247	
v/s Ratio Prot	c0.04	c0.36		0.01	0.31		0.01	0.02		c0.06	c0.09	
v/s Ratio Perm												
v/c Ratio	0.52	0.58		0.36	0.55		0.40	0.40		0.46	0.57	
Uniform Delay, d1	44.4	11.3		47.6	13.3		47.7	45.5		40.0	38.7	
Progression Factor	1.12	0.51		1.14	0.34		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.9		1.8	0.8		3.1	1.6		0.9	2.1	
Delay (s)	51.4	6.6		56.3	5.2		50.8	47.1		40.9	40.9	
Level of Service	D	A		E	A		D	D		D	D	
Approach Delay (s)		9.1			6.0			48.1			40.9	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	106	19	160	116	23	135
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	123	22	186	135	27	157
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			202			
pX, platoon unblocked						
vC, conflicting volume	465	253			321	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	465	253			321	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	77	97			98	
cM capacity (veh/h)	545	790			1250	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	123	22	321	184
Volume Left	123	0	0	27
Volume Right	0	22	135	0
cSH	545	790	1700	1250
Volume to Capacity	0.23	0.03	0.19	0.02
Queue Length 95th (ft)	22	2	0	2
Control Delay (s)	13.5	9.7	0.0	1.3
Lane LOS	B	A		A
Approach Delay (s)	12.9		0.0	1.3
Approach LOS	B			

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.88		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1599	3228	1458	1630	3214		1646	1548		1646	1625	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.73	1.00		0.63	1.00	
Satd. Flow (perm)	1599	3228	1458	1630	3214		1262	1548		1090	1625	
Volume (vph)	26	867	216	61	740	71	152	24	80	80	22	20
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	27	913	227	64	779	75	160	25	84	84	23	21
RTOR Reduction (vph)	0	0	36	0	5	0	0	70	0	0	18	0
Lane Group Flow (vph)	27	913	191	64	849	0	160	39	0	84	26	0
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%	1%	0%	0%	1%	0%	0%
Turn Type	Prot		Perm	Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases			6				4			8		
Actuated Green, G (s)	3.2	62.9	62.9	7.6	67.3		17.0	17.0		17.0	17.0	
Effective Green, g (s)	3.2	63.9	63.9	7.6	68.3		16.5	16.5		16.5	16.5	
Actuated g/C Ratio	0.03	0.64	0.64	0.08	0.68		0.16	0.16		0.16	0.16	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		3.5	3.5		3.5	3.5	
Vehicle Extension (s)	2.3	4.5	4.5	2.3	4.8		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	51	2063	932	124	2195		208	255		180	268	
v/s Ratio Prot	0.02	c0.28		c0.04	0.26			0.03			0.02	
v/s Ratio Perm			0.13				c0.13			0.08		
v/c Ratio	0.53	0.44	0.20	0.52	0.39		0.77	0.15		0.47	0.10	
Uniform Delay, d1	47.7	9.1	7.5	44.4	6.8		39.9	35.8		37.8	35.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	0.7	0.5	2.2	0.5		15.0	0.2		1.4	0.1	
Delay (s)	53.9	9.8	8.0	46.7	7.3		54.9	36.0		39.2	35.6	
Level of Service	D	A	A	D	A		D	D		D	D	
Approach Delay (s)		10.4			10.1			47.3			37.9	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	176	384	178	30	24	58
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	198	431	200	34	27	65
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	234				1044	217
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234				1044	217
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				87	92
cM capacity (veh/h)	1334				214	828

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	629	234	92
Volume Left	198	0	27
Volume Right	0	34	65
cSH	1334	1700	450
Volume to Capacity	0.15	0.14	0.20
Queue Length 95th (ft)	13	0	19
Control Delay (s)	3.7	0.0	15.0
Lane LOS	A		C
Approach Delay (s)	3.7	0.0	15.0
Approach LOS			C

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	0.98			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		0.97	1.00
Satd. Flow (prot)	1646	3172		1539	3159			1620	1422		1689	1417
Flt Permitted	0.95	1.00		0.95	1.00			0.57	1.00		0.70	1.00
Satd. Flow (perm)	1646	3172		1539	3159			954	1422		1221	1417
Volume (vph)	90	864	71	65	771	140	57	46	92	110	72	59
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	93	891	73	67	795	144	59	47	95	113	74	61
RTOR Reduction (vph)	0	4	0	0	10	0	0	0	79	0	0	51
Lane Group Flow (vph)	93	960	0	67	929	0	0	106	16	0	187	10
Confl. Peds. (#/hr)			7	7					2	2		
Heavy Vehicles (%)	1%	3%	7%	8%	3%	2%	6%	4%	3%	0%	1%	5%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	9.1	62.3		8.1	61.3			17.6	17.6		17.6	17.6
Effective Green, g (s)	9.1	62.8		8.1	61.8			17.1	17.1		17.1	17.1
Actuated g/C Ratio	0.09	0.63		0.08	0.62			0.17	0.17		0.17	0.17
Clearance Time (s)	4.0	4.5		4.0	4.5			3.5	3.5		3.5	3.5
Vehicle Extension (s)	2.3	5.1		2.3	5.1			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	150	1992		125	1952			163	243		209	242
v/s Ratio Prot	c0.06	c0.30		0.04	0.29							
v/s Ratio Perm								0.11	0.01		c0.15	0.01
v/c Ratio	0.62	0.48		0.54	0.48			0.65	0.07		0.89	0.04
Uniform Delay, d1	43.8	9.9		44.1	10.3			38.7	34.8		40.6	34.6
Progression Factor	1.00	1.00		1.17	0.97			1.00	1.00		1.00	1.00
Incremental Delay, d2	6.3	0.4		2.6	0.7			8.0	0.1		34.7	0.1
Delay (s)	50.1	10.3		54.1	10.7			46.7	34.8		75.3	34.7
Level of Service	D	B		D	B			D	C		E	C
Approach Delay (s)		13.8			13.6			41.1			65.3	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	79	0	0	82	0	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	98	0	0	101	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			98		199	98
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			98		199	98
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1508		794	964

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	98	101	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1508	1700
Volume to Capacity	0.06	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	14.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	57	17	90	56	9	52
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	72	22	114	71	11	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			94		382	83
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			94		382	83
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		98	93
cM capacity (veh/h)			1507		577	982

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	94	185	77
Volume Left	0	114	11
Volume Right	22	0	66
cSH	1700	1507	890
Volume to Capacity	0.06	0.08	0.09
Queue Length 95th (ft)	0	6	7
Control Delay (s)	0.0	4.9	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	4.9	9.4
Approach LOS			A

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	19	99	19	44	122	36	13	46	14	43	56	34
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	21	110	21	49	136	40	14	51	16	48	62	38
Pedestrians											2	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	178			131			485	438	121	459	429	158
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	178			131			485	438	121	459	429	158
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	98			97			96	89	98	89	87	96
cM capacity (veh/h)	1378			1454			412	484	936	428	490	892

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	152	224	81	148
Volume Left	21	49	14	48
Volume Right	21	40	16	38
cSH	1378	1454	516	526
Volume to Capacity	0.02	0.03	0.16	0.28
Queue Length 95th (ft)	1	3	14	29
Control Delay (s)	1.2	1.9	13.3	14.5
Lane LOS	A	A	B	B
Approach Delay (s)	1.2	1.9	13.3	14.5
Approach LOS			B	B

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.91			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00			0.97	
Satd. Flow (prot)	1662	3260	1488	1599	3228	1430		1512			1613	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		1.00			0.67	
Satd. Flow (perm)	1662	3260	1488	1599	3228	1430		1507			1124	
Volume (vph)	23	569	4	139	535	229	2	60	113	372	118	25
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	24	587	4	143	552	236	2	62	116	384	122	26
RTOR Reduction (vph)	0	0	0	0	0	0	0	60	0	0	2	0
Lane Group Flow (vph)	24	587	4	143	552	236	0	120	0	0	530	0
Heavy Vehicles (%)	0%	2%	0%	4%	3%	4%	0%	5%	6%	4%	5%	0%
Turn Type	Prot		Free	Prot		Free	Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases			Free			Free	4			8		
Actuated Green, G (s)	2.8	19.1	89.0	11.8	28.1	89.0		41.1			41.1	
Effective Green, g (s)	3.8	21.1	89.0	12.8	30.1	89.0		43.1			43.1	
Actuated g/C Ratio	0.04	0.24	1.00	0.14	0.34	1.00		0.48			0.48	
Clearance Time (s)	5.0	6.0		5.0	6.0			6.0			6.0	
Vehicle Extension (s)	2.3	4.8		2.3	4.8			2.5			2.5	
Lane Grp Cap (vph)	71	773	1488	230	1092	1430		730			544	
v/s Ratio Prot	0.01	c0.18		c0.09	0.17							
v/s Ratio Perm			0.00			0.17		0.08			c0.47	
v/c Ratio	0.34	0.76	0.00	0.62	0.51	0.17		0.16			0.97	
Uniform Delay, d1	41.4	31.6	0.0	35.8	23.5	0.0		12.9			22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	1.6	5.0	0.0	4.2	0.7	0.2		0.1			31.8	
Delay (s)	43.0	36.6	0.0	40.0	24.2	0.2		12.9			54.2	
Level of Service	D	D	A	D	C	A		B			D	
Approach Delay (s)		36.6			20.6			12.9			54.2	
Approach LOS		D			C			B			D	

Intersection Summary			
HCM Average Control Delay	32.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.93		1.00	0.99		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1599	1628		1662	1727		1662	3222		1662	3197	1473
Flt Permitted	0.68	1.00		1.00	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1141	1628		1750	1727		1662	3222		1662	3197	1473
Volume (vph)	132	14	12	6	19	2	33	810	14	2	814	176
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	145	15	13	7	21	2	36	890	15	2	895	193
RTOR Reduction (vph)	0	12	0	0	2	0	0	1	0	0	0	76
Lane Group Flow (vph)	145	16	0	7	21	0	36	904	0	2	895	117
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	1%
Turn Type	pm+pt			pm+pt			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								2
Actuated Green, G (s)	10.2	5.4		2.2	1.4		3.0	34.2		1.1	32.3	32.3
Effective Green, g (s)	10.7	5.9		2.7	1.9		3.0	36.2		1.1	34.3	34.3
Actuated g/C Ratio	0.18	0.10		0.05	0.03		0.05	0.60		0.02	0.57	0.57
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	0.2	2.5		0.2	2.5		2.3	5.4		2.3	5.4	5.4
Lane Grp Cap (vph)	240	160		78	55		83	1944		30	1828	842
v/s Ratio Prot	c0.05	0.01		0.00	0.01		c0.02	c0.28		0.00	0.28	
v/s Ratio Perm	c0.06			0.00								0.08
v/c Ratio	0.60	0.10		0.09	0.38		0.43	0.46		0.07	0.49	0.14
Uniform Delay, d1	22.5	24.6		27.5	28.5		27.7	6.6		28.9	7.6	6.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.9	0.2		0.2	3.2		2.1	0.8		0.5	0.9	0.3
Delay (s)	25.4	24.8		27.7	31.7		29.8	7.4		29.5	8.6	6.3
Level of Service	C	C		C	C		C	A		C	A	A
Approach Delay (s)		25.3			30.7			8.2			8.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.95		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1612		1612	1609		1630	1597		1629	1697	
Flt Permitted	0.64	1.00		0.60	1.00		0.57	1.00		0.61	1.00	
Satd. Flow (perm)	1118	1612		1017	1609		973	1597		1048	1697	
Volume (vph)	32	130	54	65	106	57	49	172	34	56	219	37
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	37	149	62	75	122	66	56	198	39	64	252	43
RTOR Reduction (vph)	0	32	0	0	42	0	0	11	0	0	10	0
Lane Group Flow (vph)	37	179	0	75	146	0	56	226	0	64	285	0
Confl. Peds. (#/hr)			13	13					1	1		
Heavy Vehicles (%)	0%	3%	2%	2%	2%	5%	2%	6%	9%	2%	1%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.6	8.6		8.6	8.6		20.0	18.5		20.0	18.5	
Effective Green, g (s)	9.1	9.1		9.1	9.1		21.0	19.5		21.0	19.5	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.50	0.46		0.50	0.46	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	242	348		220	348		509	740		543	786	
v/s Ratio Prot		c0.11			0.09		0.00	0.14		c0.00	c0.17	
v/s Ratio Perm	0.03			0.07			0.05			0.05		
v/c Ratio	0.15	0.51		0.34	0.42		0.11	0.31		0.12	0.36	
Uniform Delay, d1	13.4	14.5		14.0	14.2		5.5	7.1		5.5	7.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.0		0.7	0.6		0.1	0.3		0.1	0.4	
Delay (s)	13.6	15.5		14.6	14.8		5.5	7.4		5.6	7.7	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s)		15.2			14.8			7.0			7.3	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	42.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	115	72	107	43	2
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	137	86	127	51	2
Pedestrians		3	1			
Lane Width (ft)		12.0	12.0			
Walking Speed (ft/s)		4.0	4.0			
Percent Blockage		0	0			
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			1286			
pX, platoon unblocked						
vC, conflicting volume	213				287	152
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	213				287	152
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				93	100
cM capacity (veh/h)	1369				707	897

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	137	213	54
Volume Left	0	0	51
Volume Right	0	127	2
cSH	1369	1700	714
Volume to Capacity	0.00	0.13	0.08
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.0	0.0	10.5
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.5
Approach LOS			B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	286	24	67	10	28	59	24	27	3	59	36	38
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	295	25	69	10	29	61	25	28	3	61	37	39
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											678	
pX, platoon unblocked												
vC, conflicting volume	311	239	19	301	277	29	76			31		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	311	239	19	301	277	29	76			31		
tC, single (s)	7.5	6.5	6.9	7.5	6.6	7.0	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	45	96	93	98	95	94	98			96		
cM capacity (veh/h)	537	630	1062	552	593	1032	1506			1595		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3	SB 4
Volume Total	295	94	10	90	25	31	61	19	19	39
Volume Left	295	0	10	0	25	0	61	0	0	0
Volume Right	0	69	0	61	0	3	0	0	0	39
cSH	537	899	552	834	1506	1700	1595	1700	1700	1700
Volume to Capacity	0.55	0.10	0.02	0.11	0.02	0.02	0.04	0.01	0.01	0.02
Queue Length 95th (ft)	82	9	1	9	1	0	3	0	0	0
Control Delay (s)	19.6	9.5	11.7	9.8	7.4	0.0	7.3	0.0	0.0	0.0
Lane LOS	C	A	B	A	A		A			
Approach Delay (s)	17.1		10.0		3.3		3.3			
Approach LOS	C		B							

Intersection Summary			
Average Delay	12.2		
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

1489: SE 4th Ave & S Redwood St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	2	2	4	31	0	11	5	100	8	15	96	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	2	2	5	36	0	13	6	118	9	18	113	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	296	288	114	289	284	122	114			127		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	296	288	114	289	284	122	114			127		
tC, single (s)	7.6	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	4.0	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	100	100	94	100	99	100			99		
cM capacity (veh/h)	556	615	945	654	618	934	1488			1394		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	9	49	133	132
Volume Left	2	36	6	18
Volume Right	5	13	9	1
cSH	722	710	1488	1394
Volume to Capacity	0.01	0.07	0.00	0.01
Queue Length 95th (ft)	1	6	0	1
Control Delay (s)	10.1	10.5	0.4	1.1
Lane LOS	B	B	A	A
Approach Delay (s)	10.1	10.5	0.4	1.1
Approach LOS	B	B		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

1515: N Knights Bridge Rd & N Cedar St

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	296	112	14	124	84	18
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	312	118	15	131	88	19
Pedestrians	1			6	1	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			430		533	378
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			430		533	378
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		82	97
cM capacity (veh/h)			1139		502	670

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	429	145	107
Volume Left	0	15	88
Volume Right	118	0	19
cSH	1700	1139	525
Volume to Capacity	0.25	0.01	0.20
Queue Length 95th (ft)	0	1	19
Control Delay (s)	0.0	0.9	13.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.9	13.6
Approach LOS			B

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1537: SE 4th Ave & Sequoia Pkwy

30th HV Existing Conditions
Baseline

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	14	5	4	0	2	3	3	43	1	1	87	24
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	19	7	5	0	3	4	4	57	1	1	116	32

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	25	5	7	4	59	1	148
Volume Left (vph)	19	0	0	4	0	1	0
Volume Right (vph)	0	5	4	0	1	0	32
Hadj (s)	0.15	-0.60	-0.36	0.50	0.07	0.50	-0.11
Departure Headway (s)	4.5	3.2	4.1	5.2	4.7	5.1	4.5
Degree Utilization, x	0.03	0.00	0.01	0.01	0.08	0.00	0.19
Capacity (veh/h)	756	1121	835	680	742	685	783
Control Delay (s)	7.7	6.2	7.1	7.0	6.9	6.9	7.3
Approach Delay (s)	7.4		7.1	6.9		7.3	
Approach LOS	A		A	A		A	

Intersection Summary			
Delay	7.2		
HCM Level of Service	A		
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1556: NW 3rd Ave & N Cedar St

30th HV Existing Conditions
Baseline

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	16	10	66	2	7	17	19	48	1	18	81	5
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	20	12	81	2	9	21	23	59	1	22	100	6
Pedestrians		3			1			2			1	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	284	259	108	345	261	62	109			61		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	284	259	108	345	261	62	109			61		
tC, single (s)	7.1	6.6	6.2	7.1	6.6	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.1	3.3	2.2			2.2		
p0 queue free %	97	98	91	100	99	98	98			99		
cM capacity (veh/h)	633	611	947	536	603	1007	1459			1553		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	114	32	84	128
Volume Left	20	2	23	22
Volume Right	81	21	1	6
cSH	826	807	1459	1553
Volume to Capacity	0.14	0.04	0.02	0.01
Queue Length 95th (ft)	12	3	1	1
Control Delay (s)	10.0	9.6	2.2	1.4
Lane LOS	B	A	A	A
Approach Delay (s)	10.0	9.6	2.2	1.4
Approach LOS	B	A		

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	35	115	45	24	84	5	22	23	20	13	59	35
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	41	135	53	28	99	6	26	27	24	15	69	41

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	229	133	76	126
Volume Left (vph)	41	28	26	15
Volume Right (vph)	53	6	24	41
Hadj (s)	-0.05	0.05	-0.09	-0.14
Departure Headway (s)	4.5	4.7	4.8	4.7
Degree Utilization, x	0.29	0.17	0.10	0.17
Capacity (veh/h)	753	714	679	700
Control Delay (s)	9.3	8.7	8.4	8.7
Approach Delay (s)	9.3	8.7	8.4	8.7
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.9		
HCM Level of Service	A		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	0	0	857	0	0	832
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	0	0	874	0	0	849
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1299	437			874	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1299	437			874	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	156	573			780	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	0	583	291	0	424	424
Volume Left	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	1700
Volume to Capacity	0.00	0.34	0.17	0.00	0.25	0.25
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	70	1	4	61	3	4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	82	1	5	72	4	5
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			85		165	84
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			85		165	84
tC, single (s)			4.4		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1378		827	980

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	84	76	8
Volume Left	0	5	4
Volume Right	1	0	5
cSH	1700	1378	908
Volume to Capacity	0.05	0.00	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.5	9.0
Lane LOS		A	A
Approach Delay (s)	0.0	0.5	9.0
Approach LOS			A

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	17.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	34	45	27	29	71	55
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	42	56	33	36	88	68

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	98	69	156
Volume Left (vph)	42	33	0
Volume Right (vph)	56	0	68
Hadj (s)	-0.26	0.16	-0.22
Departure Headway (s)	4.1	4.4	4.0
Degree Utilization, x	0.11	0.08	0.17
Capacity (veh/h)	828	783	883
Control Delay (s)	7.6	7.8	7.8
Approach Delay (s)	7.6	7.8	7.8
Approach LOS	A	A	A

Intersection Summary			
Delay	7.7		
HCM Level of Service	A		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	23	160	0	0	132	9	0	0	0	35	0	46
Peak Hour Factor	0.96	0.96	0.92	0.92	0.96	0.96	0.92	0.92	0.92	0.96	0.92	0.96
Hourly flow rate (vph)	24	167	0	0	138	9	0	0	0	36	0	48
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	147			167			405	361	167	357	357	142
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	147			167			405	361	167	357	357	142
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			100	100	100	94	100	95
cM capacity (veh/h)	1447			1411			521	556	878	595	560	911

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	191	147	36	48
Volume Left	24	0	36	0
Volume Right	0	9	0	48
cSH	1447	1411	595	911
Volume to Capacity	0.02	0.00	0.06	0.05
Queue Length 95th (ft)	1	0	5	4
Control Delay (s)	1.1	0.0	11.4	9.2
Lane LOS	A		B	A
Approach Delay (s)	1.1	0.0	10.2	
Approach LOS			B	

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	3197	1430	1614	3220		3162	1750	1430	1646	1571	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.00	1.00	
Satd. Flow (perm)	1662	3197	1430	1614	3220		3162	1750	1430	0	1571	
Volume (vph)	65	733	101	63	681	15	267	47	45	59	48	53
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	67	756	104	65	702	15	275	48	46	61	49	55
RTOR Reduction (vph)	0	0	50	0	1	0	0	0	42	0	44	0
Lane Group Flow (vph)	67	756	54	65	716	0	275	48	4	61	60	0
Heavy Vehicles (%)	0%	4%	4%	3%	3%	0%	2%	0%	4%	1%	2%	3%
Turn Type	Prot		Perm	Prot			Prot		Perm	pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6						4	8		
Actuated Green, G (s)	7.6	50.5	50.5	10.0	54.4		12.9	8.2	8.2	12.3	7.6	
Effective Green, g (s)	7.6	52.0	52.0	11.5	55.9		12.9	8.2	8.2	12.3	7.6	
Actuated g/C Ratio	0.08	0.52	0.52	0.12	0.56		0.13	0.08	0.08	0.12	0.08	
Clearance Time (s)	4.0	5.5	5.5	5.5	5.5		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.3	5.5	5.5	2.3	5.5		2.3	2.3	2.3	3.0	2.3	
Lane Grp Cap (vph)	126	1662	744	186	1800		408	144	117	202	119	
v/s Ratio Prot	0.04	c0.24		0.04	c0.22		c0.09	0.03		0.04	c0.04	
v/s Ratio Perm			0.04						0.00			
v/c Ratio	0.53	0.45	0.07	0.35	0.40		0.67	0.33	0.03	0.30	0.50	
Uniform Delay, d1	44.5	15.1	12.0	40.8	12.5		41.5	43.3	42.2	39.9	44.4	
Progression Factor	0.78	0.72	0.46	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.5	0.8	0.2	0.7	0.7		3.8	0.8	0.1	0.8	1.9	
Delay (s)	37.2	11.6	5.7	41.5	13.2		45.3	44.1	42.3	40.8	46.3	
Level of Service	D	B	A	D	B		D	D	D	D	D	
Approach Delay (s)		12.8			15.5			44.8			44.3	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix F: Future Year HCM Output

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	80	10	40	30	10	30	200	20	80	350	30
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	12	93	12	47	35	12	35	233	23	93	407	35

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	116	93	291	535
Volume Left (vph)	12	47	35	93
Volume Right (vph)	12	12	23	35
Hadj (s)	0.01	0.04	-0.01	0.03
Departure Headway (s)	6.2	6.3	5.3	5.1
Degree Utilization, x	0.20	0.16	0.43	0.75
Capacity (veh/h)	511	497	631	697
Control Delay (s)	10.8	10.6	12.3	21.6
Approach Delay (s)	10.8	10.6	12.3	21.6
Approach LOS	B	B	B	C

Intersection Summary			
Delay	16.8		
HCM Level of Service	C		
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	90	0	190	220	140	160
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	105	0	221	256	163	186
Pedestrians	3					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	956	259	352			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	956	259	352			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	55	100	82			
cM capacity (veh/h)	233	783	1215			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	105	477	349
Volume Left	105	221	0
Volume Right	0	0	186
cSH	233	1215	1700
Volume to Capacity	0.45	0.18	0.21
Queue Length 95th (ft)	54	17	0
Control Delay (s)	32.4	5.0	0.0
Lane LOS	D	A	
Approach Delay (s)	32.4	5.0	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	30	360	390	190	400	450
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	33	400	433	211	444	500
Pedestrians			9			33
Lane Width (ft)			12.0			12.0
Walking Speed (ft/s)			4.0			4.0
Percent Blockage			1			3
Right turn flare (veh)		8				
Median type	None					
Median storage veh)						
Upstream signal (ft)						1183
pX, platoon unblocked						
vC, conflicting volume	1937	572			644	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1937	572			644	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	13	21			53	
cM capacity (veh/h)	38	507			945	

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	433	644	444	500
Volume Left	33	0	444	0
Volume Right	400	211	0	0
cSH	499	1700	945	1700
Volume to Capacity	0.87	0.38	0.47	0.29
Queue Length 95th (ft)	232	0	64	0
Control Delay (s)	51.3	0.0	12.1	0.0
Lane LOS	F		B	
Approach Delay (s)	51.3	0.0	5.7	
Approach LOS	F			

Intersection Summary			
Average Delay	13.7		
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	10	50	530	70	20	860
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	54	576	76	22	935
Pedestrians	2		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						262
pX, platoon unblocked	0.80					
vC, conflicting volume	1595	616			654	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1741	616			654	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	89			98	
cM capacity (veh/h)	74	484			941	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	65	652	957
Volume Left	11	0	22
Volume Right	54	76	0
cSH	252	1700	941
Volume to Capacity	0.26	0.38	0.02
Queue Length 95th (ft)	25	0	2
Control Delay (s)	24.2	0.0	0.6
Lane LOS	C		A
Approach Delay (s)	24.2	0.0	0.6
Approach LOS	C		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	10	250	50	30	10	60	280	70	10	480	30
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	11	11	263	53	32	11	63	295	74	11	505	32

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	284	95	358	74	263	284
Volume Left (vph)	11	53	63	0	11	0
Volume Right (vph)	263	11	0	74	0	32
Hadj (s)	-0.55	0.04	0.13	-0.55	0.07	-0.04
Departure Headway (s)	6.1	7.2	6.8	6.1	6.6	6.5
Degree Utilization, x	0.48	0.19	0.68	0.12	0.48	0.51
Capacity (veh/h)	541	420	510	561	525	536
Control Delay (s)	14.5	11.9	21.6	8.8	14.4	14.9
Approach Delay (s)	14.5	11.9	19.4		14.7	
Approach LOS	B	B	C		B	

Intersection Summary			
Delay	16.0		
HCM Level of Service	C		
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	300	10	190	70	80	0	60	130	30	70	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	22	333	11	211	78	89	0	67	144	33	78	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	367	378	211	111
Volume Left (vph)	22	211	0	33
Volume Right (vph)	11	89	144	0
Hadj (s)	0.06	-0.03	-0.30	0.10
Departure Headway (s)	5.6	5.5	5.9	6.6
Degree Utilization, x	0.57	0.58	0.35	0.20
Capacity (veh/h)	606	619	533	455
Control Delay (s)	15.8	15.8	12.0	11.2
Approach Delay (s)	15.8	15.8	12.0	11.2
Approach LOS	C	C	B	B

Intersection Summary			
Delay	14.6		
HCM Level of Service	B		
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	300	180	40	360	0	160	0	10	10	10	10
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	333	200	44	400	0	178	0	11	11	11	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	400			533			939	922	433	933	1022	400
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	400			533			939	922	433	933	1022	400
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			20	100	98	95	95	98
cM capacity (veh/h)	1170			1045			223	261	627	236	228	654

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	533	444	189	33
Volume Left	0	44	178	11
Volume Right	200	0	11	11
cSH	1170	1045	231	295
Volume to Capacity	0.00	0.04	0.82	0.11
Queue Length 95th (ft)	0	3	154	9
Control Delay (s)	0.0	1.3	65.3	18.7
Lane LOS		A	F	C
Approach Delay (s)	0.0	1.3	65.3	18.7
Approach LOS			F	C

Intersection Summary			
Average Delay	11.3		
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.97		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1614		1733	1387		1716
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1614		1733	1387		1716
Volume (vph)	280	0	920	420	0	390
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	301	0	989	452	0	419
RTOR Reduction (vph)	0	0	0	207	0	0
Lane Group Flow (vph)	301	0	989	245	0	419
Confl. Peds. (#/hr)				8	8	
Heavy Vehicles (%)	3%	50%	1%	4%	50%	2%
Turn Type				Perm	Perm	
Protected Phases	4		6			2
Permitted Phases				6	2	
Actuated Green, G (s)	12.9		23.9	23.9		23.9
Effective Green, g (s)	13.4		25.4	25.4		25.4
Actuated g/C Ratio	0.29		0.54	0.54		0.54
Clearance Time (s)	4.5		5.5	5.5		5.5
Vehicle Extension (s)	2.5		3.0	3.0		3.0
Lane Grp Cap (vph)	462		941	753		931
v/s Ratio Prot	c0.19		c0.57			0.24
v/s Ratio Perm				0.18		
v/c Ratio	0.65		1.05	0.33		0.45
Uniform Delay, d1	14.7		10.7	5.9		6.5
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	2.9		43.7	0.3		0.3
Delay (s)	17.6		54.4	6.2		6.8
Level of Service	B		D	A		A
Approach Delay (s)	17.6		39.3			6.8
Approach LOS	B		D			A

Intersection Summary			
HCM Average Control Delay	30.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	46.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	110	20	510	200	40	140
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	128	23	593	233	47	163
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)			202			
pX, platoon unblocked						
vC, conflicting volume	966	709			826	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	966	709			826	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	52	95			94	
cM capacity (veh/h)	267	437			814	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	128	23	826	209
Volume Left	128	0	0	47
Volume Right	0	23	233	0
cSH	267	437	1700	814
Volume to Capacity	0.48	0.05	0.49	0.06
Queue Length 95th (ft)	61	4	0	5
Control Delay (s)	30.3	13.7	0.0	2.6
Lane LOS	D	B		A
Approach Delay (s)	27.7		0.0	2.6
Approach LOS	D			

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	340	660	450	40	20	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	382	742	506	45	22	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	551				2034	528
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	551				2034	528
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	63				42	100
cM capacity (veh/h)	1019				39	554

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1124	551	22
Volume Left	382	0	22
Volume Right	0	45	0
cSH	1019	1700	39
Volume to Capacity	0.37	0.32	0.58
Queue Length 95th (ft)	44	0	52
Control Delay (s)	8.3	0.0	186.0
Lane LOS	A		F
Approach Delay (s)	8.3	0.0	186.0
Approach LOS			F

Intersection Summary			
Average Delay	7.9		
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	40	220	0	0	320	20	0	0	0	30	0	50
Peak Hour Factor	0.92	0.81	0.81	0.81	0.81	0.92	0.81	0.92	0.81	0.92	0.92	0.92
Hourly flow rate (vph)	43	272	0	0	395	22	0	0	0	33	0	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	417			272			819	775	272	764	764	406
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	417			272			819	775	272	764	764	406
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	90	100	92
cM capacity (veh/h)	1142			1303			264	316	772	311	321	645

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	315	417	0	87
Volume Left	43	0	0	33
Volume Right	0	22	0	54
cSH	1142	1303	1700	460
Volume to Capacity	0.04	0.00	0.00	0.19
Queue Length 95th (ft)	3	0	0	17
Control Delay (s)	1.5	0.0	0.0	14.6
Lane LOS	A		A	B
Approach Delay (s)	1.5	0.0	0.0	14.6
Approach LOS			A	B

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	340	220	320	170	30	140
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	430	278	405	215	38	177
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			709		1595	570
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			709		1595	570
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			55		42	66
cM capacity (veh/h)			895		65	525

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	709	620	215
Volume Left	0	405	38
Volume Right	278	0	177
cSH	1700	895	234
Volume to Capacity	0.42	0.45	0.92
Queue Length 95th (ft)	0	60	198
Control Delay (s)	0.0	10.3	84.7
Lane LOS		B	F
Approach Delay (s)	0.0	10.3	84.7
Approach LOS			F

Intersection Summary			
Average Delay	15.9		
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

1418: S Township Rd & S Redwood St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	40	490	40	170	410	150	10	30	10	30	40	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	44	544	44	189	456	167	11	33	11	33	44	33
Pedestrians											2	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	624			589			1628	1658	567	1602	1596	541
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	624			589			1628	1658	567	1602	1596	541
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	95			81			70	55	98	21	45	94
cM capacity (veh/h)	941			986			37	74	527	42	81	544

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	633	811	56	111
Volume Left	44	189	11	33
Volume Right	44	167	11	33
cSH	941	986	72	80
Volume to Capacity	0.05	0.19	0.77	1.40
Queue Length 95th (ft)	4	18	91	218
Control Delay (s)	1.2	4.4	144.6	330.5
Lane LOS	A	A	F	F
Approach Delay (s)	1.2	4.4	144.6	330.5
Approach LOS			F	F

Intersection Summary			
Average Delay	30.5		
Intersection Capacity Utilization	96.2%	ICU Level of Service	F
Analysis Period (min)	15		

1442: 13th Ave & Ivy St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1617		1614	1632		1630	1598		1630	1724	
Flt Permitted	0.31	1.00		0.40	1.00		0.45	1.00		0.32	1.00	
Satd. Flow (perm)	537	1617		682	1632		780	1598		550	1724	
Volume (vph)	40	240	90	180	290	110	100	310	60	150	270	10
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	46	276	103	207	333	126	115	356	69	172	310	11
RTOR Reduction (vph)	0	24	0	0	24	0	0	13	0	0	3	0
Lane Group Flow (vph)	46	356	0	207	436	0	115	412	0	172	318	0
Confl. Peds. (#/hr)			13	13					1	1		
Heavy Vehicles (%)	0%	3%	2%	2%	2%	5%	2%	6%	9%	2%	1%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.4	18.4		18.4	18.4		19.9	16.5		19.9	16.5	
Effective Green, g (s)	18.9	18.9		18.9	18.9		20.9	17.5		20.9	17.5	
Actuated g/C Ratio	0.36	0.36		0.36	0.36		0.40	0.34		0.40	0.34	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	196	590		249	595		371	540		293	582	
v/s Ratio Prot		0.22			0.27		0.02	c0.26		c0.04	0.18	
v/s Ratio Perm	0.09			c0.30			0.10			0.20		
v/c Ratio	0.23	0.60		0.83	0.73		0.31	0.76		0.59	0.55	
Uniform Delay, d1	11.4	13.4		15.0	14.3		10.0	15.3		11.2	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.5		20.1	4.4		0.3	6.7		2.5	1.3	
Delay (s)	11.9	14.9		35.1	18.6		10.4	22.0		13.6	15.3	
Level of Service	B	B		D	B		B	C		B	B	
Approach Delay (s)		14.5			23.7			19.5			14.7	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	51.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	130	390	130	40	0
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	155	464	155	48	0
Pedestrians		3	1			
Lane Width (ft)		12.0	12.0			
Walking Speed (ft/s)		4.0	4.0			
Percent Blockage		0	0			
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			1286			
pX, platoon unblocked						
vC, conflicting volume	619				697	545
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	619				697	545
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				88	100
cM capacity (veh/h)	971				410	541

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	155	619	48
Volume Left	0	0	48
Volume Right	0	155	0
cSH	971	1700	410
Volume to Capacity	0.00	0.36	0.12
Queue Length 95th (ft)	0	0	10
Control Delay (s)	0.0	0.0	14.9
Lane LOS			B
Approach Delay (s)	0.0	0.0	14.9
Approach LOS			B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	40	90	20	50	300	50	690	20	280	250	40
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	5	41	93	21	52	309	52	711	21	289	258	41
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											678	
pX, platoon unblocked												
vC, conflicting volume	1985	1670	129	1644	1701	722	299			732		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1985	1670	129	1644	1701	722	299			732		
tC, single (s)	7.5	6.5	6.9	7.5	6.6	7.0	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	34	90	4	11	15	96			67		
cM capacity (veh/h)	1	63	903	21	58	365	1245			882		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3	SB 4
Volume Total	5	134	21	361	52	732	289	129	129	41
Volume Left	5	0	21	0	52	0	289	0	0	0
Volume Right	0	93	0	309	0	21	0	0	0	41
cSH	1	176	21	208	1245	1700	882	1700	1700	1700
Volume to Capacity	5.03	0.76	0.96	1.74	0.04	0.43	0.33	0.08	0.08	0.02
Queue Length 95th (ft)	Err	123	68	615	3	0	36	0	0	0
Control Delay (s)	Err	71.3	434.8	389.9	8.0	0.0	11.1	0.0	0.0	0.0
Lane LOS	F	F	F	F	A		B			
Approach Delay (s)	439.0		392.3		0.5		5.4			
Approach LOS	F		F							

Intersection Summary			
Average Delay	113.3		
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		

1489: SE 4th Ave & S Redwood St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	10	0	10	40	0	80	10	200	30	40	50	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	12	0	12	47	0	94	12	235	35	47	59	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	524	447	59	441	429	253	59			271		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	524	447	59	441	429	253	59			271		
tC, single (s)	7.6	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	4.0	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	97	100	99	91	100	88	99			96		
cM capacity (veh/h)	337	486	1013	506	498	791	1558			1232		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	24	141	282	106
Volume Left	12	47	12	47
Volume Right	12	94	35	0
cSH	506	666	1558	1232
Volume to Capacity	0.05	0.21	0.01	0.04
Queue Length 95th (ft)	4	20	1	3
Control Delay (s)	12.5	11.9	0.4	3.7
Lane LOS	B	B	A	A
Approach Delay (s)	12.5	11.9	0.4	3.7
Approach LOS	B	B		

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

1515: N Knights Bridge Rd & N Cedar St

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	550	130	20	400	100	20
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	579	137	21	421	105	21
Pedestrians	1			6	1	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			717		1113	654
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			717		1113	654
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		53	95
cM capacity (veh/h)			893		226	467

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	716	442	126
Volume Left	0	21	105
Volume Right	137	0	21
cSH	1700	893	247
Volume to Capacity	0.42	0.02	0.51
Queue Length 95th (ft)	0	2	67
Control Delay (s)	0.0	0.7	33.8
Lane LOS		A	D
Approach Delay (s)	0.0	0.7	33.8
Approach LOS			D

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	90	20	30	350	290	70
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	120	27	40	467	387	93

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total (vph)	147	40	467	480
Volume Left (vph)	120	40	0	0
Volume Right (vph)	27	0	0	93
Hadj (s)	0.05	0.50	0.09	-0.08
Departure Headway (s)	6.3	6.0	5.6	5.1
Degree Utilization, x	0.26	0.07	0.72	0.68
Capacity (veh/h)	498	585	628	690
Control Delay (s)	11.5	8.2	20.6	18.3
Approach Delay (s)	11.5	19.6		18.3
Approach LOS	B	C		C

Intersection Summary			
Delay	18.0		
HCM Level of Service	C		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	30	0	80	0	10	20	40	60	10	20	90	10
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	37	0	99	0	12	25	49	74	12	25	111	12
Pedestrians		3			1			2			1	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	381	356	122	447	356	82	126			87		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	381	356	122	447	356	82	126			87		
tC, single (s)	7.1	6.6	6.2	7.1	6.6	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.1	3.3	2.2			2.2		
p0 queue free %	93	100	89	100	98	97	97			98		
cM capacity (veh/h)	532	528	930	449	522	981	1438			1520		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	136	37	136	148
Volume Left	37	0	49	25
Volume Right	99	25	12	12
cSH	772	759	1438	1520
Volume to Capacity	0.18	0.05	0.03	0.02
Queue Length 95th (ft)	16	4	3	1
Control Delay (s)	10.7	10.0	2.9	1.3
Lane LOS	B	A	A	A
Approach Delay (s)	10.7	10.0	2.9	1.3
Approach LOS	B	A		

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	60	170	100	60	140	20	110	110	50	70	270	260
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	71	200	118	71	165	24	129	129	59	82	318	306

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	388	259	318	706
Volume Left (vph)	71	71	129	82
Volume Right (vph)	118	24	59	306
Hadj (s)	-0.09	0.03	0.00	-0.20
Departure Headway (s)	7.9	8.6	8.2	7.6
Degree Utilization, x	0.85	0.62	0.73	1.50
Capacity (veh/h)	437	392	418	475
Control Delay (s)	42.2	24.4	30.1	254.7
Approach Delay (s)	42.2	24.4	30.1	254.7
Approach LOS	E	C	D	F

Intersection Summary			
Delay	126.9		
HCM Level of Service	F		
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	360	30	60	150	70	190
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	424	35	71	176	82	224
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			460		760	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			460		760	442
tC, single (s)			4.4		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.3
p0 queue free %			93		76	64
cM capacity (veh/h)			990		350	619

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	459	247	306
Volume Left	0	71	82
Volume Right	35	0	224
cSH	1700	990	513
Volume to Capacity	0.27	0.07	0.60
Queue Length 95th (ft)	0	6	97
Control Delay (s)	0.0	3.1	21.9
Lane LOS		A	C
Approach Delay (s)	0.0	3.1	21.9
Approach LOS			C

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	170	80	40	60	150	280
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	210	99	49	74	185	346

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	309	123	531
Volume Left (vph)	210	49	0
Volume Right (vph)	99	0	346
Hadj (s)	-0.06	0.15	-0.37
Departure Headway (s)	5.4	5.7	4.6
Degree Utilization, x	0.47	0.19	0.68
Capacity (veh/h)	618	577	752
Control Delay (s)	13.1	10.0	17.1
Approach Delay (s)	13.1	10.0	17.1
Approach LOS	B	B	C

Intersection Summary			
Delay	14.9		
HCM Level of Service	B		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	170	280	60	30	460	120	50	80	20	70	30	230
Peak Hour Factor	0.96	0.96	0.92	0.92	0.96	0.96	0.92	0.92	0.92	0.96	0.92	0.96
Hourly flow rate (vph)	177	292	65	33	479	125	54	87	22	73	33	240
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	604			357			1541	1348	324	1351	1318	542
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	604			357			1541	1348	324	1351	1318	542
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	82			97			0	28	97	0	74	56
cM capacity (veh/h)	983			1202			36	120	717	45	125	545

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	534	637	54	109	73	272
Volume Left	177	33	54	0	73	0
Volume Right	65	125	0	22	0	240
cSH	983	1202	36	144	45	389
Volume to Capacity	0.18	0.03	1.52	0.75	1.63	0.70
Queue Length 95th (ft)	16	2	146	113	182	129
Control Delay (s)	4.6	0.7	509.1	81.8	510.5	33.2
Lane LOS	A	A	F	F	F	D
Approach Delay (s)	4.6	0.7	224.2		134.0	
Approach LOS			F		F	

Intersection Summary			
Average Delay	51.1		
Intersection Capacity Utilization	100.0%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↱		↰	↱	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.95		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	3246		1630	3177		1484	1592		1630	1519	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	3246		1630	3177		1484	1592		1630	1519	
Volume (vph)	230	1420	40	110	1130	120	80	170	80	200	120	260
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	245	1511	43	117	1202	128	85	181	85	213	128	277
RTOR Reduction (vph)	0	2	0	0	8	0	0	17	0	0	76	0
Lane Group Flow (vph)	245	1552	0	117	1322	0	85	249	0	213	329	0
Confl. Peds. (#/hr)	1		1	1		1	9					9
Heavy Vehicles (%)	2%	2%	0%	2%	3%	2%	12%	4%	6%	2%	0%	2%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	11.4	41.6		11.0	41.7		7.9	20.9		10.5	23.5	
Effective Green, g (s)	11.4	42.1		11.0	41.7		7.9	20.4		10.5	23.0	
Actuated g/C Ratio	0.11	0.42		0.11	0.42		0.08	0.20		0.10	0.23	
Clearance Time (s)	4.0	4.5		4.0	4.0		4.0	3.5		4.0	3.5	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	186	1367		179	1325		117	325		171	349	
v/s Ratio Prot	c0.15	c0.48		0.07	c0.42		0.06	0.16		c0.13	c0.22	
v/s Ratio Perm												
v/c Ratio	1.32	1.14		0.65	1.00		0.73	0.77		1.25	0.94	
Uniform Delay, d1	44.3	29.0		42.7	29.1		45.0	37.6		44.8	37.8	
Progression Factor	1.00	1.00		0.58	0.38		1.00	1.00		1.00	1.00	
Incremental Delay, d2	175.4	70.5		4.4	18.8		18.2	9.7		149.9	33.2	
Delay (s)	219.7	99.5		29.2	29.8		63.2	47.3		194.6	71.0	
Level of Service	F	F		C	C		E	D		F	E	
Approach Delay (s)		115.9			29.8			51.1			113.6	
Approach LOS		F			C			D			F	

Intersection Summary			
HCM Average Control Delay	80.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↱		↰	↱	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1599	3180		1646	3186		1630	1576		1614	1720	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3180		1646	3186		1630	1576		1614	1720	
Volume (vph)	110	1570	170	280	1140	100	230	210	140	330	430	20
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	118	1688	183	301	1226	108	247	226	151	355	462	22
RTOR Reduction (vph)	0	8	0	0	7	0	0	24	0	0	2	0
Lane Group Flow (vph)	118	1863	0	301	1327	0	247	353	0	355	482	0
Confl. Peds. (#/hr)	1		1	1		1	2		19	19		2
Heavy Vehicles (%)	4%	3%	1%	1%	3%	2%	2%	4%	0%	3%	1%	0%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	10.0	40.5		9.5	39.5		12.0	18.5		14.0	20.5	
Effective Green, g (s)	11.0	41.5		9.5	40.0		12.5	18.5		14.5	20.5	
Actuated g/C Ratio	0.11	0.42		0.10	0.40		0.12	0.18		0.14	0.20	
Clearance Time (s)	5.0	5.0		4.0	4.5		4.5	4.0		4.5	4.0	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.5	2.3	
Lane Grp Cap (vph)	176	1320		156	1274		204	292		234	353	
v/s Ratio Prot	0.07	c0.59		c0.18	0.42		0.15	0.22		c0.22	c0.28	
v/s Ratio Perm												
v/c Ratio	0.67	1.41		1.93	1.04		1.21	1.21		1.52	1.37	
Uniform Delay, d1	42.8	29.2		45.2	30.0		43.8	40.8		42.7	39.8	
Progression Factor	0.61	0.47		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	187.2		441.0	36.8		131.4	121.0		253.4	182.2	
Delay (s)	30.3	201.1		486.2	66.8		175.2	161.7		296.2	221.9	
Level of Service	C	F		F	E		F	F		F	F	
Approach Delay (s)		191.0			144.1			167.1			253.3	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	183.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	125.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			↑↱		↰	↑↱	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	0	0	10	0	250	0	990	90	360	1200	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	0	0	11	0	275	0	1088	99	396	1319	0
Pedestrians					1							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					0							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2929	3298	659	2589	3248	594	1319			1188		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2929	3298	659	2589	3248	594	1319			1188		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	0	100	39	100			31		
cM capacity (veh/h)	1	3	411	6	3	452	531			577		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	0	286	725	462	396	879	440
Volume Left	0	11	0	0	396	0	0
Volume Right	0	275	0	99	0	0	0
cSH	1700	110	1700	1700	577	1700	1700
Volume to Capacity	0.00	2.59	0.43	0.27	0.69	0.52	0.26
Queue Length 95th (ft)	0	651	0	0	132	0	0
Control Delay (s)	0.0	803.4	0.0	0.0	23.7	0.0	0.0
Lane LOS	A	F			C		
Approach Delay (s)	0.0	803.4	0.0		5.5		
Approach LOS	A	F					

Intersection Summary			
Average Delay	75.0		
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↱		↰	↱	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.95		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3217		1554	3183		1662	1646		1646	1534	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	3217		1554	3183		1662	1646		1646	1534	
Volume (vph)	70	1630	30	30	1220	120	20	60	30	150	80	160
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	74	1734	32	32	1298	128	21	64	32	160	85	170
RTOR Reduction (vph)	0	1	0	0	6	0	0	19	0	0	73	0
Lane Group Flow (vph)	74	1765	0	32	1420	0	21	77	0	160	182	0
Confl. Peds. (#/hr)	2		2	2		2			10	10		
Heavy Vehicles (%)	0%	3%	4%	7%	3%	1%	0%	0%	0%	1%	2%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	7.4	55.9		4.9	53.4		3.9	8.2		15.5	19.8	
Effective Green, g (s)	7.4	55.9		4.9	53.4		3.9	7.7		15.5	19.3	
Actuated g/C Ratio	0.07	0.56		0.05	0.53		0.04	0.08		0.16	0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	3.5		4.0	3.5	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	123	1798		76	1700		65	127		255	296	
v/s Ratio Prot	c0.04	c0.55		0.02	0.45		0.01	0.05		c0.10	c0.12	
v/s Ratio Perm												
v/c Ratio	0.60	0.98		0.42	0.84		0.32	0.60		0.63	0.61	
Uniform Delay, d1	44.9	21.6		46.2	19.6		46.8	44.7		39.5	36.9	
Progression Factor	1.06	0.77		1.22	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	3.4		0.2	0.5		1.7	6.2		3.9	3.0	
Delay (s)	48.0	20.0		56.5	12.4		48.4	50.8		43.4	39.9	
Level of Service	D	B		E	B		D	D		D	D	
Approach Delay (s)		21.1			13.4			50.4			41.3	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.89		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1599	3228	1458	1630	3211		1646	1560		1646	1619	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.72	1.00		0.65	1.00	
Satd. Flow (perm)	1599	3228	1458	1630	3211		1239	1560		1120	1619	
Volume (vph)	40	1370	380	70	1060	110	260	30	80	120	30	30
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	42	1442	400	74	1116	116	274	32	84	126	32	32
RTOR Reduction (vph)	0	0	49	0	7	0	0	64	0	0	24	0
Lane Group Flow (vph)	42	1442	351	74	1225	0	274	52	0	126	40	0
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%	1%	0%	0%	1%	0%	0%
Turn Type	Prot		Perm	Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases			6				4			8		
Actuated Green, G (s)	5.2	55.8	55.8	7.5	58.1		24.2	24.2		24.2	24.2	
Effective Green, g (s)	5.2	56.8	56.8	7.5	59.1		23.7	23.7		23.7	23.7	
Actuated g/C Ratio	0.05	0.57	0.57	0.08	0.59		0.24	0.24		0.24	0.24	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		3.5	3.5		3.5	3.5	
Vehicle Extension (s)	2.3	4.5	4.5	2.3	4.8		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	83	1834	828	122	1898		294	370		265	384	
v/s Ratio Prot	0.03	c0.45		c0.05	0.38			0.03			0.02	
v/s Ratio Perm			0.24				c0.22			0.11		
v/c Ratio	0.51	0.79	0.42	0.61	0.65		0.93	0.14		0.48	0.10	
Uniform Delay, d1	46.1	16.9	12.3	44.8	13.5		37.4	30.1		32.8	29.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	3.5	1.6	6.5	1.7		34.8	0.1		1.0	0.1	
Delay (s)	49.0	20.3	13.9	51.3	15.2		72.2	30.2		33.8	29.9	
Level of Service	D	C	B	D	B		E	C		C	C	
Approach Delay (s)		19.6			17.3			59.7			32.5	
Approach LOS		B			B			E			C	

Intersection Summary			
HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	0.96			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.97	1.00
Satd. Flow (prot)	1646	3187		1539	3113			1646	1423		1683	1417
Flt Permitted	0.95	1.00		0.95	1.00			0.78	1.00		0.36	1.00
Satd. Flow (perm)	1646	3187		1539	3113			1311	1423		622	1417
Volume (vph)	110	1720	100	70	1230	420	90	190	160	100	40	100
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	113	1773	103	72	1268	433	93	196	165	103	41	103
RTOR Reduction (vph)	0	3	0	0	27	0	0	0	91	0	0	79
Lane Group Flow (vph)	113	1873	0	72	1674	0	0	289	74	0	144	24
Confl. Peds. (#/hr)			7	7					2	2		
Heavy Vehicles (%)	1%	3%	7%	8%	3%	2%	6%	4%	3%	0%	1%	5%
Turn Type	Prot			Prot			Perm		Perm	Perm		Perm
Protected Phases	1	6		5	2			4			8	
Permitted Phases							4		4	8		8
Actuated Green, G (s)	11.0	55.9		8.3	53.2			23.8	23.8		23.8	23.8
Effective Green, g (s)	11.0	56.4		8.3	53.7			23.3	23.3		23.3	23.3
Actuated g/C Ratio	0.11	0.56		0.08	0.54			0.23	0.23		0.23	0.23
Clearance Time (s)	4.0	4.5		4.0	4.5			3.5	3.5		3.5	3.5
Vehicle Extension (s)	2.3	5.1		2.3	5.1			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	181	1797		128	1672			305	332		145	330
v/s Ratio Prot	c0.07	c0.59		0.05	0.54							
v/s Ratio Perm								0.22	0.05		c0.23	0.02
v/c Ratio	0.62	1.04		0.56	1.00			0.95	0.22		0.99	0.07
Uniform Delay, d1	42.5	21.8		44.1	23.2			37.7	31.0		38.3	29.9
Progression Factor	1.00	1.00		1.00	0.80			1.00	1.00		1.00	1.00
Incremental Delay, d2	5.3	33.2		1.8	14.9			37.3	0.2		72.3	0.1
Delay (s)	47.8	55.0		45.9	33.4			75.1	31.3		110.6	30.0
Level of Service	D	D		D	C			E	C		F	C
Approach Delay (s)		54.6			33.9			59.2			77.0	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM Average Control Delay	48.1	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.92			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00			0.97	
Satd. Flow (prot)	1662	3260	1488	1599	3228	1430		1520			1617	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.65	
Satd. Flow (perm)	1662	3260	1488	1599	3228	1430		1488			1091	
Volume (vph)	50	1270	10	160	910	270	10	80	140	320	160	30
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	52	1309	10	165	938	278	10	82	144	330	165	31
RTOR Reduction (vph)	0	0	0	0	0	0	0	62	0	0	3	0
Lane Group Flow (vph)	52	1309	10	165	938	278	0	174	0	0	523	0
Heavy Vehicles (%)	0%	2%	0%	4%	3%	4%	0%	5%	6%	4%	5%	0%
Turn Type	Prot		Free	Prot		Free	Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases			Free			Free	4			8		
Actuated Green, G (s)	5.1	18.2	89.0	12.7	25.8	89.0		41.1			41.1	
Effective Green, g (s)	6.1	20.2	89.0	13.7	27.8	89.0		43.1			43.1	
Actuated g/C Ratio	0.07	0.23	1.00	0.15	0.31	1.00		0.48			0.48	
Clearance Time (s)	5.0	6.0		5.0	6.0			6.0			6.0	
Vehicle Extension (s)	2.3	4.8		2.3	4.8			2.5			2.5	
Lane Grp Cap (vph)	114	740	1488	246	1008	1430		721			528	
v/s Ratio Prot	0.03	c0.40		c0.10	c0.29							
v/s Ratio Perm			0.01			0.19		0.12			c0.48	
v/c Ratio	0.46	1.77	0.01	0.67	0.93	0.19		0.24			0.99	
Uniform Delay, d1	39.9	34.4	0.0	35.5	29.7	0.0		13.4			22.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	1.7	351.5	0.0	6.0	15.0	0.3		0.1			36.8	
Delay (s)	41.5	385.9	0.0	41.6	44.6	0.3		13.5			59.5	
Level of Service	D	F	A	D	D	A		B			E	
Approach Delay (s)		370.0			35.3			13.5			59.5	
Approach LOS		F			D			B			E	

Intersection Summary			
HCM Average Control Delay	168.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	105.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1599	1712		1662	1719		1662	3195		1662	3197	1473
Flt Permitted	0.52	1.00		0.61	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	880	1712		1074	1719		1662	3195		1662	3197	1473
Volume (vph)	160	120	20	190	150	20	40	980	90	20	950	250
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	176	132	22	209	165	22	44	1077	99	22	1044	275
RTOR Reduction (vph)	0	12	0	0	9	0	0	9	0	0	0	123
Lane Group Flow (vph)	176	142	0	209	178	0	44	1167	0	22	1044	152
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	1%
Turn Type	pm+pt			pm+pt			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								2
Actuated Green, G (s)	13.9	9.4		13.9	9.4		3.7	26.6		1.0	23.9	23.9
Effective Green, g (s)	14.4	9.9		14.4	9.9		3.7	28.6		1.0	25.9	25.9
Actuated g/C Ratio	0.24	0.16		0.24	0.16		0.06	0.48		0.02	0.43	0.43
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	0.2	2.5		0.2	2.5		2.3	5.4		2.3	5.4	5.4
Lane Grp Cap (vph)	265	282		302	284		102	1523		28	1380	636
v/s Ratio Prot	0.05	0.08		c0.05	0.10		c0.03	c0.37		0.01	0.33	
v/s Ratio Perm	0.11			c0.11								0.10
v/c Ratio	0.66	0.50		0.69	0.63		0.43	0.77		0.79	0.76	0.24
Uniform Delay, d1	19.9	22.8		20.2	23.3		27.1	12.9		29.4	14.4	10.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.8	1.0		5.4	3.7		1.7	3.7		79.6	3.9	0.9
Delay (s)	24.7	23.9		25.6	27.0		28.8	16.7		109.0	18.3	11.7
Level of Service	C	C		C	C		C	B		F	B	B
Approach Delay (s)		24.3			26.3			17.1			18.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	100	20	1100	270	40	1120
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	102	20	1122	276	41	1143
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1913	699			1398	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1913	699			1398	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	95			92	
cM capacity (veh/h)	56	387			495	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	122	748	650	41	571	571
Volume Left	102	0	0	41	0	0
Volume Right	20	0	276	0	0	0
cSH	65	1700	1700	495	1700	1700
Volume to Capacity	1.87	0.44	0.38	0.08	0.34	0.34
Queue Length 95th (ft)	281	0	0	7	0	0
Control Delay (s)	548.6	0.0	0.0	12.9	0.0	0.0
Lane LOS	F			B		
Approach Delay (s)	548.6	0.0		0.4		
Approach LOS	F					

Intersection Summary			
Average Delay	25.0		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	3197	1430	1614	3218		3162	1750	1430	1646	1609	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.00	1.00	
Satd. Flow (perm)	1662	3197	1430	1614	3218		3162	1750	1430	0	1609	
Volume (vph)	110	1230	460	90	1100	30	560	150	100	120	110	70
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	113	1268	474	93	1134	31	577	155	103	124	113	72
RTOR Reduction (vph)	0	0	304	0	2	0	0	0	90	0	23	0
Lane Group Flow (vph)	113	1268	170	93	1163	0	577	155	13	124	162	0
Heavy Vehicles (%)	0%	4%	4%	3%	3%	0%	2%	0%	4%	1%	2%	3%
Turn Type	Prot		Perm	Prot			Prot		Perm	pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6						4	8		
Actuated Green, G (s)	9.8	34.0	34.0	14.0	39.7		20.0	13.1	13.1	19.9	13.0	
Effective Green, g (s)	9.8	35.5	35.5	15.5	41.2		20.0	13.1	13.1	19.9	13.0	
Actuated g/C Ratio	0.10	0.36	0.36	0.16	0.41		0.20	0.13	0.13	0.20	0.13	
Clearance Time (s)	4.0	5.5	5.5	5.5	5.5		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.3	5.5	5.5	2.3	5.5		2.3	2.3	2.3	3.0	2.3	
Lane Grp Cap (vph)	163	1135	508	250	1326		632	229	187	328	209	
v/s Ratio Prot	0.07	c0.40		0.06	c0.36		c0.18	0.09		0.08	c0.10	
v/s Ratio Perm			0.12						0.01			
v/c Ratio	0.69	1.12	0.33	0.37	0.88		0.91	0.68	0.07	0.38	0.77	
Uniform Delay, d1	43.6	32.2	23.6	37.9	27.1		39.1	41.4	38.1	34.7	42.1	
Progression Factor	0.92	0.60	1.41	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.4	57.0	0.5	0.5	8.4		17.5	6.6	0.1	0.7	15.3	
Delay (s)	43.4	76.4	33.9	38.4	35.5		56.7	48.1	38.2	35.4	57.3	
Level of Service	D	E	C	D	D		E	D	D	D	E	
Approach Delay (s)		63.5			35.7			52.8			48.5	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM Average Control Delay	52.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	20	40	30	30	10	30	250	110	10	480	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	22	43	33	33	11	33	272	120	11	522	33
Pedestrians					7			5				
Lane Width (ft)					12.0			12.0				
Walking Speed (ft/s)					4.0			4.0				
Percent Blockage					1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								281				
pX, platoon unblocked	0.87	0.87		0.87	0.87	0.87				0.87		
vC, conflicting volume	984	1023	543	1023	980	339	554			398		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	903	949	543	949	899	158	554			227		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	90	92	81	86	99	97			99		
cM capacity (veh/h)	191	213	541	170	229	768	1026			1164		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	65	76	424	565
Volume Left	0	33	33	11
Volume Right	43	11	120	33
cSH	358	218	1026	1164
Volume to Capacity	0.18	0.35	0.03	0.01
Queue Length 95th (ft)	16	37	2	1
Control Delay (s)	17.3	30.0	1.0	0.3
Lane LOS	C	D	A	A
Approach Delay (s)	17.3	30.0	1.0	0.3
Approach LOS	C	D		

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 16. N Grant St -- NW 1st Ave			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	90	180	10	150	60	210
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	196	11	163	65	228

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	293	174	293
Volume Left (vph)	98	11	0
Volume Right (vph)	196	0	228
Hadj (s)	-0.32	0.08	-0.46
Departure Headway (s)	4.7	5.1	4.4
Degree Utilization, x	0.38	0.24	0.36
Capacity (veh/h)	718	665	766
Control Delay (s)	10.5	9.7	9.9
Approach Delay (s)	10.5	9.7	9.9
Approach LOS	B	A	A

Intersection Summary			
Delay	10.1		
HCM Level of Service	B		
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 14. N Holly St -- N Knights Bridge Rd			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	190	350	290	90	310	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1630	1407	1653		1630	1716
Flt Permitted	0.95	1.00	1.00		0.27	1.00
Satd. Flow (perm)	1630	1407	1653		464	1716
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	380	315	98	337	457
RTOR Reduction (vph)	0	195	15	0	0	0
Lane Group Flow (vph)	207	185	398	0	337	457
Confl. Peds. (#/hr)	9	33				
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%
Turn Type		pm+ov			pm+pt	
Protected Phases	8	1	2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	12.7	25.6	19.3		36.2	36.2
Effective Green, g (s)	12.7	25.6	19.3		36.2	36.2
Actuated g/C Ratio	0.22	0.45	0.34		0.64	0.64
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	364	732	561		560	1092
v/s Ratio Prot	c0.13	0.06	c0.24		c0.14	0.27
v/s Ratio Perm		0.07			0.25	
v/c Ratio	0.57	0.25	0.71		0.60	0.42
Uniform Delay, d1	19.7	9.7	16.4		6.5	5.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.0	0.2	4.2		1.8	0.3
Delay (s)	21.7	9.9	20.6		8.3	5.4
Level of Service	C	A	C		A	A
Approach Delay (s)	14.1		20.6			6.6
Approach LOS	B		C			A

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

Description: 50 vehicles transferred from SBL to SBT (due to modeling limitations related to traffic signals)
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	30	80	410	60	40	460
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	87	446	65	43	500
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			917			266
pX, platoon unblocked	0.87					
vC, conflicting volume	1065	478			511	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1000	478			511	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	85	85			96	
cM capacity (veh/h)	225	587			1054	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	120	511	543
Volume Left	33	0	43
Volume Right	87	65	0
cSH	408	1700	1054
Volume to Capacity	0.29	0.30	0.04
Queue Length 95th (ft)	30	0	3
Control Delay (s)	17.5	0.0	1.1
Lane LOS	C		A
Approach Delay (s)	17.5	0.0	1.1
Approach LOS	C		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	70	0	390	90	0	360	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	0	0	74	0	411	95	0	379	53
Pedestrians		11			10			4				
Lane Width (ft)		0.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								292				
pX, platoon unblocked	0.85	0.85		0.85	0.85	0.85				0.85		
vC, conflicting volume	948	932	231	661	910	468	443			515		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	848	829	231	510	804	281	443			337		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.2			4.5		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.4		
p0 queue free %	100	100	100	100	100	88	100			100		
cM capacity (veh/h)	191	259	775	375	268	606	1100			923		

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	74	505	253	179
Volume Left	0	0	0	0
Volume Right	74	95	0	53
cSH	606	1700	1700	1700
Volume to Capacity	0.12	0.30	0.15	0.11
Queue Length 95th (ft)	10	0	0	0
Control Delay (s)	11.8	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.8	0.0	0.0	
Approach LOS	B			

Intersection Summary					
Average Delay	0.9				
Intersection Capacity Utilization	39.8%	ICU Level of Service		A	
Analysis Period (min)	15				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	270	10	50	200	80	0	60	90	40	70	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	293	11	54	217	87	0	65	98	43	76	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	326	359	163	120
Volume Left (vph)	22	54	0	43
Volume Right (vph)	11	87	98	0
Hadj (s)	0.06	-0.10	-0.23	0.11
Departure Headway (s)	5.4	5.2	5.7	6.2
Degree Utilization, x	0.49	0.52	0.26	0.20
Capacity (veh/h)	631	660	548	495
Control Delay (s)	13.4	13.5	10.7	10.7
Approach Delay (s)	13.4	13.5	10.7	10.7
Approach LOS	B	B	B	B

Intersection Summary			
Delay	12.7		
HCM Level of Service	B		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 20. N Holly St -- NE Territorial Rd			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	280	190	30	460	0	150	0	10	10	10	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	304	207	33	500	0	163	0	11	11	11	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	500			511			989	973	408	984	1076	500
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	500			511			989	973	408	984	1076	500
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			21	100	98	95	95	98
cM capacity (veh/h)	1075			1065			207	246	648	220	214	575

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	511	533	174	33
Volume Left	0	33	163	11
Volume Right	207	0	11	11
cSH	1075	1065	216	274
Volume to Capacity	0.00	0.03	0.80	0.12
Queue Length 95th (ft)	0	2	146	10
Control Delay (s)	0.0	0.9	66.9	19.9
Lane LOS		A	F	C
Approach Delay (s)	0.0	0.9	66.9	19.9
Approach LOS			F	C

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 21. N Redwood St -- NE Territorial Rd			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	220	0	930	410	0	460
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.96		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1614		1733	1380		1716
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1614		1733	1380		1716
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	232	0	979	432	0	484
RTOR Reduction (vph)	0	0	0	139	0	0
Lane Group Flow (vph)	232	0	979	293	0	484
Confl. Peds. (#/hr)				8	8	
Heavy Vehicles (%)	3%	50%	1%	4%	50%	2%
Turn Type				Perm	Perm	
Protected Phases	4		6			2
Permitted Phases				6	2	
Actuated Green, G (s)	14.3		46.6	46.6		46.6
Effective Green, g (s)	14.8		48.1	48.1		48.1
Actuated g/C Ratio	0.21		0.68	0.68		0.68
Clearance Time (s)	4.5		5.5	5.5		5.5
Vehicle Extension (s)	2.5		3.0	3.0		3.0
Lane Grp Cap (vph)	337		1176	936		1164
v/s Ratio Prot	c0.14		c0.57			0.28
v/s Ratio Perm				0.21		
v/c Ratio	0.69		0.83	0.31		0.42
Uniform Delay, d1	25.9		8.4	4.7		5.1
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	5.3		5.2	0.2		0.2
Delay (s)	31.2		13.6	4.8		5.3
Level of Service	C		B	A		A
Approach Delay (s)	31.2		10.9			5.3
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	70.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 11. S Knights Bridge Rd -- S Arndt Rd			
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	110	0	10	10	20	30	50	0	20	90	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	120	0	11	11	22	33	54	0	22	98	11
Pedestrians		3			1			2			1	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	297	270	108	329	276	56	112			55		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	297	270	108	329	276	56	112			55		
tC, single (s)	7.1	6.6	6.2	7.1	6.6	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.1	3.3	2.2			2.2		
p0 queue free %	95	80	100	98	98	98	98			99		
cM capacity (veh/h)	615	602	947	515	588	1014	1456			1561		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	152	43	87	130
Volume Left	33	11	33	22
Volume Right	0	22	0	11
cSH	604	713	1456	1561
Volume to Capacity	0.25	0.06	0.02	0.01
Queue Length 95th (ft)	25	5	2	1
Control Delay (s)	13.0	10.4	2.9	1.3
Lane LOS	B	B	A	A
Approach Delay (s)	13.0	10.4	2.9	1.3
Approach LOS	B	B		

Intersection Summary				
Average Delay		6.9		
Intersection Capacity Utilization		26.4%	ICU Level of Service	A
Analysis Period (min)		15		
Description: 15. N Cedar St -- NW 3rd Ave				

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	320	710	390	50	30	110
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	348	772	424	54	33	120
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	478				1918	451
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	478				1918	451
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	68				34	80
cM capacity (veh/h)	1084				50	612

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1120	478	152
Volume Left	348	0	33
Volume Right	0	54	120
cSH	1084	1700	179
Volume to Capacity	0.32	0.28	0.85
Queue Length 95th (ft)	35	0	152
Control Delay (s)	7.1	0.0	85.8
Lane LOS	A		F
Approach Delay (s)	7.1	0.0	85.8
Approach LOS			F

Intersection Summary				
Average Delay		12.0		
Intersection Capacity Utilization		104.5%	ICU Level of Service	G
Analysis Period (min)		15		
Description: 12. N Birch St -- N Knights Bridge Rd				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (veh/h)	40	270	0	0	400	20	0	0	0	30	0	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	45	307	0	0	455	23	0	0	0	34	0	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	477			307			920	875	307	864	864	466
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	477			307			920	875	307	864	864	466
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	87	100	90
cM capacity (veh/h)	1085			1265			222	276	738	266	280	597

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	352	477	0	91
Volume Left	45	0	0	34
Volume Right	0	23	0	57
cSH	1085	1265	1700	407
Volume to Capacity	0.04	0.00	0.00	0.22
Queue Length 95th (ft)	3	0	0	21
Control Delay (s)	1.5	0.0	0.0	16.4
Lane LOS	A		A	C
Approach Delay (s)	1.5	0.0	0.0	16.4
Approach LOS			A	C

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 33. Molalla Forest Rd -- SE 13th Ave			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Volume (vph)	30	280	80	160	330	60	130	200	130	170	280	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1632		1616	1669		1630	1523		1629	1724	
Flt Permitted	0.34	1.00		0.38	1.00		0.46	1.00		0.40	1.00	
Satd. Flow (perm)	595	1632		648	1669		797	1523		693	1724	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	304	87	174	359	65	141	217	141	185	304	11
RTOR Reduction (vph)	0	18	0	0	12	0	0	45	0	0	3	0
Lane Group Flow (vph)	33	373	0	174	412	0	141	313	0	185	312	0
Confl. Peds. (#/hr)			13	13					1	1		
Heavy Vehicles (%)	0%	3%	2%	2%	2%	5%	2%	6%	9%	2%	1%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.0	16.0		16.0	16.0		18.2	14.9		18.2	14.9	
Effective Green, g (s)	16.5	16.5		16.5	16.5		18.2	15.9		18.2	15.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.38	0.33		0.38	0.33	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	206	565		224	577		362	508		329	575	
v/s Ratio Prot		0.23			0.25		0.03	c0.21		c0.04	0.18	
v/s Ratio Perm	0.06			c0.27			0.12			0.18		
v/c Ratio	0.16	0.66		0.78	0.71		0.39	0.62		0.56	0.54	
Uniform Delay, d1	10.8	13.2		14.0	13.6		10.1	13.3		10.9	12.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	2.5		14.9	3.9		0.5	2.6		1.8	1.3	
Delay (s)	11.1	15.7		28.9	17.5		10.6	15.9		12.7	14.3	
Level of Service	B	B		C	B		B	B		B	B	
Approach Delay (s)		15.3			20.8			14.4			13.7	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 24. S Ivy St -- SE 13th Ave			

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	0	0	0	470	20	800
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	511	22	870
Pedestrians				1	3	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			3		514	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			3		514	4
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	19
cM capacity (veh/h)			1615		523	1079

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	511	22	870
Volume Left	0	22	0
Volume Right	0	0	870
cSH	1700	523	1079
Volume to Capacity	0.30	0.04	0.81
Queue Length 95th (ft)	0	3	230
Control Delay (s)	0.0	12.2	20.5
Lane LOS		B	C
Approach Delay (s)	0.0	20.3	
Approach LOS		C	

Intersection Summary			
Average Delay	12.9		
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 18. NE 4th Ave -- NE 3rd Ave			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	40	140	40	50	180	60	570	30	220	220	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	10	41	143	41	51	184	61	582	31	224	224	41
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											678	
pX, platoon unblocked												
vC, conflicting volume	1587	1408	112	1444	1434	597	265			612		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1587	1408	112	1444	1434	597	265			612		
tC, single (s)	7.5	6.5	6.9	7.5	6.6	7.0	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	49	60	85	8	47	58	95			77		
cM capacity (veh/h)	20	103	926	45	97	441	1281			977		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3	SB 4
Volume Total	10	184	41	235	61	612	224	150	88	27
Volume Left	10	0	41	0	61	0	224	0	0	0
Volume Right	0	143	0	184	0	31	0	0	14	27
cSH	20	333	45	248	1281	1700	977	1700	1700	1700
Volume to Capacity	0.51	0.55	0.92	0.94	0.05	0.36	0.23	0.09	0.05	0.02
Queue Length 95th (ft)	36	79	92	214	4	0	22	0	0	0
Control Delay (s)	304.4	28.3	250.0	86.6	8.0	0.0	9.8	0.0	0.0	0.0
Lane LOS	F	D	F	F	A		A			
Approach Delay (s)	42.9		110.8		0.7		4.5			
Approach LOS	E		F							

Intersection Summary			
Average Delay	25.4		
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 27. SE Hazel Dell Way -- SE Sequoia Pkwy			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	10	10	120	0	20	10	130	140	40	210	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	11	130	0	22	11	141	152	43	228	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	576	630	228	571	554	217	228			293		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	576	630	228	571	554	217	228			293		
tC, single (s)	7.6	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	4.0	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	100	97	99	68	100	97	99			96		
cM capacity (veh/h)	343	383	816	406	424	827	1352			1208		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	22	152	304	272
Volume Left	0	130	11	43
Volume Right	11	22	152	0
cSH	522	438	1352	1208
Volume to Capacity	0.04	0.35	0.01	0.04
Queue Length 95th (ft)	3	38	1	3
Control Delay (s)	12.2	17.5	0.3	1.6
Lane LOS	B	C	A	A
Approach Delay (s)	12.2	17.5	0.3	1.6
Approach LOS	B	C		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 25. S Redwood St -- SE 4th Ave			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	580	160	40	330	110	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	592	163	41	337	112	20
Pedestrians	1			6	1	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						4
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			756		1094	680
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			756		1094	680
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		50	95
cM capacity (veh/h)			863		226	452

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	755	378	133
Volume Left	0	41	112
Volume Right	163	0	20
cSH	1700	863	267
Volume to Capacity	0.44	0.05	0.50
Queue Length 95th (ft)	0	4	64
Control Delay (s)	0.0	1.5	32.2
Lane LOS		A	D
Approach Delay (s)	0.0	1.5	32.2
Approach LOS			D

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 13. N Cedar St -- N Knights Bridge Rd			

HCM Unsignalized Intersection Capacity Analysis
1537: SE 4th Ave & Sequoia Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	180	20	20	0	30	60	10	130	0	0	360	90
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	196	22	22	0	33	65	11	141	0	0	391	98

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	196	43	0	98	11	141	0	489
Volume Left (vph)	196	0	0	0	11	0	0	0
Volume Right (vph)	0	22	0	65	0	0	0	98
Hadj (s)	0.50	-0.33	0.00	-0.43	0.50	0.09	0.00	-0.10
Departure Headway (s)	7.1	6.2	6.9	6.5	6.9	6.5	5.9	5.8
Degree Utilization, x	0.39	0.08	0.00	0.18	0.02	0.25	0.00	0.78
Capacity (veh/h)	464	526	485	500	483	517	600	607
Control Delay (s)	13.3	8.6	8.7	9.7	8.8	10.5	7.7	25.3
Approach Delay (s)	12.4		9.7		10.3		25.3	
Approach LOS	B		A		B		D	

Intersection Summary				
Delay	18.3			
HCM Level of Service	C			
Intersection Capacity Utilization	50.7%	ICU Level of Service		A
Analysis Period (min)	15			
Description: 30. S Walnut Rd -- SE 4th Ave				

HCM Unsignalized Intersection Capacity Analysis
1574: SE 1st Ave & Otto Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	180	130	60	10	70	0	10	160	20	0	40	70
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	205	148	68	11	80	0	11	182	23	0	45	80

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	420	91	216	125
Volume Left (vph)	205	11	11	0
Volume Right (vph)	68	0	23	80
Hadj (s)	0.08	0.11	0.03	-0.30
Departure Headway (s)	5.1	5.6	5.5	5.4
Degree Utilization, x	0.60	0.14	0.33	0.19
Capacity (veh/h)	678	573	593	594
Control Delay (s)	15.3	9.6	11.2	9.6
Approach Delay (s)	15.3	9.6	11.2	9.6
Approach LOS	C	A	B	A

Intersection Summary				
Delay	12.8			
HCM Level of Service	B			
Intersection Capacity Utilization	53.3%	ICU Level of Service		A
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis — Canby TSP
1646: 13th Ave & S Mulino Rd — 2030 Financially Constrained - No Couplet

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	210	80	50	60	150	340
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	239	91	57	68	170	386

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	330	125	557
Volume Left (vph)	239	57	0
Volume Right (vph)	91	0	386
Hadj (s)	-0.02	0.16	-0.40
Departure Headway (s)	5.6	5.8	4.7
Degree Utilization, x	0.51	0.20	0.73
Capacity (veh/h)	607	570	744
Control Delay (s)	14.2	10.3	19.2
Approach Delay (s)	14.2	10.3	19.2
Approach LOS	B	B	C

Intersection Summary			
Delay	16.5		
HCM Level of Service	C		
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 34. S Mulino Rd -- SE 13th Ave			

HCM Unsignalized Intersection Capacity Analysis — Canby TSP
1654: S Township Rd & Sequoia Pkwy — 2030 Financially Constrained - No Couplet

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	70	290	60	30	320	30	90	40	30	100	30	270
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	74	305	63	32	337	32	95	42	32	105	32	284

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	74	368	32	368	95	74	105	316
Volume Left (vph)	74	0	32	0	95	0	105	0
Volume Right (vph)	0	63	0	32	0	32	0	284
Hadj (s)	0.50	-0.11	0.53	-0.06	0.53	-0.27	0.50	-0.63
Departure Headway (s)	7.6	7.0	7.7	7.1	8.4	7.6	7.9	6.8
Degree Utilization, x	0.16	0.72	0.07	0.73	0.22	0.16	0.23	0.59
Capacity (veh/h)	451	495	446	488	385	429	433	503
Control Delay (s)	10.8	24.7	10.1	25.7	12.6	10.9	12.1	18.0
Approach Delay (s)	22.4		24.4		11.9		16.5	
Approach LOS	C		C		B		C	

Intersection Summary			
Delay	20.0		
HCM Level of Service	C		
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 31. S Township Rd -- S Walnut St			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	20	820	20	10	420	220
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	20	837	20	10	429	224
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		8				
Median type					None	
Median storage veh)						
Upstream signal (ft)					382	
pX, platoon unblocked						
vC, conflicting volume	1082	0	980	969	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1082	0	980	969	0	
tC, single (s)	6.5	6.2	7.1	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.5	4.0	2.2	
p0 queue free %	87	23	46	95	74	
cM capacity (veh/h)	160	1085	38	186	1623	

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	857	31	653
Volume Left	0	20	429
Volume Right	837	0	224
cSH	1111	52	1623
Volume to Capacity	0.77	0.59	0.26
Queue Length 95th (ft)	202	58	27
Control Delay (s)	18.8	147.9	6.1
Lane LOS	C	F	A
Approach Delay (s)	18.8	147.9	6.1
Approach LOS	C	F	

Intersection Summary			
Average Delay	16.0		
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

1165: Highway 99E & Elm St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↱		↰	↱	
Volume (vph)	160	1280	50	90	1160	100	50	190	50	60	110	200
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.97		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	3241		1630	3186		1484	1623		1630	1532	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	3241		1630	3186		1484	1623		1630	1532	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	168	1347	53	95	1221	105	53	200	53	63	116	211
RTOR Reduction (vph)	0	3	0	0	6	0	0	9	0	0	66	0
Lane Group Flow (vph)	168	1397	0	95	1320	0	53	244	0	63	261	0
Confl. Peds. (#/hr)	1		1	1		1	9					9
Heavy Vehicles (%)	2%	2%	0%	2%	3%	2%	12%	4%	6%	2%	0%	2%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	12.8	52.1		7.2	47.0		4.6	17.8		6.9	20.1	
Effective Green, g (s)	12.8	52.6		7.2	47.0		4.6	17.3		6.9	19.6	
Actuated g/C Ratio	0.13	0.53		0.07	0.47		0.05	0.17		0.07	0.20	
Clearance Time (s)	4.0	4.5		4.0	4.0		4.0	3.5		4.0	3.5	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	209	1705		117	1497		68	281		112	300	
v/s Ratio Prot	0.10	c0.43		0.06	c0.41		0.04	c0.15		0.04	c0.17	
v/s Ratio Perm												
v/c Ratio	0.80	0.82		0.81	0.88		0.78	0.87		0.56	0.87	
Uniform Delay, d1	42.4	19.7		45.7	24.0		47.2	40.2		45.1	39.0	
Progression Factor	0.87	0.74		0.86	1.76		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.3	3.6		20.9	4.8		40.0	23.1		4.6	22.6	
Delay (s)	52.1	18.1		60.1	46.9		87.2	63.3		49.7	61.5	
Level of Service	D	B		E	D		F	E		D	E	
Approach Delay (s)		21.8			47.8			67.4			59.6	
Approach LOS		C			D			E			E	

Intersection Summary			
HCM Average Control Delay	39.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
Description: 3. Elm St -- Hwy 99E			

c Critical Lane Group

1172: Highway 99E & Ivy St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↱		↰	↱	
Volume (vph)	140	1180	80	190	1040	70	130	230	130	120	220	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.5	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1599	3197		1646	3195		1630	1587		1614	1710	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3197		1646	3195		1630	1587		1614	1710	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	147	1242	84	200	1095	74	137	242	137	126	232	21
RTOR Reduction (vph)	0	5	0	0	5	0	0	20	0	0	3	0
Lane Group Flow (vph)	147	1321	0	200	1164	0	137	359	0	126	250	0
Confl. Peds. (#/hr)	1		1	1		1	2		19	19		2
Heavy Vehicles (%)	4%	3%	1%	1%	3%	2%	2%	4%	0%	3%	1%	0%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	11.2	40.5		11.5	40.3		12.6	18.5		12.0	17.9	
Effective Green, g (s)	12.2	41.5		11.5	40.8		13.1	18.5		12.0	17.9	
Actuated g/C Ratio	0.12	0.42		0.12	0.41		0.13	0.18		0.12	0.18	
Clearance Time (s)	5.0	5.0		4.0	4.5		4.5	4.0		4.5	4.0	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.5	2.3	
Lane Grp Cap (vph)	195	1327		189	1304		214	294		194	306	
v/s Ratio Prot	0.09	c0.41		c0.12	0.36		c0.08	c0.23		0.08	0.15	
v/s Ratio Perm												
v/c Ratio	0.75	1.00		1.06	0.89		0.64	1.22		0.65	0.82	
Uniform Delay, d1	42.4	29.2		44.2	27.6		41.2	40.8		42.0	39.5	
Progression Factor	0.78	0.65		0.76	1.45		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.8	16.9		72.7	7.4		5.3	125.7		6.5	14.8	
Delay (s)	41.1	36.0		106.3	47.3		46.5	166.4		48.5	54.3	
Level of Service	D	D		F	D		D	F		D	D	
Approach Delay (s)		36.5			55.9			134.6			52.4	
Approach LOS		D			E			F			D	

Intersection Summary			
HCM Average Control Delay	58.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		
Description: 5. Ivy St -- Hwy 99 E			

c Critical Lane Group

1286: Haines Rd & Highway 99E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	10	190	1050	80	280	1280
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	207	1141	87	304	1391
Pedestrians	1					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2490	615			1229	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2490	615			1229	
tC, single (s)	6.8	6.9			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	53			45	
cM capacity (veh/h)	11	439			557	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	11	207	761	467	304	696	696
Volume Left	11	0	0	0	304	0	0
Volume Right	0	207	0	87	0	0	0
cSH	11	439	1700	1700	557	1700	1700
Volume to Capacity	1.00	0.47	0.45	0.27	0.55	0.41	0.41
Queue Length 95th (ft)	50	62	0	0	82	0	0
Control Delay (s)	719.8	20.3	0.0	0.0	19.0	0.0	0.0
Lane LOS	F	C			C		
Approach Delay (s)	55.3		0.0		3.4		
Approach LOS	F						

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 10. Hwy 99E -- Haines Rd			

1302: Highway 99E & Grant St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	1230	80	70	1020	70	80	230	10	140	150	260
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	3.5		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3192		1554	3196		1662	1736		1646	1543	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	3192		1554	3196		1662	1736		1646	1543	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	95	1295	84	74	1074	74	84	242	11	147	158	274
RTOR Reduction (vph)	0	4	0	0	5	0	0	2	0	0	62	0
Lane Group Flow (vph)	95	1375	0	74	1143	0	84	251	0	147	370	0
Confl. Peds. (#/hr)	2		2	2		2			10	10		
Heavy Vehicles (%)	0%	3%	4%	7%	3%	1%	0%	0%	0%	1%	2%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	7.8	47.3		7.4	46.9		7.7	15.7		14.1	22.1	
Effective Green, g (s)	7.8	47.3		7.4	46.9		7.7	15.7		14.1	21.6	
Actuated g/C Ratio	0.08	0.47		0.07	0.47		0.08	0.16		0.14	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	3.5		4.0	3.5	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	130	1510		115	1499		128	273		232	333	
v/s Ratio Prot	c0.06	c0.43		0.05	0.36		0.05	0.14		c0.09	c0.24	
v/s Ratio Perm												
v/c Ratio	0.73	0.91		0.64	0.76		0.66	0.92		0.63	1.11	
Uniform Delay, d1	45.1	24.4		45.0	21.9		44.9	41.5		40.5	39.2	
Progression Factor	1.45	0.39		1.38	0.09		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.0	6.3		4.8	1.8		9.7	33.9		4.6	82.8	
Delay (s)	76.3	15.8		66.7	3.9		54.6	75.5		45.1	122.0	
Level of Service	E	B		E	A		D	E		D	F	
Approach Delay (s)		19.7			7.7			70.3			102.4	
Approach LOS		B			A			E			F	

Intersection Summary			
HCM Average Control Delay	33.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		
Description: 4. Grant St -- Hwy 99E			

c Critical Lane Group

1388: Highway 99E & Berg Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	1360	370	50	1030	110	240	40	90	100	50	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1599	3228	1458	1630	3209		1646	1568		1646	1651	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.70	1.00		0.61	1.00	
Satd. Flow (perm)	1599	3228	1458	1630	3209		1216	1568		1049	1651	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	42	1432	389	53	1084	116	253	42	95	105	53	32
RTOR Reduction (vph)	0	0	154	0	7	0	0	72	0	0	23	0
Lane Group Flow (vph)	42	1432	235	53	1193	0	253	65	0	105	62	0
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%	1%	0%	0%	1%	0%	0%
Turn Type	Prot		Perm	Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases			6				4			8		
Actuated Green, G (s)	6.1	57.5	57.5	5.7	57.1		24.3	24.3		24.3	24.3	
Effective Green, g (s)	6.1	58.5	58.5	5.7	58.1		23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.06	0.58	0.58	0.06	0.58		0.24	0.24		0.24	0.24	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		3.5	3.5		3.5	3.5	
Vehicle Extension (s)	2.3	4.5	4.5	2.3	4.8		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	98	1888	853	93	1864		289	373		250	393	
v/s Ratio Prot	0.03	c0.44		0.03	c0.37			0.04			0.04	
v/s Ratio Perm			0.16				c0.21			0.10		
v/c Ratio	0.43	0.76	0.28	0.57	0.64		0.88	0.17		0.42	0.16	
Uniform Delay, d1	45.3	15.5	10.3	46.0	14.0		36.7	30.3		32.3	30.2	
Progression Factor	1.00	1.00	1.00	1.20	0.42		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	2.9	0.8	3.5	1.0		24.1	0.2		0.8	0.1	
Delay (s)	47.0	18.4	11.1	58.6	6.9		60.7	30.4		33.1	30.3	
Level of Service	D	B	B	E	A		E	C		C	C	
Approach Delay (s)		17.5			9.0			50.1			31.8	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM Average Control Delay	18.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

Description: 2. Berg Pkwy -- Hwy 99E

c Critical Lane Group

1396: Highway 99E & Pine St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	1250	20	120	1060	380	10	110	80	600	250	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	6.5	6.5	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.97	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1630	3217		1539	3228	1458		1703	1418	3162	1706	
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1630	3217		1539	3228	1458		1703	1418	3162	1706	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	143	1276	20	122	1082	388	10	112	82	612	255	10
RTOR Reduction (vph)	0	1	0	0	0	84	0	0	74	0	2	0
Lane Group Flow (vph)	143	1295	0	122	1082	304	0	122	8	612	263	0
Confl. Peds. (#/hr)			7	7					2			
Heavy Vehicles (%)	2%	3%	7%	8%	3%	2%	6%	2%	3%	2%	2%	2%
Turn Type	Prot			Prot		pm+ov	Split		Perm	Split		
Protected Phases	1	6		5	2	8	4	4		8	8	
Permitted Phases						2			4			
Actuated Green, G (s)	11.3	40.2		9.6	38.5	61.8		10.4	10.4	23.3	23.3	
Effective Green, g (s)	11.3	40.7		9.6	39.0	62.8		9.9	9.9	21.3	21.3	
Actuated g/C Ratio	0.11	0.41		0.10	0.39	0.63		0.10	0.10	0.21	0.21	
Clearance Time (s)	4.0	4.5		4.0	4.5	4.5		3.5	3.5	4.5	4.5	
Vehicle Extension (s)	2.3	5.1		2.3	5.1	2.5		2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	184	1309		148	1259	916		169	140	674	363	
v/s Ratio Prot	0.09	c0.40		0.08	c0.34	0.08		c0.07		c0.19	0.15	
v/s Ratio Perm						0.13			0.01			
v/c Ratio	0.78	0.99		0.82	0.86	0.33		0.72	0.06	0.91	0.73	
Uniform Delay, d1	43.1	29.4		44.4	28.0	8.7		43.7	40.8	38.4	36.6	
Progression Factor	1.27	1.41		1.02	1.46	3.18		1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.6	15.3		18.3	4.7	0.1		13.3	0.1	16.0	6.6	
Delay (s)	64.3	56.9		63.7	45.6	27.9		57.0	41.0	54.4	43.3	
Level of Service	E	E		E	D	C		E	D	D	D	
Approach Delay (s)		57.6			42.7			50.6			51.0	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM Average Control Delay	50.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

Description: 6. Pine St -- Hwy 99 E

c Critical Lane Group

1422: Highway 99E & Barlow Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	1270	10	160	920	210	10	90	130	310	160	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.92			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00			0.97	
Satd. Flow (prot)	1662	3260	1488	1599	3228	1430		1531			1620	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.58	
Satd. Flow (perm)	1662	3260	1488	1599	3228	1430		1496			967	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	51	1296	10	163	939	214	10	92	133	316	163	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	39	0	0	1	0
Lane Group Flow (vph)	51	1296	10	163	939	214	0	196	0	0	498	0
Heavy Vehicles (%)	0%	2%	0%	4%	3%	4%	0%	5%	6%	4%	5%	0%
Turn Type	Prot		Free	Prot		Free	Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases			Free			Free	4			8		
Actuated Green, G (s)	7.3	47.0	119.5	14.5	54.2	119.5		41.0			41.0	
Effective Green, g (s)	8.3	49.0	119.5	15.5	56.2	119.5		43.0			43.0	
Actuated g/C Ratio	0.07	0.41	1.00	0.13	0.47	1.00		0.36			0.36	
Clearance Time (s)	5.0	6.0		5.0	6.0			6.0			6.0	
Vehicle Extension (s)	2.3	4.8		2.3	4.8			2.5			2.5	
Lane Grp Cap (vph)	115	1337	1488	207	1518	1430		538			348	
v/s Ratio Prot	0.03	c0.40		c0.10	0.29							
v/s Ratio Perm			0.01			0.15		0.13			c0.51	
v/c Ratio	0.44	0.97	0.01	0.79	0.62	0.15		0.36			1.43	
Uniform Delay, d1	53.4	34.5	0.0	50.4	23.6	0.0		28.2			38.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	1.6	17.8	0.0	16.9	1.0	0.2		0.3			209.5	
Delay (s)	55.0	52.3	0.0	67.3	24.7	0.2		28.5			247.7	
Level of Service	D	D	A	E	C	A		C			F	
Approach Delay (s)		52.0			26.0			28.5			247.7	
Approach LOS		D			C			C			F	

Intersection Summary			
HCM Average Control Delay	69.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	119.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		
Description: 1. S Barlow Rd -- Hwy 99E			
c Critical Lane Group			

1439: NE Territorial Rd & Highway 99E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	80	10	80	90	10	110	1050	80	20	980	290
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.98		1.00	0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1599	1721		1662	1724		1662	3200		1662	3197	1473
Flt Permitted	0.49	1.00		0.69	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	823	1721		1214	1724		1662	3200		1662	3197	1473
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	87	11	87	98	11	120	1141	87	22	1065	315
RTOR Reduction (vph)	0	5	0	0	4	0	0	4	0	0	0	169
Lane Group Flow (vph)	174	93	0	87	105	0	120	1224	0	22	1065	146
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	1%
Turn Type	pm+pt			pm+pt			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								2
Actuated Green, G (s)	26.1	14.1		21.3	11.7		13.3	53.0		4.8	44.5	44.5
Effective Green, g (s)	26.1	14.6		21.3	12.2		13.3	55.0		4.8	46.5	46.5
Actuated g/C Ratio	0.26	0.15		0.21	0.12		0.13	0.55		0.05	0.46	0.46
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	0.2	2.5		0.2	2.5		2.3	5.4		2.3	5.4	5.4
Lane Grp Cap (vph)	308	251		302	210		221	1760		80	1487	685
v/s Ratio Prot	c0.07	0.05		0.03	0.06		c0.07	c0.38		0.01	0.33	
v/s Ratio Perm	c0.08			0.03								0.10
v/c Ratio	0.56	0.37		0.29	0.50		0.54	0.70		0.28	0.72	0.21
Uniform Delay, d1	30.7	38.5		32.7	41.0		40.5	16.4		45.9	21.5	15.9
Progression Factor	1.00	1.00		0.98	0.98		1.42	0.20		1.00	1.00	1.00
Incremental Delay, d2	1.4	0.7		0.2	1.4		1.3	1.6		1.1	3.0	0.7
Delay (s)	32.2	39.2		32.2	41.7		58.9	4.8		47.0	24.4	16.6
Level of Service	C	D		C	D		E	A		D	C	B
Approach Delay (s)		34.7			37.5			9.7			23.0	
Approach LOS		C			D			A			C	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 9. Hwy 99 -- NE Territorial Rd			
c Critical Lane Group			

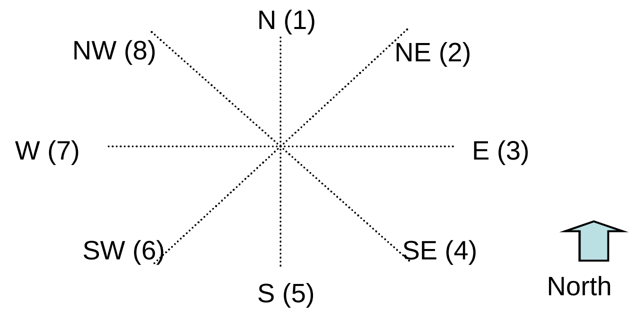
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	400	180	1060	370	110	960
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1630	1458	3260	1458	1630	3260
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1630	1458	3260	1458	1630	3260
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	435	196	1152	402	120	1043
RTOR Reduction (vph)	0	137	0	217	0	0
Lane Group Flow (vph)	435	59	1152	185	120	1043
Turn Type		Perm		Perm	Prot	
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	29.8	29.8	44.4	44.4	11.3	60.2
Effective Green, g (s)	30.3	30.3	45.9	45.9	11.8	61.7
Actuated g/C Ratio	0.30	0.30	0.46	0.46	0.12	0.62
Clearance Time (s)	4.5	4.5	5.5	5.5	4.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	494	442	1496	669	192	2011
v/s Ratio Prot	c0.27		c0.35		0.07	c0.32
v/s Ratio Perm		0.04		0.13		
v/c Ratio	0.88	0.13	0.77	0.28	0.62	0.52
Uniform Delay, d1	33.1	25.3	22.6	16.8	42.0	10.8
Progression Factor	1.00	1.00	1.64	8.14	1.09	0.95
Incremental Delay, d2	16.6	0.1	2.0	0.5	4.6	0.7
Delay (s)	49.7	25.5	39.1	136.9	50.5	11.0
Level of Service	D	C	D	F	D	B
Approach Delay (s)	42.2		64.4			15.1
Approach LOS	D		E			B

Intersection Summary			
HCM Average Control Delay	43.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	1320	350	90	1220	40	310	160	100	100	120	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	3197	1430	1614	3216		3162	1750	1430	1646	1625	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.65	1.00	
Satd. Flow (perm)	1662	3197	1430	1614	3216		3162	1750	1430	1133	1625	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	71	1347	357	92	1245	41	316	163	102	102	122	61
RTOR Reduction (vph)	0	0	202	0	2	0	0	0	80	0	19	0
Lane Group Flow (vph)	71	1347	155	92	1284	0	316	163	22	102	164	0
Heavy Vehicles (%)	0%	4%	4%	3%	3%	0%	2%	0%	4%	1%	2%	3%
Turn Type	Prot		Perm	Prot			Prot		Perm	pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6						4	8		
Actuated Green, G (s)	9.4	42.0	42.0	9.4	43.5		14.3	21.6	21.6	23.3	15.3	
Effective Green, g (s)	9.4	43.5	43.5	10.9	45.0		14.3	21.6	21.6	23.3	15.3	
Actuated g/C Ratio	0.09	0.44	0.44	0.11	0.45		0.14	0.22	0.22	0.23	0.15	
Clearance Time (s)	4.0	5.5	5.5	5.5	5.5		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.3	5.5	5.5	2.3	5.5		2.3	2.3	2.3	3.0	2.3	
Lane Grp Cap (vph)	156	1391	622	176	1447		452	378	309	305	249	
v/s Ratio Prot	0.04	c0.42		c0.06	0.40		c0.10	0.09		0.03	c0.10	
v/s Ratio Perm			0.11						0.02	0.05		
v/c Ratio	0.46	0.97	0.25	0.52	0.89		0.70	0.43	0.07	0.33	0.66	
Uniform Delay, d1	42.9	27.6	17.9	42.1	25.2		40.8	33.9	31.2	31.4	39.9	
Progression Factor	0.86	0.94	2.85	1.17	1.10		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	9.2	0.4	1.4	6.9		4.1	0.5	0.1	0.7	5.2	
Delay (s)	37.4	35.0	51.4	50.8	34.5		44.9	34.4	31.3	32.0	45.0	
Level of Service	D	D	D	D	C		D	C	C	C	D	
Approach Delay (s)		38.4			35.6			39.6			40.4	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	37.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		
Description: 7. Sequoia Pkwy -- Hwy 99 E			
c Critical Lane Group			

General & Site Information	
Analyst:	BBC
Agency/Company:	DKS Associates
Date:	10/20/2010
Project Name:	Canby TSP
Intersection:	SE 1st/Mulino/Haines/Bremer
Analysis Time Period:	P.M. Peak
Jurisdiction:	Clackamas Co.
Year:	2030 Financially Constrained



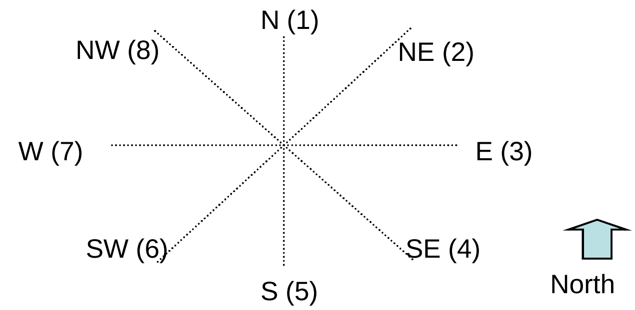
Volumes		Roundabout Approach/Entry Legs							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Input	N (1), vph		30	70		230		30	
Volumes	NE (2), vph	20		40		30		20	
to Leg #	E (3), vph	30	90			50		30	
	SE (4), vph								
	S (5), vph	280	80	60				130	
	SW (6), vph								
	W (7), vph	30	20	20		80			
	NW (8), vph								
Output	Total Vehicles	360	220	190	0	390	0	210	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Trucks	3.5	3.5	3.5	0.0	3.5	0.0	3.5	0.0
E_t	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
F_{HV}	0.966	0.966	0.966	1.000	0.966	1.000	0.966	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	35	81	0	265	0	35	0
NE (2), pcu/h	23	0	46	0	35	0	23	0
E (3), pcu/h	35	104	0	0	58	0	35	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	322	92	69	0	0	0	150	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	35	23	23	0	92	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	414	253	219	0	449	0	242	0
Conflicting flow, pcu/h	403	564	472	702	253	886	644	817

Results	N	NE	E	SE	S	SW	W	NW
Entry Capacity, pcu/h	756	643	705	NA	877	NA	593	NA
Leg v/c ratio	0.55	0.39	0.31		0.51		0.41	
Control Delay, s/pcu	10.4	9.2	7.4		8.3		10.2	
LOS	B	A	A		A		B	
95th Percentile Queue (ft)	582	355	307	0	630	0	339	0

General & Site Information	
Analyst:	BBC
Agency/Company:	DKS Associates
Date:	10/20/2010
Project Name:	Canby TSP
Intersection:	Township Rd/Mulino Rd
Analysis Time Period:	P.M. Peak
Jurisdiction:	Clackamas Co.
Year:	2030 Financially Constrained



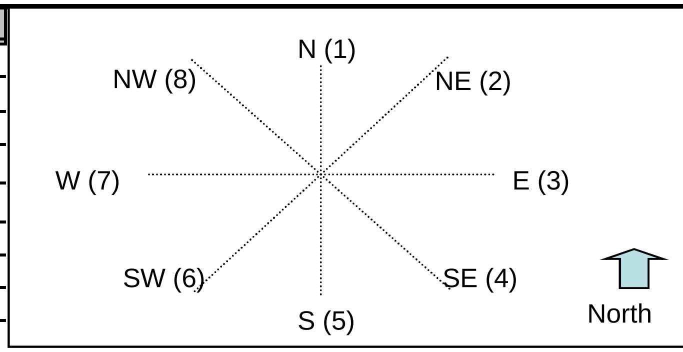
Volumes		Roundabout Approach/Entry Legs							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Input Volumes to Leg #	N (1), vph			50		200		130	
	NE (2), vph								
	E (3), vph	60				50		180	
	SE (4), vph								
	S (5), vph	300		60				110	
	SW (6), vph								
	W (7), vph	170		100		40			
	NW (8), vph								
Output	Total Vehicles	530	0	210	0	290	0	420	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Trucks	2.5	0.0	2.0	0.0	3.0	0.0	3.0	0.0
E_t	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
F_{HV}	0.976	1.000	0.980	1.000	0.971	1.000	0.971	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	58	0	234	0	152	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	70	0	0	0	59	0	211	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	349	0	70	0	0	0	129	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	198	0	116	0	47	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	617	0	243	0	339	0	492	0
Conflicting flow, pcu/h	232	676	433	772	433	980	489	850

Results	N	NE	E	SE	S	SW	W	NW
Entry Capacity, pcu/h	896	NA	733	NA	733	NA	693	NA
Leg v/c ratio	0.69		0.33		0.46		0.71	
Control Delay, s/pcu	12.4		7.3		9.1		16.8	
LOS	B		A		A		C	
95th Percentile Queue (ft)	843	0	334	0	469	0	679	0

General & Site Information	
Analyst:	BBC
Agency/Company:	DKS Associates
Date:	10/20/2010
Project Name:	Canby TSP
Intersection:	Township Rd/Redwood Rd
Analysis Time Period:	P.M. Peak
Jurisdiction:	City of Canby
Year:	2030 Financially Constrained



Volumes		Roundabout Approach/Entry Legs							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Input	N (1), vph			50		150		70	
Volumes	NE (2), vph								
to Leg #	E (3), vph	130				40		230	
	SE (4), vph								
	S (5), vph	80		50				10	
	SW (6), vph								
	W (7), vph	140		450		60			
	NW (8), vph								
Output	Total Vehicles	350	0	550	0	250	0	310	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Trucks	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0
E_t	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
F_{HV}	0.980	1.000	0.980	1.000	0.980	1.000	0.980	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	55	0	166	0	78	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	144	0	0	0	44	0	255	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	89	0	55	0	0	0	11	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	155	0	499	0	67	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	388	0	610	0	277	0	344	0
Conflicting flow, pcu/h	621	920	310	754	477	632	288	1009

Results	N	NE	E	SE	S	SW	W	NW
Entry Capacity, pcu/h	607	NA	828	NA	702	NA	847	NA
Leg v/c ratio	0.64		0.74		0.40		0.41	
Control Delay, s/pcu	15.8		15.4		8.4		7.1	
LOS	C		C		A		A	
95th Percentile Queue (ft)	557	0	875	0	398	0	493	0

1015: N 1st Ave & Grant St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	30	30	40	30	10	20	250	150	10	560	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	33	33	43	33	11	22	272	163	11	609	33
Pedestrians					7			5				
Lane Width (ft)					12.0			12.0				
Walking Speed (ft/s)					4.0			4.0				
Percent Blockage					1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								281				
pX, platoon unblocked	0.87	0.87		0.87	0.87	0.87				0.87		
vC, conflicting volume	1071	1132	326	784	1067	360	641			442		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1007	1077	326	677	1002	190	641			284		
tC, single (s)	7.5	6.6	6.9	7.5	6.6	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	82	95	81	84	98	98			99		
cM capacity (veh/h)	144	180	673	235	200	714	953			1116		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1	SB 2
Volume Total	65	87	457	315	337
Volume Left	0	43	22	11	0
Volume Right	33	11	163	0	33
cSH	283	240	953	1116	1700
Volume to Capacity	0.23	0.36	0.02	0.01	0.20
Queue Length 95th (ft)	22	39	2	1	0
Control Delay (s)	21.5	28.4	0.7	0.4	0.0
Lane LOS	C	D	A	A	
Approach Delay (s)	21.5	28.4	0.7	0.2	
Approach LOS	C	D			

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 16. N Grant St -- NW 1st Ave			

1040: N Knights Bridge Rd & N Holly St

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	80	130	0	190	90	290
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	141	0	207	98	315

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	228	207	413
Volume Left (vph)	87	0	0
Volume Right (vph)	141	0	315
Hadj (s)	-0.28	0.07	-0.45
Departure Headway (s)	5.0	5.1	4.3
Degree Utilization, x	0.32	0.29	0.50
Capacity (veh/h)	654	671	794
Control Delay (s)	10.3	10.1	11.5
Approach Delay (s)	10.3	10.1	11.5
Approach LOS	B	B	B

Intersection Summary			
Delay	10.9		
HCM Level of Service	B		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 14. N Holly St -- N Knights Bridge Rd			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	150	320	290	100	310	420
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1630	1417	1648		1630	1716
Flt Permitted	0.95	1.00	1.00		0.29	1.00
Satd. Flow (perm)	1630	1417	1648		501	1716
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	348	315	109	337	457
RTOR Reduction (vph)	0	207	15	0	0	0
Lane Group Flow (vph)	163	141	409	0	337	457
Confl. Peds. (#/hr)	9	33				
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%
Turn Type		pm+ov			pm+pt	
Protected Phases	8	1	2		1	6
Permitted Phases		8			6	
Actuated Green, G (s)	9.1	21.6	19.9		36.4	36.4
Effective Green, g (s)	9.1	21.6	19.9		36.4	36.4
Actuated g/C Ratio	0.17	0.40	0.37		0.68	0.68
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	277	678	613		605	1168
v/s Ratio Prot	c0.10	0.05	c0.25		c0.13	0.27
v/s Ratio Perm		0.05			0.25	
v/c Ratio	0.59	0.21	0.67		0.56	0.39
Uniform Delay, d1	20.5	10.4	14.0		5.1	3.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.2	0.2	2.8		1.1	0.2
Delay (s)	23.7	10.5	16.8		6.2	3.9
Level of Service	C	B	B		A	A
Approach Delay (s)	14.7		16.8			4.9
Approach LOS	B		B			A

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

Description: 50 vehicles transferred from SBL to SBT (due to modeling limitations related to traffic signals)

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	20	80	275	195	70	410
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	87	299	212	76	446
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			921			262
pX, platoon unblocked	0.86					
vC, conflicting volume	1003	405			511	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	919	405			511	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	87			93	
cM capacity (veh/h)	239	646			1054	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	109	511	522
Volume Left	22	0	76
Volume Right	87	212	0
cSH	482	1700	1054
Volume to Capacity	0.23	0.30	0.07
Queue Length 95th (ft)	21	0	6
Control Delay (s)	14.6	0.0	2.0
Lane LOS	B		A
Approach Delay (s)	14.6	0.0	2.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

1222: N 1st Ave & N Ivy St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	0	0	70	0	390	90	0	400	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	0	0	0	74	0	411	95	0	421	42
Pedestrians		11			10			4				
Lane Width (ft)		0.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			1			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								292				
pX, platoon unblocked	0.87	0.87		0.87	0.87	0.87				0.87		
vC, conflicting volume	985	968	247	682	942	468	474			515		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	905	886	247	556	856	308	474			363		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.2			4.5		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.4		
p0 queue free %	100	100	100	100	100	88	100			100		
cM capacity (veh/h)	177	245	757	356	255	596	1070			921		

Direction, Lane #	WB 1	NB 1	SB 1	SB 2
Volume Total	74	505	281	182
Volume Left	0	0	0	0
Volume Right	74	95	0	42
cSH	596	1700	1700	1700
Volume to Capacity	0.12	0.30	0.17	0.11
Queue Length 95th (ft)	11	0	0	0
Control Delay (s)	11.9	0.0	0.0	0.0
Lane LOS	B			
Approach Delay (s)	11.9	0.0	0.0	
Approach LOS	B			

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

1232: NE Territorial Rd & N Holly St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	20	220	20	150	60	80	0	60	100	30	80	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	239	22	163	65	87	0	65	109	33	87	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	283	315	174	120
Volume Left (vph)	22	163	0	33
Volume Right (vph)	22	87	109	0
Hadj (s)	0.04	-0.06	-0.25	0.09
Departure Headway (s)	5.3	5.1	5.5	5.9
Degree Utilization, x	0.41	0.45	0.26	0.20
Capacity (veh/h)	639	661	583	535
Control Delay (s)	11.9	12.3	10.4	10.3
Approach Delay (s)	11.9	12.3	10.4	10.3
Approach LOS	B	B	B	B

Intersection Summary			
Delay	11.5		
HCM Level of Service	B		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 20. N Holly St -- NE Territorial Rd			

HCM Unsignalized Intersection Capacity Analysis
1242: NE Territorial Rd & N Redwood St

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	210	100	30	390	0	160	0	10	10	10	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	228	109	33	424	0	174	0	11	11	11	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	424			337			788	772	283	783	826	424
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	424			337			788	772	283	783	826	424
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			40	100	99	96	96	98
cM capacity (veh/h)	1146			1234			288	324	761	303	301	634

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	337	457	185	33
Volume Left	0	33	174	11
Volume Right	109	0	11	11
cSH	1146	1234	299	366
Volume to Capacity	0.00	0.03	0.62	0.09
Queue Length 95th (ft)	0	2	96	7
Control Delay (s)	0.0	0.8	34.7	15.8
Lane LOS		A	D	C
Approach Delay (s)	0.0	0.8	34.7	15.8
Approach LOS			D	C

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 21. N Redwood St -- NE Territorial Rd			

HCM Signalized Intersection Capacity Analysis
1299: Arndt Rd & S Knights Bridge Rd

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	270	0	940	400	0	400
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	0.97		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1614		1733	1381		1716
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1614		1733	1381		1716
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	284	0	989	421	0	421
RTOR Reduction (vph)	0	0	0	150	0	0
Lane Group Flow (vph)	284	0	989	271	0	421
Confl. Peds. (#/hr)				8	8	
Heavy Vehicles (%)	3%	50%	1%	4%	50%	2%
Turn Type				Perm	Perm	
Protected Phases	4		6			2
Permitted Phases				6	2	
Actuated Green, G (s)	15.4		41.7	41.7		41.7
Effective Green, g (s)	15.9		43.2	43.2		43.2
Actuated g/C Ratio	0.24		0.64	0.64		0.64
Clearance Time (s)	4.5		5.5	5.5		5.5
Vehicle Extension (s)	2.5		3.0	3.0		3.0
Lane Grp Cap (vph)	382		1116	889		1105
v/s Ratio Prot	c0.18		c0.57			0.25
v/s Ratio Perm				0.20		
v/c Ratio	0.74		0.89	0.30		0.38
Uniform Delay, d1	23.7		9.9	5.3		5.6
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	7.2		8.7	0.2		0.2
Delay (s)	31.0		18.6	5.5		5.9
Level of Service	C		B	A		A
Approach Delay (s)	31.0		14.7			5.9
Approach LOS	C		B			A

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	67.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 11. S Knights Bridge Rd -- S Arndt Rd			
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	90	90	0	10	40	20	0	50	0	20	90	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	98	0	11	43	22	0	54	0	22	98	33
Pedestrians		3			1			2			1	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	259	216	119	264	232	56	133			55		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	259	216	119	264	232	56	133			55		
tC, single (s)	7.1	6.6	6.2	7.1	6.6	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.1	3.3	3.5	4.1	3.3	2.2			2.2		
p0 queue free %	85	85	100	98	93	98	100			99		
cM capacity (veh/h)	637	660	934	605	636	1014	1429			1561		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	196	76	54	152
Volume Left	98	11	0	22
Volume Right	0	22	0	33
cSH	648	706	1429	1561
Volume to Capacity	0.30	0.11	0.00	0.01
Queue Length 95th (ft)	32	9	0	1
Control Delay (s)	12.9	10.7	0.0	1.1
Lane LOS	B	B		A
Approach Delay (s)	12.9	10.7	0.0	1.1
Approach LOS	B	B		

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 15. N Cedar St -- NW 3rd Ave			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	290	720	460	70	20	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	315	783	500	76	22	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	576				1951	538
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	576				1951	538
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	68				54	100
cM capacity (veh/h)	997				48	547

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1098	576	22
Volume Left	315	0	22
Volume Right	0	76	0
cSH	997	1700	48
Volume to Capacity	0.32	0.34	0.46
Queue Length 95th (ft)	34	0	42
Control Delay (s)	7.2	0.0	132.6
Lane LOS	A		F
Approach Delay (s)	7.2	0.0	132.6
Approach LOS			F

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		
Description: 12. N Birch St -- N Knights Bridge Rd			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	230	0	0	360	20	0	0	0	30	0	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	45	261	0	0	409	23	0	0	0	34	0	45
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	432			261			818	784	261	773	773	420
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	432			261			818	784	261	773	773	420
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	89	100	93
cM capacity (veh/h)	1128			1315			267	312	782	306	317	633

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	307	432	0	80
Volume Left	45	0	0	34
Volume Right	0	23	0	45
cSH	1128	1315	1700	435
Volume to Capacity	0.04	0.00	0.00	0.18
Queue Length 95th (ft)	3	0	0	17
Control Delay (s)	1.6	0.0	0.0	15.1
Lane LOS	A		A	C
Approach Delay (s)	1.6	0.0	0.0	15.1
Approach LOS			A	C

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 33. Molalla Forest Rd -- SE 13th Ave			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	280	90	150	320	50	130	210	120	160	260	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	1626		1616	1675		1630	1533		1629	1724	
Flt Permitted	0.37	1.00		0.37	1.00		0.50	1.00		0.41	1.00	
Satd. Flow (perm)	639	1626		621	1675		851	1533		696	1724	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	304	98	163	348	54	141	228	130	174	283	11
RTOR Reduction (vph)	0	21	0	0	10	0	0	39	0	0	3	0
Lane Group Flow (vph)	33	381	0	163	392	0	141	319	0	174	291	0
Confl. Peds. (#/hr)			13	13					1	1		
Heavy Vehicles (%)	0%	3%	2%	2%	2%	5%	2%	6%	9%	2%	1%	0%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.8	15.8		15.8	15.8		18.2	14.9		18.2	14.9	
Effective Green, g (s)	16.3	16.3		16.3	16.3		18.2	15.9		18.2	15.9	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.38	0.33		0.38	0.33	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.0	5.0		4.0	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	219	558		213	575		380	513		331	577	
v/s Ratio Prot		0.23			0.23		0.03	c0.21		c0.04	0.17	
v/s Ratio Perm	0.05			c0.26			0.12			0.16		
v/c Ratio	0.15	0.68		0.77	0.68		0.37	0.62		0.53	0.50	
Uniform Delay, d1	10.8	13.4		13.9	13.4		10.0	13.3		10.5	12.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	3.2		14.4	3.1		0.4	2.7		1.2	1.0	
Delay (s)	11.0	16.5		28.3	16.4		10.4	15.9		11.6	13.6	
Level of Service	B	B		C	B		B	B		B	B	
Approach Delay (s)		16.1			19.9			14.4			12.9	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 24. S Ivy St -- SE 13th Ave			
c Critical Lane Group			

1452: NE 4th Ave & NE 3rd Ave

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	0	0	0	480	40	770
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	522	43	837
Pedestrians				1	3	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			3		525	4
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			3		525	4
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	22
cM capacity (veh/h)			1615		515	1079

Direction, Lane #	WB 1	NB 1	NB 2
Volume Total	522	43	837
Volume Left	0	43	0
Volume Right	0	0	837
cSH	1700	515	1079
Volume to Capacity	0.31	0.08	0.78
Queue Length 95th (ft)	0	7	204
Control Delay (s)	0.0	12.6	18.8
Lane LOS		B	C
Approach Delay (s)	0.0	18.5	
Approach LOS		C	

Intersection Summary			
Average Delay	11.6		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 18. NE 4th Ave -- NE 3rd Ave			

1480: SE Hazel Dell Way & Sequoia Pkwy

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	40	140	50	50	190	50	480	20	190	200	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	0	41	143	51	51	194	51	490	20	194	204	41
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											678	
pX, platoon unblocked												
vC, conflicting volume	1403	1204	102	1255	1235	500	245			510		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1403	1204	102	1255	1235	500	245			510		
tC, single (s)	7.5	6.5	6.9	7.5	6.6	7.0	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	72	85	30	63	62	96			82		
cM capacity (veh/h)	37	146	940	73	137	511	1304			1065		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3	SB 4
Volume Total	0	184	51	245	51	510	194	136	82	27
Volume Left	0	0	51	0	51	0	194	0	0	0
Volume Right	0	143	0	194	0	20	0	0	14	27
cSH	1700	425	73	325	1304	1700	1065	1700	1700	1700
Volume to Capacity	0.00	0.43	0.70	0.75	0.04	0.30	0.18	0.08	0.05	0.02
Queue Length 95th (ft)	0	53	80	145	3	0	17	0	0	0
Control Delay (s)	0.0	19.7	128.3	43.2	7.9	0.0	9.1	0.0	0.0	0.0
Lane LOS	A	C	F	E	A		A			
Approach Delay (s)	19.7		57.9		0.7		4.0			
Approach LOS	C		F							

Intersection Summary			
Average Delay	15.5		
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 27. SE Hazel Dell Way -- SE Sequoia Pkwy			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	10	10	130	0	70	10	110	90	40	90	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	11	11	141	0	76	11	120	98	43	98	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	451	424	98	391	375	168	98			217		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	451	424	98	391	375	168	98			217		
tC, single (s)	7.6	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	4.0	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	97	98	99	74	100	91	99			97		
cM capacity (veh/h)	395	504	964	539	536	881	1508			1290		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	33	217	228	141
Volume Left	11	141	11	43
Volume Right	11	76	98	0
cSH	540	623	1508	1290
Volume to Capacity	0.06	0.35	0.01	0.03
Queue Length 95th (ft)	5	39	1	3
Control Delay (s)	12.1	13.8	0.4	2.6
Lane LOS	B	B	A	A
Approach Delay (s)	12.1	13.8	0.4	2.6
Approach LOS	B	B		

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 25. S Redwood St -- SE 4th Ave			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	580	160	40	410	110	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	592	163	41	418	112	31
Pedestrians	1			6	1	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						4
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			756		1175	680
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			756		1175	680
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		44	93
cM capacity (veh/h)			863		202	452

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	755	459	143
Volume Left	0	41	112
Volume Right	163	0	31
cSH	1700	863	257
Volume to Capacity	0.44	0.05	0.56
Queue Length 95th (ft)	0	4	77
Control Delay (s)	0.0	1.4	36.7
Lane LOS		A	E
Approach Delay (s)	0.0	1.4	36.7
Approach LOS			E

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 13. N Cedar St -- N Knights Bridge Rd			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	140	10	20	0	40	30	10	140	0	0	310	140
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	152	11	22	0	43	33	11	152	0	0	337	152

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	152	33	0	76	11	152	0	489
Volume Left (vph)	152	0	0	0	11	0	0	0
Volume Right (vph)	0	22	0	33	0	0	0	152
Hadj (s)	0.50	-0.46	0.00	-0.27	0.50	0.08	0.00	-0.16
Departure Headway (s)	7.0	6.0	6.7	6.4	6.5	6.1	5.6	5.4
Degree Utilization, x	0.29	0.05	0.00	0.14	0.02	0.26	0.00	0.74
Capacity (veh/h)	477	543	488	493	517	555	630	643
Control Delay (s)	11.6	8.1	8.5	9.3	8.5	10.0	7.4	21.0
Approach Delay (s)	11.0		9.3		9.9		21.0	
Approach LOS	B		A		A		C	

Intersection Summary			
Delay	16.0		
HCM Level of Service	C		
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
Description: 30. S Walnut Rd -- SE 4th Ave			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	140	170	60	30	120	0	10	160	50	0	50	80
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	159	193	68	34	136	0	11	182	57	0	57	91

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	420	170	250	148
Volume Left (vph)	159	34	11	0
Volume Right (vph)	68	0	57	91
Hadj (s)	0.06	0.13	-0.04	-0.28
Departure Headway (s)	5.5	6.0	5.8	5.8
Degree Utilization, x	0.64	0.28	0.41	0.24
Capacity (veh/h)	628	542	558	525
Control Delay (s)	17.6	11.3	12.8	10.6
Approach Delay (s)	17.6	11.3	12.8	10.6
Approach LOS	C	B	B	B

Intersection Summary			
Delay	14.3		
HCM Level of Service	B		
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	190	80	40	60	150	320
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	216	91	45	68	170	364

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	307	114	534
Volume Left (vph)	216	45	0
Volume Right (vph)	91	0	364
Hadj (s)	-0.04	0.15	-0.39
Departure Headway (s)	5.4	5.7	4.6
Degree Utilization, x	0.46	0.18	0.68
Capacity (veh/h)	619	587	759
Control Delay (s)	13.0	9.9	16.9
Approach Delay (s)	13.0	9.9	16.9
Approach LOS	B	A	C

Intersection Summary			
Delay	14.8		
HCM Level of Service	B		
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 34. S Mulino Rd -- SE 13th Ave			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	60	240	60	30	300	30	80	40	40	90	30	220
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	63	253	63	32	316	32	84	42	42	95	32	232

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	63	316	32	347	84	84	95	263
Volume Left (vph)	63	0	32	0	84	0	95	0
Volume Right (vph)	0	63	0	32	0	42	0	232
Hadj (s)	0.50	-0.13	0.53	-0.06	0.53	-0.32	0.50	-0.61
Departure Headway (s)	7.3	6.6	7.3	6.7	7.9	7.1	7.5	6.4
Degree Utilization, x	0.13	0.58	0.06	0.65	0.19	0.17	0.20	0.47
Capacity (veh/h)	470	515	470	515	411	464	449	531
Control Delay (s)	10.1	17.2	9.6	19.8	11.5	10.3	11.2	13.8
Approach Delay (s)	16.1		19.0		10.9		13.1	
Approach LOS	C		C		B		B	

Intersection Summary			
Delay	15.4		
HCM Level of Service	C		
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
Description: 31. S Township Rd -- S Walnut St			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↱		↰	↱	
Volume (vph)	150	1220	40	90	1140	80	40	180	50	110	100	200
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.97		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	3244		1630	3194		1484	1621		1630	1523	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	3244		1630	3194		1484	1621		1630	1523	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	158	1284	42	95	1200	84	42	189	53	116	105	211
RTOR Reduction (vph)	0	2	0	0	5	0	0	9	0	0	66	0
Lane Group Flow (vph)	158	1324	0	95	1279	0	42	233	0	116	250	0
Confl. Peds. (#/hr)	1		1	1		1	9					9
Heavy Vehicles (%)	2%	2%	0%	2%	3%	2%	12%	4%	6%	2%	0%	2%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	13.1	50.6		12.6	50.6		4.2	18.1		12.7	26.6	
Effective Green, g (s)	13.1	51.1		12.6	50.6		4.2	17.6		12.7	26.1	
Actuated g/C Ratio	0.12	0.46		0.11	0.46		0.04	0.16		0.12	0.24	
Clearance Time (s)	4.0	4.5		4.0	4.0		4.0	3.5		4.0	3.5	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	194	1507		187	1469		57	259		188	361	
v/s Ratio Prot	0.10	c0.41		0.06	c0.40		0.03	c0.14		0.07	c0.16	
v/s Ratio Perm												
v/c Ratio	0.81	0.88		0.51	0.87		0.74	0.90		0.62	0.69	
Uniform Delay, d1	47.3	26.6		45.8	26.8		52.4	45.3		46.3	38.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	21.7	7.6		1.3	7.3		35.9	30.2		4.7	4.9	
Delay (s)	68.9	34.2		47.1	34.1		88.2	75.5		51.0	43.2	
Level of Service	E	C		D	C		F	E		D	D	
Approach Delay (s)		37.9			35.0			77.4			45.3	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM Average Control Delay	40.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		
Description: 3. Elm St -- Hwy 99E			
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↱		↰	↱	
Volume (vph)	120	1280	20	220	1110	100	120	230	5	150	240	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.5	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1599	3221		1646	3185		1630	1677		1614	1712	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3221		1646	3185		1630	1677		1614	1712	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	126	1347	21	232	1168	105	126	242	5	158	253	21
RTOR Reduction (vph)	0	1	0	0	6	0	0	1	0	0	3	0
Lane Group Flow (vph)	126	1367	0	232	1267	0	126	246	0	158	271	0
Confl. Peds. (#/hr)	1		1	1		1	2		19	19		2
Heavy Vehicles (%)	4%	3%	1%	1%	3%	2%	2%	4%	0%	3%	1%	0%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	10.0	40.5		12.2	42.2		11.2	17.1		12.7	18.6	
Effective Green, g (s)	11.0	41.5		12.2	42.7		11.7	17.1		12.7	18.6	
Actuated g/C Ratio	0.11	0.42		0.12	0.43		0.12	0.17		0.13	0.19	
Clearance Time (s)	5.0	5.0		4.0	4.5		4.5	4.0		4.5	4.0	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.5	2.3	
Lane Grp Cap (vph)	176	1337		201	1360		191	287		205	318	
v/s Ratio Prot	0.08	c0.42		c0.14	0.40		0.08	0.15		c0.10	c0.16	
v/s Ratio Perm												
v/c Ratio	0.72	1.02		1.15	0.93		0.66	0.86		0.77	0.85	
Uniform Delay, d1	43.0	29.2		43.9	27.3		42.2	40.3		42.2	39.4	
Progression Factor	1.06	1.15		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.3	23.6		111.2	12.7		6.8	21.1		15.7	18.8	
Delay (s)	51.9	57.2		155.1	40.0		49.0	61.4		57.9	58.1	
Level of Service	D	E		F	D		D	E		E	E	
Approach Delay (s)		56.8			57.7			57.2			58.1	
Approach LOS		E			E			E			E	

Intersection Summary			
HCM Average Control Delay	57.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		
Description: 5. Ivy St -- Hwy 99 E			
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	10	240	1000	90	370	1190
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	261	1087	98	402	1293
Pedestrians	1					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2588	593			1186	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2588	593			1186	
tC, single (s)	6.8	6.9			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	42			30	
cM capacity (veh/h)	6	453			579	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	11	261	725	460	402	647	647
Volume Left	11	0	0	0	402	0	0
Volume Right	0	261	0	98	0	0	0
cSH	6	453	1700	1700	579	1700	1700
Volume to Capacity	1.73	0.58	0.43	0.27	0.70	0.38	0.38
Queue Length 95th (ft)	58	89	0	0	137	0	0
Control Delay (s)	1433.7	23.2	0.0	0.0	24.2	0.0	0.0
Lane LOS	F	C			C		
Approach Delay (s)	79.6		0.0		5.7		
Approach LOS	F						

Intersection Summary			
Average Delay	9.9		
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 10. Hwy 99E -- Haines Rd			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	1220	70	70	1070	100	70	230	0	170	270	180
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	3.5		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3196		1554	3185		1662	1750		1646	1607	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	3196		1554	3185		1662	1750		1646	1607	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	1284	74	74	1126	105	74	242	0	179	284	189
RTOR Reduction (vph)	0	4	0	0	7	0	0	0	0	0	23	0
Lane Group Flow (vph)	105	1354	0	74	1224	0	74	242	0	179	450	0
Confl. Peds. (#/hr)	2		2	2		2			10	10		
Heavy Vehicles (%)	0%	3%	4%	7%	3%	1%	0%	0%	0%	1%	2%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	9.2	46.8		7.4	45.0		8.0	15.5		14.8	22.3	
Effective Green, g (s)	9.2	46.8		7.4	45.0		8.0	15.5		14.8	21.8	
Actuated g/C Ratio	0.09	0.47		0.07	0.45		0.08	0.16		0.15	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	3.5		4.0	3.5	
Vehicle Extension (s)	2.3	4.3		2.3	4.3		2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	153	1496		115	1433		133	271		244	350	
v/s Ratio Prot	c0.06	c0.42		0.05	0.38		0.04	0.14		c0.11	c0.28	
v/s Ratio Perm												
v/c Ratio	0.69	0.91		0.64	0.85		0.56	0.89		0.73	1.28	
Uniform Delay, d1	44.0	24.6		45.0	24.6		44.3	41.4		40.7	39.1	
Progression Factor	1.00	1.00		0.73	1.78		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.5	9.4		4.2	2.9		3.5	28.4		9.9	148.1	
Delay (s)	54.5	34.0		37.2	46.7		47.8	69.8		50.6	187.2	
Level of Service	D	C		D	D		D	E		D	F	
Approach Delay (s)		35.4			46.1			64.7			149.7	
Approach LOS		D			D			E			F	

Intersection Summary			
HCM Average Control Delay	61.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		
Description: 4. Grant St -- Hwy 99E			
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	1330	370	40	1020	130	230	80	50	80	90	100
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.94		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1599	3228	1458	1630	3201		1646	1648		1646	1612	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.57	1.00		0.67	1.00	
Satd. Flow (perm)	1599	3228	1458	1630	3201		985	1648		1160	1612	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	1400	389	42	1074	137	242	84	53	84	95	105
RTOR Reduction (vph)	0	0	195	0	13	0	0	31	0	0	55	0
Lane Group Flow (vph)	53	1400	195	42	1199	0	242	106	0	84	145	0
Heavy Vehicles (%)	4%	3%	2%	2%	2%	3%	1%	0%	0%	1%	0%	0%
Turn Type	Prot		Perm	Prot			Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases			6				4			8		
Actuated Green, G (s)	2.1	32.8	32.8	2.1	32.8		20.2	20.2		20.2	20.2	
Effective Green, g (s)	2.1	33.8	33.8	2.1	33.8		19.7	19.7		19.7	19.7	
Actuated g/C Ratio	0.03	0.50	0.50	0.03	0.50		0.29	0.29		0.29	0.29	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		3.5	3.5		3.5	3.5	
Vehicle Extension (s)	2.3	4.5	4.5	2.3	4.8		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	50	1614	729	51	1601		287	480		338	470	
v/s Ratio Prot	c0.03	c0.43		0.03	0.37			0.06			0.09	
v/s Ratio Perm			0.13				c0.25			0.07		
v/c Ratio	1.06	0.87	0.27	0.82	0.75		0.84	0.22		0.25	0.31	
Uniform Delay, d1	32.8	14.9	9.8	32.6	13.5		22.5	18.1		18.3	18.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	145.2	5.6	0.3	63.1	2.3		19.4	0.2		0.3	0.3	
Delay (s)	178.0	20.5	10.1	95.7	15.8		41.9	18.3		18.6	18.9	
Level of Service	F	C	B	F	B		D	B		B	B	
Approach Delay (s)		22.8			18.5			33.4			18.8	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM Average Control Delay	22.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 2. Berg Pkwy -- Hwy 99E			
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1390	150	80	1080	150	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3159		1539	3228	1568	1444
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3159		1539	3228	1568	1444
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1418	153	82	1102	153	163
RTOR Reduction (vph)	6	0	0	0	0	141
Lane Group Flow (vph)	1565	0	82	1102	153	22
Confl. Peds. (#/hr)		7	7			2
Heavy Vehicles (%)	3%	7%	8%	3%	6%	3%
Turn Type			Prot			Prot
Protected Phases	6		5	2	4	4
Permitted Phases						
Actuated Green, G (s)	73.9		8.6	86.5	15.5	15.5
Effective Green, g (s)	74.4		8.6	87.0	15.0	15.0
Actuated g/C Ratio	0.68		0.08	0.79	0.14	0.14
Clearance Time (s)	4.5		4.0	4.5	3.5	3.5
Vehicle Extension (s)	5.1		2.3	5.1	2.5	2.5
Lane Grp Cap (vph)	2137		120	2553	214	197
v/s Ratio Prot	c0.50		c0.05	0.34	c0.10	0.02
v/s Ratio Perm						
v/c Ratio	0.73		0.68	0.43	0.71	0.11
Uniform Delay, d1	11.4		49.4	3.7	45.5	41.7
Progression Factor	1.00		1.15	0.82	1.00	1.00
Incremental Delay, d2	1.6		11.2	0.5	10.1	0.2
Delay (s)	13.1		68.2	3.4	55.5	41.8
Level of Service	B		E	A	E	D
Approach Delay (s)	13.1			7.9	48.5	
Approach LOS	B			A	D	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 6. Pine St -- Hwy 99 E			
c Critical Lane Group			

1422: Highway 99E & Barlow Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	1280	10	160	930	260	10	80	130	300	160	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.92			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00			0.97	
Satd. Flow (prot)	1662	3260	1488	1599	3228	1430		1525			1620	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.59	
Satd. Flow (perm)	1662	3260	1488	1599	3228	1430		1489			988	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	41	1306	10	163	949	265	10	82	133	306	163	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	35	0	0	1	0
Lane Group Flow (vph)	41	1306	10	163	949	265	0	190	0	0	488	0
Heavy Vehicles (%)	0%	2%	0%	4%	3%	4%	0%	5%	6%	4%	5%	0%
Turn Type	Prot		Free	Prot		Free	Perm			Perm		
Protected Phases	1	6		5	2			4			8	
Permitted Phases			Free			Free	4			8		
Actuated Green, G (s)	7.4	62.2	150.0	15.8	70.6	150.0		55.0			55.0	
Effective Green, g (s)	8.4	64.2	150.0	16.8	72.6	150.0		57.0			57.0	
Actuated g/C Ratio	0.06	0.43	1.00	0.11	0.48	1.00		0.38			0.38	
Clearance Time (s)	5.0	6.0		5.0	6.0			6.0			6.0	
Vehicle Extension (s)	2.3	4.8		2.3	4.8			2.5			2.5	
Lane Grp Cap (vph)	93	1395	1488	179	1562	1430		566			375	
v/s Ratio Prot	0.02	c0.40		c0.10	0.29							
v/s Ratio Perm			0.01			0.19		0.13			c0.49	
v/c Ratio	0.44	0.94	0.01	0.91	0.61	0.19		0.34			1.30	
Uniform Delay, d1	68.5	40.9	0.0	65.9	28.3	0.0		33.1			46.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	1.9	12.3	0.0	42.4	1.0	0.3		0.3			153.6	
Delay (s)	70.5	53.2	0.0	108.2	29.2	0.3		33.3			200.1	
Level of Service	E	D	A	F	C	A		C			F	
Approach Delay (s)		53.3			33.0			33.3			200.1	
Approach LOS		D			C			C			F	

Intersection Summary			
HCM Average Control Delay	64.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		
Description: 1. S Barlow Rd -- Hwy 99E			
c Critical Lane Group			

1439: NE Territorial Rd & Highway 99E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	60	20	70	60	10	100	1020	110	30	890	280
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.96		1.00	0.98		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1599	1684		1662	1712		1662	3190		1662	3197	1473
Flt Permitted	0.52	1.00		0.70	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	882	1684		1226	1712		1662	3190		1662	3197	1473
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	65	22	76	65	11	109	1109	120	33	967	304
RTOR Reduction (vph)	0	13	0	0	6	0	0	5	0	0	0	139
Lane Group Flow (vph)	152	74	0	76	70	0	109	1224	0	33	967	165
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	1%
Turn Type	pm+pt			pm+pt			Prot			Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4								2
Actuated Green, G (s)	23.0	11.0		18.2	8.6		13.3	63.7		7.2	57.6	57.6
Effective Green, g (s)	23.0	11.5		18.2	9.1		13.3	65.7		7.2	59.6	59.6
Actuated g/C Ratio	0.21	0.10		0.17	0.08		0.12	0.60		0.07	0.54	0.54
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	6.0		4.0	6.0	6.0
Vehicle Extension (s)	0.2	2.5		0.2	2.5		2.3	5.4		2.3	5.4	5.4
Lane Grp Cap (vph)	263	176		241	142		201	1905		109	1732	798
v/s Ratio Prot	c0.06	0.04		0.03	0.04		c0.07	c0.38		0.02	0.30	
v/s Ratio Perm	c0.06			0.02								0.11
v/c Ratio	0.58	0.42		0.32	0.49		0.54	0.64		0.30	0.56	0.21
Uniform Delay, d1	38.1	46.1		40.1	48.2		45.5	14.5		49.0	16.6	13.0
Progression Factor	1.00	1.00		0.99	1.00		1.05	0.99		1.00	1.00	1.00
Incremental Delay, d2	1.9	1.2		0.3	1.9		1.9	1.6		0.9	1.3	0.6
Delay (s)	40.0	47.3		40.1	50.0		49.7	15.8		49.9	17.9	13.6
Level of Service	D	D		D	D		D	B		D	B	B
Approach Delay (s)		42.7			45.1			18.6			17.7	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		
Description: 9. Hwy 99 -- NE Territorial Rd			
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	1140	260	100	880	20	240	120	120	160	160	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	3197	1430	1614	3220		3162	1750	1430	1646	1672	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.63	1.00	
Satd. Flow (perm)	1662	3197	1430	1614	3220		3162	1750	1430	1088	1672	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	31	1163	265	102	898	20	245	122	122	163	163	31
RTOR Reduction (vph)	0	0	146	0	1	0	0	0	102	0	7	0
Lane Group Flow (vph)	31	1163	119	102	917	0	245	122	20	163	187	0
Heavy Vehicles (%)	0%	4%	4%	3%	3%	0%	2%	0%	4%	1%	2%	3%
Turn Type	Prot		Perm	Prot			Prot		Perm	pm+pt		
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6						4	8		
Actuated Green, G (s)	7.2	47.7	47.7	13.0	55.0		13.4	18.3	18.3	28.9	16.9	
Effective Green, g (s)	7.2	49.2	49.2	14.5	56.5		13.4	18.3	18.3	28.9	16.9	
Actuated g/C Ratio	0.07	0.45	0.45	0.13	0.51		0.12	0.17	0.17	0.26	0.15	
Clearance Time (s)	4.0	5.5	5.5	5.5	5.5		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.3	5.5	5.5	2.3	5.5		2.3	2.3	2.3	3.0	2.3	
Lane Grp Cap (vph)	109	1430	640	213	1654		385	291	238	347	257	
v/s Ratio Prot	0.02	c0.36		c0.06	0.28		c0.08	0.07		0.05	c0.11	
v/s Ratio Perm			0.08						0.01	0.07		
v/c Ratio	0.28	0.81	0.19	0.48	0.55		0.64	0.42	0.09	0.47	0.73	
Uniform Delay, d1	48.9	26.4	18.3	44.2	18.2		46.0	41.1	38.8	33.2	44.4	
Progression Factor	1.13	0.72	1.17	0.96	0.84		1.00	1.00	1.00	1.01	1.01	
Incremental Delay, d2	0.6	3.7	0.5	0.9	1.3		2.8	0.6	0.1	1.0	8.9	
Delay (s)	55.8	22.7	22.0	43.5	16.5		48.8	41.7	38.9	34.5	53.7	
Level of Service	E	C	C	D	B		D	D	D	C	D	
Approach Delay (s)		23.3			19.2			44.5			44.9	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	27.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		
Description: 7. Sequoia Pkwy -- Hwy 99 E			
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	120	1120	0	100	880
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0		4.0	4.0
Lane Util. Factor		1.00	0.95		1.00	0.95
Frt		0.86	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		1514	3260		1662	3228
Flt Permitted		1.00	1.00		0.22	1.00
Satd. Flow (perm)		1514	3260		389	3228
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	126	1179	0	105	926
RTOR Reduction (vph)	0	112	0	0	0	0
Lane Group Flow (vph)	0	14	1179	0	105	926
Heavy Vehicles (%)	0%	0%	2%	0%	0%	3%
Turn Type		custom			Perm	
Protected Phases			2			6
Permitted Phases		8			6	8
Actuated Green, G (s)		12.0	90.0		90.0	102.0
Effective Green, g (s)		12.0	90.0		90.0	102.0
Actuated g/C Ratio		0.11	0.82		0.82	0.93
Clearance Time (s)		4.0	4.0		4.0	4.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		165	2667		318	3228
v/s Ratio Prot			c0.36			c0.23
v/s Ratio Perm		0.01			0.27	0.05
v/c Ratio		0.08	0.44		0.33	0.29
Uniform Delay, d1		44.1	2.8		2.5	0.4
Progression Factor		1.64	0.03		0.39	1.00
Incremental Delay, d2		0.2	0.5		2.4	0.0
Delay (s)		72.5	0.6		3.4	0.4
Level of Service		E	A		A	A
Approach Delay (s)	72.5		0.6			0.7
Approach LOS	E		A			A

Intersection Summary			
HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

2277: Otto Rd (South) & Highway 99E

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰		↑↑	↱		↑↑
Volume (vph)	130	0	1120	240	0	880
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	1.00		0.95	1.00		0.95
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1630		3260	1458		3260
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1630		3260	1458		3260
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	137	0	1179	253	0	926
RTOR Reduction (vph)	0	0	0	53	0	0
Lane Group Flow (vph)	137	0	1179	200	0	926
Turn Type				Perm		
Protected Phases	8		2			6
Permitted Phases				2		
Actuated Green, G (s)	15.1		86.9	86.9		86.9
Effective Green, g (s)	15.1		86.9	86.9		86.9
Actuated g/C Ratio	0.14		0.79	0.79		0.79
Clearance Time (s)	4.0		4.0	4.0		4.0
Vehicle Extension (s)	3.0		3.0	3.0		3.0
Lane Grp Cap (vph)	224		2575	1152		2575
v/s Ratio Prot	c0.08		c0.36			0.28
v/s Ratio Perm				0.14		
v/c Ratio	0.61		0.46	0.17		0.36
Uniform Delay, d1	44.7		3.8	2.8		3.4
Progression Factor	1.00		0.12	0.00		0.26
Incremental Delay, d2	4.6		0.4	0.2		0.4
Delay (s)	49.5		0.8	0.2		1.3
Level of Service	D		A	A		A
Approach Delay (s)	49.5		0.7			1.3
Approach LOS	D		A			A

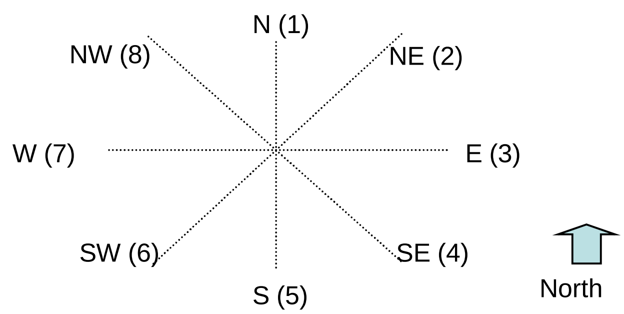
Intersection Summary			
HCM Average Control Delay	3.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

2278: Otto Rd & Otto Rd (North)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↱		↰	↱	
Volume (vph)	100	370	0	130	500	20	80	0	160	20	0	80
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1716		1630	1706		1630	1458		1630	1458	
Flt Permitted	0.27	1.00		0.42	1.00		0.70	1.00		0.65	1.00	
Satd. Flow (perm)	456	1716		727	1706		1205	1458		1117	1458	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	389	0	137	526	21	84	0	168	21	0	84
RTOR Reduction (vph)	0	0	0	0	3	0	0	96	0	0	48	0
Lane Group Flow (vph)	105	389	0	137	544	0	84	72	0	21	36	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.3	23.3		23.3	23.3		23.7	23.7		23.7	23.7	
Effective Green, g (s)	23.3	23.3		23.3	23.3		23.7	23.7		23.7	23.7	
Actuated g/C Ratio	0.42	0.42		0.42	0.42		0.43	0.43		0.43	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	193	727		308	723		519	628		481	628	
v/s Ratio Prot		0.23			c0.32			0.05			0.02	
v/s Ratio Perm	0.23			0.19			c0.07			0.02		
v/c Ratio	0.54	0.54		0.44	0.75		0.16	0.12		0.04	0.06	
Uniform Delay, d1	11.9	11.8		11.3	13.4		9.6	9.4		9.1	9.1	
Progression Factor	1.00	1.00		1.00	1.00		1.37	1.00		1.01	1.00	
Incremental Delay, d2	3.1	0.8		1.0	4.4		0.7	0.4		0.2	0.2	
Delay (s)	15.0	12.6		12.3	17.8		13.7	9.7		9.3	9.3	
Level of Service	B	B		B	B		B	A		A	A	
Approach Delay (s)		13.1			16.7			11.1			9.3	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

General & Site Information	
Analyst:	BBC
Agency/Company:	DKS Associates
Date:	10/20/2010
Project Name:	Canby TSP
Intersection:	SE 1st/Mulino/Haines/Bremer
Analysis Time Period:	P.M. Peak
Jurisdiction:	Clackamas Co.
Year:	2030 Preferred Package



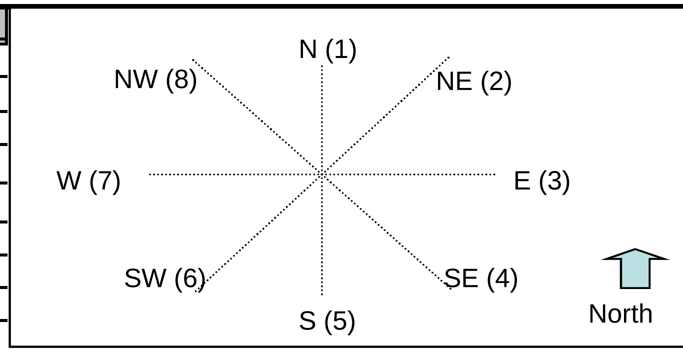
Volumes		Roundabout Approach/Entry Legs							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Input	N (1), vph		40	80		190		90	
Volumes	NE (2), vph	20		30		30		30	
to Leg #	E (3), vph	40	90			50		30	
	SE (4), vph								
	S (5), vph	300	140	60				110	
	SW (6), vph								
	W (7), vph	110	10	20		150			
	NW (8), vph								
Output	Total Vehicles	470	280	190	0	420	0	260	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Trucks	3.5	3.5	3.5	0.0	3.5	0.0	3.5	0.0
E_t	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
F_{HV}	0.966	0.966	0.966	1.000	0.966	1.000	0.966	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	45	90	0	214	0	101	0
NE (2), pcu/h	23	0	34	0	34	0	34	0
E (3), pcu/h	45	101	0	0	56	0	34	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	338	158	68	0	0	0	124	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	124	11	23	0	169	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	529	315	214	0	473	0	293	0
Conflicting flow, pcu/h	529	664	574	810	338	1024	731	1058

Results	N	NE	E	SE	S	SW	W	NW
Entry Capacity, pcu/h	666	582	637	NA	806	NA	544	NA
Leg v/c ratio	0.79	0.54	0.34		0.59		0.54	
Control Delay, s/pcu	22.9	13.2	8.5		10.6		14.1	
LOS	C	B	A		B		B	
95th Percentile Queue (ft)	759	452	307	0	679	0	420	0

General & Site Information	
Analyst:	BBC
Agency/Company:	DKS Associates
Date:	10/20/2010
Project Name:	Canby TSP
Intersection:	Township Rd/Mulino Rd
Analysis Time Period:	P.M. Peak
Jurisdiction:	Clackamas Co.
Year:	2030 Preferred Package



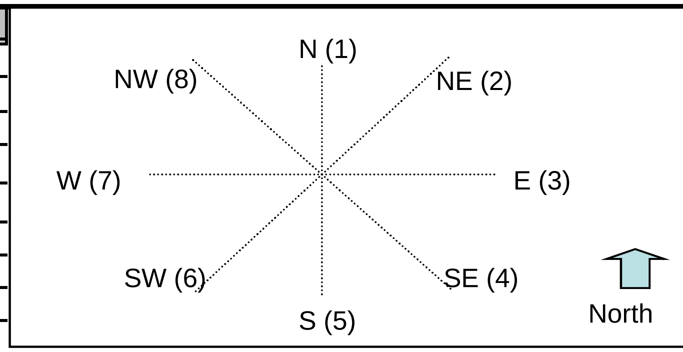
Volumes		Roundabout Approach/Entry Legs							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Input	N (1), vph			60		180		130	
Volumes	NE (2), vph								
to Leg #	E (3), vph	90				60		140	
	SE (4), vph								
	S (5), vph	290		60				100	
	SW (6), vph								
	W (7), vph	180		90		30			
	NW (8), vph								
Output	Total Vehicles	560	0	210	0	270	0	370	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Trucks	2.5	0.0	2.0	0.0	3.0	0.0	3.0	0.0
E_t	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
F_{HV}	0.976	1.000	0.980	1.000	0.971	1.000	0.971	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	70	0	211	0	152	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	105	0	0	0	70	0	164	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	338	0	70	0	0	0	117	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	210	0	104	0	35	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	652	0	243	0	316	0	433	0
Conflicting flow, pcu/h	209	641	398	737	421	945	512	861

Results	N	NE	E	SE	S	SW	W	NW
Entry Capacity, pcu/h	917	NA	759	NA	742	NA	677	NA
Leg v/c ratio	0.71		0.32		0.43		0.64	
Control Delay, s/pcu	13.0		7.0		8.4		14.3	
LOS	B		A		A		B	
95th Percentile Queue (ft)	891	0	334	0	436	0	598	0

General & Site Information	
Analyst:	BBC
Agency/Company:	DKS Associates
Date:	10/20/2010
Project Name:	Canby TSP
Intersection:	Township Rd/Redwood Rd
Analysis Time Period:	P.M. Peak
Jurisdiction:	City of Canby
Year:	2030 Preferred Package



Volumes		Roundabout Approach/Entry Legs							
		N (1)	NE (2)	E (3)	SE (4)	S (5)	SW (6)	W (7)	NW (8)
Input	N (1), vph			30		130		40	
Volumes	NE (2), vph								
to Leg #	E (3), vph	50				40		250	
	SE (4), vph								
	S (5), vph	70		110				10	
	SW (6), vph								
	W (7), vph	110		390		60			
	NW (8), vph								
Output	Total Vehicles	230	0	530	0	230	0	300	0

Volume Characteristics	N	NE	E	SE	S	SW	W	NW
% Trucks	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0
E_t	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
F_{HV}	0.980	1.000	0.980	1.000	0.980	1.000	0.980	1.000

Entry/Conflicting Flows	N	NE	E	SE	S	SW	W	NW
Flow to Leg # N (1), pcu/h	0	0	33	0	144	0	44	0
NE (2), pcu/h	0	0	0	0	0	0	0	0
E (3), pcu/h	55	0	0	0	44	0	277	0
SE (4), pcu/h	0	0	0	0	0	0	0	0
S (5), pcu/h	78	0	122	0	0	0	11	0
SW (6), pcu/h	0	0	0	0	0	0	0	0
W (7), pcu/h	122	0	432	0	67	0	0	0
NW (8), pcu/h	0	0	0	0	0	0	0	0
Entry flow, pcu/h	255	0	588	0	255	0	333	0
Conflicting flow, pcu/h	621	843	255	632	377	588	255	876

Results	N	NE	E	SE	S	SW	W	NW
Entry Capacity, pcu/h	607	NA	876	NA	775	NA	876	NA
Leg v/c ratio	0.42		0.67		0.33		0.38	
Control Delay, s/pcu	10.1		12.1		6.9		6.6	
LOS	B		B		A		A	
95th Percentile Queue (ft)	366	0	843	0	366	0	477	0

Appendix G: Future Forecasting Memorandum

TECHNICAL MEMORANDUM #3

TO: Matilda Deas, City of Canby
Sonya Kazen, ODOT Region 1

FROM: Chris Maciejewski, P.E.
Garth Appanaitis, E.I.T.
Brad Coy, E.I.T.

DATE: March 31, 2010

SUBJECT: **Canby TSP – Future Forecasting** P09042-002-002

Future forecasting is an important step in the transportation planning process and provides estimates of future travel demand. This memorandum documents the forecasting methodology and results associated with the enhanced cumulative analysis tool developed in conjunction with the Canby Transportation System Plan (TSP) Update. The enhanced cumulative analysis tool provides study intersection turn movement volumes for the 2030 TSP horizon year.

Introduction

The forecasting methodology associated with the enhanced cumulative analysis tool expands upon a Cumulative Analysis approach, as defined in the Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit's (TPAU's) *Analysis Procedures Manual*.[1] In the context of the traditional 4-step travel demand model approach, the typical Cumulative Analysis is used for trip generation and trip distribution purposes only. The result is a trip table (for growth increment only) that is used as an input into traffic assignment where analysis is completed by manually assigning the new trips to a transportation network and then adding them to the existing traffic volumes to estimate future volumes.

The enhanced cumulative analysis tool uses the same trip generation and trip distribution methodology as the typical Cumulative Analysis, but it applies the methodology to all land uses within the city (i.e., both existing uses as well as any future development based on a land use inventory). The enhanced tool then uses VISUM modeling software[2] and incorporates intersection node delay to complete the equilibrium trip assignment. The result is an improved traffic volume forecasting tool that dynamically assigns both new and existing trips to the transportation network using an equilibrium assignment procedure that represents routing choice more accurately than manual assignment because it is responsive to varying levels of congestion and delay as traffic patterns change. This tool enables a more comprehensive analysis of future conditions and potential TSP alternatives.

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[1] *Analysis Procedures Manual (APM)*, Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU), Last Updated July 2009, pgs. 61-74
[2] VISUM is a transportation travel demand modeling software developed by PTV Vision

The following sections of this memorandum detail each component of the travel forecast methodology associated with the enhanced cumulative analysis tool. These components include the roadway network, transportation analysis zones (TAZs), land use, and travel demand. The resulting 2030 future projected volumes are also provided.

Roadway Network

The roadway network included in the Canby TSP VISUM model consists of all local, collector, and arterial streets within the Canby Urban Growth Boundary (UGB). In addition, because there are TSP study intersections outside of the Canby UGB, the model includes the key roadways to the east and west of Canby that provide access to those study intersections.

An existing roadway network was built using NAVTEQ files as the initial base. Then, details were added based on an existing conditions inventory that included posted speeds, traffic control, lane geometries, and number of travel lanes. Many of the elements of the existing conditions inventory are provided in TSP Chapter 3 (Existing Conditions). The purpose of the existing conditions network was to configure the model and act as a base in the development of the future model.

The 2030 future year baseline roadway network was then developed to use for the 2030 No-Build analysis, which is provided in TSP Chapter 4 (Future Needs). The one capacity-related improvement that is planned for construction in the near future is the paving and realignment of Walnut Road on the east end of town.[3] Walnut Road currently is a narrow road connecting Southeast 1st Avenue with the Sequoia Parkway/Southeast 4th Avenue intersection. It will be widened and the southern portion will be realigned to form a new three-leg intersection with Sequoia Parkway at a location approximately 500 feet north of the Southeast 4th Avenue intersection. In addition, streets were added in the Northeast Canby Concept Plan area to provide internal circulation. The 2030 future year network will be further adjusted and used to perform analysis of the various transportation alternatives and improvements analyzed for the Canby TSP Update.

Transportation Analysis Zones

For transportation modeling purposes, the Canby UGB was divided into 72 transportation analysis zones (TAZs), which represent the sources of vehicle trip generation within the city. The Canby TSP VISUM network also includes 12 external TAZs at the key gateways into and out of the city to account for vehicle trips that enter and exit the Canby UGB, as well as four additional TAZ to represent outlying residential areas. The internal and external TAZs are shown in Figure 1. The next sections of this memorandum discuss the land uses and trip generation estimates associated with each TAZ and with the city as a whole.

[3] The City has other roadway projects that are planned for construction, but they consist of repaving or reconstructing roadways without adding additional motor vehicle travel lanes or changing intersection locations.

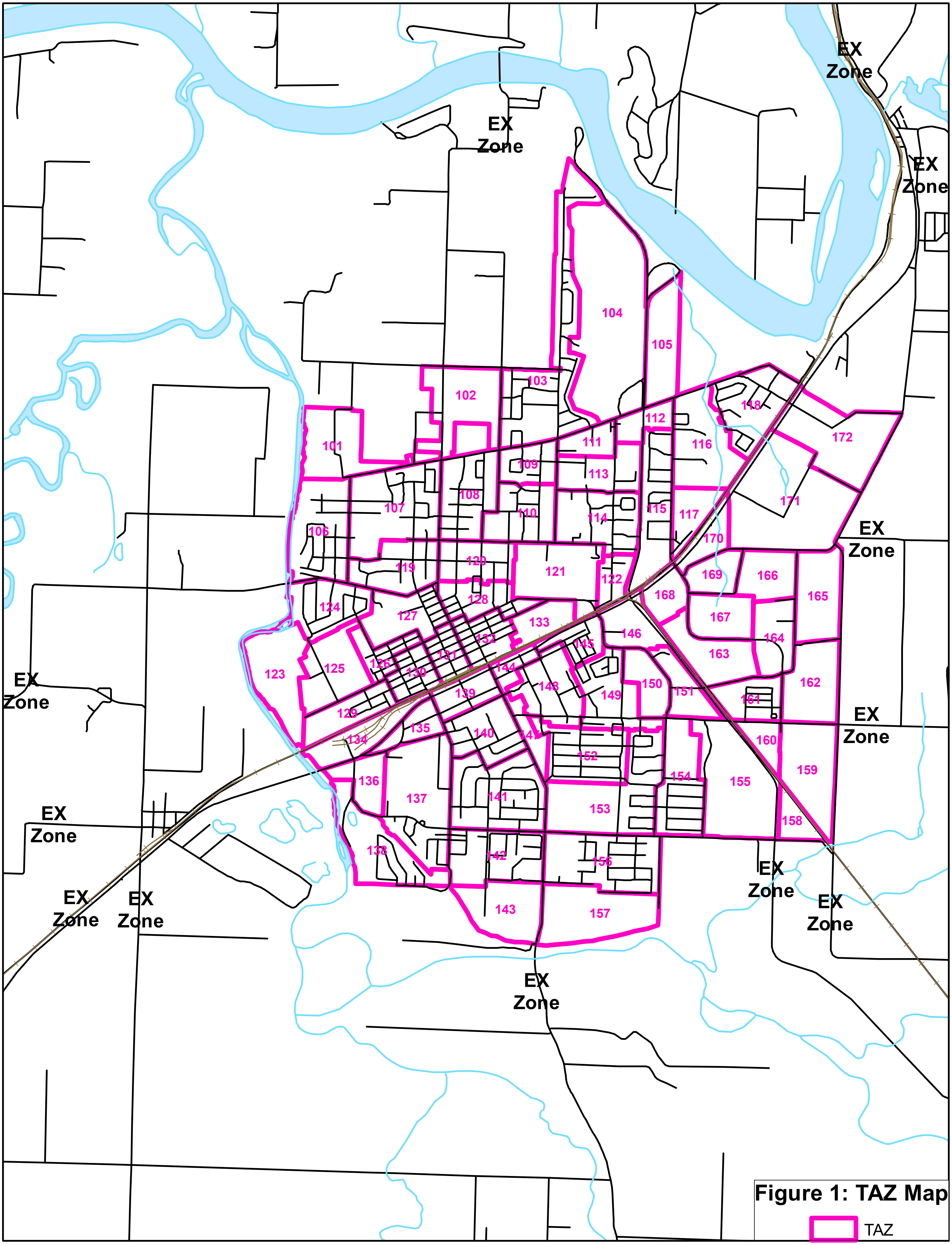


Figure 1: TAZ Map

Land Use

Land use is a key factor affecting the traffic demands placed on Canby's transportation system. The location, density, type, and mixture of land uses have a direct impact on traffic levels and patterns. An existing 2009 land use inventory and a future 2030 land use projection were performed for each TAZ in the Canby UGB.

The existing 2009 land use inventory approximated the number of households and the amount of retail employment, service employment, educational employment, and other employment that currently exist in each TAZ. Existing land uses within Canby were obtained from tax assessor data, census data, and zoning data and compared with existing aerial photography. The existing land uses correspond to a population of approximately 15,165 residents.

The future 2030 land use projection is an estimate of the amount of each land use that the TAZ could accommodate at expected build-out of vacant or underdeveloped lands assuming Comprehensive Plan zoning. The one exception is within the Northeast Canby Concept Plan area, which is located in northeast Canby between OR 99E, Territorial Road, Haines Road, and Southeast 1st Avenue. In this area, land uses consistent with the Northeast Canby Concept Plan[4] were assumed instead of Comprehensive Plan zoning. The projected land uses correspond to a year 2030 population projection of approximately 26,100 residents and were estimated by assuming typical development densities based on the past five years of development in Canby.

Detailed land use data by TAZ are provided as supplementary material to this memorandum, and the existing land use estimates and future projections for the entire Canby UGB are listed in Table 1.

Table 1: Canby UGB Land Use Summary

Land Use	Existing 2009 Land Use	Projected Growth from 2009 to 2030	Projected 2030 Land Use
Households			
Total Households	**6,127**	**4,403 (+72%)**	**10,530**
Employees			
Retail Employees	624	715 (+115%)	1,339
Service Employees	1,004	644 (+64%)	1,648
Educational Employees	409	257 (+63%)	666
Other Employees	1,928	3,007 (+156%)	4,935
Total Employees	**3,965**	**4,623 (+117%)**	**8,588**

[4] *Draft NE Canby Concept Plan*, Prepared by Parametrix; June 8, 2005; A review of the plan can be found in the Background Document Review Memorandum, which is included as Appendix A.

Travel Demand

Travel demand on roadways and at intersections in Canby was estimated using methodology similar to that specified by the ODOT Procedures Manual for cumulative analysis models (often referred to as Level 2 models).[5] Adjustments made to the methodology include modeling all vehicle trips (not just growth increment), adjusting the trip distribution to reduce household-to-household trips, and using VISUM modeling software to perform the trip assignment. Travel demand was performed for 30th highest hour conditions for both 2009 and 2030. The purpose of the 2009 model was to calibrate the network in preparation for developing the 2030 model network, which would then be used for the future analysis.

The travel demand analysis includes the translation of City land use information into motor vehicle trips. This was done for each of the Canby TAZs based on the existing and projected land uses described previously in the Land Use section of this memorandum. Trips traveling to and from the external TAZs were also estimated for both the 2009 and 2030 analysis years. This section of the memorandum describes the methodology used to determine the different trips types and how the trips were distributed and assigned to the roadway network. Calibration analysis is also provided.

Trip Types

Travel demand projections involve the determination of three distinct types of trips, which are categorized based on whether their origin and/or destination (i.e., the trip ends) are internal or external to the Canby UGB. The three trip types and how they apply to Canby are described in the list below.

- **External-External (E-E) Trips** do not have an origin or destination in Canby and either do not stop or only make a very minor stop while passing through the Canby UGB. These trips are typically referred to as through traffic.
- **Internal-External (I-E) Trips** originate in Canby and are traveling to a location outside of the Canby UGB and **External-Internal (E-I) Trips** originate outside of the Canby UGB and are traveling to a location within Canby.
- **Internal-Internal (I-I) Trips** travel from one location within the Canby UGB to another location within the UGB.

External Trip Ends

External trip ends are the origin and/or destination of E-E, I-E, or E-I trips and were estimated for both 2009 and 2030. The number of 2009 external trip ends was based on existing traffic volumes (i.e., 30th highest hour conditions) at key gateways to the City, which include OR 99E on the east and west, Arndt Road and Anderson Road on the west, Barlow Road, Mulino Road, and Ivy Street on the south, Township Road, Bremer Road, and New Era Road to the east, and Locust Street to the north. Growth estimates were applied to each gateway to determine 2030 external trip ends.

[5] *Analysis Procedures Manual (APM)*, Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU), Last Updated July 2009, pgs. 61-74

External trip ends consist of through trips (i.e., E-E trips) as well as trips that enter and leave Canby (i.e., I-E and E-I trips). The proportion of each external trip type was estimated.

Future external trip end quantities were estimated based on the forecasted growth at the external gateways in Metro's 2005 and 2030 regional travel demand model. Although Canby is outside Metro's formal modeling area, the data provided in the Metro model was compared to ODOT Highway Volume Table, and determined to be reasonable for this project. The growth rates applied to entering and exiting trips at external locations range from 0.5% to 3.9% per year by direction (compounded) and are included as an attachment.

Internal Trip Ends

The number of internal trip ends in Canby was determined using land use trip generation methodology, which translates land use quantities (number of dwelling units or number of employees) into vehicle trip ends (number of vehicles entering or leaving a TAZ) using land use specific trip generation rates. Average PM peak hour trip generation rates are listed in Table 2 for the applicable land uses. These rates were based on national rates obtained from the Institute of Transportation Engineers (ITE) *Trip Generation, 8th Edition*[6], and were adjusted to reflect local travel patterns based on existing vehicle count data .

Table 2: PM Peak Hour Trip Generation Rates by Land Use

Land Use	Trips In	Trips Out	Total Trip Ends
Households (per dwelling unit)	0.47	0.28	0.75
Retail (per employee)	1.93	2.17	4.10
Service (per employee)	0.97	1.23	2.20
Education (per employee)	0.79	0.85	1.64
Other (per employee)	0.05	0.26	0.30

By applying these trip generation rates to the TAZ land uses, the number of trips entering and exiting each TAZ in Canby were estimated. These internal trip estimates were obtained for both the existing 2009 land uses and the projected 2030 land uses, and the detailed results are provided as supplementary material to this memorandum. For the entire City of Canby, existing land uses in 2009 are estimated to generate 10,400 internal trip ends and future land uses in 2030 are expected to generate 19,800 internal trip ends. Therefore, Canby is estimated to have traffic growth of 9,400 internal trip ends between 2009 and 2030.

Trip Distribution

Trip distribution was performed to estimate how many trips travel between each of the internal and external TAZs. The external trips passing through Canby were distributed based on the O-D survey

[6] *Trip Generation Manual*, 8th Edition, Institute of Transportation Engineers, 2009.

discussed previously in the External Trip Ends section of this memorandum. Distribution for trips traveling to and from internal zones (i.e., trips having at least one internal trip end) was based on weighting the attractiveness of each zone, as measured by the number of trip ends generated by the zone. Separate weighting percentages were used for household and non-household trip ends because otherwise household-to-household trips would be higher than expected for the PM peak hour. A detailed trip table showing the number of trips traveling between each of the internal and external zones is provided as supplementary material to this memorandum.

Trip Assignment

Trip assignment involves the determination of the specific travel routes taken by all of the trips within the transportation network. This step was performed using VISUM modeling software. Model inputs included the transportation network (i.e., road and intersection locations and characteristics, as determined from maps and field inventories) and a trip distribution table (determined using methodology described previously in this memorandum). Iterated equilibrium assignment was then performed using estimated travel times along roadways and delays at intersection movements.[7] The path choice for each trip was based on minimal travel times between locations. Model outputs include traffic volumes on roadway segments and at intersections.

Calibration

Calibration was performed on the 2009 base year model by comparing model volumes at the Canby TSP study intersections with existing 2009 traffic volumes (i.e., 30th highest hour conditions). A plot comparing the existing traffic counts and the base year model volumes for all study intersection turn movements was analyzed to evaluate the accuracy of the model and is shown in Figure 2. The slope of the fitted curve is 1.025, indicating that the model volumes are generally only 2 percent higher than the existing counts and that the trip generation is appropriate and does not require further refinement. Furthermore, the R^2 value of 0.976 indicates that the model volumes are consistent with the target volumes.

The calibration analysis for the 2009 base year model indicates that the model reasonably predicts trip patterns and volumes. Therefore, the 2030 future year model is expected to reasonably forecast future year traffic volumes for the following reasons:

- The 2030 future year model was created using the 2009 base year model as a starting point.
- Roadway network changes assumed for the future year are not expected to significantly alter travel patterns.
- Future land use projections for the year 2030 were prepared using methodology consistent with the 2009 base year land use estimates.

[7] Roadway travel times were calculated based on distance and travel speed. Intersection movement delays were calculated using Highway Capacity Manual (HCM) methodology for signalized and unsignalized intersections. Detailed lane geometry, traffic control, roadway cross-section, and roadway travel speed information is required for model accuracy.

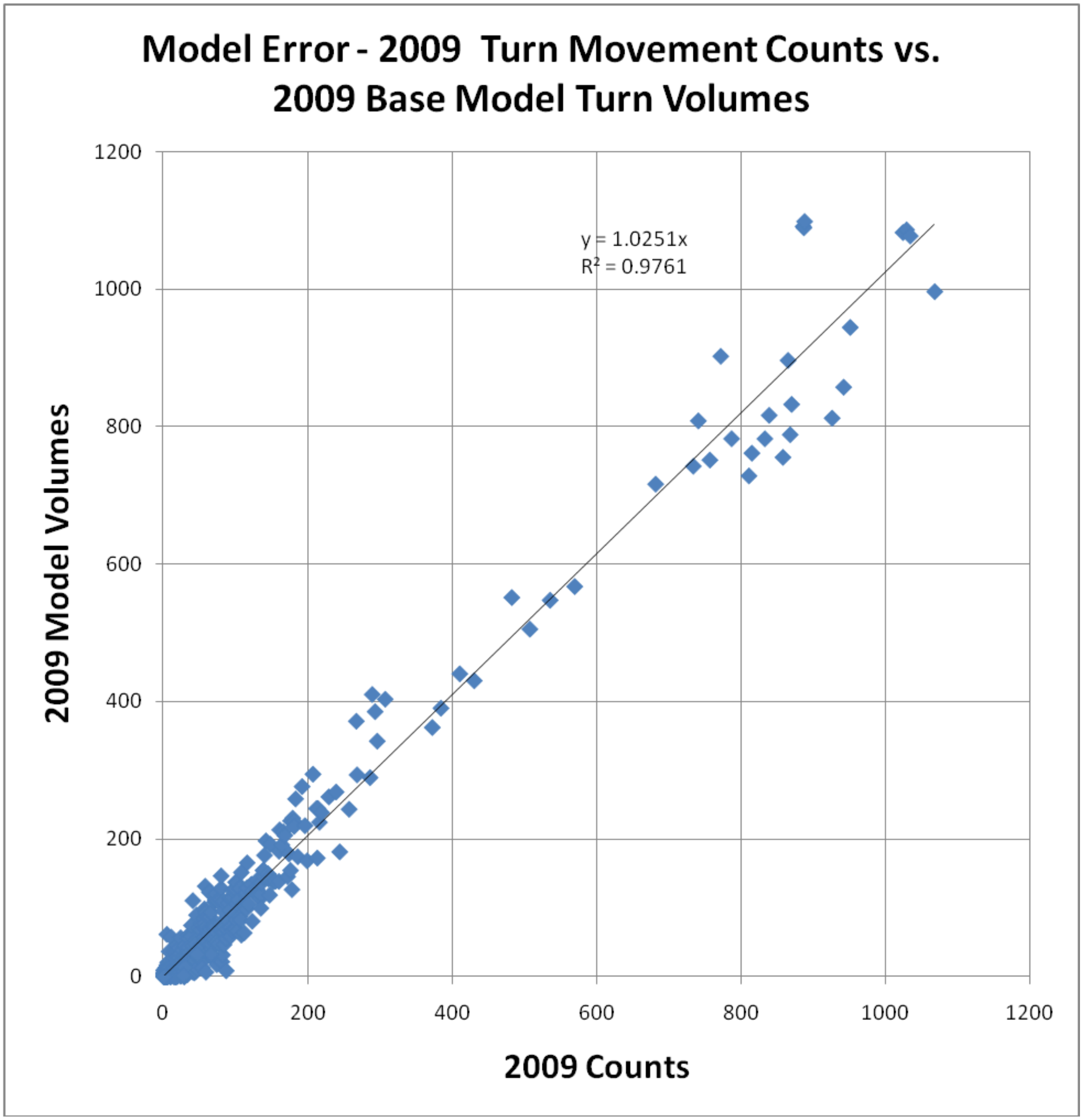
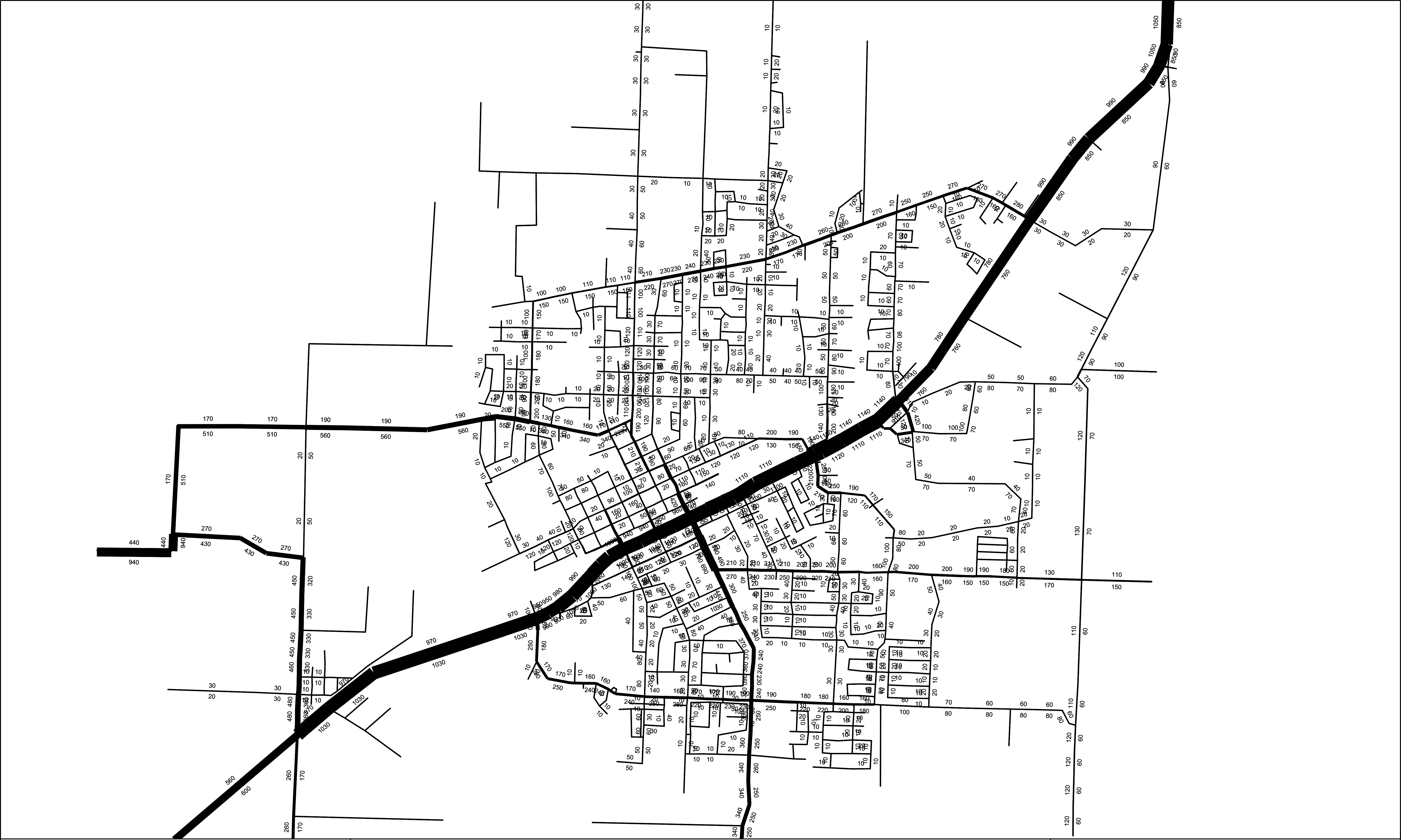


Figure 2: 2009 Model vs. 2009 30th HV Turn Movements

Model Volumes

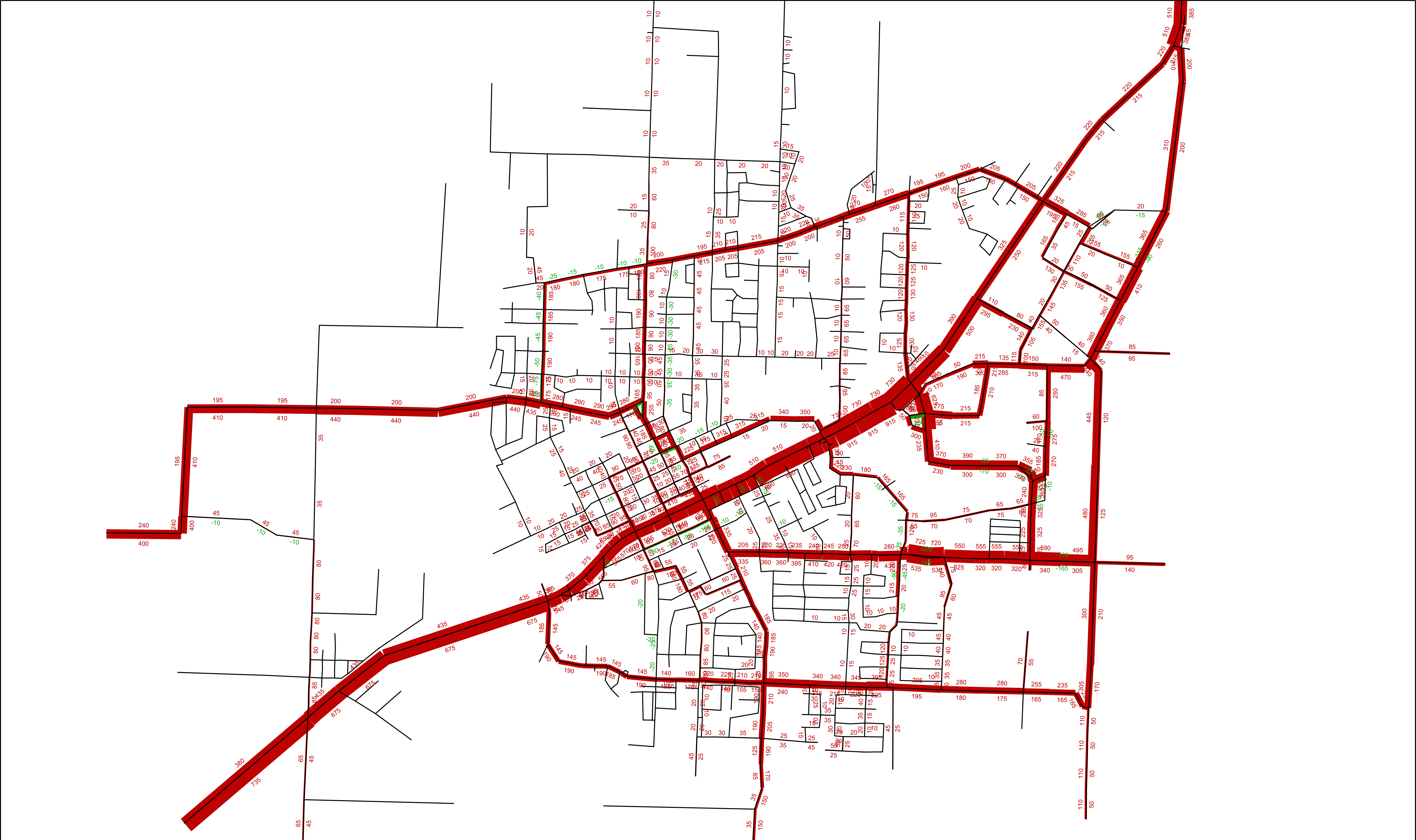
Model output volume plots are shown in Figure 3 for the 2009 base year and in Figure 4 for the 2030 future year. Figure 5 shows the increment of traffic growth between 2009 and 2030 during the P M peak hour. Design hour volumes were extracted from the model for both the base year 2009 and forecast year 2030 scenarios. A “post processing” technique following NCHRP 255 methodology[8] was utilized to refine model travel forecasts to the volume forecasts utilized for 2030 intersection analysis. Future 2030 turn movement projections are included in Figure 6.

[8] *Highway Traffic Data for Urbanized Area Project Planning and Design - National Cooperative Highway Research Program Report 255*, Transportation Research Board, Washington D.C., 1982.

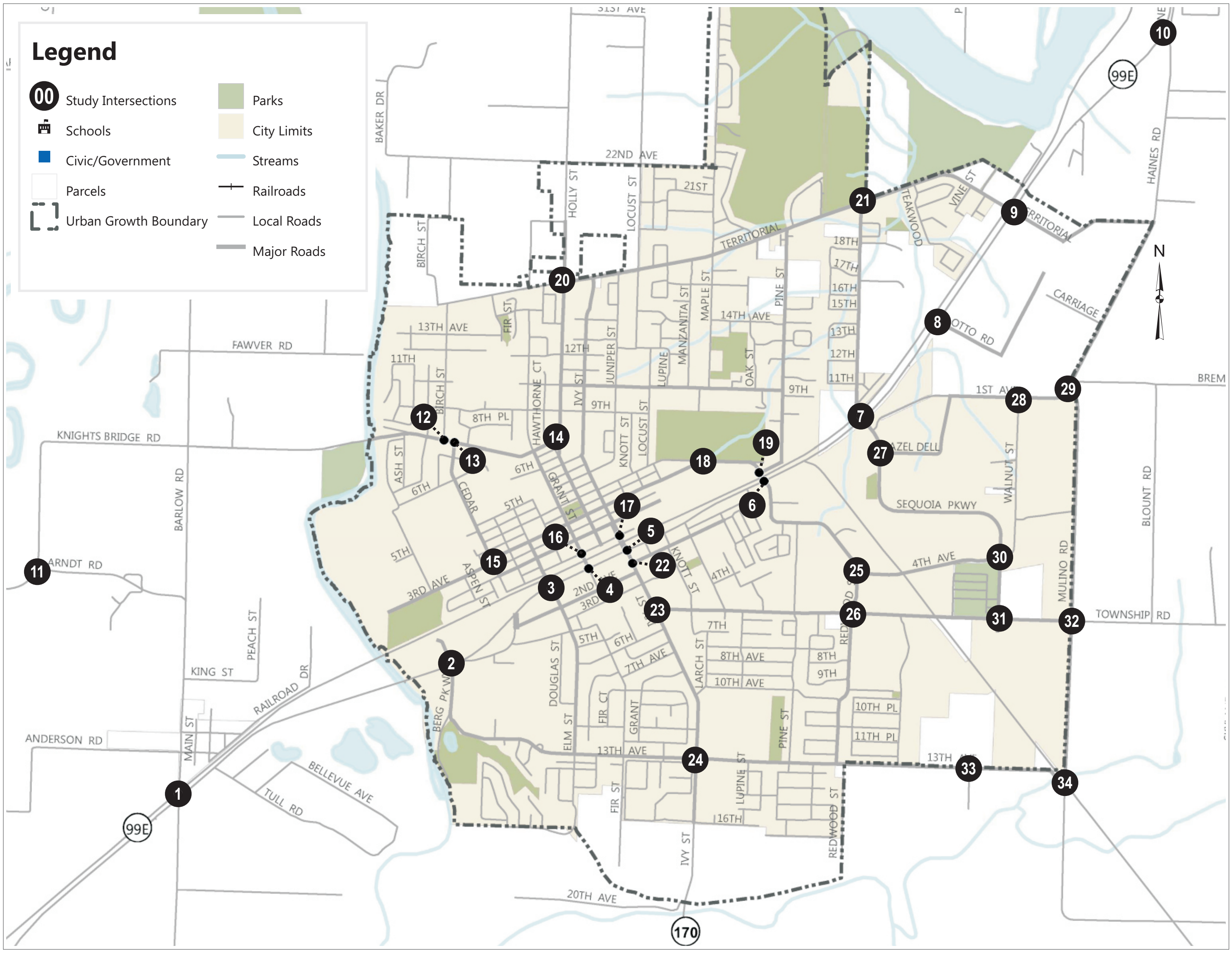


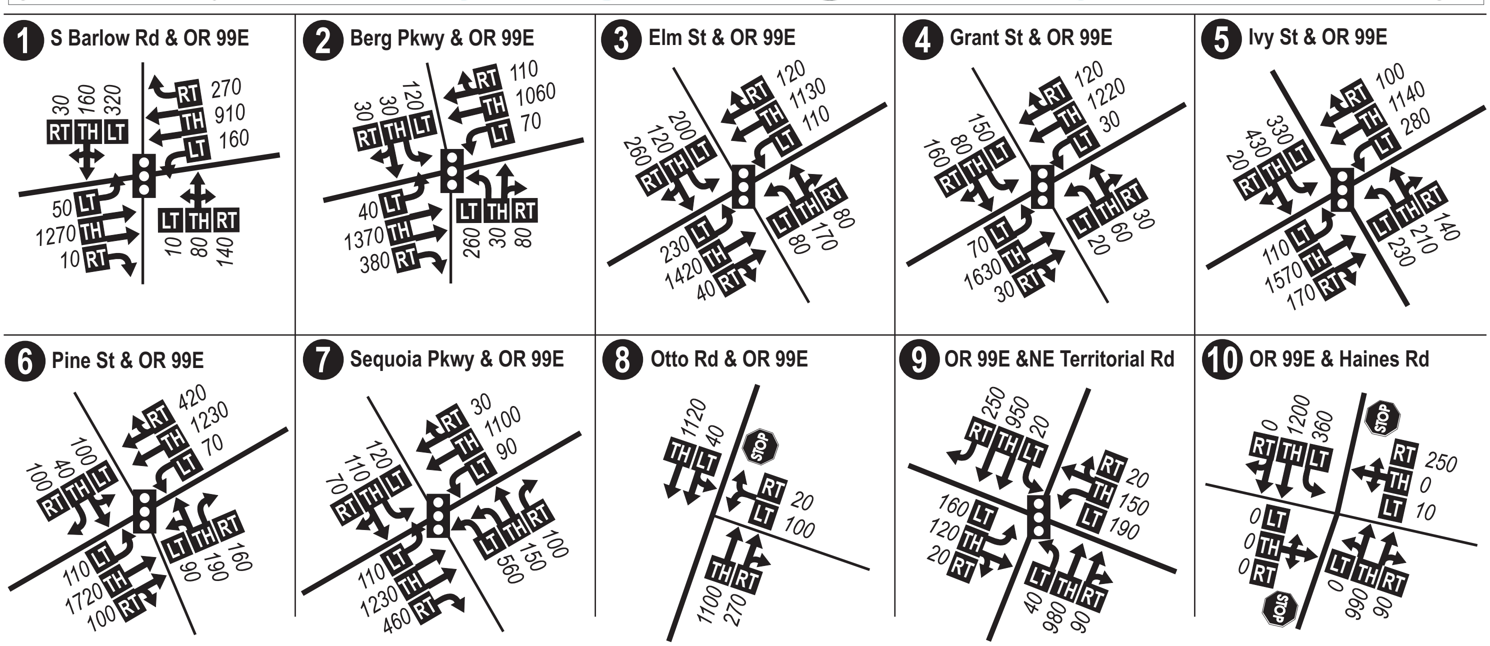
Canby TSP	CanbyBase_v39_2009BaseYearModel.ver	Created on: 04.09.2009
	2009 PM Peak Hour Volumes	1:20107

Created on: 19.03.2010	Canby2030_v2(NEAreaCirculation).ver	1:19714



Canby TSP Model	Canby2030_v2(NEAreaCirculation).ver	Created on: 19.03.2010
	PM 1-hr Difference Volumes	1:20248





Intersection Detail Legend

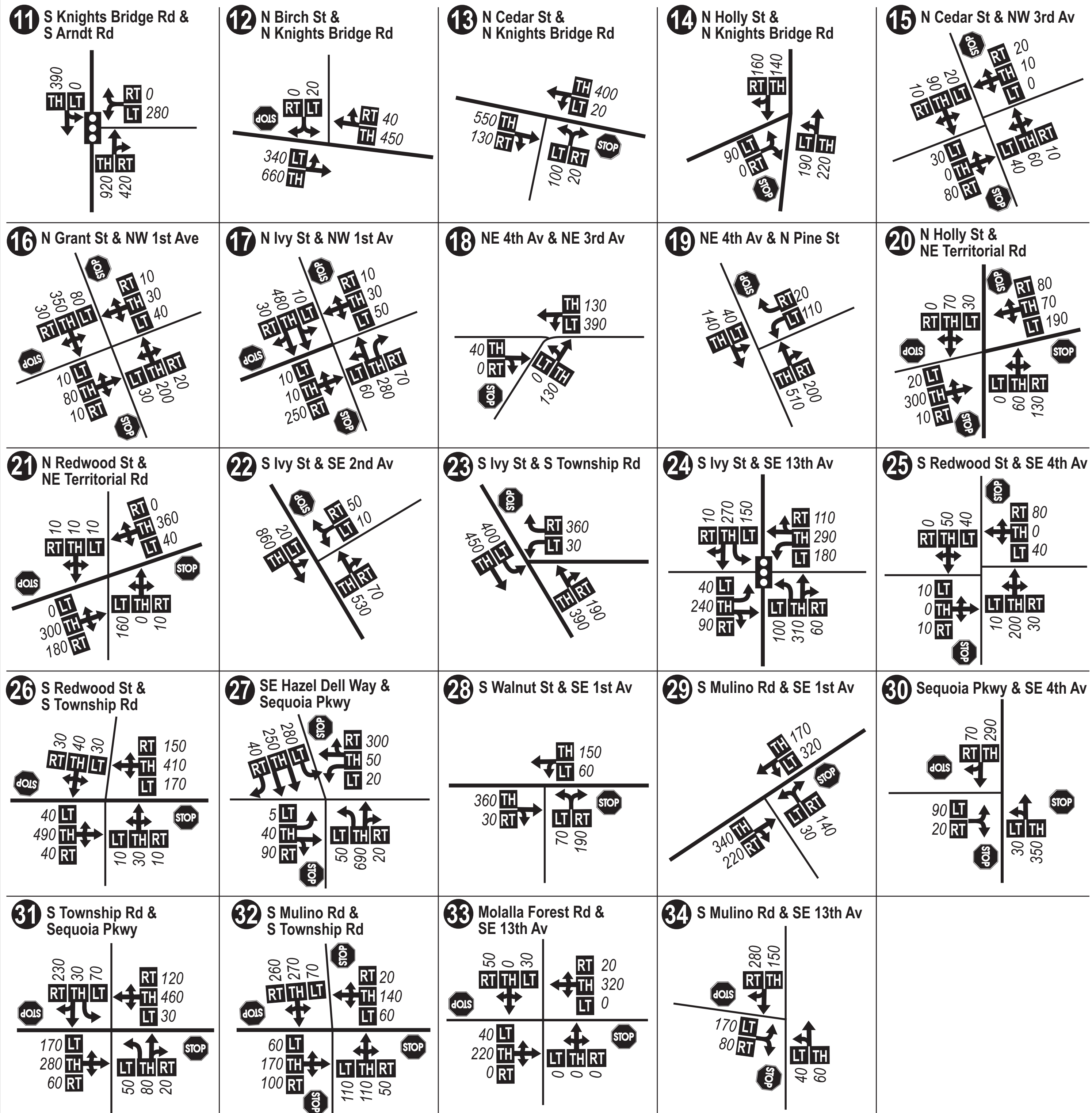
- 00 - 30th Highest Hour Traffic Volume*
- LT TH RT (Left•Thru•Right) - Volume Turn Movement
- ← - Lane Configuration
- Traffic Signal
- STOP - Stop Sign

*See note on Figure 4-2b

CITY OF CANBY
Transportation System Plan

FIGURE 6a

FUTURE 2030 BASELINE VOLUMES (SHEET 1 OF 2)



* Turn movement volumes were determined using the enhanced cumulative analysis tool developed for the Canby TSP and using a post-processing technique utilizing base year traffic volumes.

Intersection Detail Legend

00 - 30th Highest Hour Traffic Volume*

LT TH RT (Left•Thru•Right) - Volume Turn Movement

← - Lane Configuration

Traffic Signal

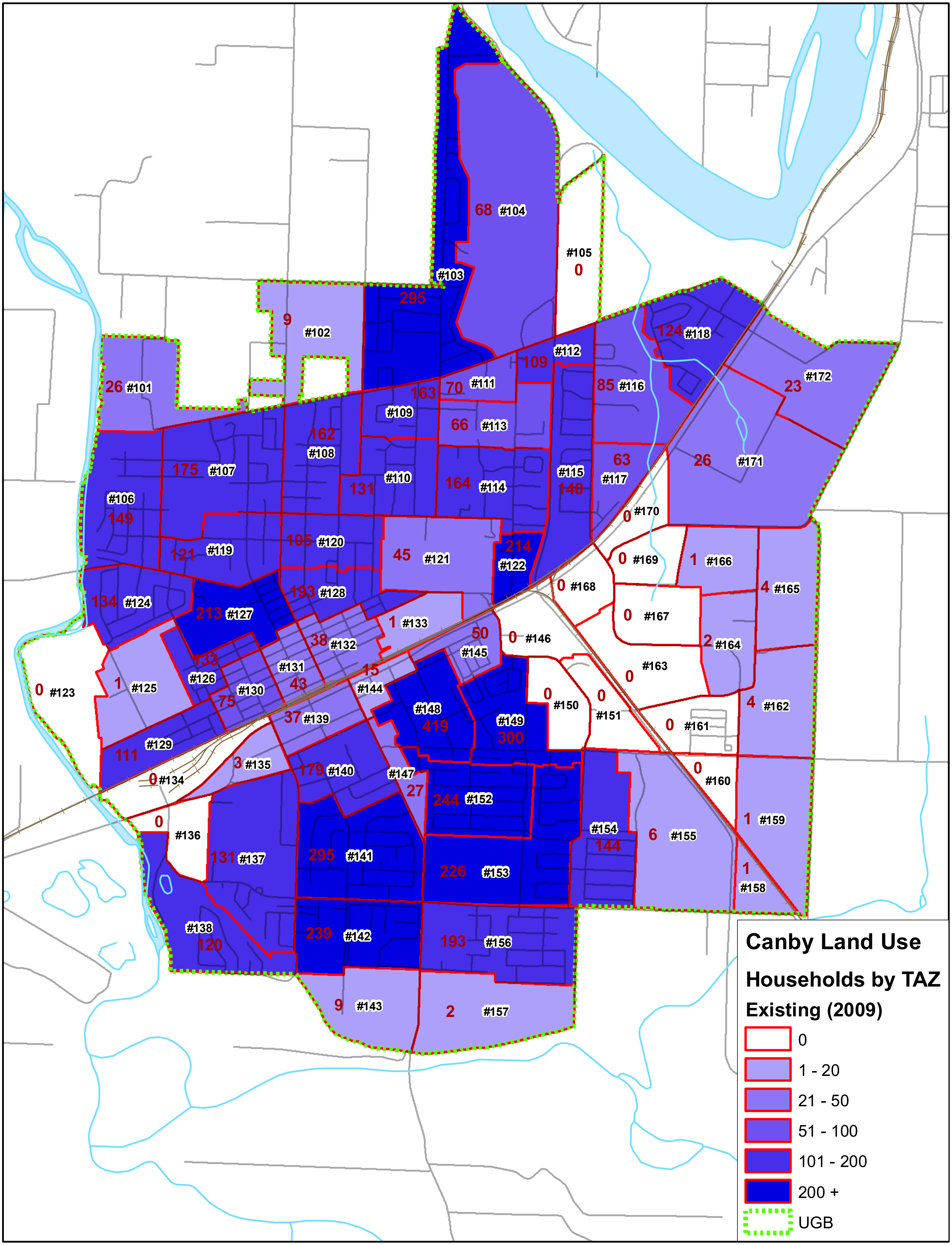
STOP - Stop Sign

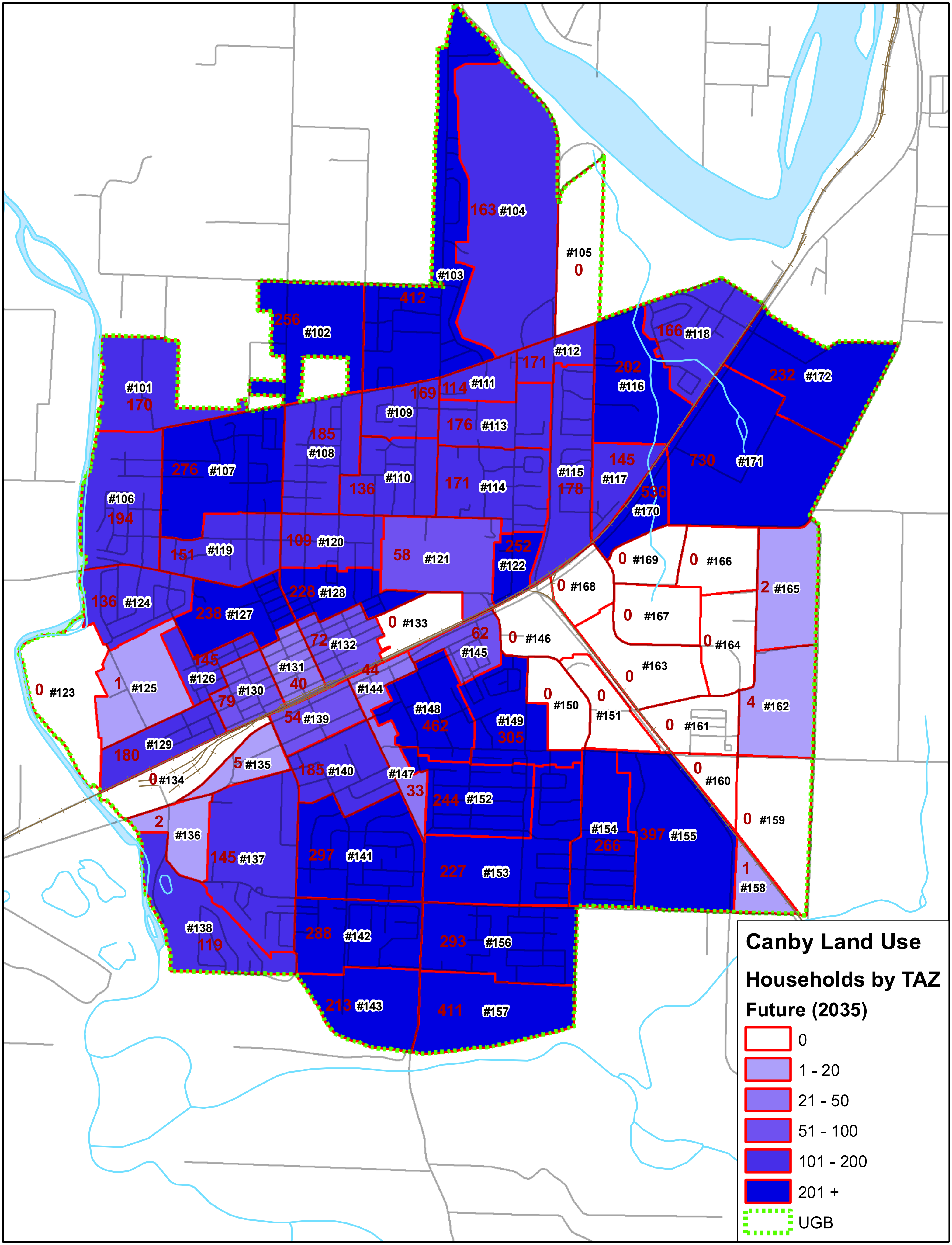
CITY OF CANBY

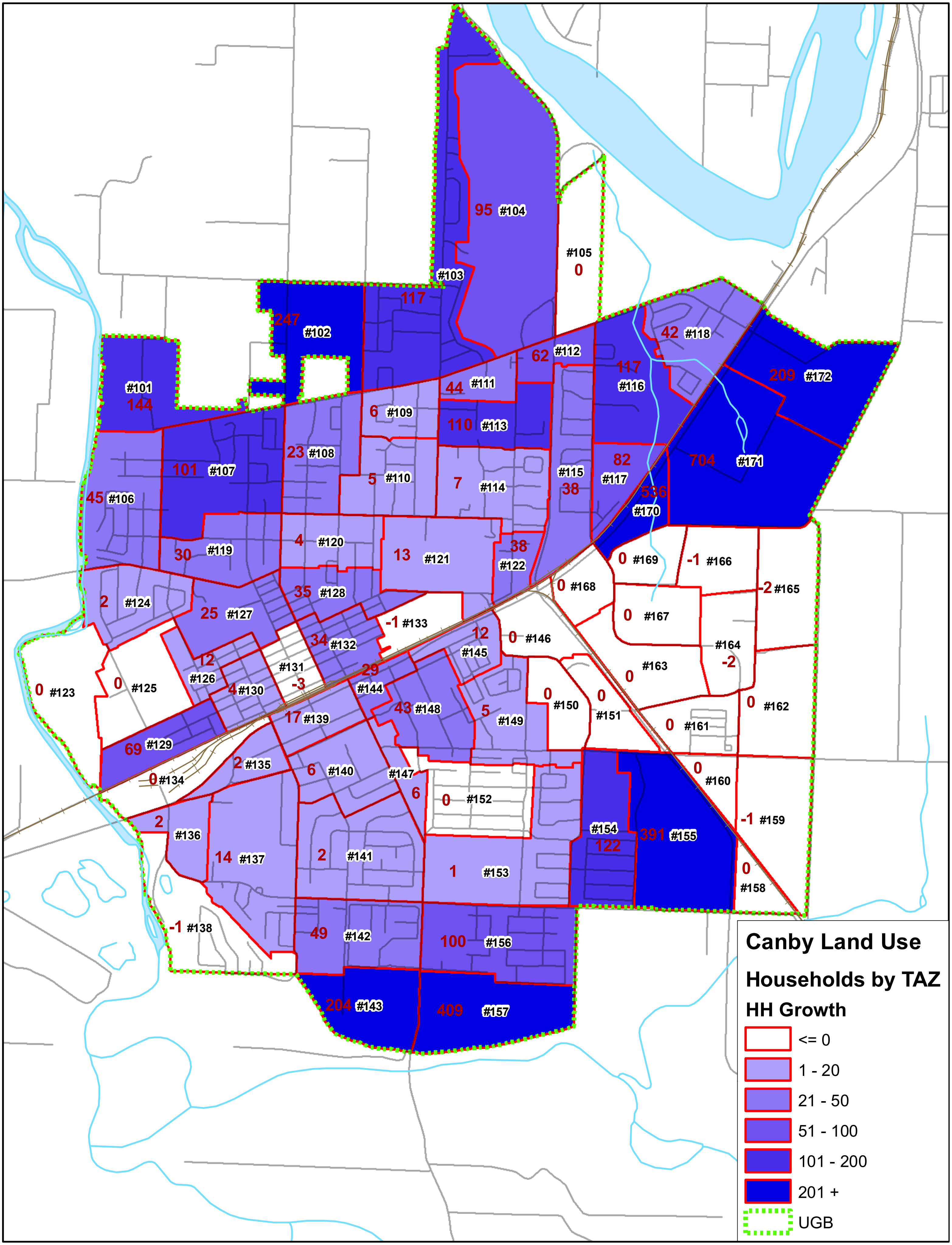
Transportation System Plan

FIGURE 6b

FUTURE 2030 BASELINE VOLUMES (SHEET 2 OF 2)


Canby Land Use
Households by TAZ
Existing (2009)
0
1 - 20
21 - 50
51 - 100
101 - 200
200 +
UGB
68 #104
#105 0
#103
295
9 #102
26 #101
124 #118
109 #112
23 #172
163 70 #111
85 #116
#109
66 #113
162 #108
175 #107
63 #117
26 #171
#115 140
#110 131
164 #114
#106 149
0 #170
105 #120
45 #121
214 #122
121 #119
0 #169
1 #166
0 #168
4 #165
193 #128
134 #124
213 #127
1 #133
0 #167
50 #145
0 #146
38 #132
2 #164
133 #126
#131 43
15 #144
0 #163
0 #123
1 #125
75 #130
#148 419
#149 300
0 #150
0 #151
0 #161
4 #162
37 #139
111 #129
3 #135
0 #134
179 #140
#147 27
244 #152
0 #160
0 #136
131 #137
295 #141
#154 144
6 #155
1 #159
226 #153
1 #158
#138 120
239 #142
193 #156
9 #143
2 #157


Canby Land Use
Households by TAZ
Future (2035)
0
1 - 20
21 - 50
51 - 100
101 - 200
201 +
UGB
163 #104
#105 0
#103
412
256 #102
166 #118
#101 170
171 #112
202 #116
232 #172
169 114 #111
#109
185 #108
176 #113
276 #107
#110
136
171 #114
#115 178
145 #117
730
#171
536 #170
#106 194
109 #120
58 #121
252 #122
151 #119
0 #169
0 #166
2 #165
0 #168
136 #124
228 #128
238 #127
0 #167
0 #133
62 #145
0 #146
0 #164
72 #132
145
#126
#131 40
44 #144
0 #163
0 #123
1 #125
79 #130
54 #139
#148 462
#149 305
0 #150
0 #151
4 #162
0 #161
180 #129
0 #134
5 #135
185 #140
#147 33
244 #152
0 #160
0 #159
2
#136
145 #137
297 #141
#154 266
397 #155
227 #153
1 #158
#138 119
288 #142
293 #156
213 #143
411 #157


Canby Land Use
Households by TAZ
HH Growth
<= 0
1 - 20
21 - 50
51 - 100
101 - 200
201 +
UGB
#101 144
247 #102
#103 117
95 #104
#105 0
45 #106
101 #107
23 #108
6 #109
5 #110
44 #111
62 #112
110 #113
7 #114
#115 38
117 #116
82 #117
42 #118
30 #119
4 #120
13 #121
38 #122
0 #123
2 #124
0 #125
12 #126
25 #127
35 #128
69 #129
4 #130
#131 -3
34 #132
-1 #133
0 #134
2 #135
2 #136
14 #137
-1 #138
17 #139
6 #140
2 #141
49 #142
204 #143
29 #144
12 #145
0 #146
6 #147
43 #148
5 #149
0 #150
0 #151
0 #152
1 #153
#154 122
391 #155
100 #156
409 #157
0 #158
-1 #159
0 #160
0 #161
0 #162
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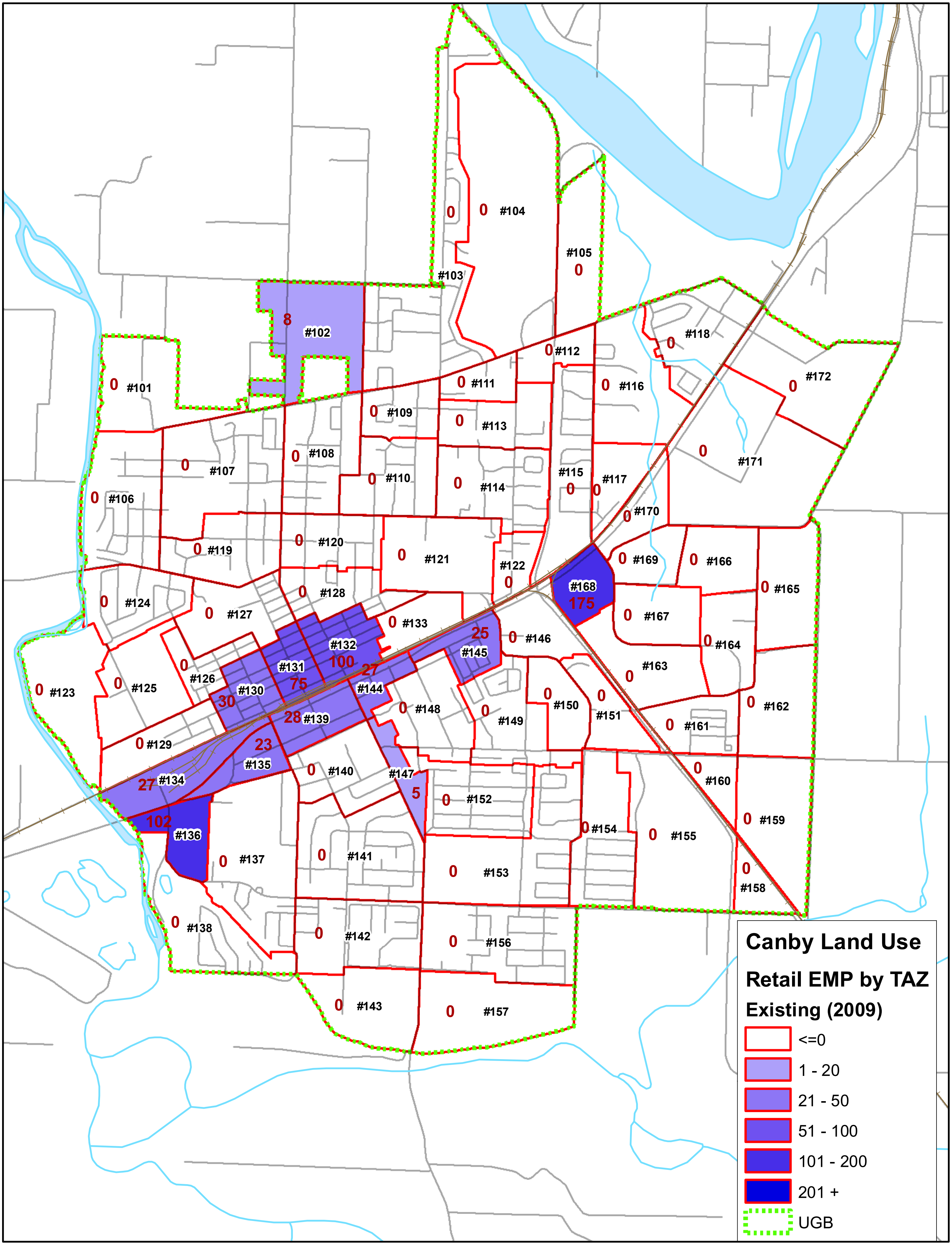
#164 -2
-2 #165
-1 #166
0 #167
0 #168
0 #169
536 #170
704 #171
209 #172


Canby Land Use
Retail EMP by TAZ
Existing (2009)
<=0
1 - 20
21 - 50
51 - 100
101 - 200
201 +
UGB
#101 0
#102 8
#103 0
#104 0
#105 0
#106 0
#107 0
#108 0
#109 0
#110 0
#111 0
#112 0
#113 0
#114 0
#115 0
#116 0
#117 0
#118 0
#119 0
#120 0
#121 0
#122 0
#123 0
#124 0
#125 0
#126 0
#127 0
#128 0
#129 0
#130 30
#131 75
#132 100
#133 0
#134 27
#135 23
#136 102
#137 0
#138 0
#139 28
#140 0
#141 0
#142 0
#143 0
#144 27
#145 25
#146 0
#147 5
#148 0
#149 0
#150 0
#151 0
#152 0
#153 0
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#158 0
#159 0
#160 0
#161 0
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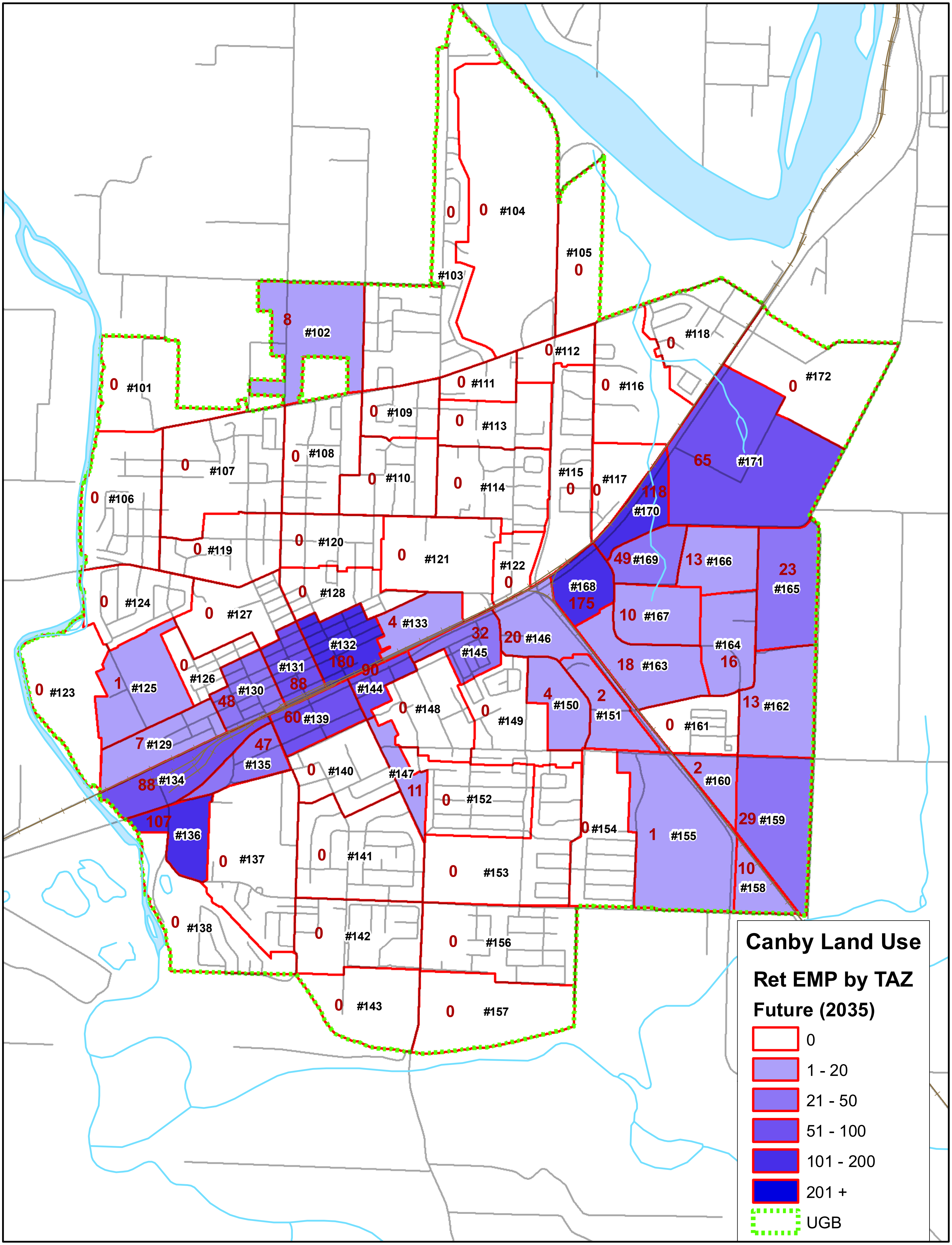
#164 0
#165 0
#166 0
#167 0
#168 175
#169 0
#170 0
#171 0
#172 0



Canby Land Use
Ret EMP by TAZ
Future (2035)
0
1 - 20
21 - 50
51 - 100
101 - 200
201 +
UGB
0 #101
8 #102
#103
0 0 #104
#105 0
0 #106
0 #107
0 #108
0 #109
0 #110
0 #111
0 #112
0 #113
0 #114
#115 0
0 #116
#117 0
0 #118
0 #119
0 #120
0 #121
#122 0
0 #123
0 #124
1 #125
0 #126
0 #127
0 #128
7 #129
48 #130
#131 88
#132 180
4 #133
88 #134
47 #135
107 #136
0 #137
0 #138
60 #139
0 #140
0 #141
0 #142
0 #143
90 #144
32 #145
20 #146
#147 11
0 #148
0 #149
4 #150
2 #151
0 #152
0 #153
0 #154
1 #155
0 #156
0 #157
10 #158
29 #159
2 #160
0 #161
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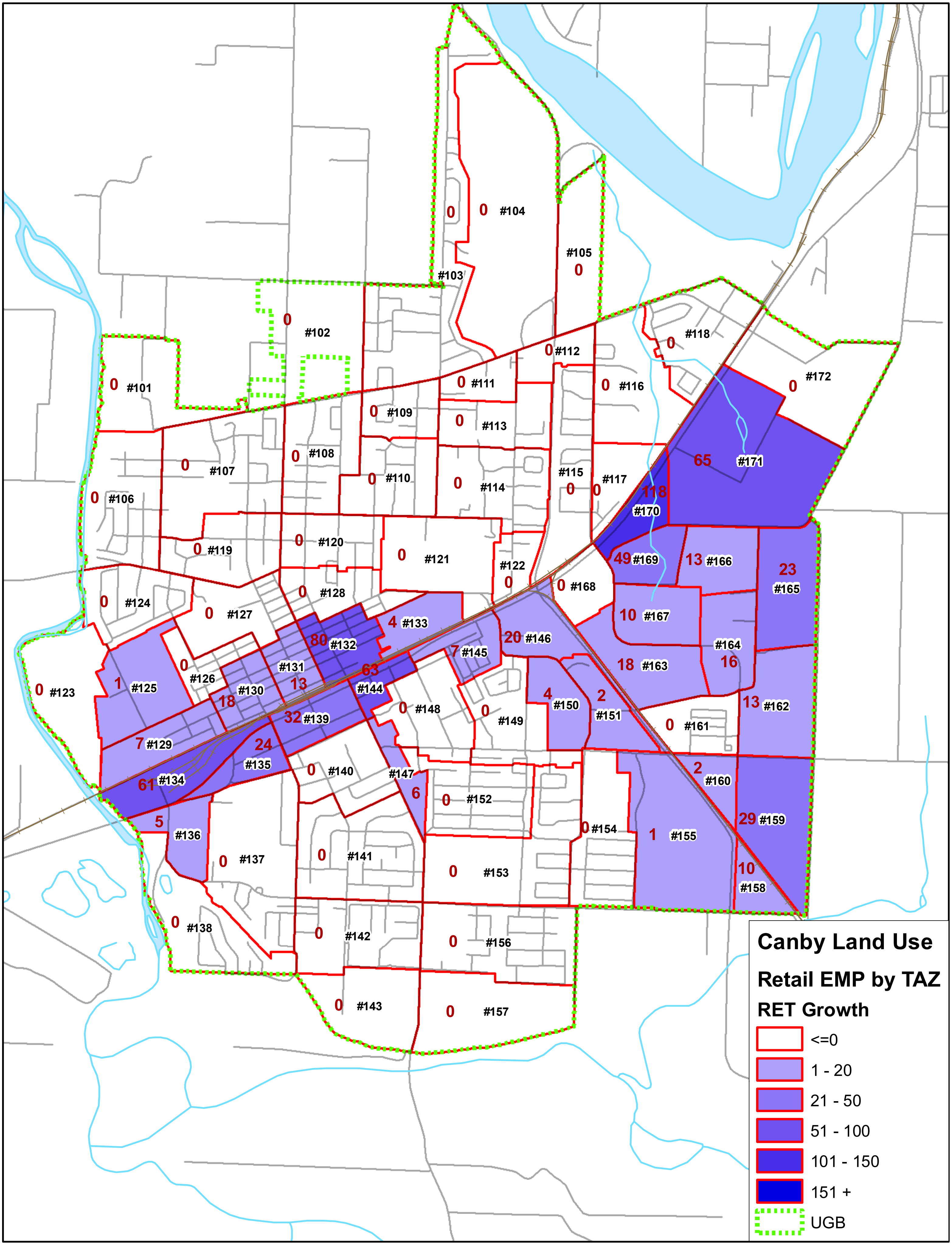
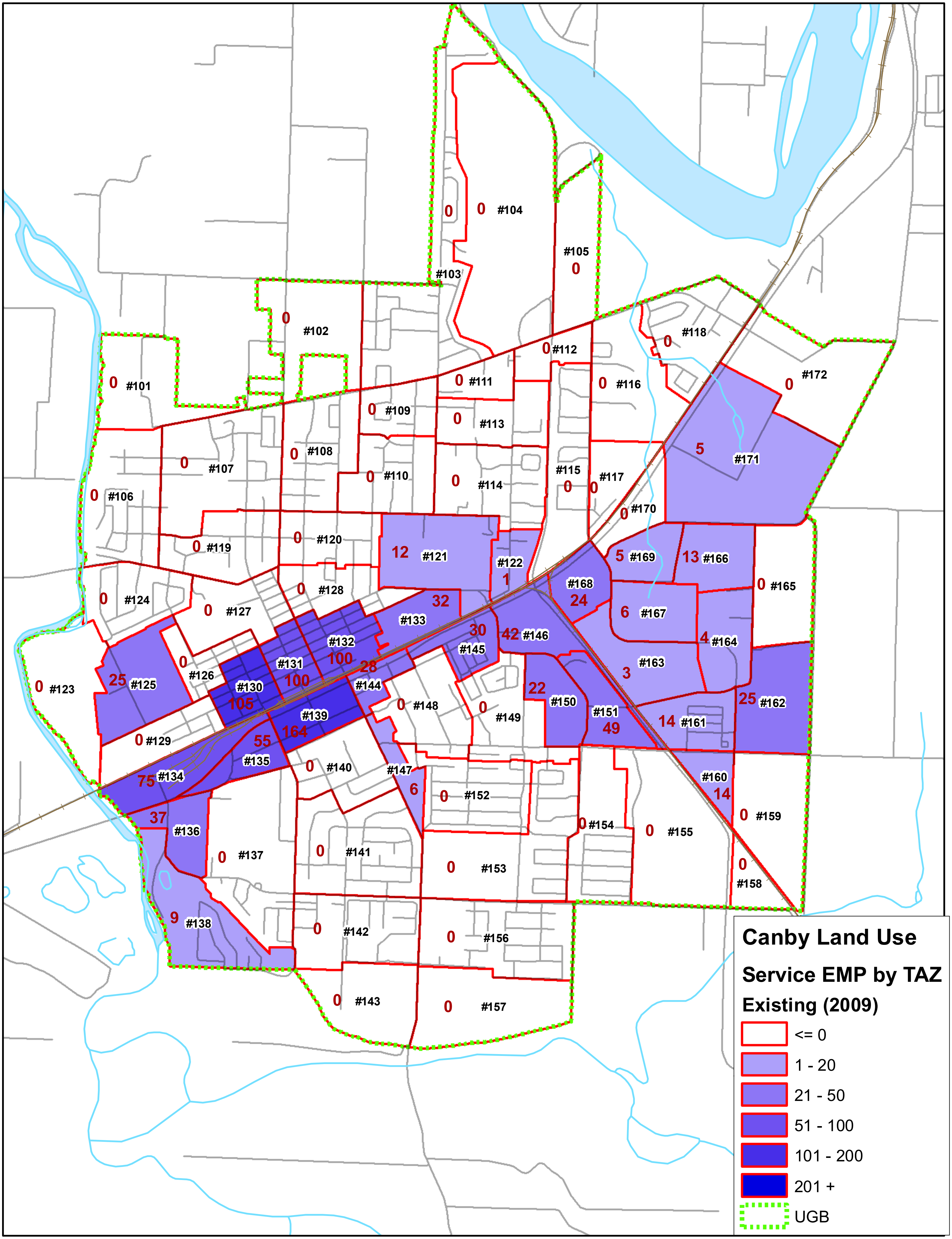
#164 16
23 #165
13 #166
10 #167
#168 175
49 #169
118 #170
65 #171
0 #172



Canby Land Use
Retail EMP by TAZ
RET Growth
<=0
1 - 20
21 - 50
51 - 100
101 - 150
151 +
UGB
0 #101
0 #102
#103
0 0 #104
#105 0
0 #106
0 #107
0 #108
0 #109
0 #110
0 #111
0 #112
0 #113
0 #114
#115 0
0 #116
#117 0
0 #118
0 #119
0 #120
0 #121
#122 0
0 #123
0 #124
1 #125
0 #126
0 #127
0 #128
7 #129
18 #130
#131 13
80 #132
4 #133
61 #134
24 #135
5 #136
0 #137
0 #138
32 #139
0 #140
0 #141
0 #142
0 #143
63 #144
7 #145
20 #146
#147 6
0 #148
0 #149
4 #150
2 #151
0 #152
0 #153
0 #154
1 #155
0 #156
0 #157
10 #158
29 #159
2 #160
0 #161
13 #162
18 #163
#164 16
23 #165
13 #166
10 #167
0 #168
49 #169
118 #170
65 #171
0 #172


Canby Land Use
Service EMP by TAZ
Existing (2009)
<= 0
1 - 20
21 - 50
51 - 100
101 - 200
201 +
UGB
0 #101
0 #102
#103
0 0 #104
#105 0
0 #106
0 #107
0 #108
0 #109
0 #110
0 #111
0 #112
0 #113
0 #114
#115 0
0 #116
#117 0
0 #118
0 #119
0 #120
12 #121
#122 1
0 #123
0 #124
25 #125
0 #126
0 #127
0 #128
0 #129
#130 105
#131 100
#132 100
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37 #136
0 #137
9 #138
#139 164
0 #140
0 #141
0 #142
0 #143
28 #144
30 #145
42 #146
#147 6
0 #148
0 #149
22 #150
#151 49
0 #152
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0 #155
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0 #159
#160 14
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6 #167
#168 24
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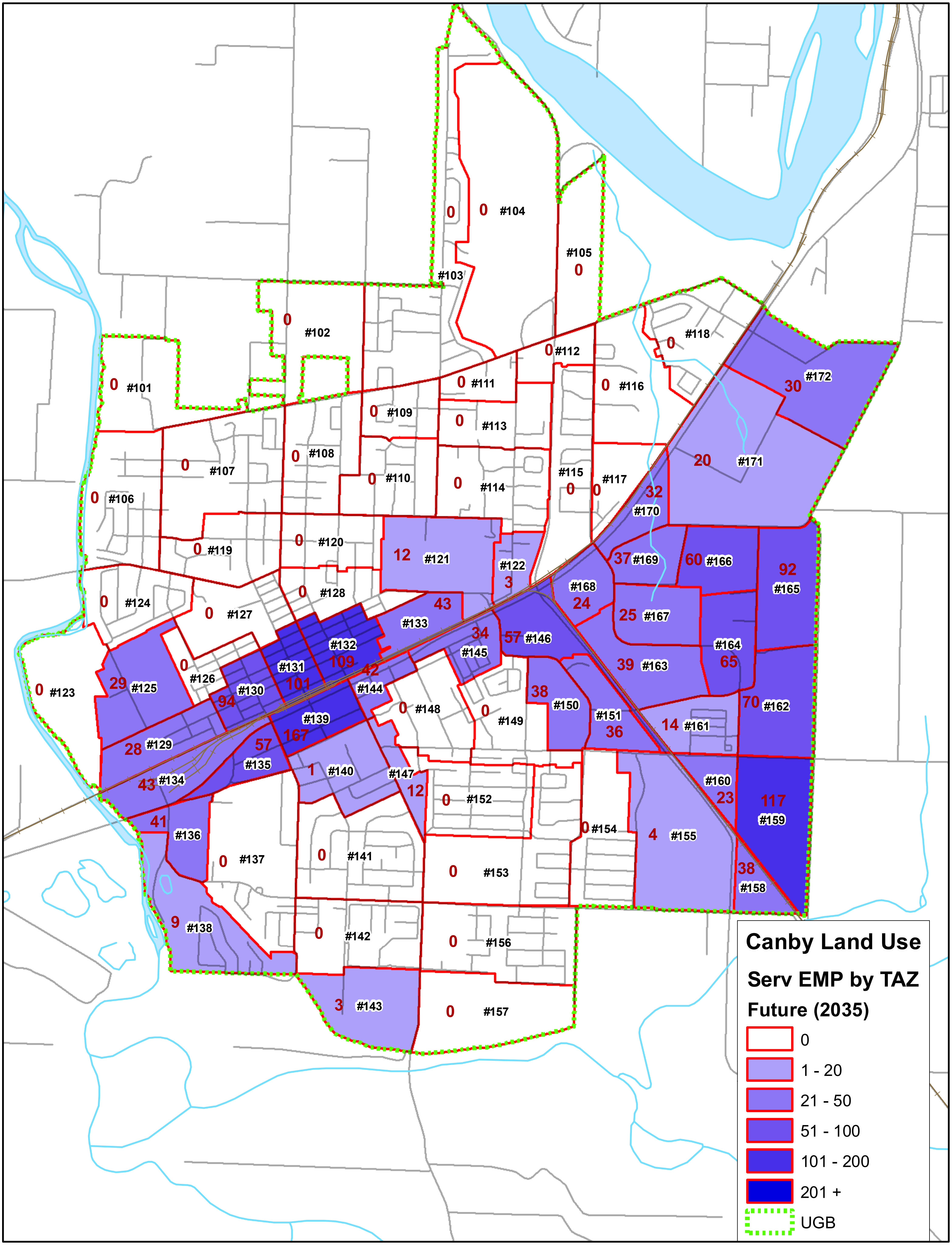
0 #170
5 #171
0 #172


Canby Land Use
Serv EMP by TAZ
Future (2035)
0
1 - 20
21 - 50
51 - 100
101 - 200
201 +
UGB
0 #101
0 #102
#103
0 0 #104
#105 0
0 #106
0 #107
0 #108
0 #109
0 #110
0 #111
0 #112
0 #113
0 #114
#115 0
0 #116
#117 0
0 #118
0 #119
0 #120
12 #121
#122 3
0 #123
0 #124
29 #125
0 #126
0 #127
0 #128
28 #129
94 #130
#131 101
#132 109
43 #133
43 #134
57 #135
41 #136
0 #137
9 #138
#139 167
1 #140
0 #141
0 #142
3 #143
42 #144
34 #145
57 #146
#147 12
0 #148
0 #149
38 #150
#151 36
0 #152
0 #153
0 #154
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117 #159
#160 23
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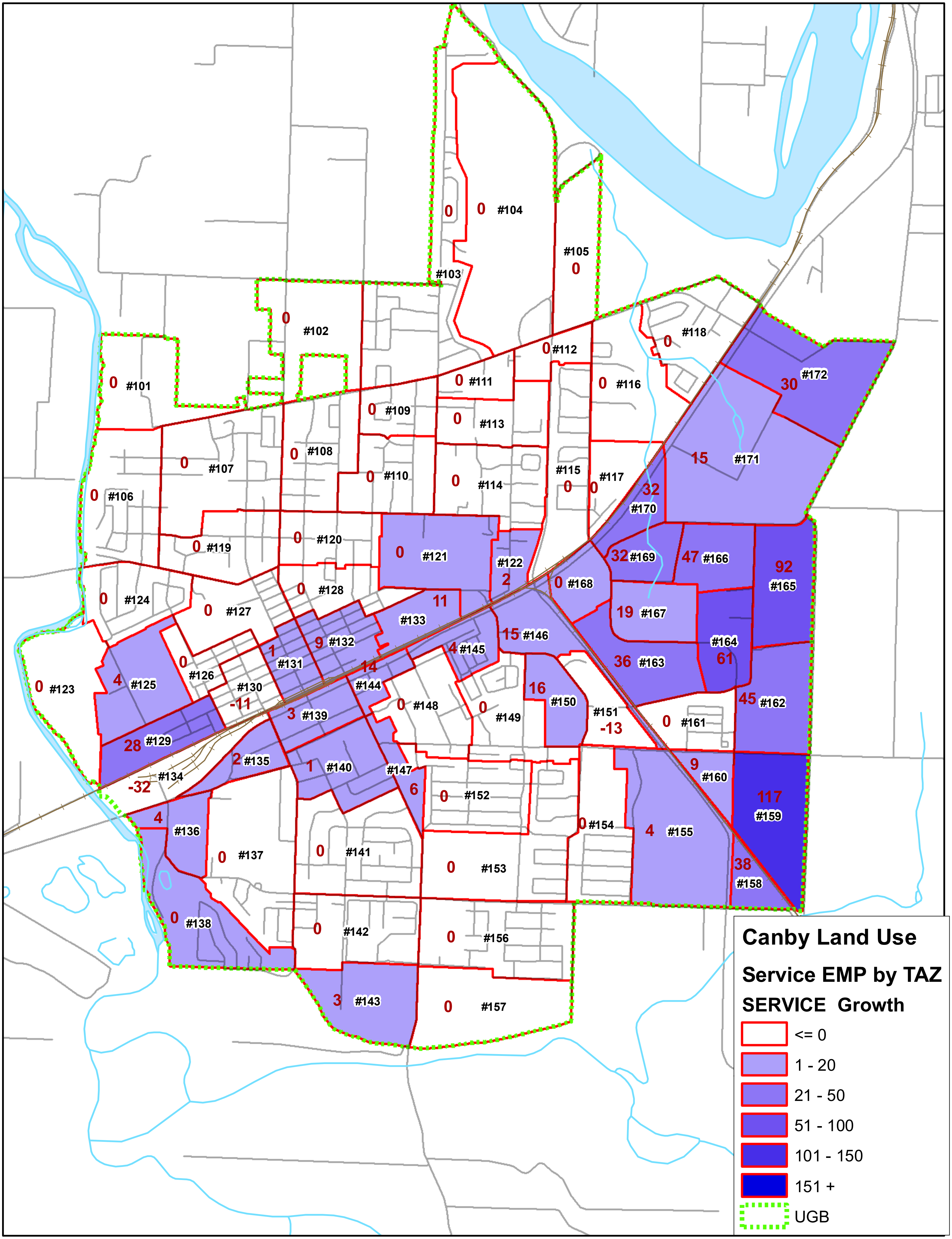
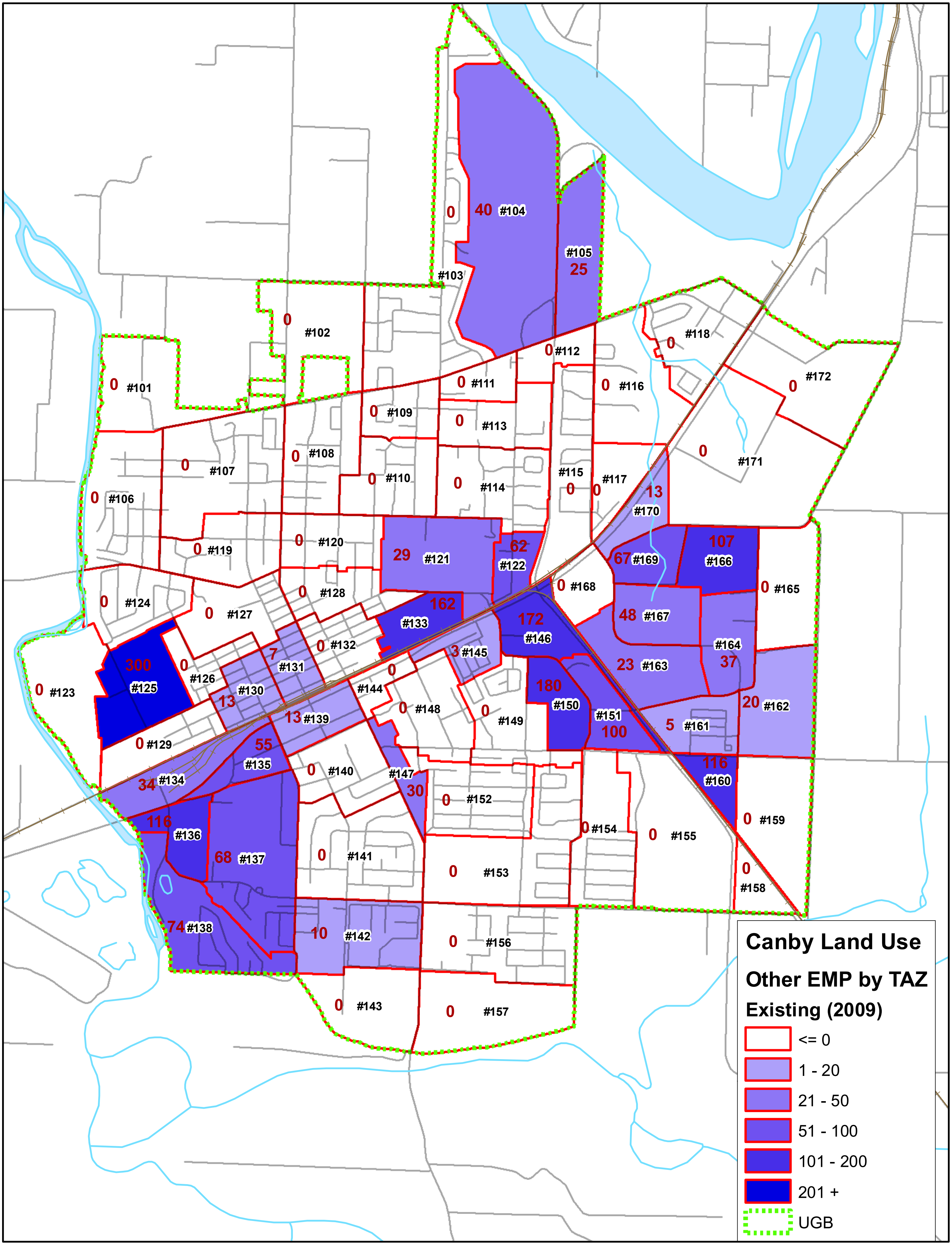
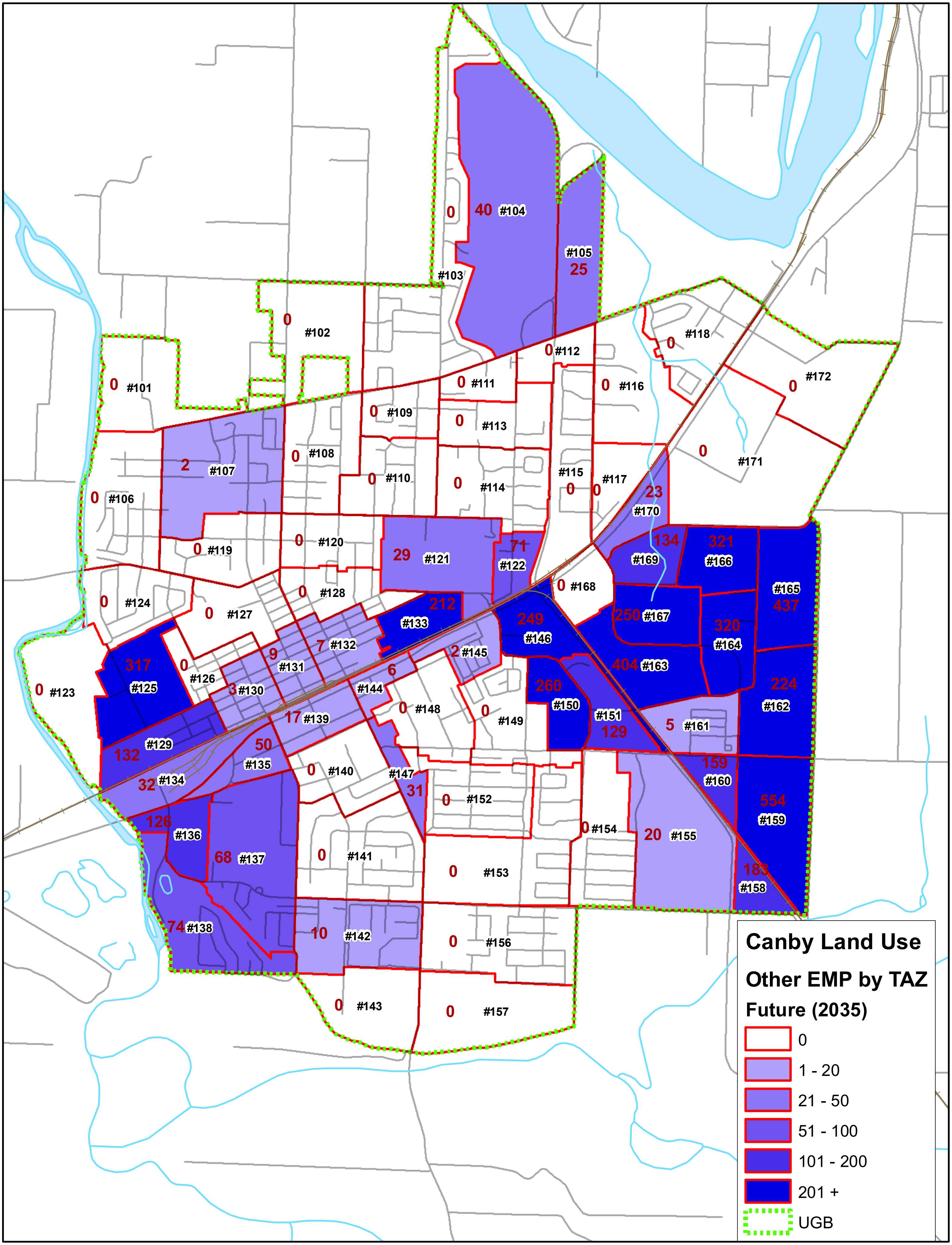
32 #170
20 #171
30 #172


Canby Land Use
Service EMP by TAZ
SERVICE Growth
<= 0
1 - 20
21 - 50
51 - 100
101 - 150
151 +
UGB



Canby Land Use
Other EMP by TAZ
Existing (2009)
<= 0
1 - 20
21 - 50
51 - 100
101 - 200
201 +
UGB


Canby Land Use
Other EMP by TAZ
Future (2035)
0
1 - 20
21 - 50
51 - 100
101 - 200
201 +
UGB
0 #101
0 #102
#103
0
40 #104
#105
25
0 #106
2 #107
0 #108
0 #109
0 #110
0 #111
0 #112
0 #113
0 #114
#115
0
0 #116
0 #117
0 #118
0 #119
0 #120
29 #121
71
#122
0 #123
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317
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32 #134
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68 #137
74 #138
17 #139
0 #140
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10 #142
0 #143
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#147
31
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#149
260
#150
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20 #155
0 #156
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#160
5 #161
224
#162
404 #163
320
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250 #167
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#170
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#171
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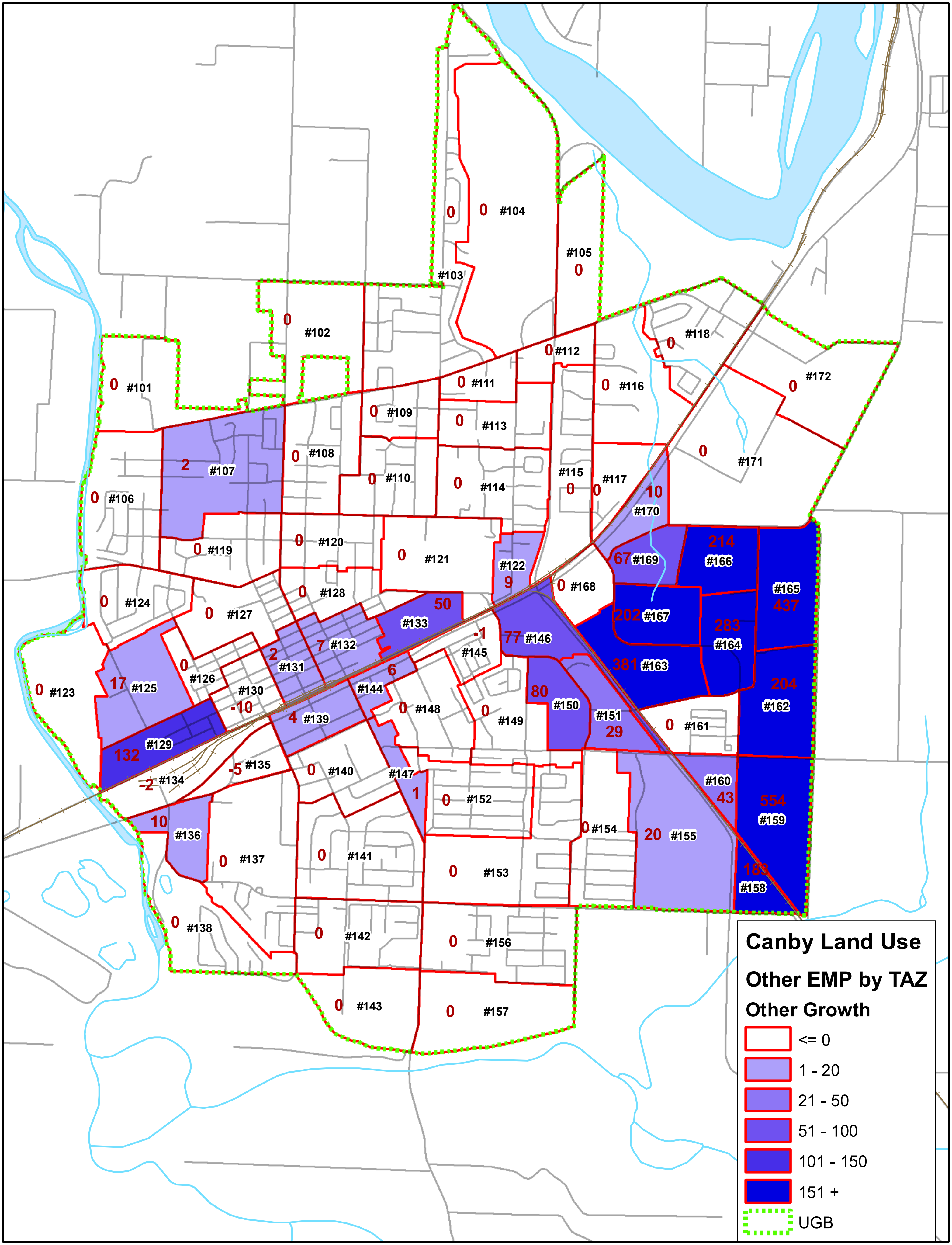
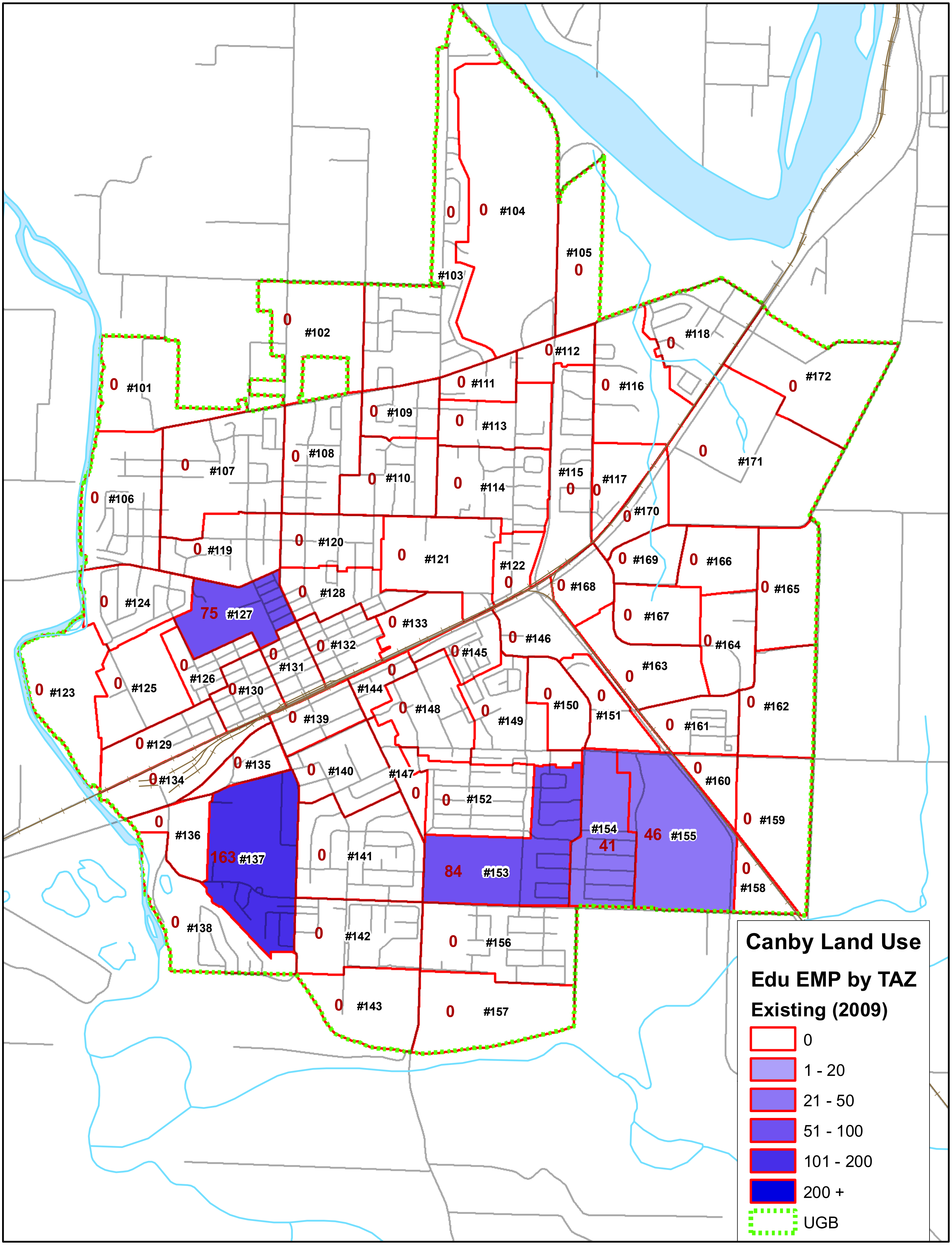
#172



Canby Land Use
Other EMP by TAZ
Other Growth
<= 0
1 - 20
21 - 50
51 - 100
101 - 150
151 +
UGB


Canby Land Use
Edu EMP by TAZ
Existing (2009)
0
1 - 20
21 - 50
51 - 100
101 - 200
200 +
UGB
0 #101
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#154 41
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0 #172

Vacant Land Use Assumptions

Sisters Example - Units per Acre

Zone	HH	RET	SERV	OTH
C	0	6	1	2
CH	0	6	3	1
LI	0	2	2	5
LM	0	0	0	0
PF	0	0	0	0
R	5	0	0	0
R-MFSD	15	1.5	0.5	1
UAR	10	1.5	0.5	1

Canby Assumptions Units per Acre

Zone	HH	RET	SERV	OTH
AG	0.2	0	0	0.2
DC	5	11	3	1
FL	0	0	0	0
HC	5	11	3	1
HDR	15	0	0	0
HI	0	0.5	1	10.5
LDR	5.5	0	0	0
LI	0	0.5	2	9.5
MC	0	5	2	1
MDR	6	0	0	0
P	0	0	0	0
PR	0	0	0	0
RC	6	0.5	4	0.5

TAZ	HH_EX	RET_EX	SERV_EX	OTH_EX	EDU_EX	HH_Fut	RET_Fut	SERV_Fut	OTH_Fut	EDU_Fut
101	26	0	0	0	0	170	0	0	0	0
102	9	8	0	0	0	256	8	0	0	0
103	295	0	0	0	0	412	0	0	0	0
104	68	0	0	40	0	163	0	0	40	0
105	0	0	0	25	0	0	0	0	25	0
106	149	0	0	0	0	194	0	0	0	0
107	175	0	0	0	0	276	0	0	2	0
108	162	0	0	0	0	185	0	0	0	0
109	163	0	0	0	0	169	0	0	0	0
110	131	0	0	0	0	136	0	0	0	0
111	70	0	0	0	0	114	0	0	0	0
112	109	0	0	0	0	171	0	0	0	0
113	66	0	0	0	0	176	0	0	0	0
114	164	0	0	0	0	171	0	0	0	0
115	140	0	0	0	0	178	0	0	0	0
116	85	0	0	0	0	202	0	0	0	0
117	63	0	0	0	0	145	0	0	0	0
118	124	0	0	0	0	166	0	0	0	0
119	121	0	0	0	0	151	0	0	0	0
120	105	0	0	0	0	109	0	0	0	0
121	45	0	12	29	0	58	0	12	29	0
122	214	0	1	62	0	252	0	3	71	0
123	0	0	0	0	0	0	0	0	0	0
124	134	0	0	0	0	136	0	0	0	0
125	1	0	25	300	0	1	1	29	317	0
126	133	0	0	0	0	145	0	0	0	0
127	213	0	0	0	75	238	0	0	0	122
128	193	0	0	0	0	228	0	0	0	0
129	111	0	0	0	0	180	7	28	132	0
130	75	30	105	13	0	79	48	94	3	0
131	43	75	100	7	0	40	88	101	9	0
132	38	100	100	0	0	72	180	109	7	0
133	1	0	32	162	0	0	4	43	212	0
134	0	27	75	34	0	0	88	43	32	0
135	3	23	55	55	0	5	47	57	50	0
136	0	102	37	116	0	2	107	41	126	0
137	131	0	0	68	163	145	0	0	68	266
138	120	0	9	74	0	119	0	9	74	0
139	37	28	164	13	0	54	60	167	17	0
140	179	0	0	0	0	185	0	1	0	0
141	295	0	0	0	0	297	0	0	0	0
142	239	0	0	10	0	288	0	0	10	0
143	9	0	0	0	0	213	0	3	0	0
144	15	27	28	0	0	44	90	42	6	0
145	50	25	30	3	0	62	32	34	2	0
146	0	0	42	172	0	0	20	57	249	0
147	27	5	6	30	0	33	11	12	31	0
148	419	0	0	0	0	462	0	0	0	0
149	300	0	0	0	0	305	0	0	0	0
150	0	0	22	180	0	0	4	38	260	0
151	0	0	49	100	0	0	2	36	129	0
152	244	0	0	0	0	244	0	0	0	0
153	226	0	0	0	85	227	0	0	0	138
154	144	0	0	0	41	266	0	0	0	66
155	6	0	0	0	46	397	1	4	20	74
156	193	0	0	0	0	293	0	0	0	0
157	2	0	0	0	0	411	0	0	0	0
158	1	0	0	0	0	1	10	38	183	0
159	1	0	0	0	0	0	29	117	554	0
160	0	0	14	116	0	0	2	23	159	0
161	0	0	14	5	0	0	0	14	5	0
162	4	0	25	20	0	4	13	70	224	0
163	0	0	3	23	0	0	18	39	404	0
164	2	0	4	37	0	0	16	65	320	0
165	4	0	0	0	0	2	23	92	437	0
166	1	0	13	107	0	0	13	60	321	0
167	0	0	6	48	0	0	10	25	250	0
168	0	175	24	0	0	0	175	24	0	0
169	0	0	5	67	0	0	49	37	134	0
170	0	0	0	13	0	536	118	32	23	0
171	26	0	5	0	0	730	65	20	0	0
172	23	0	0	0	0	232	0	30	0	0
TOTAL	**6,127**	**624**	**1,004**	**1,928**	**409**	**10,530**	**1,339**	**1,648**	**4,935**	**666**

Metro Model Volume Projections
PM Peak 2 Hour Model Volumes

Road	**Metro Model (2 hr)** **2005**	**2030**	**Annual Growth (compounded)**	**Existing** **2009**	**Projected** **2030**
99E West	1965	3736	3.3%	1158	2274
99E East	3284	4745	1.9%	1904	2802
Township	233	522	4.1%	261	496
Mulino	153	189	1.1%	174	330
Ivy	704	810	0.7%	593	778
Barlow	257	320	1.1%	436	549
Arndt	1977	2845	1.8%	1375	2015
Combined Twsp/Mul	386	711	3.1%	-	-

Appendix H: Special Transportation Area (STA) Suitability Memorandum

TECHNICAL MEMORANDUM #5

TO: Matilda Deas, City of Canby
Sonya Kazen, ODOT Region 1

FROM: Chris Maciejewski, P.E., DKS Associates
Brad Coy, E.I.T., DKS Associates

DATE: March 25, 2010

SUBJECT: **Special Transportation Area (STA) Suitability Evaluation**

P09042-002-003

This memorandum was prepared to assist the City of Canby and ODOT in determining the appropriateness of a Special Transportation Area (STA) designation for OR 99E in downtown Canby (between Elm Street and Locust Street). The sections of this memorandum discuss the objectives and typical characteristics of an STA, specific considerations for Canby, and a summary of findings.

Special Transportation Area (STA) Objectives and Characteristics

A Special Transportation Area (STA) is a designation in the Oregon Highway Plan (OHP) that can be applied to a state highway segment when a downtown business district straddles the highway and the community desires that the highway segment focus on local multi-modal activity rather than exclusively on mobility through town. The objective of an STA designation is to emphasize that, in addition to providing vehicular mobility, this portion of the state highway system should also provide access to community activities, businesses, and residences and should accommodate pedestrian, bicycle, and transit movement along and across the highway. An STA designation is a way for communities to get clear agreement from ODOT to manage this portion of the state highway as a main street or community center.

Typically, STAs are located in areas with mixed land uses and buildings closely spaced and developed with little or no setback from the highway. In addition, sidewalks are wide and are located adjacent to both the buildings and the highway. In general, public road connections are preferred to private driveway access, which would mean that or over time businesses would combine driveways and have access onto the side streets as opposed to direct highway access. Therefore, a key element in an STA is an interconnected local street network to facilitate local automobile, pedestrian, and bicycle circulation; however, private driveway access to the highway may be allowed where feasible access alternatives are not available.

Specific multi-modal benefits of an STA designation are that the highway could be converted into a more pedestrian-friendly environment. Measures consistent with an STA could be considered. Some example measures include lowering the speed limit to 25 or 30 miles per hour, installing raised medians along the highway, improving pedestrian crossings, improving street lighting, and managing driveway access points. Benefits of raised medians are that they can accommodate the placement of pedestrian islands at strategic locations and improve safety by restricting driveways to right-in/right-out movements.

An STA designation would also allow the City and ODOT to better manage development and future traffic congestion by changing the acceptable intersection performance level from the current 0.85 volume-to-capacity (v/c) operating standard for the intersections along this stretch of OR 99E in Canby to a 0.95 v/c standard. In other words, more vehicular congestion would be allowed to reduce the need for roadway capacity (i.e., widening) improvements, thereby increasing the emphasis on the importance and safety of other travel modes.

STA Considerations for Canby

In this section, a series of characteristics for considering STA designation for a portion of OR 99E in Canby are reviewed. In addition, this section discusses planning efforts and precedence for highway segments obtaining STA designation in areas with comparable highway form and function.

Highway Characteristics

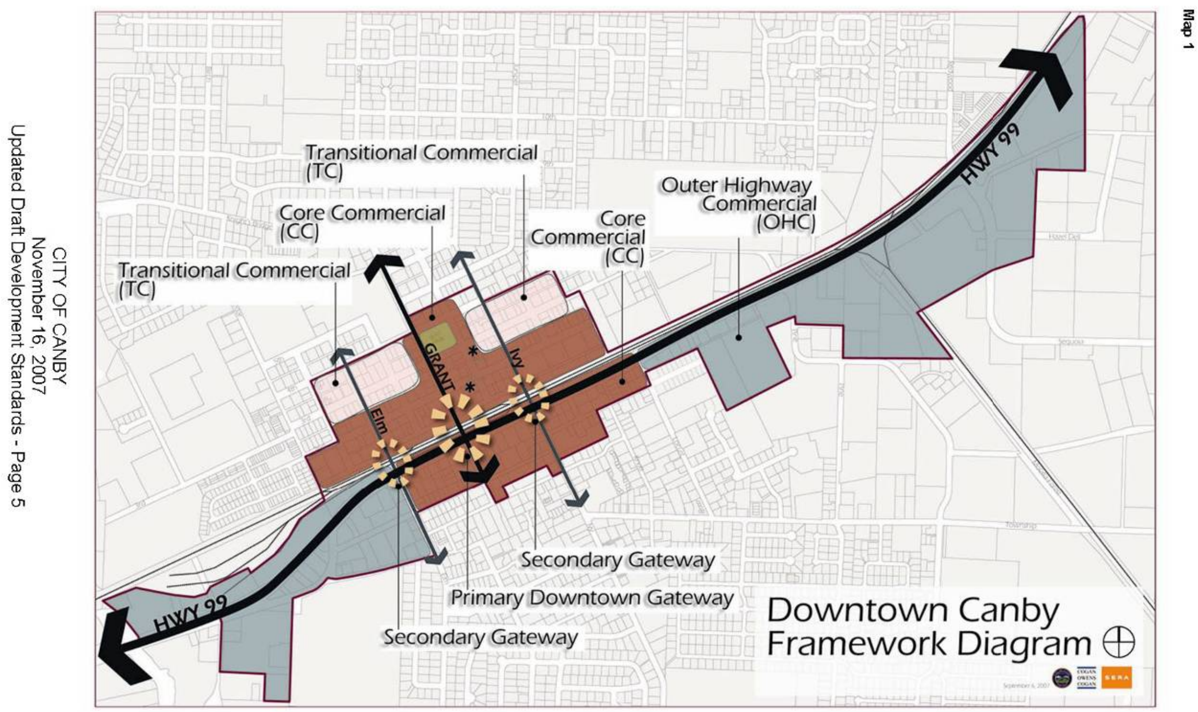
OR 99E in Canby is a Regional Highway and is not a Freeway or Expressway. Therefore, a Special Transportation Area (STA) designation may be applied. Also, because OR 99E through Canby is not a designated state Freight Route, STA designation could be applied without necessitating preparation of an STA management plan. The potential STA section is from Locust Street on the east (milepost 20.92) to Elm Street on the west (milepost 21.42). The current posted speed in this section is 35 miles per hour (mph).

Currently, OR 99E in downtown Canby lacks roadway features consistent with a business district/downtown form: there are limited sections of sidewalk, a hodgepodge assortment of older street lights that appear to be randomly placed, insufficient bikeway-shoulders, and spacing between signalized pedestrian crossings that range from a few blocks to a mile in length. On-street parking is also currently prohibited on this section of OR 99E. Significant improvements would be needed along this section of OR 99E for it to function as an STA and to appropriately accommodate pedestrian, bicycle, and transit movement along and across the highway.

Downtown Canby Design Practices

The City of Canby has a vibrant traditional downtown that surrounds OR 99E, extending from approximately North 3rd or 4th Avenue to South 2nd Avenue. In this area, many of the existing buildings are located close to the sidewalks (including along OR 99E). In recent years, the City has constructed major pedestrian enhancements in the district, such as curb bulb outs and crosswalk texturing. The downtown is also served by Canby Area Transit, which has a transit center at the intersection of North Ivy Street/North 1st Avenue and bus stops along OR 99E.

Canby desires to maintain a distinct downtown feel and City comprehensive plan policies, plan map and zoning designations, and the development code support mixed use commercial-office-residential development in the downtown district. The City has recently updated its development code to require new development to be consistent with traditional main streets (with standards for building and parking lot placement, bicycling and transit amenities, on-street parking, shared parking, consolidated access, plazas, landscaping, and architectural design elements consistent with traditional main streets). In addition, the City has joined the Oregon Main Street Program and has assigned a Main Street Manager to help implement and vision for downtown Canby. The Downtown Canby Framework Diagram reproduced below is from the City of Canby Development Standards and shows that Core Commercial (CC) design standards apply to OR 99E between Elm Street and Locust Street. Therefore, the existing and planned environment is a designated district of compact development, with characteristics consistent with a *Special Transportation Area* as described in *Oregon Highway Plan,* Policy 1B.



On-Street Parking

Providing pockets of on-street parking or shared, general purpose parking lots located behind or to the side of buildings (instead of site-specific lots in front of buildings) is a desired feature for a highway with an STA designation. The majority of parking areas on both the north and south sides of this section of OR 99E are located to the side of buildings. However, ODOT does not currently allow on-street parking on OR 99E and many buildings have their own parking lots with limited access to adjacent lots. There are also a high number of driveways, which limits the amount of available roadway that can be used to provide on-street parking. The parking on OR 99E between Elm Street and Locust Street could be improved to be more consistent with STA practices by creating cross-circulation access between adjacent parking lots, consolidating driveways, removing head-in parking in front of buildings, and providing on-street parking. Some locations where on-street parking is expected to be feasible are adjacent to any current driveway locations that would be closed as allowed by consolidation, current head-in parking locations that would be removed, and currently undeveloped lots.

Local Street Network and Identified Improvements

Between Elm Street and Locust Street, there is an existing parallel street network to OR 99E (e.g., SW 2nd Avenue), though the Union Pacific Railroad (UPRR) limits connectivity to the north. Key connections between OR 99E and the local street network in the vicinity occur at the OR 99E/Elm Street, OR 99E/Grant Street, OR 99E/Ivy Street intersections.

Potential improvements to the local street network have been identified during the TSP update process and include the conversion of two north-south roadways (i.e., non-highway) to one-way streets and potentially a new frontage road and/or intersection capacity improvements connecting to the Clackamas County Fairgrounds. These improvements would provide safer and more convenient options for access to downtown by all travel modes as well as relieve anticipated bottlenecks on downtown OR 99E intersections.

Motor Vehicle Transportation System Effects of Implementing an STA

The effects that implementing an STA designation on OR 99E would have on the transportation network in Canby (i.e., constructing improvements consistent with an STA and using a higher congestion threshold) were analyzed and are discussed in the Transportation System Solutions Report prepared in conjunction with the Canby Transportation System Plan (TSP) update. Both transportation modeling and an evaluation criteria scoring were performed, and the STA designation and supporting implementation measures were found to have a significant benefit for managing traffic demands on OR 99E in downtown Canby while providing capacity for future growth.

Union Pacific Railroad Coordination

The Union Pacific Railroad (UPRR) mainline separates the primary (north) section of downtown from OR 99E; however, there is a block of platted lots situated between UPRR and OR 99E. City code will ensure that direct highway access from these lots can be consolidated as redevelopment occurs to reduce operational conflicts.

In addition, the City is currently negotiating with UPRR for the purchase of a 1.56 acre parcel of land located between NW 1st Avenue and the UP rail line in Canby's downtown core commercial district. The Sate of Oregon's Transportation Growth Management Quick Response Program funded a feasibility study for this site, which identified potential redevelopment schemes, including uses, designs, financial feasibility, and implementation strategies. The study was completed in December of 2009, and was the catalyst for the City's current land negotiation efforts with UPRR. With the purchase of the railroad parcel, the intent is to facilitate redevelopment within those 1.56 acres that help implement the vision of the Canby Downtown Plan adopted in 2001, and the updated design guidelines for the downtown in 2008, and to meet the goals of the Canby Urban Renewal District.

Precedence

In 2004, the Oregon Transportation Commission (OTC) adopted an STA designation on McLoughlin Boulevard (OR 99E) approximately nine miles north in Oregon City. This roadway section (i.e., a half mile segment between the railroad underpass and 14th Street) had approximately equal average daily traffic (ADT) levels in 2008 as did OR 99E through downtown Canby (i.e., just over 20,000 daily vehicles).[1] This roadway section also is four to five lanes wide with limited on-street parking and a 30 mph speed limit. An enhancement plan was adopted in 2005 for McLoughlin Boulevard that indicated that this roadway section was to be converted to a more pedestrian friendly roadway with narrower travel lanes, reduced vehicle speeds, a raised landscape median, wider sidewalks, pockets of on-street parking, and pedestrian refuges,[2] Therefore, there is precedence that supports the likelihood of obtaining an STA designation for the desired section of OR 99E through Canby.

Summary

The City of Canby and ODOT are exploring the appropriateness amending the *Oregon Highway Plan* to designate a *Special Transportation Area* for the portion of OR 99E through Canby's downtown (i.e., Elm Street to Locust Street). The STA designation seems to be appropriate because the existing and planned environment surrounding the highway meets the criteria specified in the 1999 Oregon Highway Plan (OHP).[3] Specifically, an STA designation would recognize that local mobility and access needs in Canby's downtown are a priority and are as important as the highway's role to move through-traffic. Designation of an STA would also allow for the application of context-sensitive highway design features as well as a slightly higher level of traffic congestion downtown, consistent with the greater access needs.

Significant multi-modal improvements should be provided along this section of OR 99E for it to better accommodate pedestrian, bicycle, and transit movement along and across the highway consistent with the desired characteristics of an STA. To this end, the TSP has an alternative to include an STA implementation project as a priority project. This project (and the identified cost estimate) would include pedestrian, bicycle, transit, and on-street parking improvement projects along the section of OR 99E recommended for STA designation.

The City has also expressed interested in working with ODOT to develop a "downtown streetscape" plan for OR 99E in the *Special Transportation Area* (as well as for the remainder of the OR 99E corridor in Canby). Such a plan would help ensure coordinated efforts between ODOT and the City and also provide guidance to future development along the corridor.

[1] 2008 ODOT Transportation Volume Tables, obtained from ODOT website.
[2] *McLoughlin Boulevard Enhancement Plan*, November 1, 2005; Adopted May 18, 2005.
[3] *1999 Oregon Highway Plan*; Policy Element, pages 49-51.

Appendix I: Industrial Area Cross-Section Analysis Memorandum

TECHNICAL MEMORANDUM #4

TO: Matilda Deas, City of Canby
Sonya Kazen, ODOT Region 1

FROM: Chris Maciejewski, P.E., DKS Associates
Brad Coy, E.I.T., DKS Associates

DATE: December 16, 2009

SUBJECT: **Industrial Area Roadway Cross-Sections Analysis**

P09042-002-002

This memorandum was prepared to assist the City of Canby in developing design standards for industrial area streets. Industrial uses currently play an important economic role in Canby and are expected to play an even greater role as development occurs in the large industrial area on the east side of the Canby Urban Growth Boundary (UGB).

The City desires that industrial area roadways and intersections accommodate efficient freight movement. For example, two trucks should be able to make simultaneous conflicting turn maneuvers through intersections and not have overlapping paths. This objective is not always applied to the general road system as a balance is desired between priority over all modes. However, in major industrial areas, truck movements become a higher priority and wider streets and intersections are more reasonable.

This memorandum discusses geometric analysis that was performed with AutoTurn to determine street widths for collector and local roadways in the industrial area. In addition, bicycle lane striping, driveway curb-cuts, and on-street parking are discussed.

Geometric Analysis

Geometric analysis was performed using AutoTurn software to evaluate vehicle turning paths and determine industrial area roadway widths that would accommodate truck turning movements. A key component of the analysis is the balance of street width with the required curb return radii to facilitate truck movements. In general, narrower roadways were sought compared to smaller curb return radii to minimize the overall right-of-way and impervious area footprint of the roadways. This strategy should be compatible with the pedestrian environment, as the sidewalks in the industrial area are anticipated to be separated from the roadway by landscaping/swale areas, which would minimize issues with curb ramp design.

To conduct the AutoTurn analysis, the following key assumptions were made:

- The desired design vehicle is a WB-67
- Trucks should be able to turn right from a cross-street at the same time a truck is turning left from the major street (without conflicting vehicle paths).
- Bike lanes (6-feet) will be provided on collector roadways
- Trucks paths may track into a bike lane as a turn is being completed, but it is not desired that a truck must merge into a bike lane prior to a turn to provide adequate width (which would be a potential blind-spot for the driver)
- Curb returns can be designed with compound curves that complement the vehicle turning paths

To begin the geometric analysis, a typical 40-foot wide industrial street (which is the standard in jurisdictions such as Washington County) was evaluated for local streets. An iterative process of widening or narrowing streets combined with adjusting curb-return layouts was used to determine a reasonable balance of width to intersection geometry. The process was then repeated for collector/collector intersections and collector/local intersections, including consideration of bicycle lanes on the collector roadways.

AutoTurn diagrams showing the turn path evaluations are provided in Figure 1. The four diagrams correspond to whether the movements are between collectors or local streets. Notice that the right-turn approach leg equals the left-turn receiving leg and the right-turn receiving leg equals the left-turn approach leg.

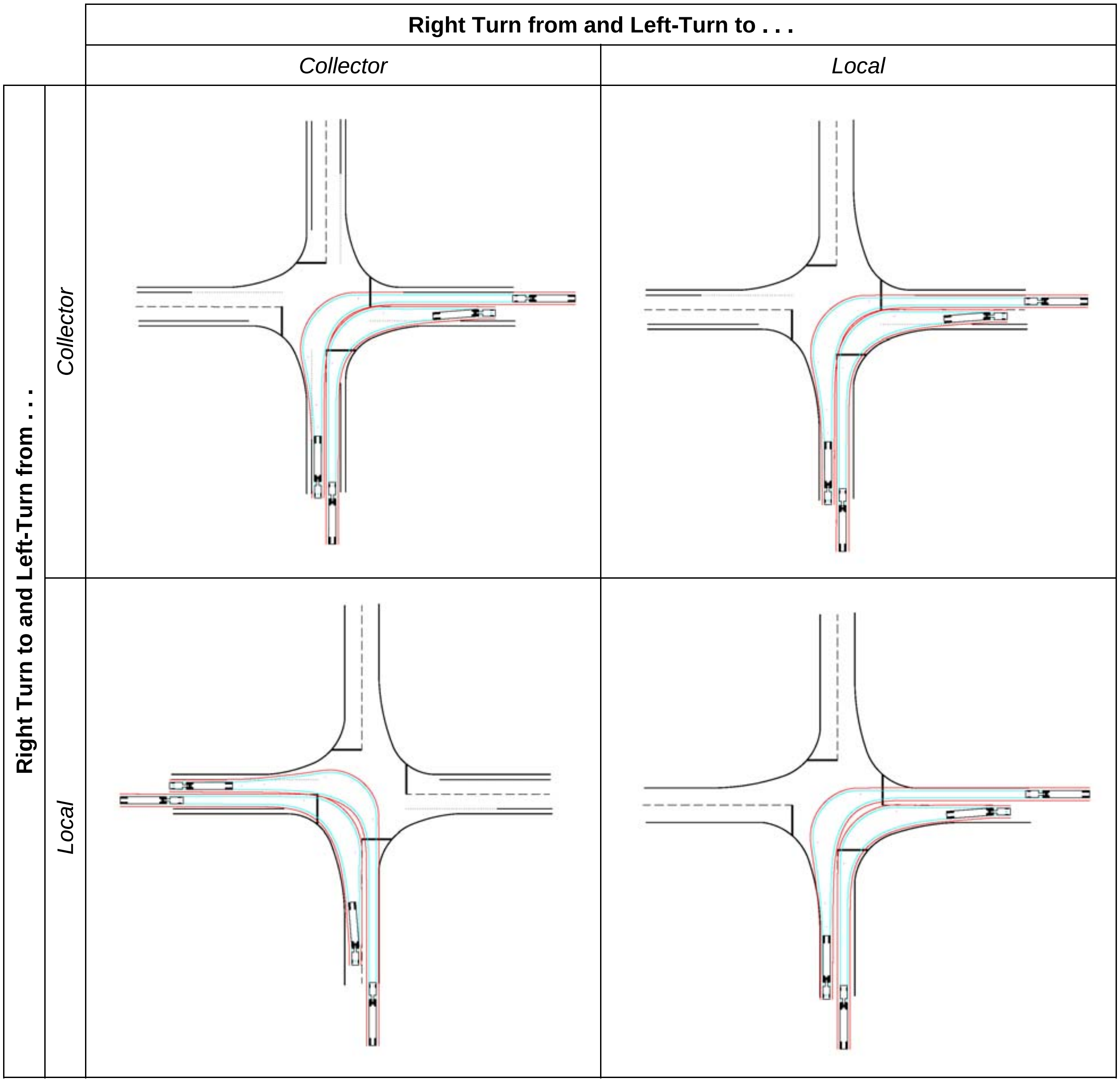


Figure 1: AutoTurn Diagrams Showing Turn Paths

Geometric Analysis Results

From the analysis, the following street-widths were determined to be adequate for the two turning trucks to both perform their respective maneuvers without overlapping:

- **Collectors:** 46-foot curb-to-curb width with one vehicular travel lane and a bike lane in each direction
- **Local streets:** 40-foot curb-to-curb width with one vehicular travel lane in each direction

Bicycle Conflicts

On the collector streets, it was assumed that the trucks would use a portion of the bicycle lanes (see Figure 1). The left turning vehicles were assumed to turn into the bike lane on the receiving leg, and the right turning vehicles were assumed to hug the centerline of the road and turn across bike lanes near the inside corner. To make it clear to truck drivers and cyclists that there are likely to be conflicts in the turning area, bike lane stripes should be dotted instead of solid within the turning maneuver area of the trucks.

Driveway Curb-Cuts

The analysis to determine street widths was focused on collector and local streets. This can be translated to required private access curb-cuts in the industrial area. Basically, the local street design would apply. A 40-foot driveway would be required and a large curb-return radii with a compound curve would be needed. The overall width from tangent point to tangent point of the driveway apron may exceed 200 feet, but this design would facilitate the same efficient flow of trucks as the a public intersection.

On-Street Parking

The City will not allow on-street parking in the Canby Pioneer Industrial Area, as they will require developments to provide site parking for deliveries and customers. However, the local street cross-section identified in this memorandum (i.e., 40-foot curb-to-curb width) does have the ability to accommodate on-street parking, except within approximately 200 feet of intersections and driveways due to the wide truck turning maneuvers. The collector street cross-section identified in this memorandum (i.e., 46-foot curb-to-curb width) would not be able to accommodate on-street parking unless 8 feet were added outside of the bicycle lane on whichever side on-street parking was desired. If parking was desired on both sides of the street, then the collector would require a total curb-to-curb width of 62 feet.

Appendix J: Industrial Area Connectivity Memorandum

TECHNICAL MEMORANDUM #6

TO: Matilda Deas, City of Canby
Sonya Kazen, ODOT Region 1

FROM: Chris Maciejewski, P.E., DKS Associates
Brad Coy, E.I.T., DKS Associates

DATE: June 19, 2010

SUBJECT: **Canby Pioneer Industrial Area Connectivity Analysis** P09042-002-003

This memorandum summarizes an analysis of connectivity options for the Canby Pioneer Industrial Park. Connectivity was reviewed to determine if on-site circulation and connections to the surrounding network can provide reasonable access for development while protecting surrounding neighborhoods from freight and cut-through traffic impacts. The following sections describe the background conditions assumed for the analysis, evaluation of the connectivity options, and recommendations for integrating the Canby Pioneer Industrial Park into the TSP Update.

Background Information

The internal roadway network that is currently planned for the Canby Pioneer Industrial Park is shown in Figure 1. This figure identifies the internal roadway network planned to provide motor vehicle access to developable parcels, including two new internal roadway connections:

1. SE 4th Avenue Extension from Sequoia Parkway to Mulino Road
2. East-west connection in northeast quadrant between Walnut Street and Mulino Road

In addition to the internal roadway network, external connections also play an important role in providing efficient access to the industrial area while limiting impacts to adjacent neighborhoods. As a major industrial area, access to OR 99E is the most important external consideration. Sequoia Parkway has been designed as the primary gateway to the industrial area from OR 99E; however, capacity constraints at the OR 99E/Seqouia Parkway intersection are expected in the future (see Draft TSP Chapter 4: Future Needs). Therefore, vehicles accessing the industrial area would divert to Haines Road and Township Road-Ivy Street to access OR 99E. Neither of these roadways are ideal routes for industrial traffic without significant upgrades to serve freight traffic or minimize impact on residential areas.

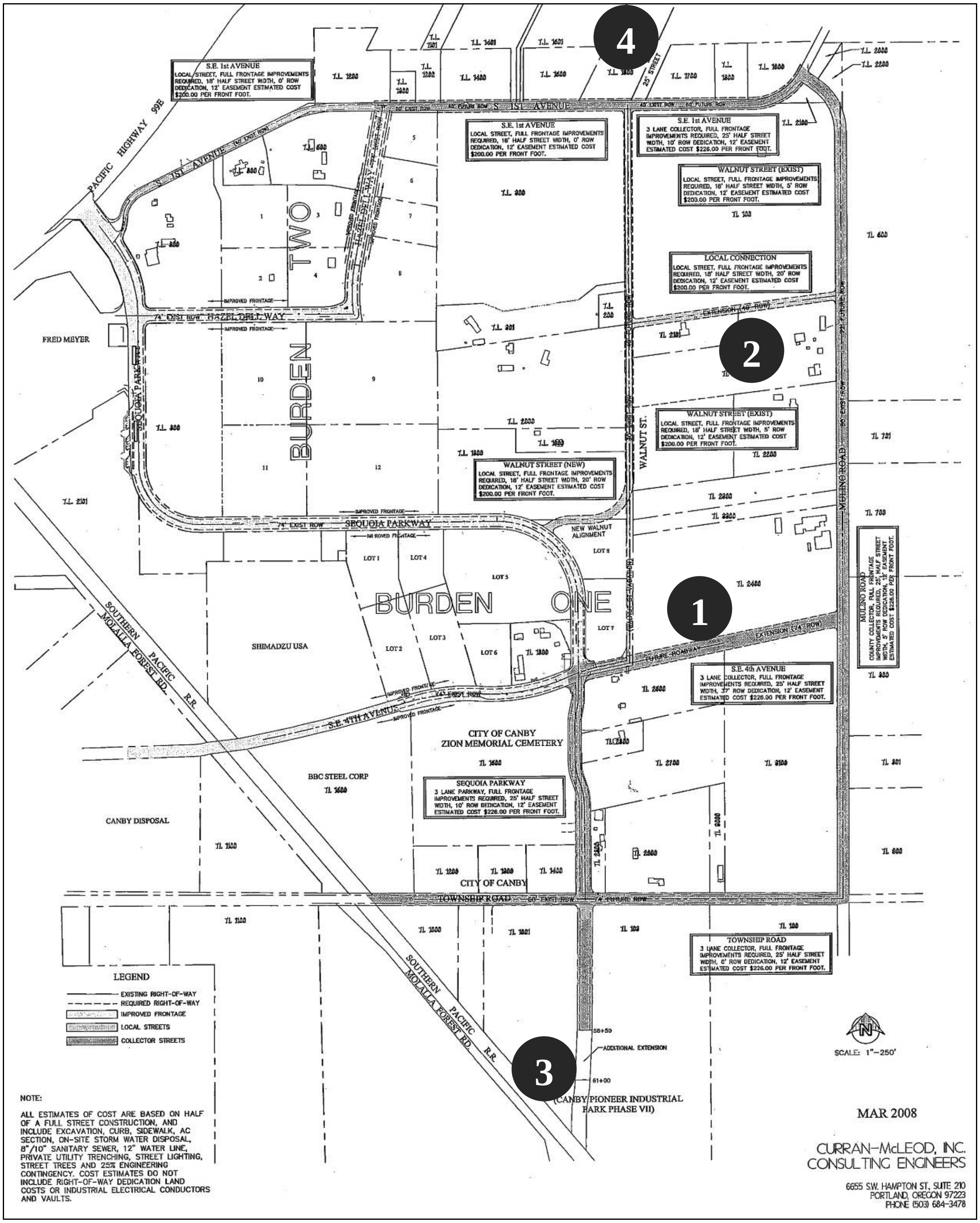


Figure 1: Currently Planned Roadway Network for Canby Pioneer Industrial Park[1]

[1] Figure (excluding number labels) prepared for City of Canby by Curran-McLeod Consulting Engineers, March 2008.

There are two new external connections that have been identified through the TSP Update as potential solutions (the locations where these would connect to the Canby Pioneer Industrial Park are labeled in Figure 1):

3. Sequoia Parkway Extension to SE 13th Avenue
4. Otto Road Connection between OR 99E and SE 1st Avenue

The Sequoia Parkway Extension would extend south from the existing Sequoia Parkway roadway to the SE 13th Avenue/Molalla Forest Road intersection. It would require a bridge over the Oregon Pacific Railroad tracks and the Molalla Forest Road multi-use trail. This extension has been previously identified as an option to serve the Canby Pioneer Industrial Park, but residents in southeast Canby have expressed concerns that this connection would increase truck traffic along SE 13th Avenue and impact pedestrian safety and neighborhood livability.

Based on preliminary TSP Update analysis, Otto Road is a promising location for a new connection between the Canby Pioneer Industrial Park and OR 99E. It is currently a driveway providing access to a few residences and farmland, but is identified within the NE Canby Master Plan area as a new major roadway. While the NE Canby Master Plan has identified the installation of a traffic signal as a desired improvement to the OR 99E/Otto Road intersection, it does not assume that Otto Road would be used as a connection to the industrial area.[2] Therefore, changes would be needed to the preliminary circulation plan provided in the NE Canby Master Plan.

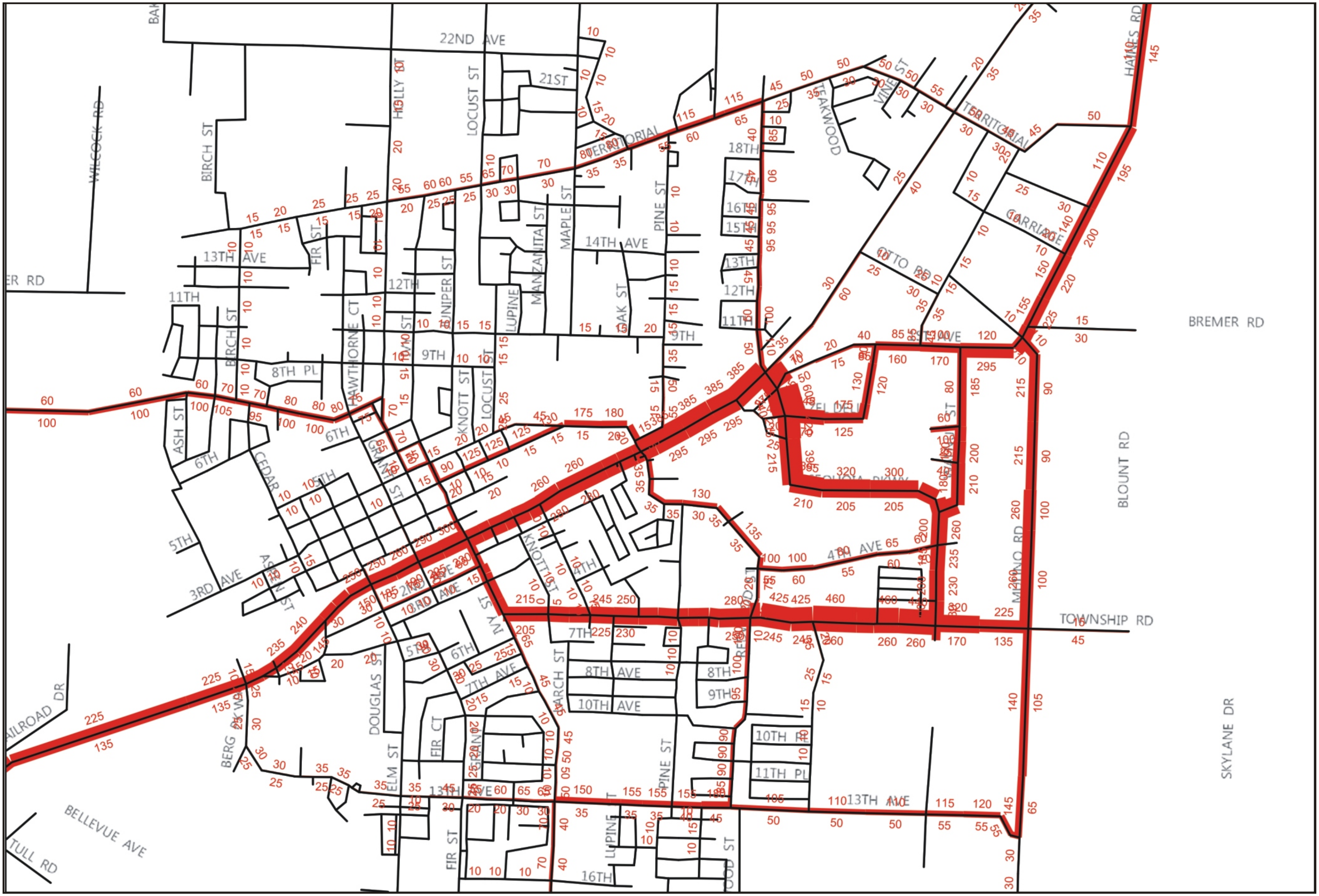
Connectivity Evaluation

The connectivity analysis for the Canby Pioneer Industrial Park was performed using the travel forecasting tool developed for the current Canby Transportation Systems Plan (TSP) update. Volume-difference plots (showing shifts in PM peak hour traffic with the connectivity options) were prepared to illustrate how each alternative would affect traffic volumes on study area roadways relative to the 2030 baseline scenario. Flow bundle plots were also generated to show which roadways would be used by vehicles traveling to and from the industrial area (as a basis for comparison, the flow bundle plot for the baseline scenario is provided in Figure 2).

The following connection alternatives were analyzed:

- SE 4th Avenue Extension from Sequoia Parkway to Mulino Road
- Additional East-West Connection between Walnut Street and Mulino Road
- Sequoia Parkway Extension south to SE 13th Avenue
- Otto Road Connection between OR 99E and SE 1st Avenue

The SE 4th Avenue Extension, which was a primary connection in the Canby Pioneer Industrial Park plan, was found to carry a significant amount of traffic and, therefore, was included with each of the other alternatives. The analysis of each scenario is presented in the following sections.



LEGEND

000 - 2030 30th Highest Hour Industrial Area Model Volumes

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NO SCALE

Figure 2

2030 BASELINE TRAFFIC SCENARIO
INDUSTRIAL AREA FLOW BUNDLE PLOT

SE 4th Avenue Extension from Sequoia Parkway to Mulino Road

The SE 4th Avenue Extension from Sequoia Parkway to Mulino Road provides an important east-west connection within the industrial area resulting in less out-of-direction travel and more flexible travel choices, which benefit user access and result in improved use of nearby roadway capacity. The flow bundle and volume-difference plots for this alternative are provided in Figure 3 and Figure 4, respectively.

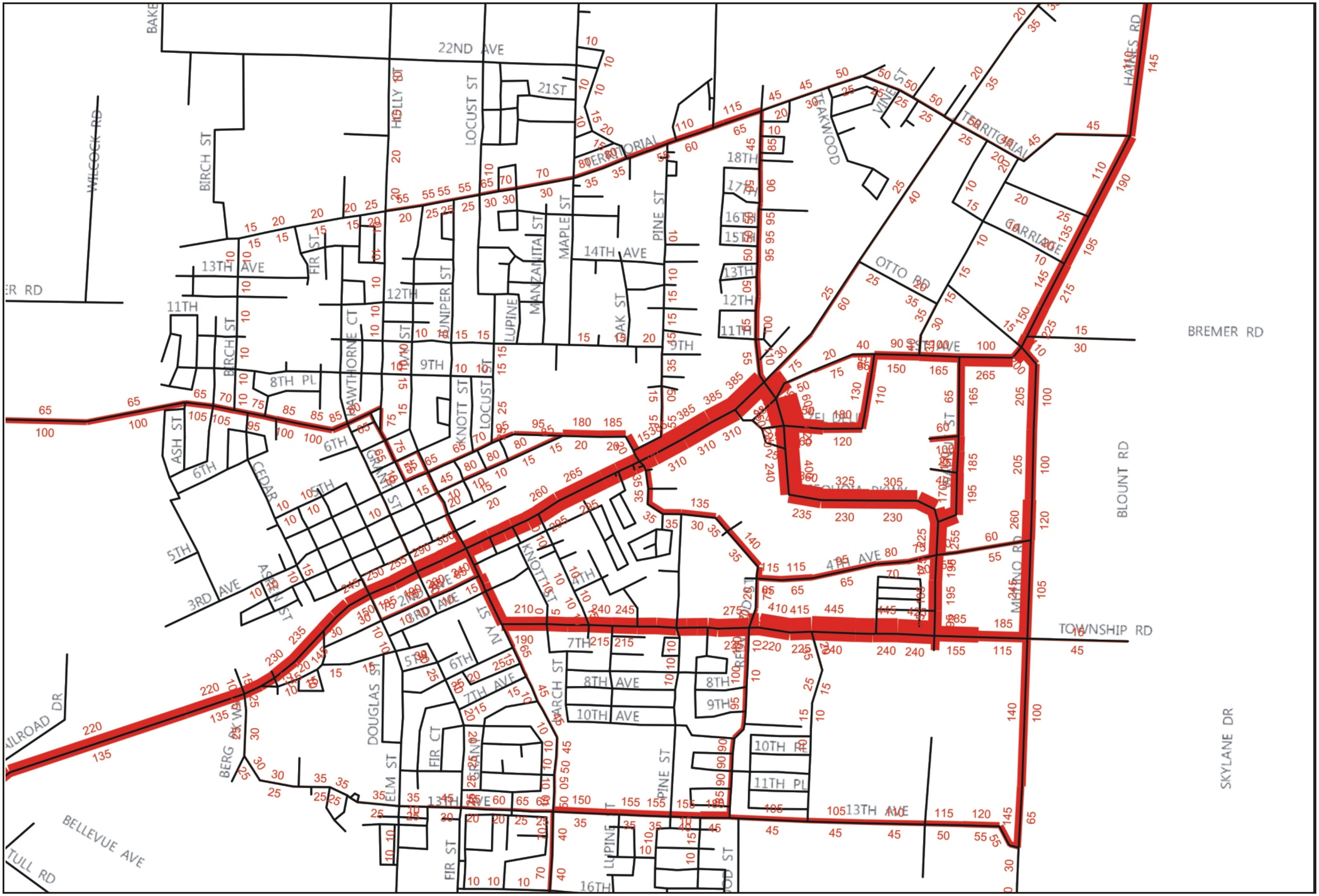
As shown in Figure 3, Sequoia Parkway is still the major gateway to the industrial area (especially for traffic to/from southwest OR 99E). Township Road and Haines Road still have significant use and Berg Parkway has minor use. Key findings of the effects of this extension include:

- **Industrial Area Roadways –** the SE 4th Avenue Extension not only provides access to developable parcels, but also reduces out-of-direction travel on Walnut Street and Township Road. The roadway would also carry traffic not generated by the industrial area, suggesting it is a key system connection for southeast Canby as an alternate to Township Road.
- **Access to OR 99E** - the improved connectivity within the industrial area does not significantly improve access to OR 99E. However, by providing a new system connection that provides an alternate route for traffic using Township Road and Ivy Street reduces the impact that developing the industrial area has on those roadways.
- **Surrounding Neighborhood Impacts –** the SE 4th Avenue Extension reduces traffic volumes on portions of Township Road and SE Ivy Street by improving access to Redwood Street and Sequoia Parkway. This connection was not found to significantly impact surrounding residential areas.

Additional East-West Connection between Walnut Street and Mulino Road

The additional east-west connection between Walnut Street and Mulino Road in the northeast quadrant of the Canby Pioneer Industrial Area was analyzed assuming that the SE 4th Avenue Extension from Sequoia Parkway to Mulino Road (which was previously discussed) is also provided. The flow bundle and volume-difference plots for this alternative are provided in Figure 5 and Figure 6, respectively.

The analysis indicates that this additional east-west connection has very little impact to the roadway network. Therefore, this connection would be considered a local access roadway and is not critical to overall transportation network unless it is needed to serve non-auto modes.



LEGEND

000 - 2030 30th Highest Hour Industrial Area Model Volumes

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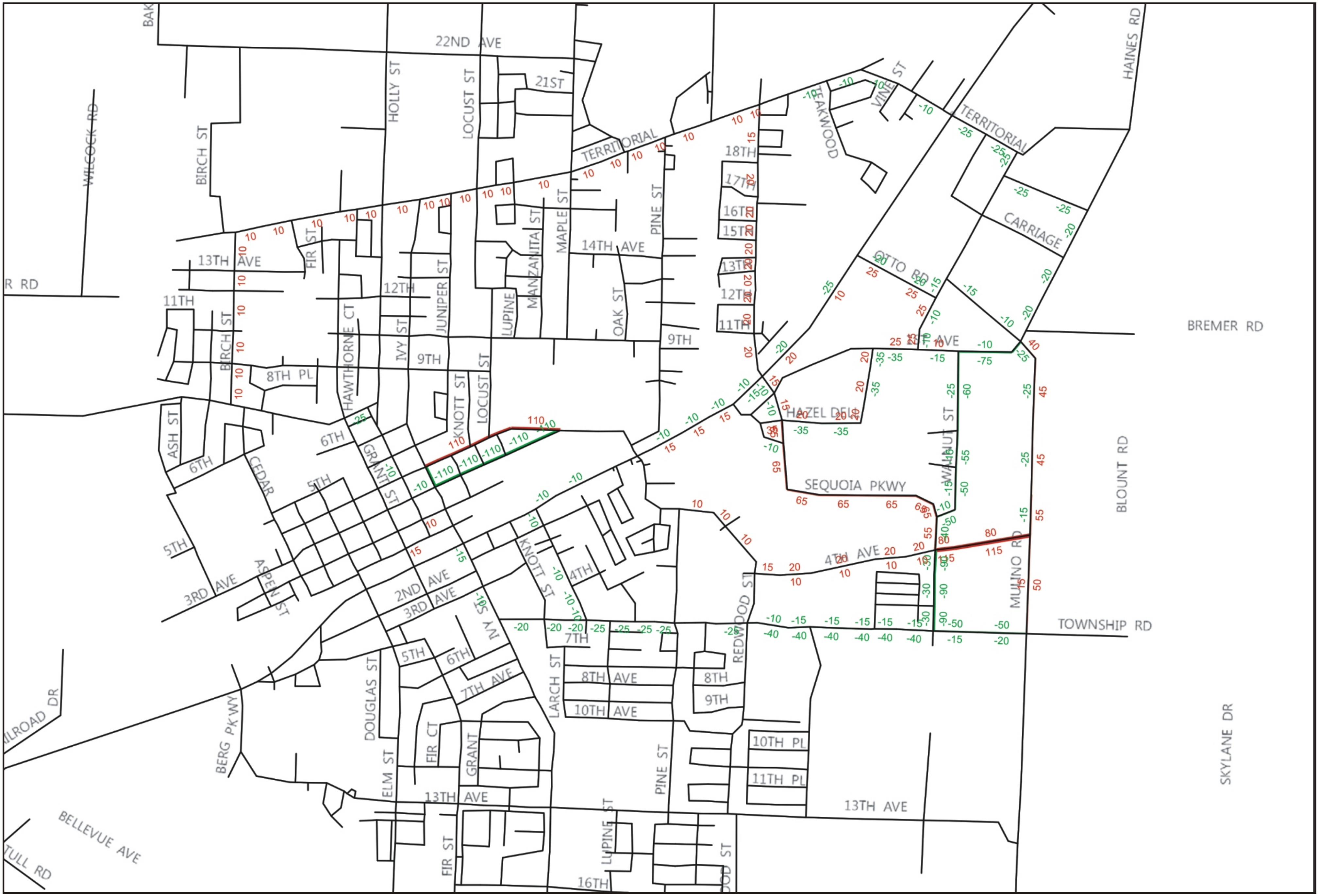
Figure 3

SE 4TH AVENUE EXTENSION TO MULINO INDUSTRIAL AREA FLOW BUNDLE PLOT



LEGEND

Total Model Volume Differences* (2030 30th Highest Hour)

000 - Volume Increase

-000 - Volume Decrease

*Compared to 2030 Baseline Scenario.

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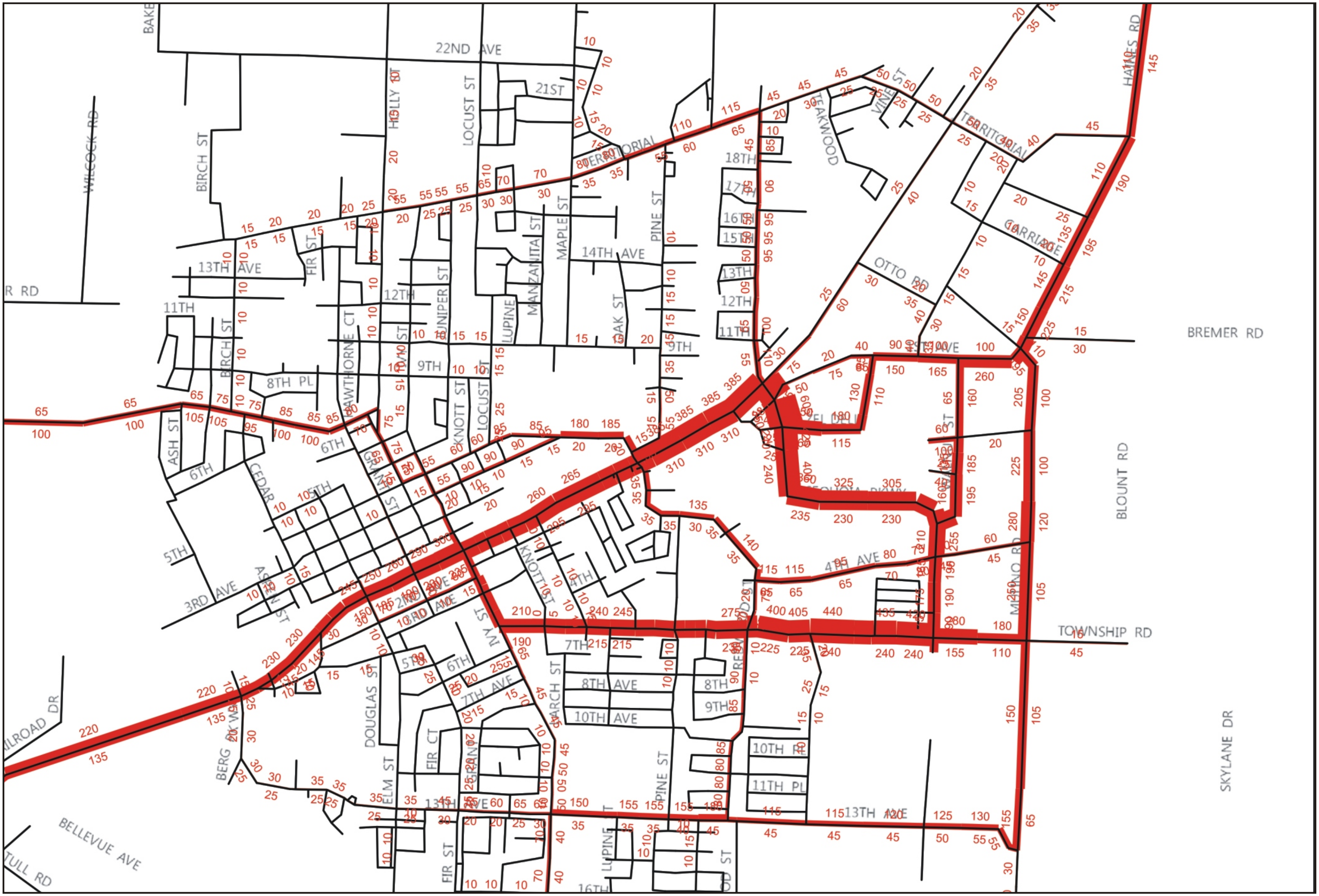
NO SCALE

Figure 4

SE 4TH AVENUE EXTENSION TO MULINO VOLUME-DIFFERENCE* PLOT



LEGEND

000 - 2030 30th Highest Hour Industrial Area Model Volumes

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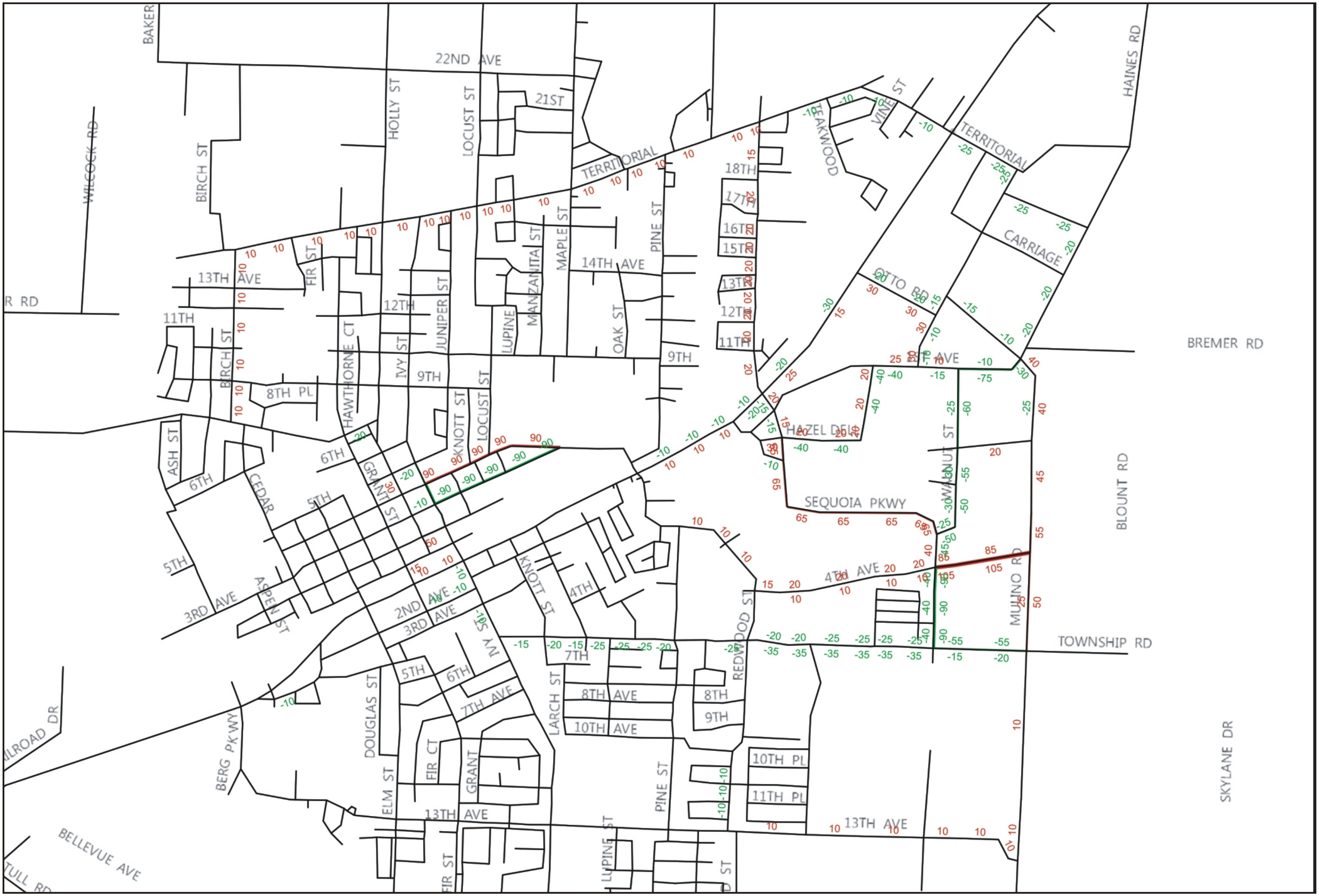
Figure 5

ADDITIONAL EAST-WEST CONNECTION INDUSTRIAL AREA FLOW BUNDLE PLOT



LEGEND

Total Model Volume Differences* (2030 30th Highest Hour)

000 - Volume Increase

-000 - Volume Decrease

*Compared to 2030 Baseline Scenario.

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Figure 6

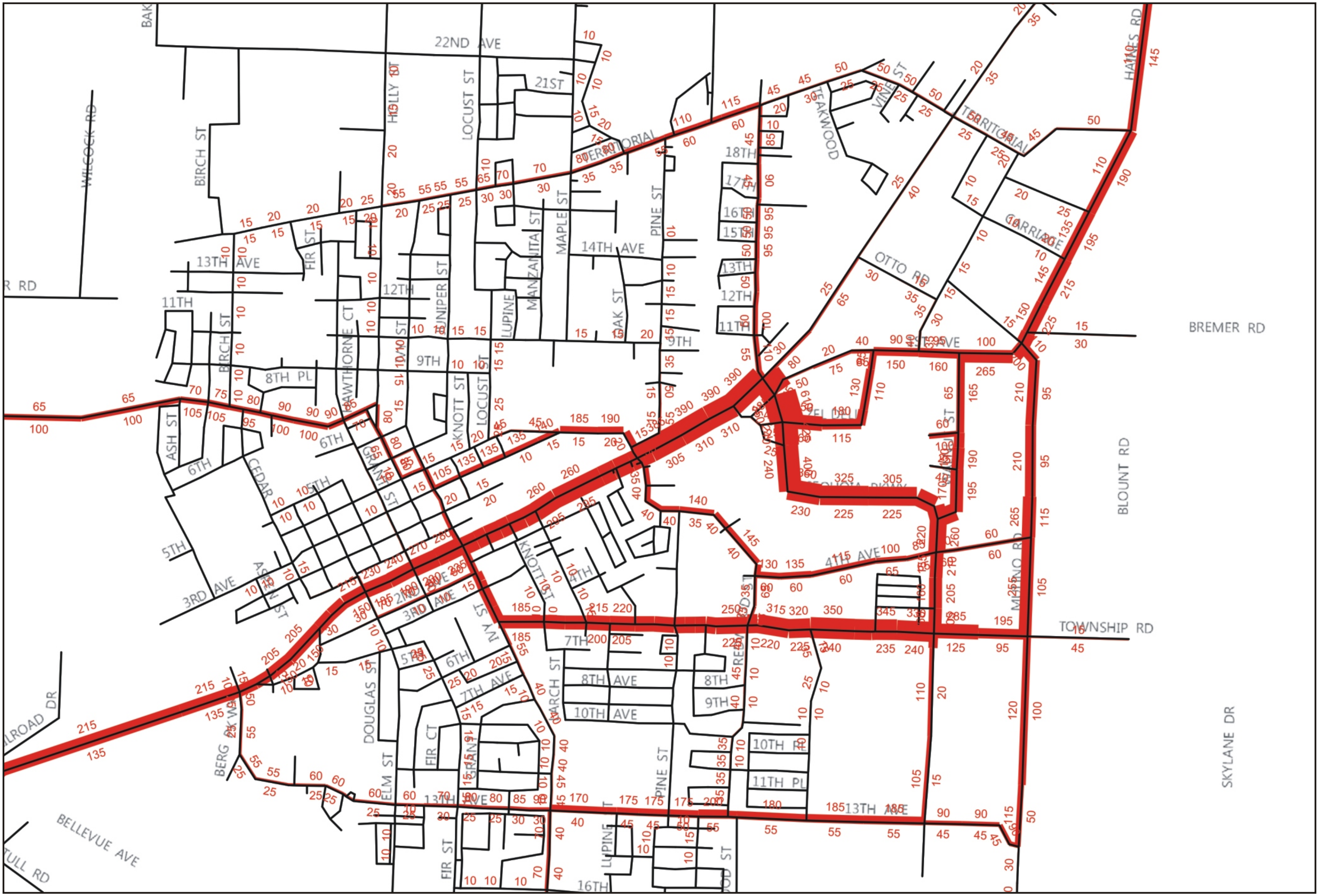
ADDITIONAL EAST-WEST CONNECTION VOLUME-DIFFERENCE* PLOT

Sequoia Parkway Extension South to SE 13th Avenue

The southern Sequoia Parkway Extension to SE 13th Avenue (i.e., with a bridge over the Oregon Pacific Railroad tracks) was also analyzed assuming that the SE 4th Avenue Extension from Sequoia Parkway to Mulino Road (which was previously discussed) is provided. The flow bundle and volume-difference plots for this alternative are provided in Figure 7 and Figure 8, respectively.

Key findings of adding this additional connection to the south include:

- **Industrial Area Roadways –** the Sequoia Parkway Extension would provide a new internal site connection that would provide an access across the railroad and multi-use trail for all modes. However, providing the new connection was not found to significantly shift volumes on other internal roadways compared to the base network.
- **Access to OR 99E** - the improved connectivity within the industrial area does not significantly improve access to OR 99E. Minor reductions would be experienced on roadways connecting OR 99E to Ivy Street (e.g., 4th Street, Grant Street, and 6th Street). Minor increases would be experienced on SE 13th Avenue connection to OR 99E, on the order of 20 vehicles per hour. However, the new connection would not significantly relieve the congested Sequoia Parkway connection to OR 99E.
- **Surrounding Neighborhood Impacts –** the Sequoia Parkway Extension provides a new access from the industrial site to 13th Avenue. This connection was found to have minor impacts on industrial traffic using 13th Avenue to access OR 99E (increase of 20 vehicles per hour), which had been a major concern for residents of SE Canby. The most significant change in traffic circulation associated with the extension is the reduction of traffic on Redwood Street between Township Road and 13th Avenue. This change is primarily a change in local circulation and does not represent a significant travel pattern change for industrial area traffic.



LEGEND

000 - 2030 30th Highest Hour Industrial Area Model Volumes

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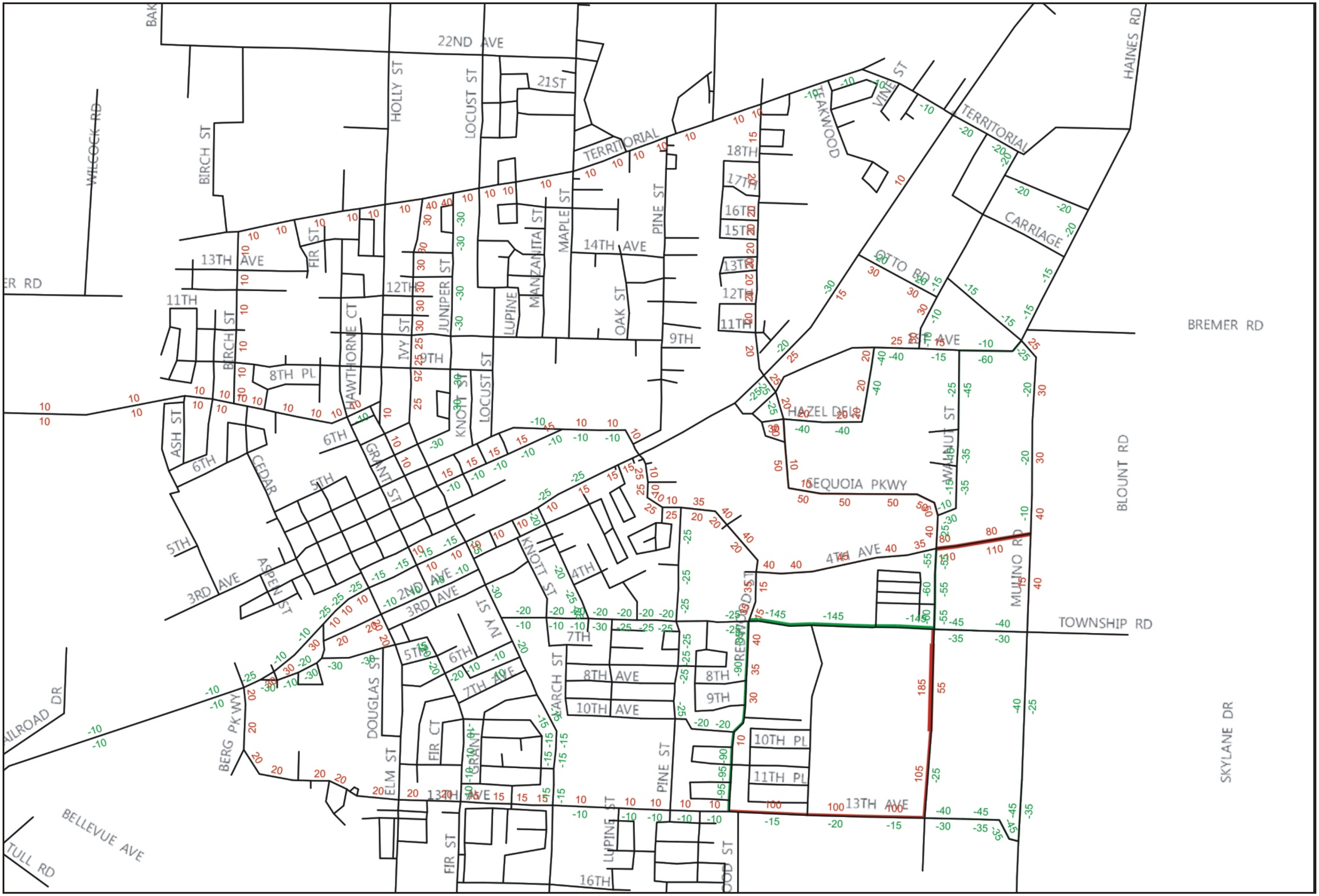
NO SCALE

Figure 7

SEQUOIA PARKWAY EXTENSION TO THE SOUTH INDUSTRIAL AREA FLOW BUNDLE PLOT



LEGEND

Total Model Volume Differences* (2030 30th Highest Hour)

000 - Volume Increase

-000 - Volume Decrease

*Compared to 2030 Baseline Scenario.

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Figure 8

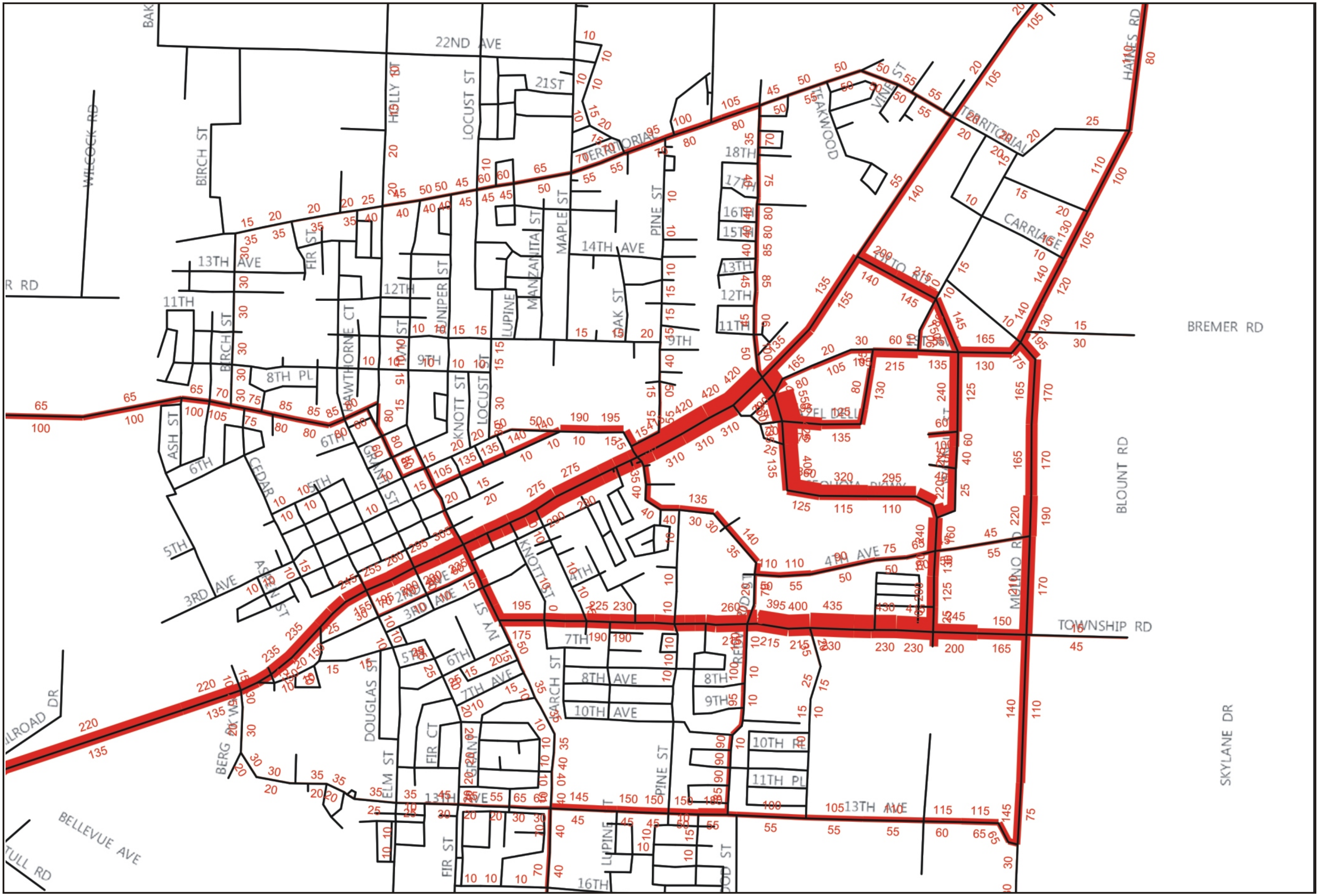
SEQUOIA PARKWAY EXTENSION TO THE SOUTH VOLUME-DIFFERENCE* PLOT

Otto Road Connection between OR 99E and SE 1st Avenue

An Otto Road connection between OR 99E and SE 1st Avenue was also analyzed assuming that the SE 4th Avenue Extension from Sequoia Parkway to Mulino Road (which was previously discussed) is provided. The flow bundle and volume-difference plots for this alternative are provided in Figure 9 and Figure 10, respectively.

The Otto Road connection was analyzed assuming a traffic signal at the OR 99E/Otto Road intersection on the northwest end and a roundabout at the SE 1st Avenue/Otto Road/Walnut Street intersection on the southeast end. This alternative provides an additional connection to OR 99E that significantly benefits inbound and outbound industrial area traffic on OR 99E from both the northeast and southwest. The following key findings of this roadway connection include:

- **Industrial Area Roadways –** the Otto Road connection would significantly shift traffic volumes of industrial area roadways away from Sequoia Parkway, Hazel Dell Way, and 1st Avenue. The Otto Road connection would become a primary access point into the industrial park, probably warranting a collector designation.
- **Access to OR 99E** - the new direct access to OR 99E via Otto Road would significantly relieve both the Sequoia Parkway and Haines Road gateways into the industrial area, which would reduce the need for capital improvements on these roadways.
- **Surrounding Neighborhood Impacts –** the Otto Road connection would reduce the reliance of the industrial area on Township Road and other roadways through existing residential areas that connect to OR 99E. However, Otto Road itself is planned to serve the NE Canby Master Plan area, which is primarily residential. Therefore, modifications to the NE Canby Master Plan should be considered that would better integrate the upgraded function of Otto Road with the surrounding land uses.



LEGEND

000 - 2030 30th Highest Hour Industrial Area Model Volumes

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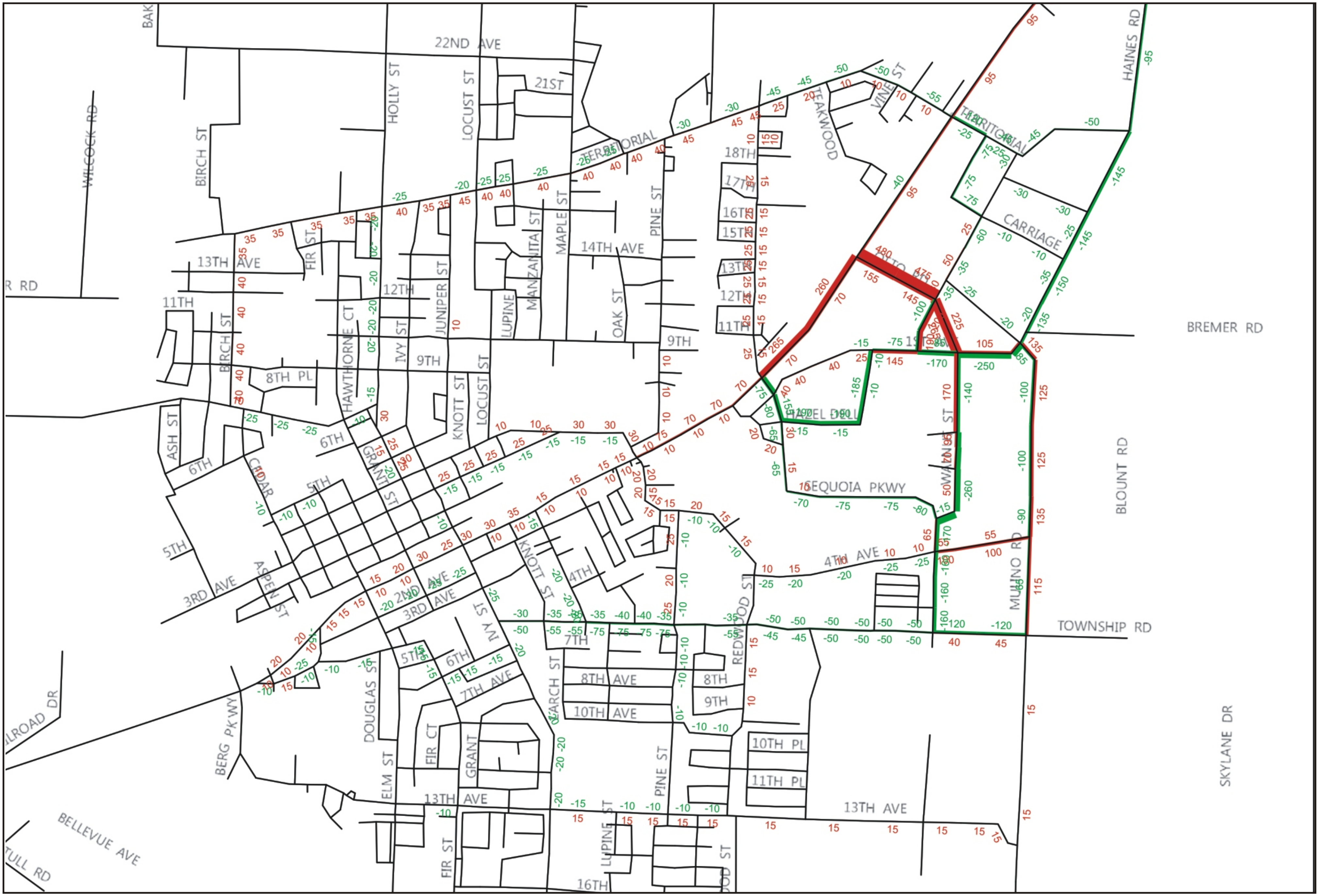
NO SCALE

Figure 9

OTTO ROAD CONNECTION TO OR 99E
INDUSTRIAL AREA FLOW BUNDLE PLOT



LEGEND

Total Model Volume Differences* (2030 30th Highest Hour)

000 - Volume Increase

-000 - Volume Decrease

*Compared to 2030 Baseline Scenario.

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NO SCALE

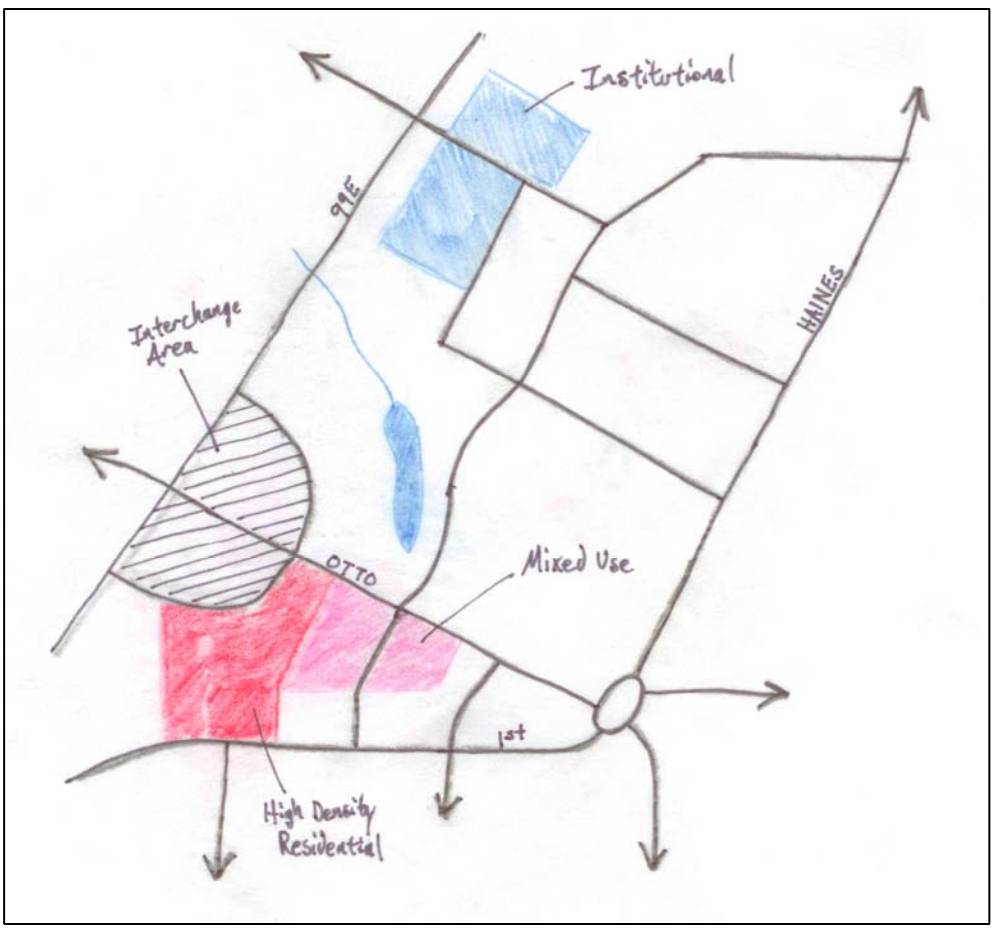
Figure 10

OTTO ROAD CONNECTION TO OR 99E VOLUME-DIFFERENCE* PLOT

Recommendations

The connectivity analysis conducted for the Canby Pioneer Industrial Park reviewed site circulation, access to OR 99E, and impacts to surrounding neighborhoods. Based on the findings of the analysis, the following considerations should be integrated into the Canby TSP update process:

- Include the extension of SE 4th Avenue to Mulino Road as planned.
- Consider the local street connection between Walnut Street and Mulino Road as an optional facility to provide multi-modal access.
- The potential extension of Sequoia Parkway to SE 13th Avenue was not found to significantly improve access of the industrial area to OR 99E. Therefore, this connection should not be considered necessary.
- Include the extension of Otto Road to Mulino Road (with a connection to Walnut Street) as a primary access point into the industrial area. Consider updating the NE Canby Master Plan street layout and land-use plans to reflect the industrial traffic that would utilize the roadway. As example of how this might be achieved is shown below.



Appendix K: Transportation Solutions Report

Transportation System Solutions Report

Introduction

This Transportation System Solutions Report presents the development of solutions packages for addressing the existing and future deficiencies and needs identified in Chapters 3 and 4 of the Canby Transportation Systems Plan (TSP). The resulting Financially Constrained and Preferred Solutions packages are integrated into Chapters 5, 6, and 7 of the Canby TSP. The following is an outline of the general solution categories discussed in this report:

Solution Categories

These sections discuss the process used to evaluate a range of alternatives and develop a recommended package of solutions for pedestrian, bicycle, and motor vehicle travel modes. In addition, these sections include descriptions of evaluation criteria, analysis methods, alternative groupings by mode or geographic area, and analysis and summary of the recommended projects.

Pedestrian and Bicycle Solutions

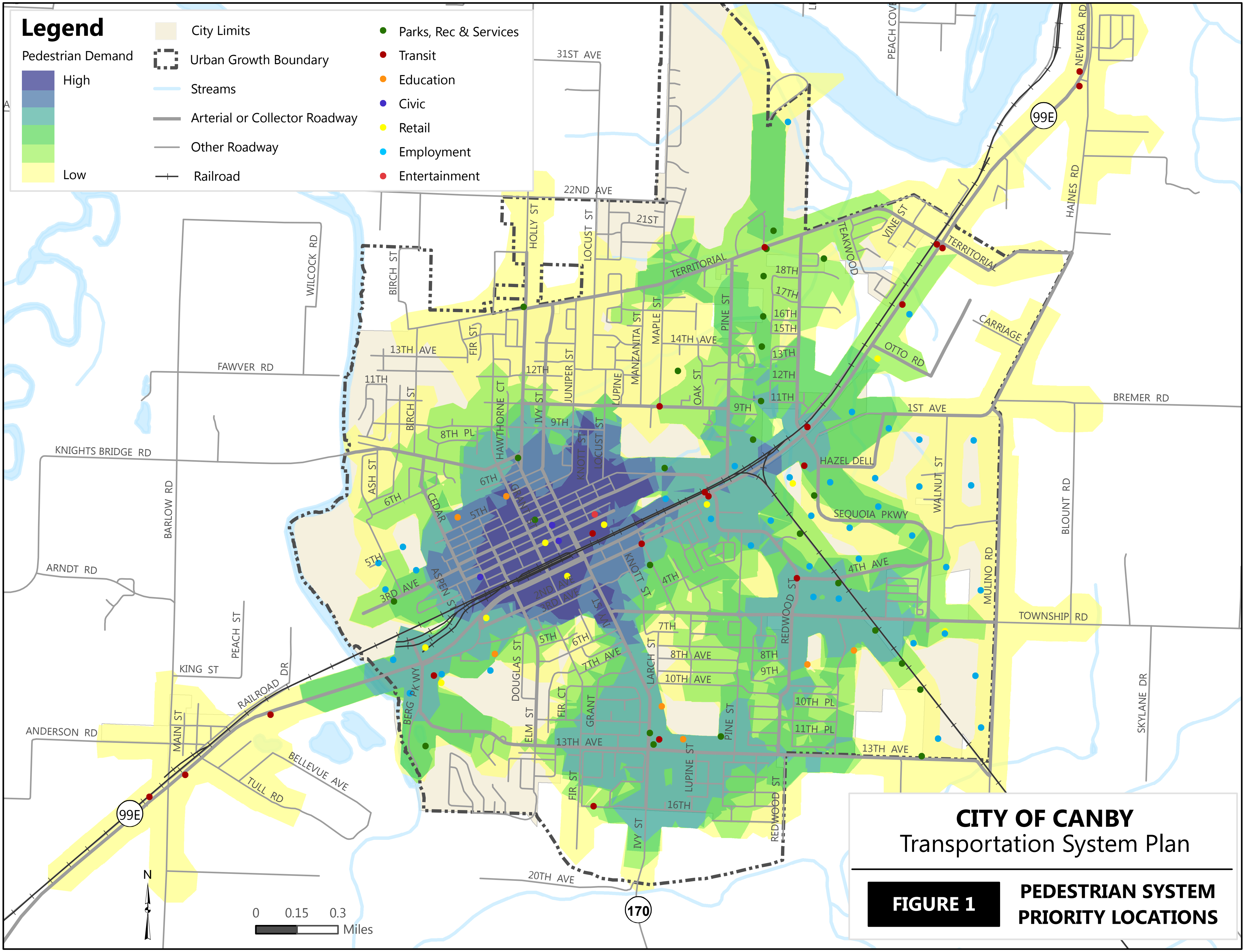
Pedestrian and bicycle strategies and projects were identified for Canby with emphasis on existing deficiencies along the arterial and collector street network, which are identified in TSP Chapters 3 and 4. An evaluation of the strategies and projects was performed to determine project prioritization and identify the recommended list of improvements to include in the financially-constrained solutions package.

Pedestrian Projects

For the pedestrian improvement project evaluation, each deficient roadway corridor (i.e., lacking sidewalks or with gaps in network) or crossing location (i.e., lacking crosswalks or with identified improvement needs) was evaluated against the following five criteria:

- High speed/high volume roadway that meets either the 25 mile per hour (mph) or 3,000 vehicles per day threshold (identified in Draft TSP Chapter 4)
- Identified safety concern (identified in Draft TSP Chapters 3 and 4)
- Prioritization based on pedestrian generator locations and weighting
- Prioritization based on community survey responses
- Inclusion with a preferred motor vehicle project (preferred motor vehicle solutions package provided in motor vehicle section of this report)

The prioritization that was performed based on pedestrian generator locations corresponds to Figure 1. This figure identifies multiple types of activity generators (such as transit stops, schools, shopping centers, etc). The importance of each generator was weighted based on responses to a community survey. In addition, a one-quarter mile impact area along the roadway network was assumed for each generator. Areas with the greatest concentration of weighted importance and pedestrian generator overlap were estimated to have the greatest pedestrian demands. The pedestrian demand spectrum is shown as six color bins. The two darkest bins are assumed to correspond with high priority demands, the two middle bins are medium priority, and the two lightest bins are low priority.



CITY OF CANBY
Transportation System Plan

FIGURE 1 PEDESTRIAN SYSTEM PRIORITY LOCATIONS

The prioritization based on community survey responses relates to feedback received from community members where they were asked to rank a list of pedestrian strategies. Based on the survey responses, the following prioritization was determined:

- **High:** Provide sidewalks when none currently exist (not in original survey categories, but also identified as high priority based on written comments received)
- **High:** Fill in gaps in the network where some sidewalks exist
- **Medium:** Reconstruct all existing substandard sidewalks to city standards
- **Medium:** Provide enhanced pedestrian crossings
- **Low:** For streets having sidewalks on one side, install sidewalks on the other side

In addition, some pedestrian projects were ranked as high priority for inclusion in the financially-constrained solutions package because they would be constructed in conjunction with motor vehicle system improvements that are assumed to be built to urban roadway standards. Representatives of Canby Area Transit (CAT) also identified which projects they considered important to the transit system.

Consideration of the pedestrian evaluation criteria was used to determine project priority and to select which projects should be included in the financially-constrained solutions package. For the financially-constrained project list, the evaluation and prioritization results are listed in Table 1, the project locations are shown in Figure 2, and the planning level cost estimates are shown in Table 2. For the remaining projects, the evaluation and prioritization results are shown in Table 3.

Table 1: Pedestrian Project Evaluation/Prioritization (Financially-Constrained)

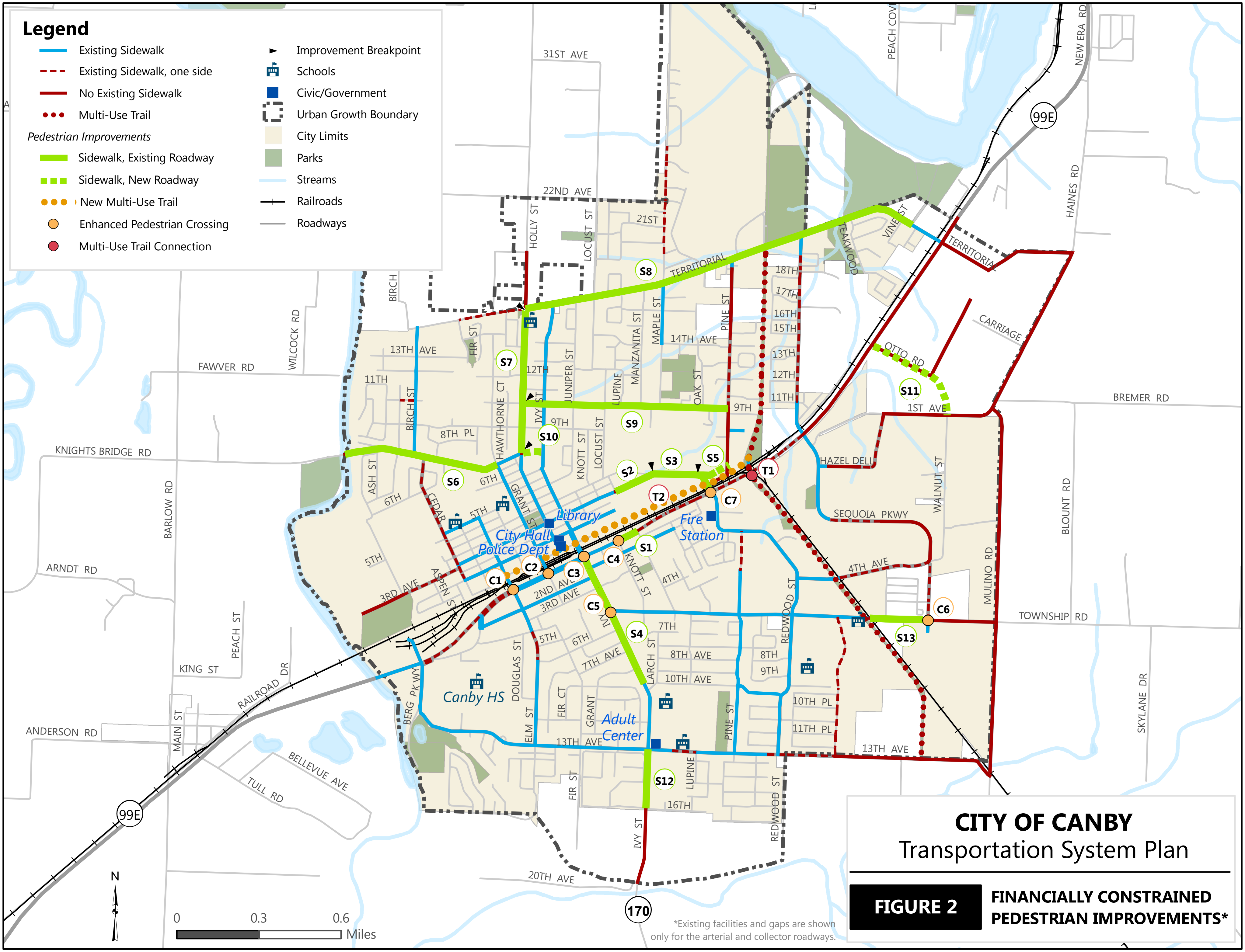
Location	Criteria: High Speeds/ Volumes	Criteria: Safety Concerns	Criteria: Prioritization Map	Criteria: Community Survey Priority	Criteria: Motor Vehicle Project	Priority	Pedestrian Project	
Sidewalks along Roadway Segment/Corridor								
OR 99E (north side, Knott St to Locust St)	+		High	Low	STA	High	**S1**	Install sidewalks (north side)
NE 3rd Ave (Locust Street to NE 4th Ave)	+	+	High	High		High	**S2**	Install sidewalks
NE 4th Ave (NE 3rd Ave to Fairgrounds)	+	+	High	High		High	**S3**	Install sidewalks
S Ivy St (OR 99E to Lee Elementary)	+	+	High-Med.	High		High	**S4**	Fill in sidewalk gaps
Pine St (OR 99E to NE 4th Ave)	+	+	High[T]	High	Realign-ment	High	**S5**	Install sidewalks
Knights Bridge Rd (west edge of UGB to Grant St)	+		Med.-Low	High		High	**S6**	Fill in sidewalk gaps
N Holly St (Knights Bridge Rd to NW Territorial Rd)	+		Med.-Low[T]	High		High	**S7**	Fill in sidewalk gaps
Territorial Rd (Holly St to OR 99E)	+		Med.-Low[T]	High		High	**S8**	Fill in sidewalk gaps
NE 10th Ave (Holly St to Pine St)	+	+	Low[T]	High		High	**S9**	Install sidewalks
Knights Bridge Rd (Holly St to Ivy St)	+		High[T]	High	Circulation change	High	**S10**	Install sidewalks
Otto Rd (OR 99E to SE 1st Ave)	+		Low	High	New Road and Traffic Signal	High	**S11**	Install sidewalks, crosswalks, and ramps
S Ivy St (S 13th Ave to S 16th Ave)	+		Med.[T]	High		High	**S12**	Fill in sidewalk gaps
S Township Rd (OP RR tracks to Sequoia Pkwy)	+		Med.[T]	High		High	**S13**	Install sidewalks
Enhanced Pedestrian Crossing								
OR 99E and UPRR (at Elm St)	+		High	Med.		High	**C1**	Improve crosswalk and ramps
OR 99E and UPRR (at Grant St)	+		High	Med.	Circulation change, STA	High	**C2**	Improve crosswalk and ramps, install pedestrian refuge island

Table 1 continued on next page.

(Cont.) Table 1: Pedestrian Project Evaluation/Prioritization (Financially-Constrained)

Location	Criteria: High Speeds/ Volumes	Criteria: Safety Concerns	Criteria: Prioritization Map	Criteria: Community Survey Priority	Criteria: Motor Vehicle Project	Priority	Pedestrian Project	
Enhanced Pedestrian Crossing (Cont.)								
OR 99E and UPRR (at Ivy St)	+	+	High	Med.	Circulation change, STA	High	**C3**	Improve crosswalk and ramps, install pedestrian refuge island
OR 99E (between Ivy St and Locust St)	+		High	Med.	STA	High	**C4**	Install pedestrian refuge island
S Ivy St (north leg at Township Rd)	+		High	Med.	Signal	High	**C5**	Install crosswalk and ramps
Township Rd (at Sequoia Pkwy)	+		Med.[T]	Med.	All-way stop	High	**C6**	Provide crosswalk
OR 99E (at Pine St)	+		Med.[T]	Med.	Pine St Imps.	High	**C7**	Improve crosswalk and ramps
Multi-Use Trail								
OR 99E and Molalla Forest Rd Trail		+	High	High		High	**T1**	Connect multi-use trail to sidewalks on south side of OR 99E
Parallel Route to OR 99E (between Elm St and Molalla Forest Rd Trail)	+		High	High		High	**T2**	Construct multi-use trail along rail corridor
Program Strategy								
Safe Routes to School (yearly funding)		+				High	**P1**	Prepare initial plan and provide yearly funding

[T] Project identified by Canby Area Transit (CAT) as high priority for transit.



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Transportation System Plan

FIGURE 2 FINANCIALLY CONSTRAINED PEDESTRIAN IMPROVEMENTS*

*Existing facilities and gaps are shown only for the arterial and collector roadways.

Table 2: Planning Level Costs for Pedestrian Projects (Financially-Constrained)

Location		Pedestrian Project	Planning Level Cost
Sidewalks			
OR 99E (north side, Knott St to Locust St)	**S1**	Install sidewalks (north side)	$0[a]
NE 3rd Ave (Locust Street to NE 4th Ave)	**S2**	Install sidewalks	$190,000
NE 4th Ave (NE 3rd Ave to Fairgrounds)	**S3**	Install sidewalks	$150,000
S Ivy St (OR 99E to Lee Elementary)	**S4**	Fill in sidewalk gaps	$490,000
Pine St (OR 99E to NE 4th Ave)	**S5**	Install sidewalks	$0[a]
Knights Bridge Rd (west UGB to Grant St)	**S6**	Fill in sidewalk gaps	$0[b]
N Holly St (Knights Bridge Rd to NW Territorial Rd)	**S7**	Fill in sidewalk gaps	$550,000
Territorial Rd (Holly St to OR 99E)	**S8**	Fill in sidewalk gaps	$1,230,000
NE 10th Ave (Holly St to Pine St)	**S9**	Install sidewalks	$830,000
Knights Bridge Rd (Holly St to Ivy St)	**S10**	Install sidewalks	$0[a]
Otto Rd (OR 99E to SE 1st Ave)	**S11**	Install sidewalks, crosswalks, ramps	$0[a]
S Ivy St (S 13th Ave to S 16th Ave)	**S12**	Fill in sidewalk gaps	$100,000
S Township Rd (OP RR to Sequoia Pkwy)	**S13**	Install sidewalks	$200,000
Enhanced Pedestrian Crossing			
OR 99E and UPRR (at Elm St)	**C1**	Improve crosswalk and ramps	$40,000
OR 99E and UPRR (at Grant St)	**C2**	Improve crosswalk and ramps, install pedestrian refuge island	$30,000
OR 99E and UPRR (at Ivy St)	**C3**	Improve crosswalk and ramps, install pedestrian refuge island	$30,000
OR 99E (between Ivy St and Locust St)	**C4**	Install pedestrian refuge island	$0[a]
S Ivy St (north leg at Township Rd)	**C5**	Install crosswalk and ramps	$0[a]
Township Rd (at Sequoia Pkwy)	**C6**	Provide crosswalk	$0[a]
OR 99E and UPRR (at Pine St)	**C7**	Improve crosswalk and ramps	$0[a]
Multi-Use Trail			
OR 99E and Molalla Forest Rd Trail	**T1**	Connect multi-use trail to sidewalks on south side of OR 99E	$360,000[c]
Parallel Route to OR 99E (between Elm St and Molalla Forest Rd Trail)	**T2**	Construct multi-use trail along rail corridor	$0[d]
Program Strategy			
Safe Routes to School (yearly funding)	**P1**	Prepare initial plan and provide yearly funding	$200,000
		TOTAL	**$4,400,000**

[a] Cost accounted for with an associated motor vehicle project.
[b] Project already underway and funding already accounted for.
[c] Projects identified in both pedestrian and bicycle improvement lists, but costs provided in pedestrian list.
[d] Projects identified in both pedestrian and bicycle improvement lists, but costs provided in bicycle list.

Table 3: Pedestrian Project Evaluation/Prioritization (Non-Financially-Constrained)

Location	Criteria					Priority	Pedestrian Project
	High Speeds/ Volumes	Safety Concerns	Prioritization Map	Community Survey Priority	Motor Vehicle Project		
Enhanced Pedestrian Crossing							
SE Township Rd (east leg at Teakwood St)	+		Med.[T]	Med.		High	Install crosswalk
Sidewalks along Roadway Segment/Corridor							
OR 99E (Sequoia Pkwy to Otto Rd)	+		Med.	High		High	Install sidewalks
Otto Rd (OR 99E overcrossing plus new frontage road along north side of OR 99E to Pine St)	+		Low	High	New Road/ Over-crossing	High	Install sidewalks (including on bridge)
Old Pacific Highway (near Canby High School)	+		Med.	High		High	Fill in sidewalk gaps
S Ivy St (S 16th Ave to southern city limits)	+		Med.-Low	High		High	Install sidewalks
N Cedar St (NW 2nd Ave to NW 5th Ave)			High[T]	Low		High	Install sidewalks (east side)
N Cedar St (NW 5th Ave to Knights Bridge Rd)		+	Med.[T]	Low		High	Install sidewalks (west side)
N Pine St (NE 10th Ave to Territorial Rd)			Med.[T]	High		High	Install sidewalks, fill in gaps
SE 1st Ave (Sequoia Pkwy to Hazel Dell Wy)	+		Med.	High		High	Fill in sidewalk gaps
Hazel Dell Wy	+		Med.	High		High	Fill in sidewalk gaps
Sequoia Pkwy (Arneson City Park to Township Rd)	+		Low[T]	High		High	Install sidewalks, fill in gaps
S Haines Rd (Mulino Rd to Territorial Rd)	+		Low[T]	High		High	Install sidewalks (west side)
OR 99E (between Otto Rd and Territorial Rd)	+		Low	High		Med.	Install sidewalks
NW 3rd Ave (west of Aspen St)			Med.	High		Med.	Fill in sidewalk gaps (esp. small gap on south near Baker St)
N Pine St (NE 4th Ave to NE 10th Ave)			Med.	High		Med.	Install sidewalks

Table 3 continued on next page.

(Cont.) Table 3: Pedestrian Project Evaluation/Prioritization (Non-Financially-Constrained)

Location	Criteria: *High Speeds/ Volumes*	Criteria: *Safety Concerns*	Criteria: *Prioritization Map*	Criteria: *Community Survey Priority*	Criteria: *Motor Vehicle Project*	Priority	Pedestrian Project
Sidewalks along Roadway Segment/Corridor (Cont.)							
S Township Rd (Sequoia Pkwy to Mulino Rd)	+		Low	High		Med.	Install sidewalks
S Teakwood St (Township Rd to SE 10th Ave)		+	Med.	Low		Med.	Install sidewalks (west side)
S Teakwood St (SE 10th Ave to 13th Ave)		+	Med.	Low		Med.	Install sidewalks (east side)
SE 1st Ave (Hazel Dell Wy to Mulino Rd)	+		Low	High		Med.	Install sidewalks
S Walnut St	+		Low	High		Med.	Install sidewalks
S Mulino Rd (Haines Rd to SE 13th Ave)	+		Low	High		Med.	Install sidewalks (west side)
OR 99E (north side, Berg Pkwy to Elm St)	+		Med.[T]	Low		Med.	Install sidewalks (north side)
OR 99E (north side, Locust St to Sequoia Pkwy)	+		Med.[T]	Low		Med.	Install sidewalks (north side)
SE 13th Ave (S Ivy St to S Lupine St)	+		Med.[T]	Low		Med.	Install sidewalks (south side)
SE 4th Ave (OP RR to Sequoia Pkwy)			Med.	Low		Low	Fill in sidewalk gaps
NW 3rd Ave (Aspen St to Cedar St)			High	Low		Low	Install sidewalks (part of north side)
S Pine St (SE 3rd Ave to SE 5th Ave)			Low[T]	Low		Low	Install sidewalks (east side)

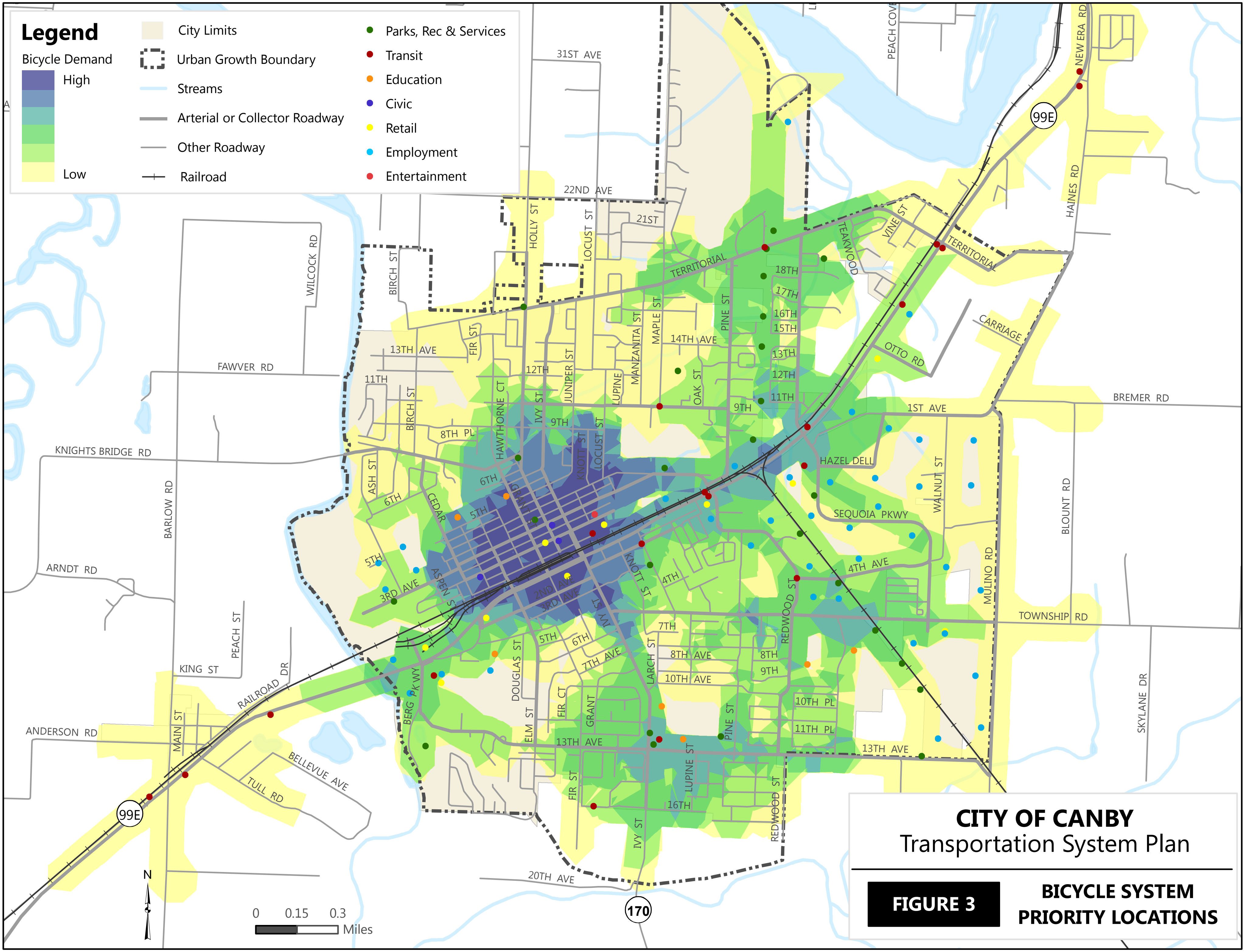
[T] Project identified by Canby Area Transit (CAT) as high priority for transit.

Bicycle Projects

For the bicycle improvement project evaluation, each deficient roadway corridor (i.e., lacking bike lanes or shoulders) or railroad crossing location was evaluated against the following five criteria:

- High speed/high volume roadway that meets either the 25 mile per hour (mph) or 3,000 vehicles per day threshold (identified in Draft TSP Chapter 4)
- Identified safety concern (identified in Draft TSP Chapters 3 and 4)
- Prioritization based on bicycle generator locations and weighting
- Prioritization based on community survey responses
- Inclusion with a preferred motor vehicle project (preferred motor vehicle solutions package provided in motor vehicle section of this report)

The prioritization that was performed based on bicycle generator locations corresponds to Figure 3. This figure identifies multiple types of activity generators (such as transit stops, schools, shopping centers, etc). The importance of each generator was weighted based on responses to a community survey. In addition, a one-quarter mile impact area along the roadway network was assumed for each generator. Areas with the greatest concentration of weighted importance and bicycle generator overlap were estimated to have the greatest bicycle demands. While the list of bicycle generators is the same as for pedestrians, the weighting values for the generator types are different and the resulting demand is slightly different. The bicycle demand spectrum is shown as six color bins. The two darkest bins are assumed to correspond with high priority demands, the two middle bins are medium priority, and the two lightest bins are low priority.



Legend
Bicycle Demand
High
Low
City Limits
Urban Growth Boundary
Streams
Arterial or Collector Roadway
Other Roadway
Railroad
Parks, Rec & Services
Transit
Education
Civic
Retail
Employment
Entertainment
0 0.15 0.3
Miles
N
99E
170
TERRITORIAL
1ST AVE
13TH AVE
SEQUOIA PKWY
4TH AVE
TOWNSHIP RD
KNIGHTS BRIDGE RD
BREMER RD
CITY OF CANBY
Transportation System Plan
FIGURE 3
BICYCLE SYSTEM PRIORITY LOCATIONS

The prioritization based on community survey responses relates to feedback received from community members where they were asked to rank a list of bicycle strategies. Based on the survey responses, the following prioritization was determined:

- **High:** Fill in gaps in the network (on key arterial and collector roadways)
- **Medium:** Provide bike lanes or shoulders on other arterial and collector roadways (not in the original survey categories, but based on prior TSP)
- **Medium:** Improve bicycle crossings at railroad tracks
- **Low:** Provide bicycle route signage
- **Low:** Remove on-street parking to allow for bike lanes

In addition, some bicycle projects were ranked as high priority for inclusion in the financially-constrained solutions package because they would be constructed in conjunction with motor vehicle system improvements that are assumed to be built to urban roadway standards.

Consideration of the bicycle evaluation criteria was used to determine project priority and to select which projects should be included in the financially-constrained solutions package. For the financially-constrained bicycle project list, the evaluation and prioritization results are listed in Table 4, the project locations are shown in Figure 4, and the planning level cost estimates are shown in Table 5. For the remaining bicycle projects, the evaluation and prioritization results are shown in Table 6.

Table 4: Bicycle Project Evaluation/Prioritization (Financially-Constrained)

Location	Criteria: High Speeds/ Volumes	Criteria: Safety Concerns	Criteria: Prioritization Map	Criteria: Community Survey Priority	Criteria: Motor Vehicle Project	Priority	Bicycle Project	
Railroad Crossing Improvements								
UPRR (at Elm St)	+	+	High	Med.		High	**R1**	Improve rail crossing (fill in gaps adjacent to rails)
UPRR (at Grant St)	+	+	High	Med.	Circulation change, STA	High	**R2**	Improve rail crossing (fill in gaps adjacent to rails)
UPRR (at Ivy St)	+		High	Med.	Circulation change, STA	High	**R3**	Provide rail crossing
UPRR (at Pine St-NE 4th Ave)	+	+	Med.	Med.	Pine St Imps.	High	**R4**	Improve rail crossing (fill in gaps adjacent to rails)
OPRR (at Township Rd)	+	+	Med.	Med.		High	**R5**	Move guardrail and improve rail crossing (fill in gaps adjacent to rails)
Bike Lanes along Roadway Segment/Corridor								
N Grant St (NW 3rd Ave to NW 1st Ave)	+		High	High	Circulation change	High	**B1**	Stripe bike lanes (convert to parallel parking)
N Ivy St (N 1st Ave to OR 99E)	+		High	High	Circulation change	High	**B2**	Stripe bike lanes
SW 2nd Ave (S Grant St to S Ivy St)	+		High	High	Circulation change	High	**B3**	Stripe bike lanes
Knights Bridge Rd (west edge of UGB to Grant St)	+		Med.-Low	High		High	**B4**	Install bike lanes
Knights Bridge Rd (Grant St to Ivy St)	+		Med.	High	Circulation change	High	**B5**	Stripe bike lanes
N Holly St (NW 22nd Ave to Knights Bridge Rd)	+		Med.-Low	High		High	**B6**	Install bike lanes (widen as needed)
NE 3rd Ave (Locust Street to NE 4th Ave)	+		High	High		High	**B7**	Install bike lanes
NE 4th Ave (NE 3rd Ave to Fairgrounds Entrance)	+		High	High		High	**B8**	Install bike lanes
Pine St (OR 99E to NE 4th Ave)	+		Low	High	New Road	High	**B9**	Install bike lanes

Table 4 continued on next page.

(Cont.) Table 4: Bicycle Project Evaluation/Prioritization (Financially-Constrained)

Location	Criteria					Priority	Bicycle Project	
	High Speeds/ Volumes	*Safety Concerns*	*Prioritization Map*	*Community Survey Priority*	*Motor Vehicle Project*			
Bike Lanes along Roadway Segment/Corridor (Cont.)								
Otto Rd (OR 99E to SE 1st Ave)	+		Low	High	New Road and Traffic Signal	High	**B10**	Install bike lanes
Multi-Use Trail								
OR 99E and Molalla Forest Rd Trail		+	High	High		High	**T1**	Connect multi-use trail to sidewalks on south side of OR 99E
Parallel Route to OR 99E (between Elm St and Molalla Forest Rd Trail)	+		High	High		High	**T2**	Construct multi-use trail along rail corridor

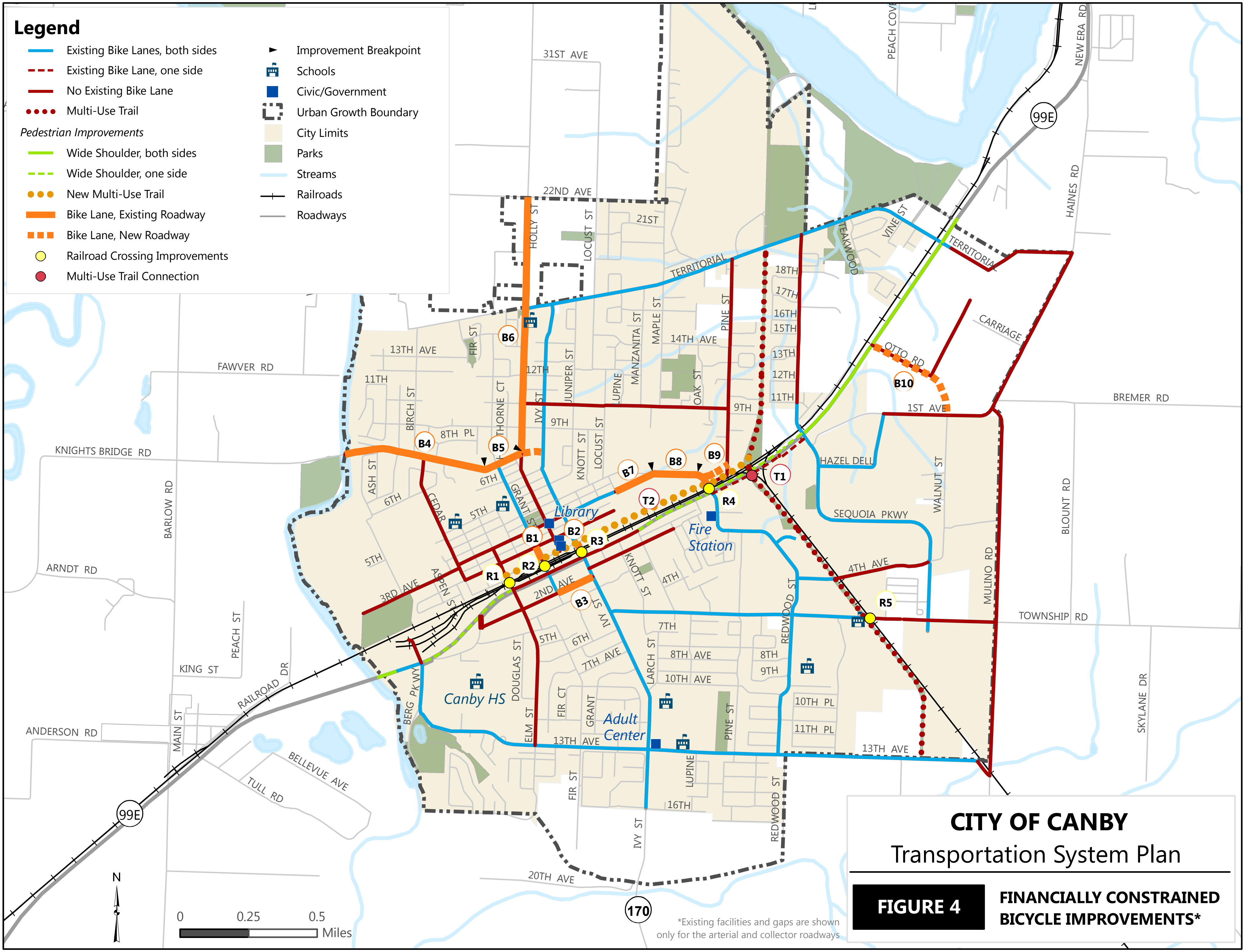


FIGURE 4 FINANCIALLY CONSTRAINED BICYCLE IMPROVEMENTS*

Table 5: Planning Level Costs for Bicycle Projects (Financially-Constrained)

Location	Bicycle Project		Planning Level Cost
Railroad Crossing Improvements			
UPRR (at Elm St)	**R1**	Improve rail crossing (fill in gaps adjacent to rails)	$100,000
UPRR (at Grant St)	**R2**	Improve rail crossing (fill in gaps adjacent to rails)	$0[a]
UPRR (at Ivy St)	**R3**	Provide rail crossing	$0[a]
OPRR (at Township Rd)	**R4**	Move guardrail and improve rail crossing (fill in gaps adjacent to rails)	$100,000
UPRR (at Pine St-NE 4th Ave)	**R5**	Improve rail crossing (fill in gaps adjacent to rails)	$0[a]
Bike Lanes			
N Grant St (NW 3rd Ave to NW 1st Ave)	**B1**	Stripe bike lanes (convert to parallel parking)	$0[a]
N Ivy St (N 1st Ave to OR 99E)	**B2**	Stripe bike lanes	$0[a]
SW 2nd Ave (S Grant St to S Ivy St)	**B3**	Stripe bike lanes	$0[a]
Knights Bridge Rd (west edge of UGB to Grant St)	**B4**	Stripe bike lanes	$35,000
Knights Bridge Rd (Grant St to Ivy St)	**B5**	Stripe bike lanes	$0[a]
N Holly St (NW 22nd Ave to Knights Bridge Rd)	**B6**	Stripe bike lanes (widen as needed)	$660,000
NE 3rd Ave (Locust Street to NE 4th Ave)	**B7**	Install bike lanes	$135,000
NE 4th Ave (NE 3rd Ave to Fairgrounds Entrance)	**B8**	Install bike lanes	$105,000
Pine St (OR 99E to NE 4th Ave)	**B9**	Install bike lanes	$0[a]
Otto Rd (OR 99E to SE 1st Ave)	**B10**	Install bike lanes	$0[a]
Multi-Use Trail			
OR 99E and Molalla Forest Rd Trail	**T1**	Connect multi-use trail to sidewalks on south side of OR 99E	$0[b]
Parallel Route to OR 99E (between Elm St and Molalla Forest Rd Trail)	**T2**	Construct multi-use trail along rail corridor	$3,435,000[c]
		TOTAL	**$4,570,000**

[a] Cost accounted for with an associated motor vehicle project.
[b] Projects identified in both pedestrian and bicycle improvement lists, but costs provided in pedestrian list.
[c] Projects identified in both pedestrian and bicycle improvement lists, but costs provided in bicycle list.

Table 6: Bicycle Project Evaluation/Prioritization (Non-Financially-Constrained)

Location	Criteria: High Speeds/ Volumes	Criteria: Safety Concerns	Criteria: Prioritization Map	Criteria: Community Survey Priority	Criteria: Motor Vehicle Project	Priority	Bicycle Project
Bike Lanes along Roadway Segment/Corridor							
OR 99E (Berg Pkwy to Elm St)	+		Med.	High		High	Install bike lanes
N Holly St (NW 2nd Ave to Knights Bridge Rd)	+		High	Med.		High	Install bike lanes
Elm St (NW 3rd Ave to SW 4th Ave)	+		High	Med.		High	Install bike lanes
NE 4th Ave (Fairgrounds Entrance to OR 99E)	+		Med.	High		High	Install bike lanes
N Redwood St (Territorial Rd to NE 11th Ave)	+		Med.	High		High	Install bike lanes
S Township Rd (OP RR tracks to Sequoia Pkwy)	+	+	Med.	High		High	Install bike lanes
SE 1st Ave (Hazel Dell Wy to Walnut St)	+	+	Low	High		High	Install bike lanes
SE 4th Ave (OP RR to Sequoia Pkwy)			Low	High		High	Install bike lanes
OR 99E (Locust St to Pine St)	+		Med.	High		Med.	Install bike lanes
OR 99E (Sequoia Pkwy to Otto Rd)	+		Med.	Med.		Med.	Install bike lanes (currently a wide shoulder)
NW 3rd Ave (Aspen St to Cedar St)			High	Med.		Med.	Install bike lanes
N Cedar St (NW 2nd Ave to NW 5th Ave)			High	Med.		Med.	Install bike lanes
N Cedar St (NW 5th Ave to Knights Bridge Rd)		+	Low	Med.		Med.	Install bike lanes
S Township Rd (Sequoia Pkwy to Mulino Rd)	+	+	Low	Med.		Med.	Install bike lanes
SE 13th Ave (just west of Mulino Rd)	+		Low	Med.		Med.	Install bike lanes
SE 1st Ave (Sequoia Pkwy to Hazel Dell Wy)	+	+	Med.	Med.		Med.	Install bike lanes

Table 6 continued on next page.

(Continued) Table 6: Bicycle Project Evaluation/Prioritization (Non-Financially-Constrained)

Location	Criteria: High Speeds/ Volumes	Safety Concerns	Prioritization Map	Community Survey Priority	Motor Vehicle Project	Priority	Bicycle Project
Bike Lanes along Roadway Segment/Corridor (Cont.)							
SE 1st Ave (Walnut St to Mulino Rd)	+	+	Low	Med.		Med.	Install bike lanes
SE Territorial Road	+	+	Low	Med.		Med.	Install bike lanes
S Haines Rd	+	+	Low	Med.		Med.	Install bike lanes
S Mulino Rd	+	+	Low	Med.		Med.	Install bike lanes
OR 99E (Otto Rd to east edge of UGB)	+		Low	Med.		Low	Install bike lanes (currently a wide shoulder)
S Elm St (SW 4th Ave to SW 13th Ave)			Low	Med.		Low	Install bike lanes
N Pine St (NE 4th Ave to NE Territorial Rd)			Med.	Med.		Low	Install bike lanes
NE 10th Ave (Holly St to Pine St)			Low	Med.		Low	Install bike lanes
NW 3rd Ave (west of Aspen St)			Low	Med.		Low	Install bike lanes
Program Strategy							
Provide bicycle route signage			N/A	Med.		Low	Install bike wayfinding signs
Railroad Crossing Improvements							
UPRR (at Pine St)		+	Med.	Med.	N/A due to closure	N/A	Improve rail crossing (fill in gaps adjacent to rails)

Motor Vehicle Solutions

There are five general categories of motor vehicle solutions that were considered for Canby. The first four are focused on improving utilization of the existing network, and the fifth adds vehicle capacity:

Improved Roadway Utilization (Non-Capacity)

- Transit Improvements
- Transportation Demand Management (TDM)
- Transportation System Management (TSM)
- Special Transportation Area (STA) Designation

Capacity Improvements

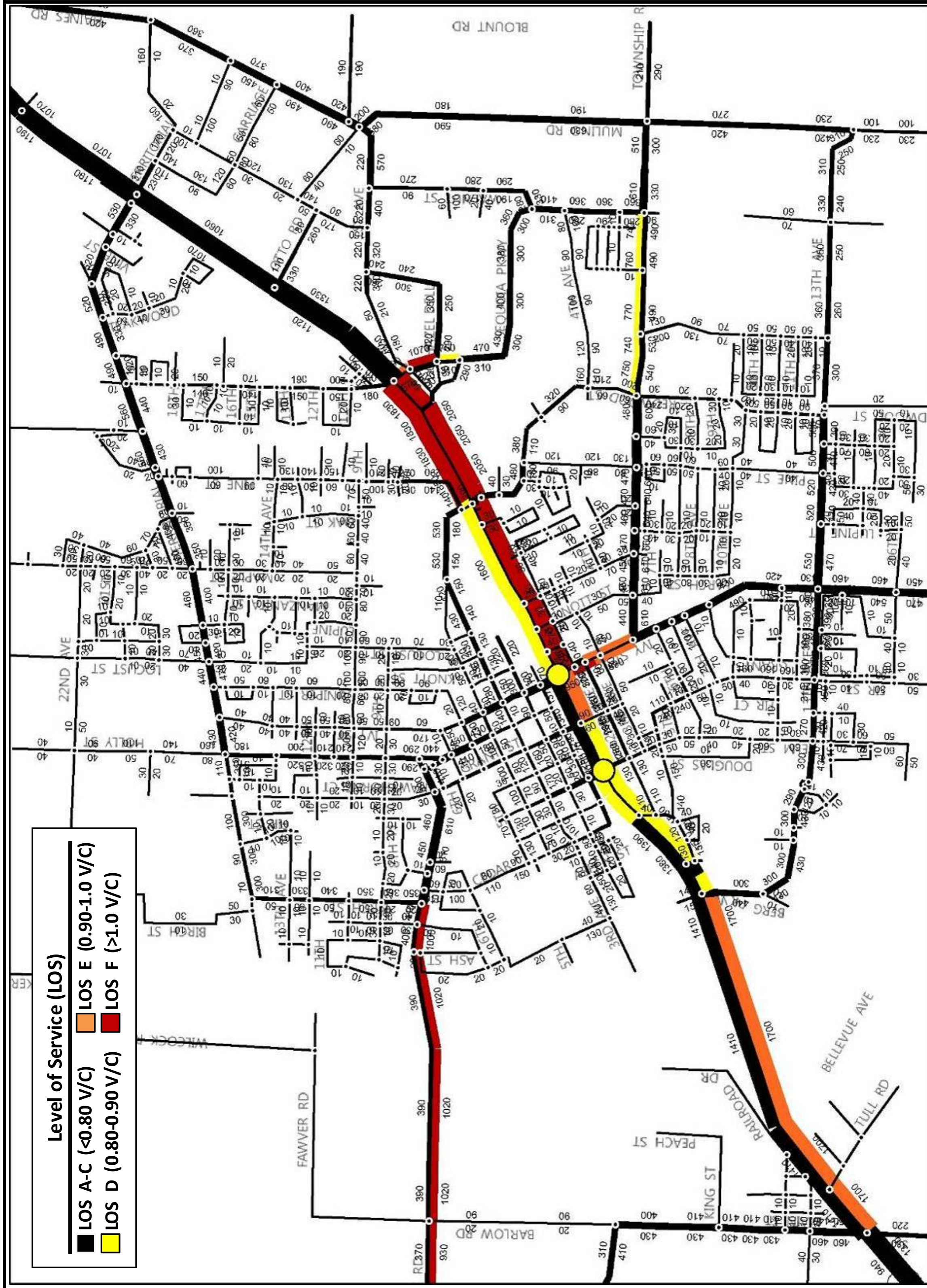
- Capital Improvement Projects

This section of the report identifies and discusses possible improvements associated with each of the non-capacity strategies that Canby could implement. Next, it considers capacity improvements at key problem areas. Then, it provides a list of preferred alternatives along with the resulting 2030 study intersection operating conditions, planning level cost estimates, and identification of potential funding sources. However, before the solutions analysis is provided, two other topics related to the analysis are discussed: analysis methods and evaluation criteria.

Analysis Methods

The primary method for analyzing the motor vehicle alternatives identified in this report was use of the travel forecast modeling tool documented in Technical Memorandum #3 (Future Forecasting). This was the same tool used to determine future needs for the year 2030, as documented in TSP Draft Chapter 4 (Future Needs). Each of the alternatives was compared with the 2030 No-Build scenario to determine how they would affect Canby’s transportation network (e.g., shifts in traffic patterns and approximate intersection operations). For assistance in comparing the alternatives identified in this report with the No-Build scenario, model volumes and roadway performance of the No-Build scenario are provided for reference in Cut Sheet 1. Each of the alternatives was run as a scenario with the travel forecast tool and Cut Sheets were created to summarize their performance.

Cut Sheet 1: 2030 No-Build Baseline Scenario



Model Volume and Performance (2030 P.M. Peak Hour)

Evaluation Criteria

To aid in the selection of Canby's preferred alternatives for motor vehicle projects, the alternatives were evaluated using criteria developed by City Staff, ODOT Staff, and feedback provided by members of the community. The evaluation criteria were based on the TSP Goals identified in TSP Draft Chapter 2 (Goals and Policies).

These evaluation criteria are listed in Table 7 and are organized by the goal they address. The criteria were evaluated with either sketch-level quantitative data or with judgment of qualitative performance, with a positive (+1), neutral (-), or negative (-1) score applied. For each issue area, the alternatives with a higher relative score are then recommended as the preferred solution. In general, options with a total score of +6 or better were recommended.

Table 7: Evaluation Criteria (by TSP Goal)

TSP Goal	Evaluation Criteria
Livability	Reduces/discourages through travel (especially truck traffic) on streets with fronting residential uses
	Consistent with Canby Comprehensive Plan policies, goals, and objectives
Safety	Improves safety of at-grade railroad crossings and/or at other intersections
	Improves safety of street crossings for pedestrians and bicycles
Economic Vitality	Improves access/connection to I-5 and OR 99E
	Improves freight access within and to Canby industrial areas
	Does not negatively impact existing developments and/or downtown viability.
Sustainability	Protects environmentally sensitive areas.
	Reduces vehicle miles traveled and improves flow of vehicles to reduce greenhouse gas emissions
Travel Choices	Pedestrian and bicycle facility improvements connect key locations such as schools and transit stops.
Quality Design	Enhances street aesthetics, particularly downtown,
Reliability and Mobility	Reduces local traffic use of OR 99E preserving highway capacity.
	Intersections will meet City, County or ODOT operating standards.
	Addresses key bottlenecks in the transportation system.
Efficient and Innovative Funding	Maximizes use of available funding programs/sources.
	Provides significant increase in mobility (for all modes) compared to cost.
Compatibility	Is consistent with or improves upon facilities as planned by the road authority (City, ODOT, or Clackamas County).

Transit Improvements

Increasing the availability and use of transit service throughout the city is one way to provide relief to traffic demand. Canby Area Transit (CAT) staff are optimistic that CAT service will be able to significantly expand by 2030. However, the view of the Transit Advisory Committee was more conservative; they seemed to agree that it is most likely that CAT service will only keep pace with population growth. With the more conservative view, the mode share for transit is not likely to change relative to existing conditions. Therefore, transit improvements to just keep up with population growth would not modify the vehicle trip generation projected for the future.

The new Transit Master Plan that is being prepared should shed light on this issue, but to be more conservative, the analysis in this solutions report assumes that future CAT service will only keep pace with population growth.

Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. As growth in the Canby area occurs, the number of vehicle trips and travel demand in the area will also increase. This growth can be better accommodated if alternative mode choices for new and existing users are encouraged.

Generally, TDM focuses on reducing vehicle miles traveled and promoting alternative modes of travel, with focus typically being placed on large employers. However, there are a wide variety of TDM actions that can be specifically tailored to the individual needs of an area. Table 8 provides a list of several strategies that may be applied as appropriate within Canby city limits. Many of these TDM strategies are tailored towards urban applications, where there are major employment generators and transit opportunities. TDM measures for cities in more rural settings require special development and should focus on increasing travel options and creating an environment that is supportive for walking and cycling. Because Canby is on the outskirts of the Portland Metropolitan Area, the most effective TDM measures for Canby are likely to include a mix of both urban and rural measures, including elements related to carpools/vanpools (see TSP Chapter 3 for existing programs available for the Canby area), employer incentives, and improved services for alternative modes of travel.

Table 8: Potential Transportation Demand Management Strategies

Strategy	Description	Potential Trip Reduction
Telecommuting	Employees perform regular work duties at home or at a work center closer to home, rather than commuting from home to work. This can be full time or on selected workdays. This can require computer equipment to be most effective.	82-91% (Full Time) 14-36% (1-2 day/wk)
Compressed Work Week	Schedule where employees work their regular scheduled number of hours in fewer days per week.	7-9% (9 day/80 hr) 16-18% (4 day/40 hr) 32-36% (3 day/36 hr)
Transit Pass Subsidy	For employees that commute to work by bus or other public transportation methods, employers pay a portion of the cost of a monthly transit pass.	19-32% (full subsidy of cost, high transit service) 4-6% (full subsidy of cost, medium transit service) 0.5-1% (full subsidy of cost, low transit service) 10-16% (half subsidy of cost, high transit service) 2-3% (half subsidy of cost, medium transit service) 0-0.5% (half subsidy of cost, low transit service)
Cash Out Employee Parking	An employer that has been subsidizing parking discontinues the subsidy and instead provides each employee an equivalent monetary amount. Employees can then use the money to take an alternative travel mode or to pay the full price for parking (at no net change in travel cost).	8-20% (high transit service) 5-9% (medium transit service) 2-4% (low transit service)
Eliminate Parking Subsidies	The portion of the cost of parking that is paid for by the employer is eliminated, and the employee pays an increased cost for parking.	8-20% (high transit service) 5-9% (medium transit service) 2-4% (low transit service)
Reduced Cost Parking for HOVs	Parking costs charged to employees are reduced for carpools and vanpools.	1-3%
Alternative Mode Subsidy	For employees that commute to work by modes other than driving alone, the employer provides a monetary bonus to the employee.	21-34% (full subsidy of cost, high alternative modes) 2-4% (half subsidy of cost, medium alternative modes)
On-Site Services	Provide services at the work site that are frequently used by the employees (and that the employee would typically need to drive to use). Examples include cafes/restaurants, dry cleaners, day care centers, and bank machines.	1-2%

Table 8 continued on next page.

(Continued) Table 8: Potential Transportation Demand Management Strategies

Strategy	Description	Potential Trip Reduction
Bicycle Program	Provides support services to those employees that bicycle to work. Examples include: safe/secure bicycle storage, shower facilities and subsidy of commute bicycle purchase.	0-10%
On-site Rideshare Matching for HOVs	Employees who are interested in carpooling or vanpooling provide information to a transportation coordinator on staff regarding their work hours, availability of a vehicle and place of residence. The coordinator then matches employees who can reasonably rideshare together.	1-2%
Provide Vanpools	Employees that live near each other are organized by their employer into a vanpool for their trip to work. The employer may subsidize the cost of operation and maintaining the van. Existing programs in the Canby area that could be utilized include Valley VanPool (for Salem destinations) and Metro VanPool (for Portland destinations)	15-25% (company provided van with fee) 30-40% (company subsidized van)
Gift/Awards for Alternative Mode Use	Employees are offered the opportunity to receive a gift or an award for using modes other than driving alone.	0-3%
Provide Buspools	Arrange a commuter bus service specifically to transport employees to work.	3-11%
Walking Program	Provide support services for those who walk to work. This could include buying walking shoes or providing lockers and showers.	0-3%
Time off with Pay for Alternative Mode Use	Employees are offered time off with pay as an incentive to use alternative modes.	1-2%
Company Cars for Business Travel	Employees are allowed to use company cars for business-related travel during the day	0-1%
Guaranteed Ride Home Program	A company owned or leased vehicle is provided in the case of an emergency for employees that use alternative modes.	1-3%

Sources:
Guidance for Estimating Trip Reductions from Commute Options, Oregon Department of Environmental Quality, August 1996
Employee Commute Options (ECO) Sample Trip Reduction Plan, Oregon Department of Environmental Quality, October 2006

Due primarily to the potential growth in the Canby Pioneer Industrial Area, one of the most promising TDM measures for Canby is to provide incentives for new employment development with more than 50 employees to implement TDM strategies. One option is for the City to require employers to implement TDM strategies as part of the development review process, similar to the Employee Commute Options (ECO) program in Portland.[1] The City may consider forming a transportation management agency (TMA) for the Canby Pioneer Industrial Area to implement and monitor this type of TDM program. The City could also facilitate implementation of TDM by existing employers through education and outreach on available or potential programs such as Carpool Match NW and the state vanpool program.

A second potential TDM measure for Canby is to create a parking management area in downtown. The goal would be to ensure that parking is supplied, maintained, and operated in a way that supports the continued economic growth of the downtown while also unbundling parking costs from nearby developments and encouraging the use of alternate travel modes to access downtown.

The affects of these two TDM measures on the city transportation network were estimated using the forecasting analysis tool and are documented Cut Sheet 2 and Cut Sheet 3. These two strategies were then evaluated, and the results are shown in Table 9.

Though neither of these TDM strategies by themselves are expected to provide noticeable improvement to Canby’s transportation network, the City should be supportive of regional TDM measures, because research has shown that a comprehensive set of complementary TDM policies implemented over a large geographic area can be an effective tool in reducing the number of vehicle miles traveled to/from that area.[2] However, the same research indicates that in order for TDM measures to be most effective, they should go beyond the low-cost, uncontroversial measures commonly used such as carpooling, transportation coordinators/associations, priority parking spaces, etc. The more effective TDM measures include elements related to parking and congestion pricing, improved services for alternative modes of travel, and other market-based measures. For Canby, implementation of employer-based TDM strategies is recommended as the first step towards managing trips. If over time the City can work with the downtown business community and the public to accept parking management, then parking management in the downtown commercial core should be pursued (e.g., parking meters).

Recommended Solution Package Component:

- Employer-Focused Travel Demand Management

[1] http://www.deq.state.or.us/nwr/ECO/eco.htm; viewed on February 17, 2010.

[2] *The Potential for Land Use Demand Management Policies to Reduce Automobile Trips*, ODOT, by ECO Northwest, June 1992.

Cut Sheet 2: Employer-Focused Transportation Demand Management

This scenario assumed a 10 percent trip reduction level to employment-related service trips anywhere within city limits where there is employee growth of 100 or more employees between 2009 and 2030. This primarily occurred in the Canby Pioneer Industrial Park.

The result was very minor reduction in traffic volumes in the Canby Pioneer Industrial Park along Sequoia Parkway, Township Road, and Mulino Road. In overview, this scenario had very minimal impact on traffic volumes and roadway performance.

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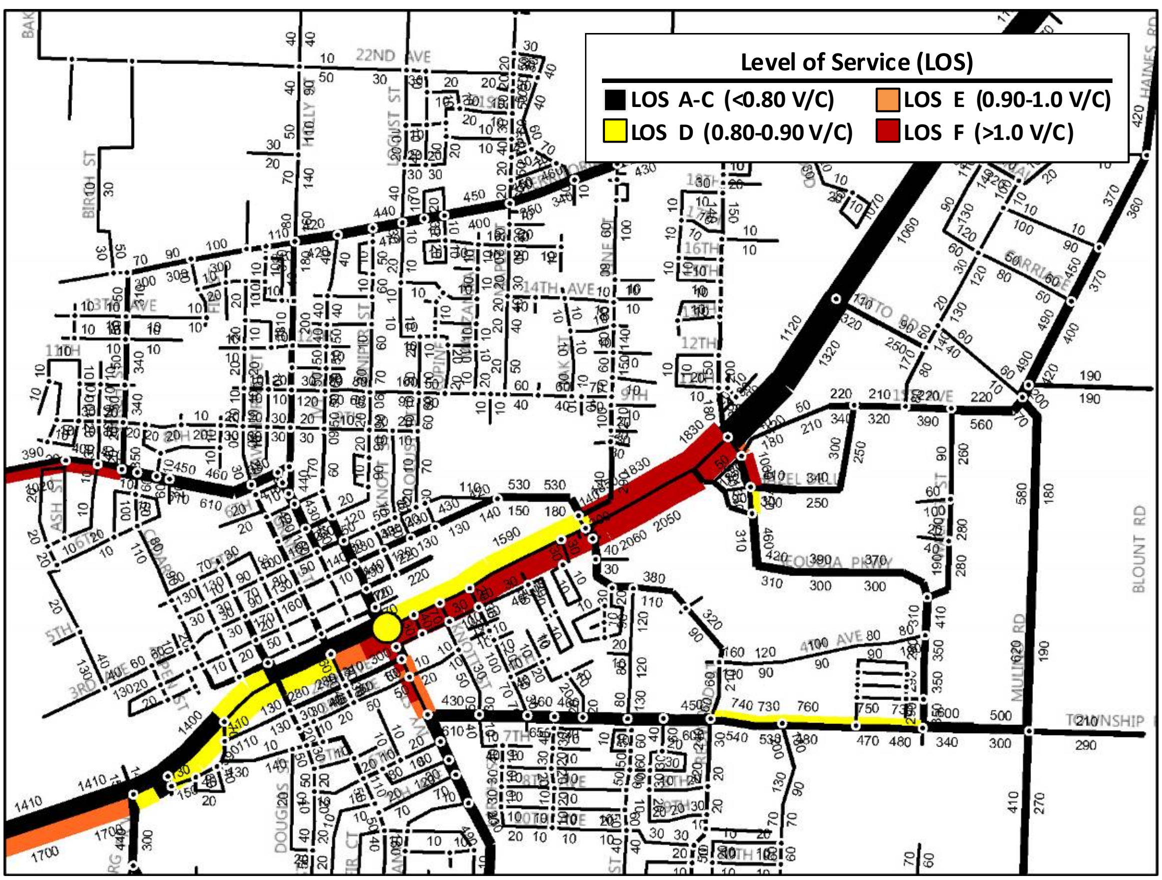
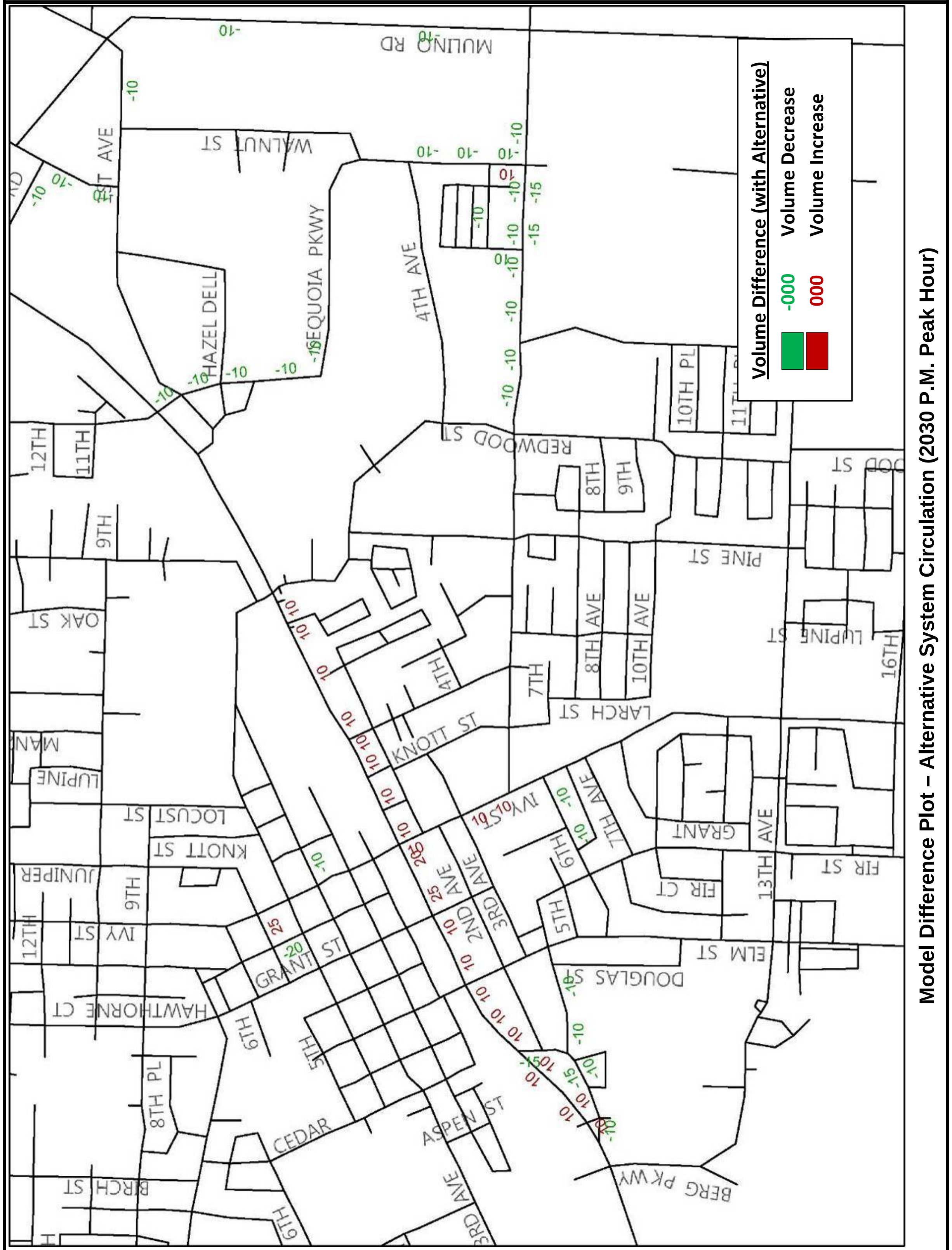
Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 2 (cont.): Employer-Focused Transportation Demand Management



Cut Sheet 3: Parking Management Area

This scenario assumed a 5 percent peak hour trip reduction level for downtown Canby to approximate the benefits of trip reduction programs observed in other urban areas that have incorporated parking management.

The result was a slight reduction in traffic along OR 99E through downtown (approximately 100 vehicles per day) and along South Ivy Street (approximately 100 vehicles per day). There was also minor rerouting in downtown, though this was not significant.

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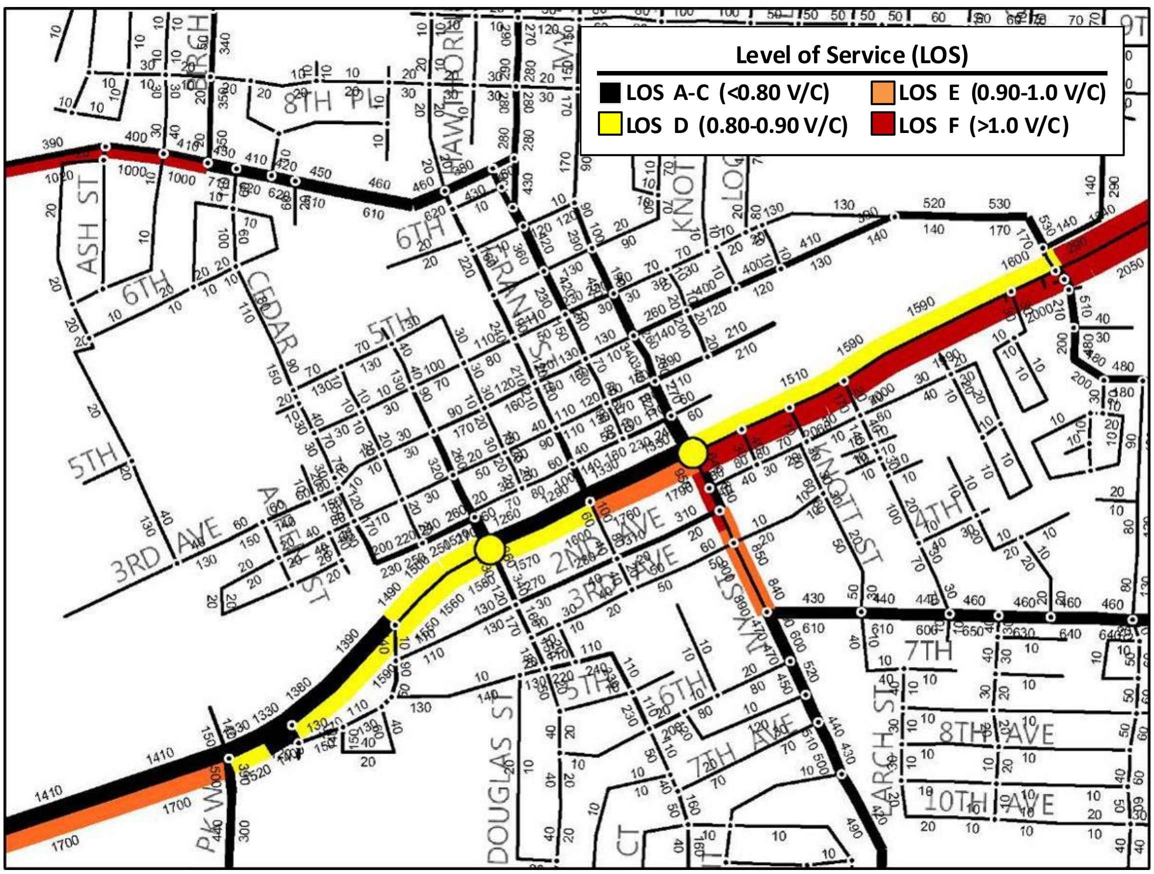
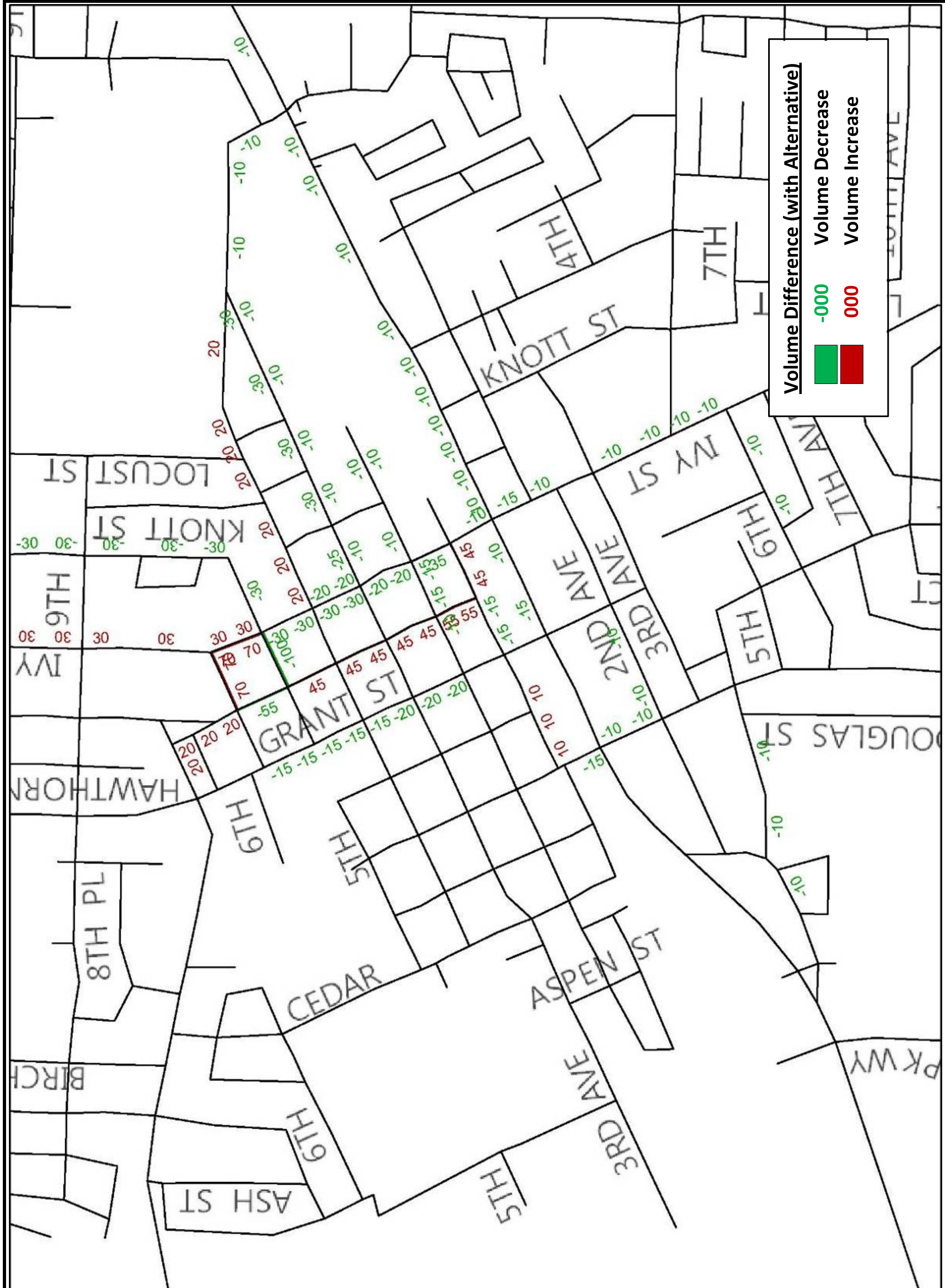
Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 3 (cont.): Parking Management Area



Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Table 9: TDM Alternatives – Evaluation Criteria Analysis

Criteria (by TSP Goal)	TDM Alternatives: Employer-Focused TDM	TDM Alternatives: Parking Management Area
Livability		
Reduces/discourages through travel (especially truck traffic) on streets with fronting residential uses	-	-
Consistent with Canby Comprehensive Plan policies, goals, and objectives	+1	-
Safety		
Improves intersection and/or railroad crossing safety	-	-
Improves pedestrian/bicycle street crossing safety	-	-
Economic Vitality		
Improves access/connection to I-5 and OR 99E	-	-
Improves industrial area freight access/connectivity	-	-
No negative impacts to existing developments and/or downtown viability	-	-1
Sustainability		
Protects environmentally sensitive areas	-	-
Reduces vehicle miles traveled and improves flow of vehicles to reduce greenhouse gas emissions	+1	+1
Travel Choices		
Pedestrian and bicycle facility improvements connect key locations (e.g., schools and transit stops)	-	-
Quality Design		
Enhances street aesthetics, particularly downtown	-	-
Reliability and Mobility		
Reduces local traffic use of OR 99E	-	-
Intersections meet operating standards	-	-
Addresses key bottlenecks	-	-
Efficient and Innovative Funding		
Maximizes use of available funding programs/sources	+1	-
Provides significant increase in mobility (for all modes) compared to cost	-	-
Compatibility		
Consistent with or improves facilities planned by road authority (City, ODOT, or Clackamas County)	-	-
Total	3	0

Transportation System Management (TSM)

Transportation System Management (TSM) focuses on lower cost strategies to enhance operational performance of the existing transportation system. The need for capacity improvements may be reduced by seeking solutions to immediate transportation problems, finding ways to better manage the system, maximizing urban mobility, and treating all modes of travel as a coordinated system. Traditionally, the solution to most congestion problems has been to build more roadways or widen existing facilities. More recently, it has been realized that urban congestion cannot be managed by simply building roadway capacity. Better management of the existing transportation network and improved coordination among transportation agencies in an area are ways to address congestion.

A toolbox of TSM measures considered for Canby includes the following:

Intelligent Transportation System (ITS) Solutions

- Traffic monitoring
- Real-time travel information
- Incident management
- Signal coordination and optimization (already being implemented on OR 99E)
- Adaptive signal systems

Other Solutions

- Access management strategies
- Traffic calming

Intelligent Transportation System (ITS) solutions are a popular type of TSM strategy that are often implemented on a larger scale, such as county-wide. Though Clackamas County has an ITS Plan, it does not identify any future projects in Canby.[3] There are also other solutions that are easier to implement for a smaller community such as Canby. Discussion of each of the TSM measures listed above is provided in the following sections.

Traffic Monitoring

Canby is a small city separated by rural lands from other major metropolitan areas. Therefore, it is not a good candidate for regional traffic monitoring. The use of closed circuit television cameras (CCTV) and vehicle detection systems would not be a cost effective way to help monitor the transportation network, especially due to limited need at only a few locations during the short peak hour congestion periods.

Real-Time Travel Information

When multiple alternate routes are available, providing real-time congestion information to drivers can help improve the efficiency of the transportation system. The variety of information services available today include hand-held devices such as cell phones and GPS devices, as well as transit kiosks, personalized email reports, radio, television, and the

[3] *Clackamas County ITS Plan*, prepared by DKS Associates, February 2003.

internet. A variable message sign (VMS) consists of a stationary sign with remotely-controlled message editing and provides information to drivers. All of these devices are aimed at providing the traveler with the best available information for making transportation choices.

Since Canby has few alternate routes to its key corridors, City provision of congestion or incident related information to drivers would not be economical.

Incident Management

Incident management includes detection, verification, response, site management, traffic management, clearance time, and recovery. Each of these steps takes time, during which the transportation operations along the corridor decrease. Research indicates that effective incident management has the potential to reduce response times by 40% and decrease fatalities by 10% in urban areas.[4] In addition, incident management has the potential to reduce delay to users and reduce vehicle emissions.

Typically, incident response is focused on freeways. However, incident response on local arterials may also be appropriate because the time it takes responders to deal with an incident in an urban area can dramatically affect the level of congestion on a corridor. If the City were able to establish a traffic monitoring center, placement of several cameras at strategic locations on OR 99E may provide some benefits. This type of program would need to be coordinated with ODOT and Clackamas County for integration into the regional ITS architecture (including costs for equipment, communications, and monitoring centers).

Signal Coordination and Optimization

A combination of coordination and optimization between traffic signals along key corridors has proven to substantially reduce congestion and travel time while increasing travel speeds due to the increased service provided to vehicles traveling together in groups on the mainline corridor. Signal coordination and optimization are already in place on OR 99E through Canby. Any new or improved traffic signals along OR 99E should be added to the coordinated system.

Adaptive Signal Systems

Adaptive traffic signal systems are state-of-the-art, coordinated traffic signal systems that automatically adjust traffic signal timing in real-time along an entire corridor to account for variation in traffic demand. At a cost of approximately $50,000 per traffic signal, the coordinated OR 99E traffic signal system in Canby could particularly benefit from an adaptive system to help the transportation system recover following train blockages and during events at the fairground. While the specific benefits of a system, as well as the type of system, would need to be explored in coordination with ODOT, this solution may be particularly effective for improving the reliability of system performance during special events.

[4] *Intelligent Transportation System Initiatives in Clark County: VAST Program*, January 2001.

Access Management Strategies

Access management is an important strategy that increases both safety and mobility along key travel corridors. Typical access management measures include turn restrictions, median installation, and driveway consolidations or closures. These measures help maintain roadway capacity and safety because they reduce mid-block turn maneuvers and vehicular speed differentials (i.e., speed differences between adjacent vehicles on the roadway). This improves flow and reduces vehicle conflicts.

In Canby, access management measures should be implemented as feasible on OR 99E and other higher classification roadways (i.e., arterials and collectors). Where possible through site redevelopment or as part of roadway improvement projects, approaches should be consolidated or removed, particularly when a driveway can be provided to a side street or access can be shared with adjacent developments. Other possible treatments include the reconstruction of driveways or the installation of medians to limit movements to right-in/right-out. Urban approach standards apply to projects within the Canby UGB. The installation of a median along OR 99E between Elm Street and Locust Street is included as an element of the Special Transportation Area (STA) alternative, which is discussed later in this report.

Traffic Calming

Traffic calming is a strategy typically used when either a local street is being used by through traffic that it was not intended to service or drivers are traveling too fast through a neighborhood. Some traffic calming measures include speed bumps, raised cross-walks, medians and pedestrian islands, curb extensions, and roundabouts. When considering these measures, the need to manage vehicle speeds and volumes must be weighed against the often conflicting need to maintain mobility, circulation, and function for service providers (e.g. emergency responders).

Canby currently has an adopted traffic calming program (as of August 2009) and has installed speed bumps, raised cross-walks, and/or curb extensions at various locations along SE 13th Avenue and in downtown. The City does not allocate funds for this program, but instead incorporates traffic calming measures into new and redevelopment projects when feasible. Additional measures can be considered for roadways were traffic volumes and speeds are expected to be higher than desired. Generally, these types of measures would be best managed by the City with an annual program that can systematically address traffic calming issues while managing traffic flow and emergency response needs within the City.

Special Transportation Area (STA) Designation

A Special Transportation Area (STA) is a designation in the Oregon Highway Plan (OHP) that can be applied to a state highway segment when a downtown business district straddles the highway. In Canby, an STA designation is desirable on OR 99E between Elm Street and Locust Street as this segment has existing/planned downtown commercial development is on both sides of OR 99E, where multi-modal activity is high.

An STA and associated improvements on OR 99E in Canby would support roadway design features that improve pedestrian, bicycle, and transit accessibility and safety, as well as enhance highway aesthetics through Canby's downtown. The City's recent adoption of its Downtown Canby Overlay (DCO) Zone, which includes OR 99E from Elm Street to Locust Street, ensures that future development in this area will also be consistent with STA land use characteristics. Multi-modal benefits could be achieved by lowering the speed limit from the current 35 miles per hour (mph) to either 25 or 30 mph, managing driveway access points, improving pedestrian crossings, and improving roadway lighting.

In addition, one or more raised medians may potentially be installed along OR 99E. Raised medians would improve access management by restricting driveway approaches on OR 99E to right-in/right-out movements. Raised medians can enhance safety for pedestrian and bicycle crossings by reducing crossing distance, providing a refuge waiting area, and channeling crossing activity to intersections or signalized mid-block crossings. Raised medians, particularly with landscaping, also provide visual clues to drivers to reduce speeds and have environmental and aesthetic benefits.

Impacts to freight mobility on OR 99E would need to be considered at the time of highway project development. OR 99E at this locale is a truck route on the national freight network.

The effects that an OR 99E STA designation and associated improvements would have on the transportation network in Canby were analyzed using the forecast analysis tool. Cut Sheet 4 provides discussion of analysis. Evaluation criteria were also considered, and the results are shown in Table 10. Overall, the STA designation and supporting implementation measures were found to have a significant benefit for OR 99E in downtown Canby.

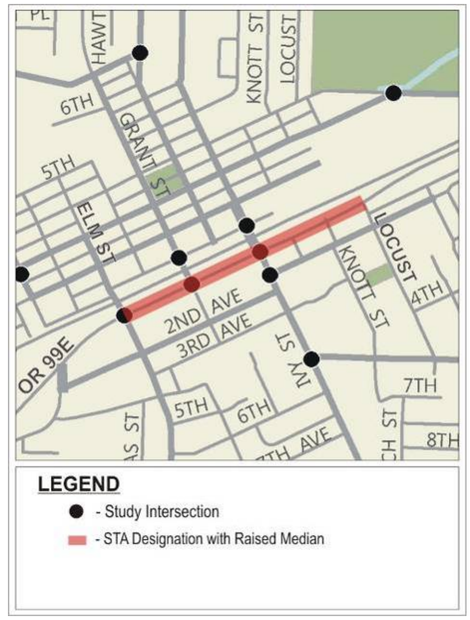
Recommended Solution Package Components:

- Adaptive Signal System on OR 99E
- STA Designation and Associated Improvements on OR 99E between Elm and Locust streets

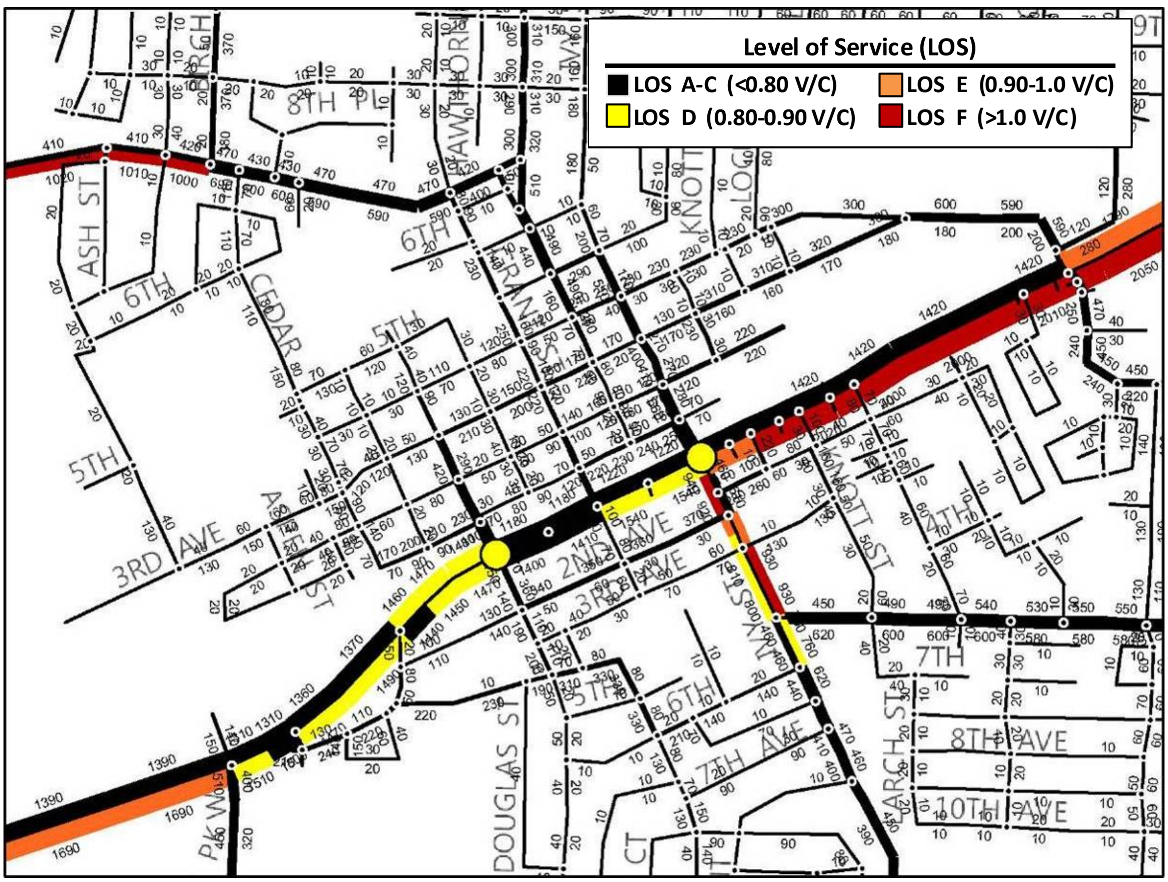
Cut Sheet 4: STA Improvements for OR 99E

Speeds would be reduced from 35 mph to either 25 or 30 mph and raised medians would be installed on OR 99E (between Elm Street and Locust Street).

The result of lowering speeds and installing raised medians on OR 99E would be a reduction in local traffic of between 1,000 and 2,000 vehicles per day in either direction on OR 99E (between Berg Parkway and Pine Street), resulting in improved highway intersection operations. In addition, there would be increased traffic on local parallel routes, among other circulation changes, and NE 4th Avenue would also attract approximately 1,000 additional vehicles per day between downtown Canby and OR 99E for those traveling to and from the northeast.



Alternative Schematic



2030 P.M. Peak Hour Model Volume and Performance

Cut Sheet 4 (cont.): STA Improvements for OR 99E

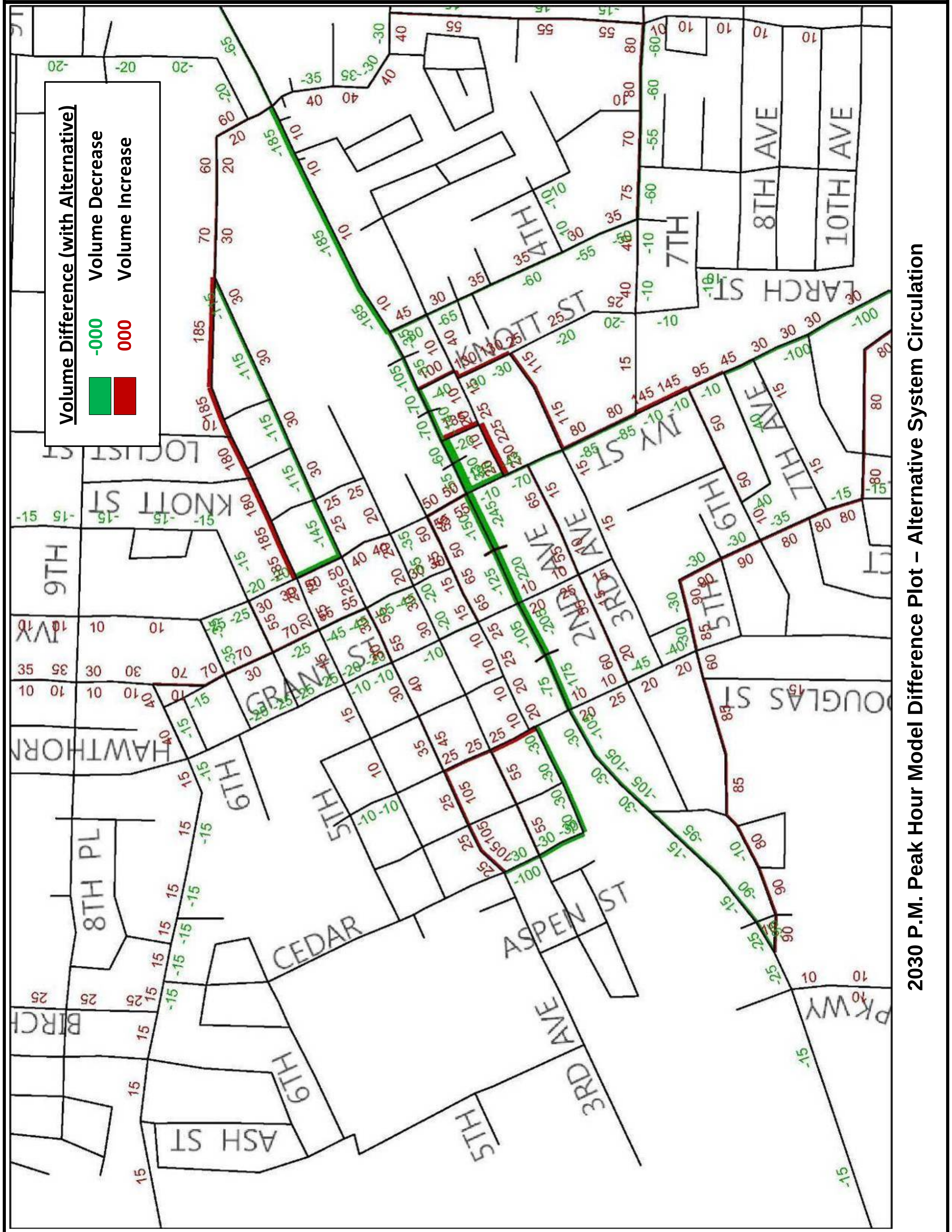


Table 10: STA Alternative – Evaluation Criteria Analysis

Criteria (by TSP Goal)	STA Alternative 4 *STA Improvements with Median on OR 99E*
Livability	
Reduces/discourages through travel (especially truck traffic) on streets with fronting residential uses	-1
Consistent with Canby Comprehensive Plan policies, goals, and objectives	+1
Safety	
Improves intersection and/or railroad crossing safety	-
Improves pedestrian/bicycle street crossing safety	+1
Economic Vitality	
Improves access/connection to I-5 and OR 99E	-1
Improves industrial area freight access/connectivity	-
No negative impacts to existing developments and/or downtown viability	-1
Sustainability	
Protects environmentally sensitive areas	-
Reduces vehicle miles traveled and improves flow of vehicles to reduce greenhouse gas emissions	-1
Travel Choices	
Pedestrian and bicycle facility improvements connect key locations (e.g., schools and transit stops)	+1
Quality Design	
Enhances street aesthetics, particularly downtown	+1
Reliability and Mobility	
Reduces local traffic use of OR 99E	+1
Intersections meet operating standards	+1
Addresses key bottlenecks	+1
Efficient and Innovative Funding	
Maximizes use of available funding programs/sources	+1
Provides significant increase in mobility (for all modes) compared to cost	+1
Compatibility	
Consistent with or improves facilities planned by road authority (City, ODOT, or Clackamas County)	+1
Total	6

Motor Vehicle Capacity Improvements

The preferred package of motor vehicle capital improvements was determined through a screening process that identified preferred transportation alternatives for the following key problem areas:

- Downtown OR 99E Capacity
- Canby Pioneer Industrial Area and NE Master Plan Area Access
- East-West Corridor Improvements North of OR 99E
- East-West Corridor Improvements South of OR 99E
- Other Isolated Intersections

The following section describes the screening process used to identify the alternatives evaluated in this report. Then, the implementation of the screening process is documented for each problem area. Next, a combined package of the recommended improvements is evaluated to determine performance across the entire network. Finally, the estimated planning level project costs of the preferred capital improvements are also provided for comparison to the City's available funding stream.

Alternatives Screening Process

The alternatives screening process was a joint effort involving collaboration among various interested parties to obtain community consensus. The following were key participants:

- **Citizen Advisory Committee (CAC):** Community representatives of various interest groups (i.e., neighborhood associations, Canby Area Transit, Planning Commission, and City Council)
- **Technical Advisory Committee (TAC):** Agency representatives from ODOT and the City, with participation by the City's on-call engineers and input also provided by ODOT Rail (County Staff were invited but did not participate)
- **Community Forums:** Community members attending public forums where information was provided and feedback was requested
- **Project Management Team:** ODOT staff, City staff, and the DKS Associates consultant team

The initial step in the screening process was to identify existing transportation issues in the city. This involved brainstorming sessions by the CAC and TAC and also included a bus tour of Canby led by the CAC, with emphasis on locations of concern. Transportation inventories and analysis of existing conditions and future needs were also performed to gain a greater understanding of the transportation needs in Canby.

Once problem areas were identified and needs were determined, brainstorming sessions were conducted with the CAC, TAC, and at a community forum to identify potential transportation solutions. Preliminary analysis was performed for all identified solutions from the brainstorming sessions, and a work session with the Project Management Team was held to refine the alternatives. The refined list of alternatives was presented to the

TAC and CAC to complete a screening process that identified the most promising projects that had the potential to address needs in the study area. The result was a narrowed list of alternatives to consider further.

Additional analysis was performed for the narrowed list of alternatives. These alternatives were then evaluated (using the evaluation criteria identified previously in Table 7) and compared in order to determine which ones should be included in the overall preferred solutions package. The following sections describe this additional analysis, including recommendations for the alternatives to be included in the preferred package of solutions.

Downtown OR 99E Capacity

Future concerns are expected along OR 99E through the downtown core (i.e., between Elm Street and Locust Street). Draft TSP Chapter 4 identified future capacity needs at both the OR 99E/Elm Street (1.08 v/c ratio) and OR 99E/Ivy Street (1.43 v/c ratio) intersections. The nearby railroad crossings of Elm Street, Grant Street, and Ivy Street also affect safety and operations due to vehicle queuing and train blockage concerns. A list of potential solutions to these concerns was identified, and the preliminary analysis and screening results are documented in Table 11.

Table 11: Downtown OR 99E Capacity Alternatives – Initial Screening

Alternative	Screening Result
Downtown circulation changes to one-way streets (northbound Ivy Street, southbound Grant Street, eastbound SW 3rd Avenue, and westbound Knights Bridge Road)	Addresses multiple concerns and is very promising. Analyze further, and refine diverge/converge details on the north
Berg Parkway extension from OR 99E to NW 3rd Ave with grade-separated railroad crossing	Keep as a potential alternative to consider later as part of an overall solutions package
Grade-separated OR 99E and railroad crossing at Ivy Street (tunnel or bridge from N 3rd to S 3rd)	Inability to maintain Ivy/N 2nd Ave intersection due to the distance from the rail and highway is considered prohibitive
OR 99E/Ivy Street jug handle (using South Juniper Street and SE 2nd Avenue)	Helps the eastbound left-turn movement instead of the more critical westbound left-turn. In addition, traffic diverts to Elm Street. Do not consider further.
Knights Bridge Rd extension to Ivy St	Not warranted as standalone project.

Based on the initial screening, four alternatives were developed for further evaluation:

- Modified Downtown Circulation Scenario (Knights Bridge Road)
- Modified Downtown Circulation Scenario (6th Avenue)
- Modified Downtown Circulation Scenario (Alternate Flow)
- Berg Parkway Extension to 3rd Avenue with Grade-Separated Railroad Crossing

These alternatives are discussed in Cut Sheets 5 through 8. Included on the cut sheets are graphics showing the alternative schematic, modeled volumes and approximate roadway performance, and how the alternative would affect traffic volumes on study area roadways relative to the 2030 No-Build scenario.

Following the cut sheets, the results of an evaluation comparison using the criteria determined from the TSP goals are provided in Table 12. Based on the results, one project is recommended for the solution package:

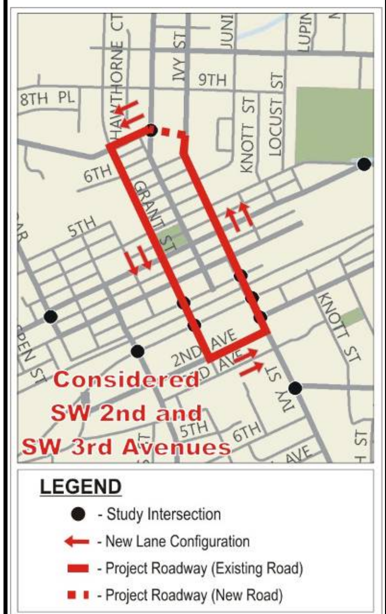
Recommended Solution Package Component:

- Modified Downtown Circulation Scenario (Knights Bridge Road)

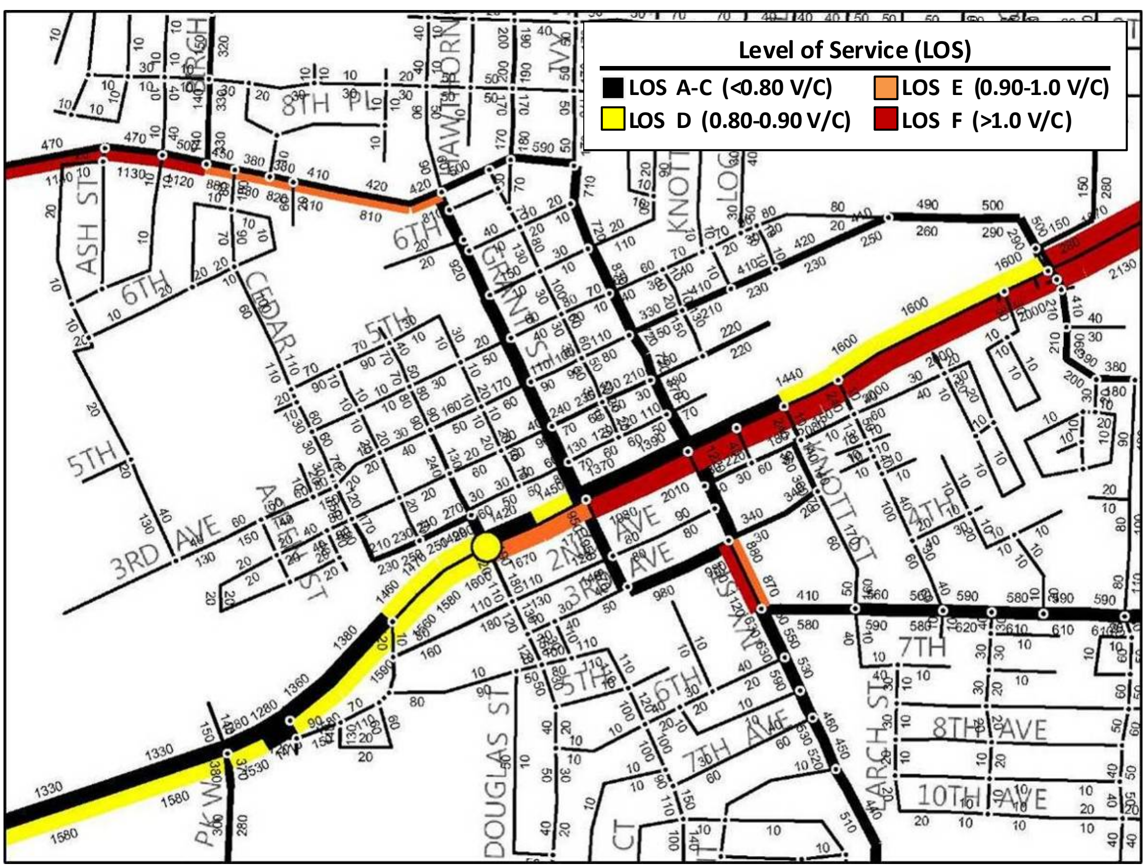
Cut Sheet 5: Modified Downtown Circulation (Knights Bridge Road)

Segments of Ivy Street, Grant Street, Knights Bridge Road, and either SW 2nd or 3rd Avenue would be converted to one-way travel. From a transportation standpoint, Knights Bridge Road is the ideal road to use on the north because it is an arterial and is used as a main gateway to the city. A new section of road and minor realignment of existing road would be needed to connect to Ivy Street, and two houses and an empty lot would likely be impacted. On the south, SW 2nd Avenue is preferred over SW 3rd Avenue due to reduced residential impacts.

Resulting traffic patterns would significantly improve operations at OR 99E/Ivy Street and OR 99E/Grant Street. Both corridors would carry approximately 10,000 vehicles per day, which could be handled by the existing OR 99E intersections. The one-way flow would also improve rail crossing safety and eliminate the conflicts that occur at North Ivy Street/North 1st Street and North Grant Street/NW 1st Street due to the atypical traffic control (i.e., only three of the four approaches are stop controlled).

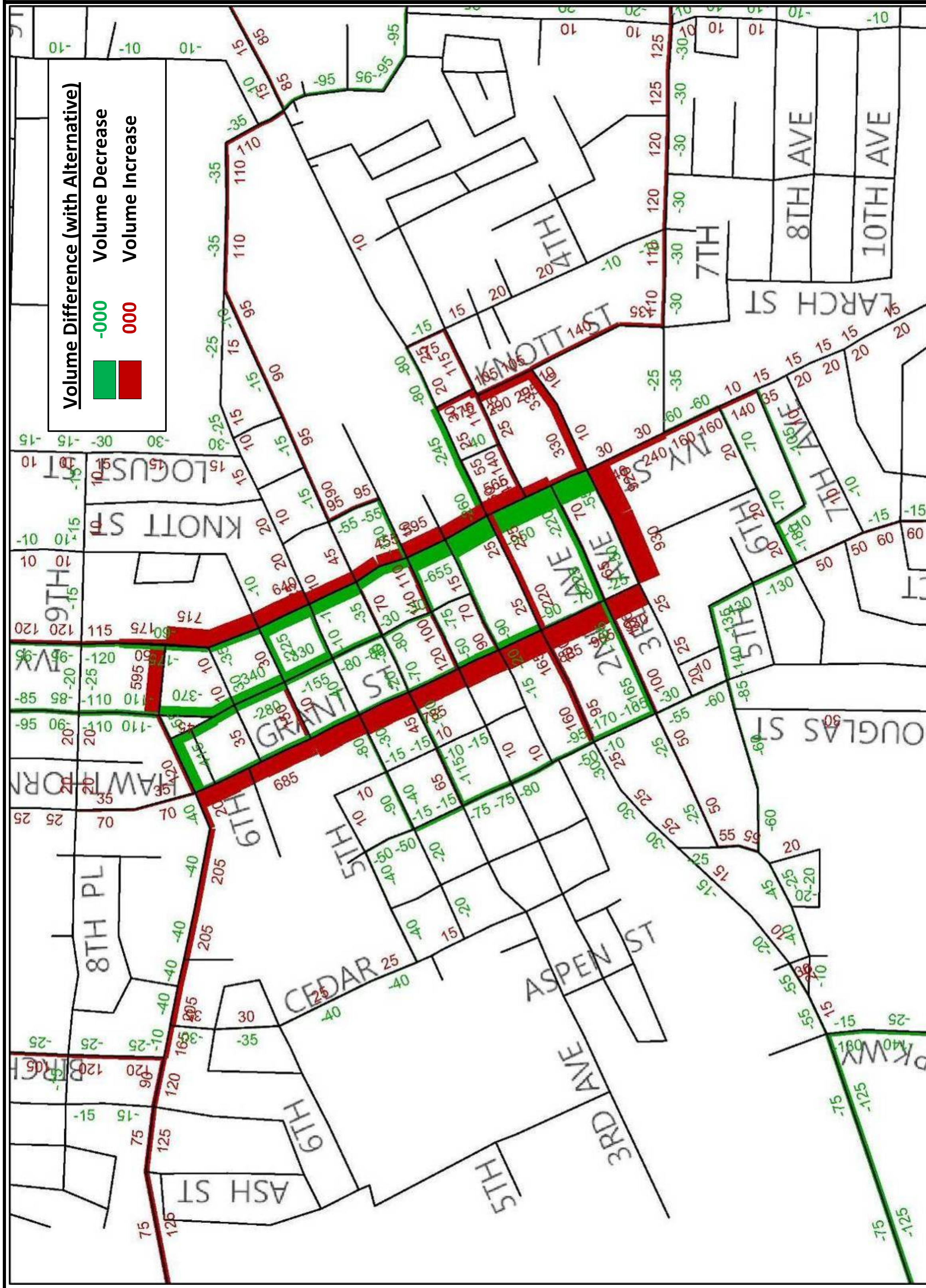


Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 5 (cont.): Modified Downtown Circulation (Knights Bridge Road)

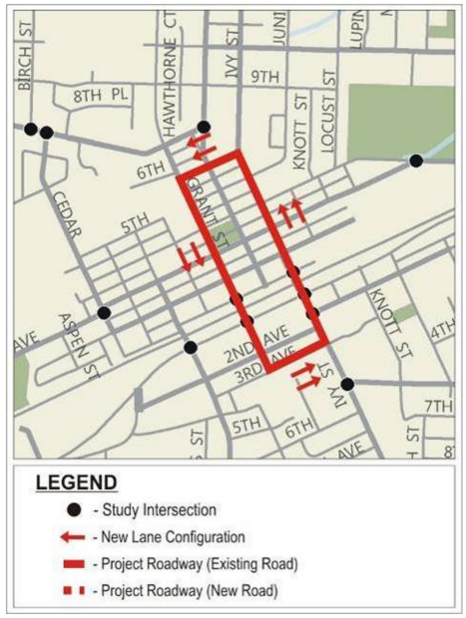


Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

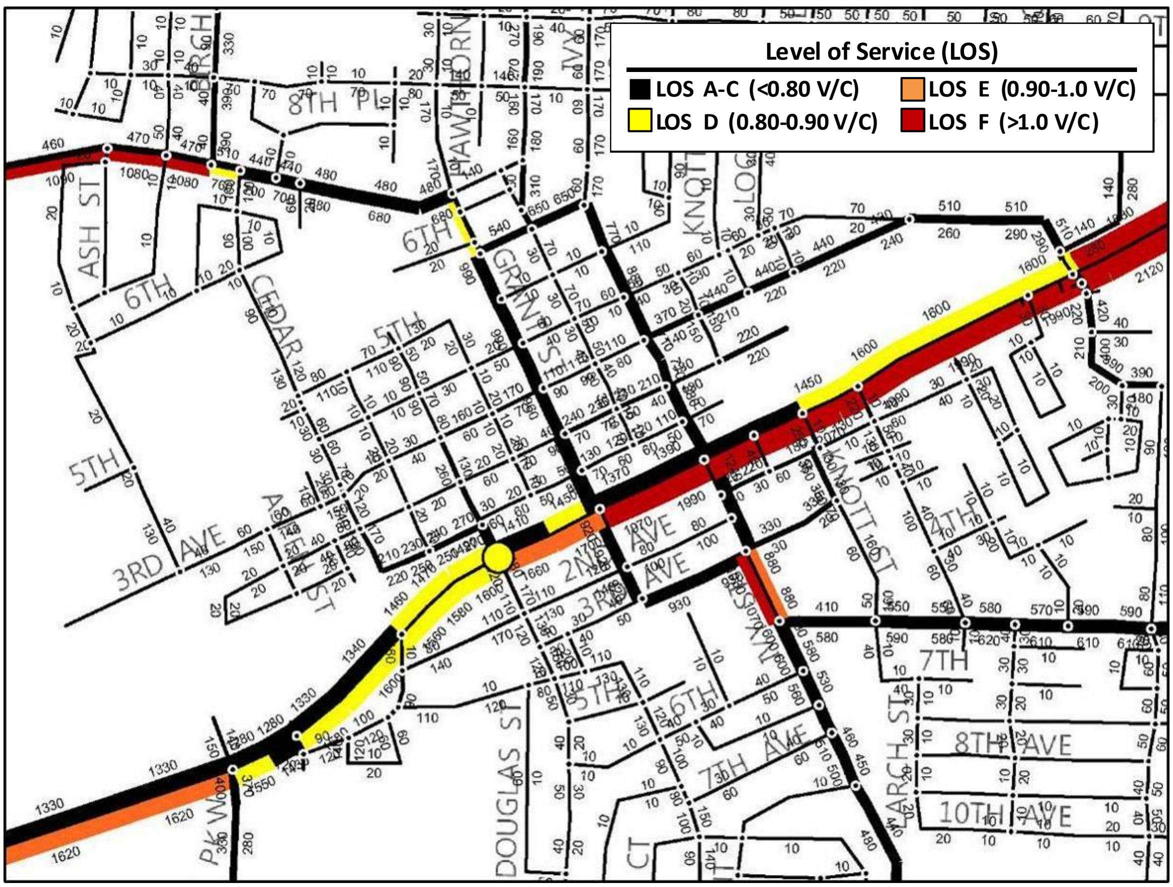
Cut Sheet 6: Modified Downtown Circulation (NW 6th Avenue)

Segments of Ivy Street, Grant Street, NW 6th Avenue, and SW 3rd Avenue would be converted to one-way travel (as shown at right). This would be more economical than using Knights Bridge Road on the north and would not require construction of any new roadways. However, it would have significant impacts to the residential land use on 6th Avenue.

Similar operations to the Modified Downtown Circulation (Knights Bridge Road) alternative make this a potential interim solution.

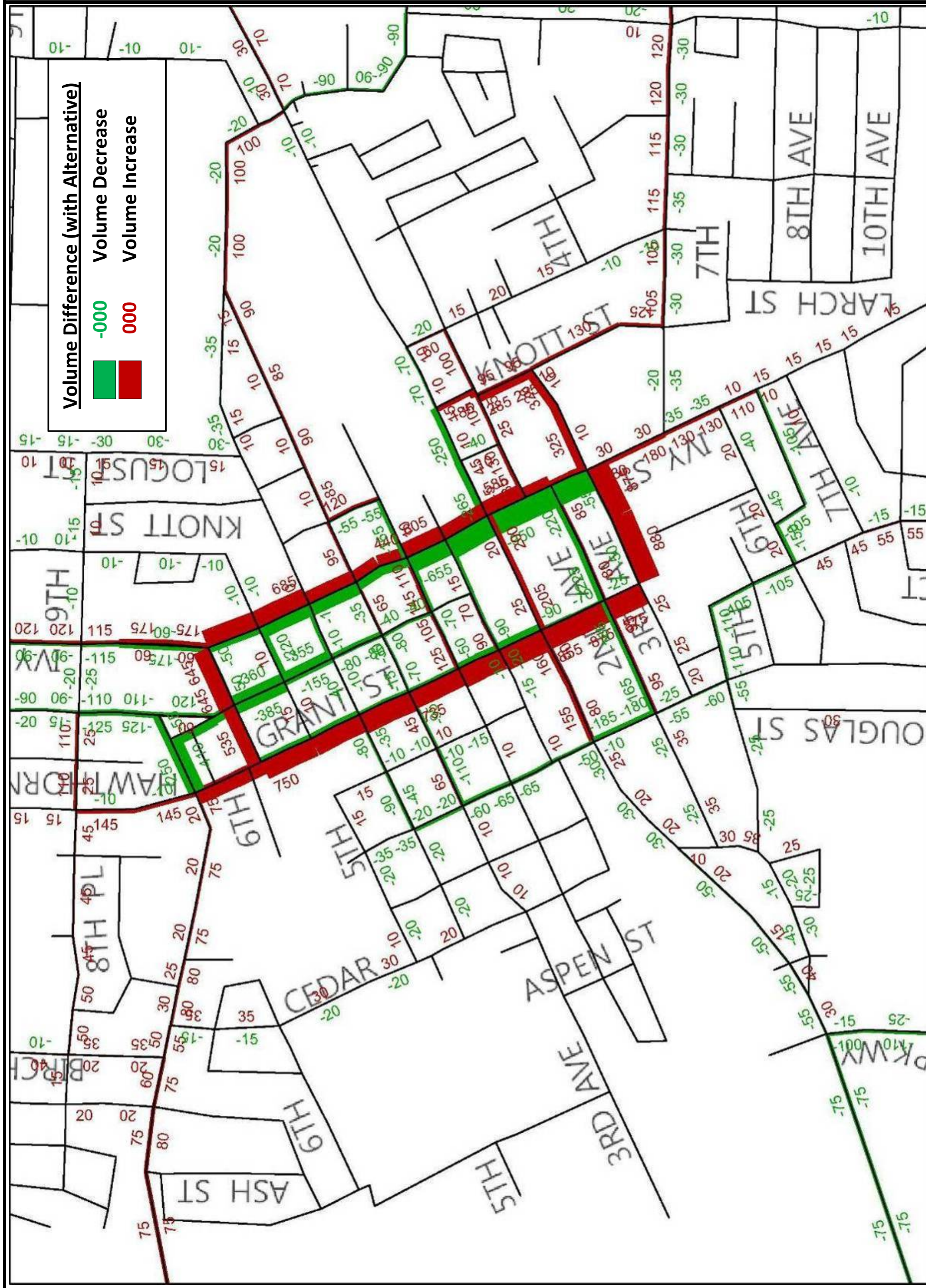


Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 6 (cont.): Modified Downtown Circulation (NW 6th Avenue)

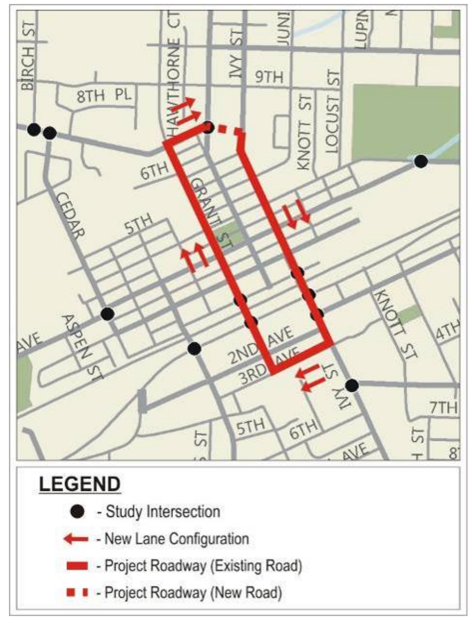


Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

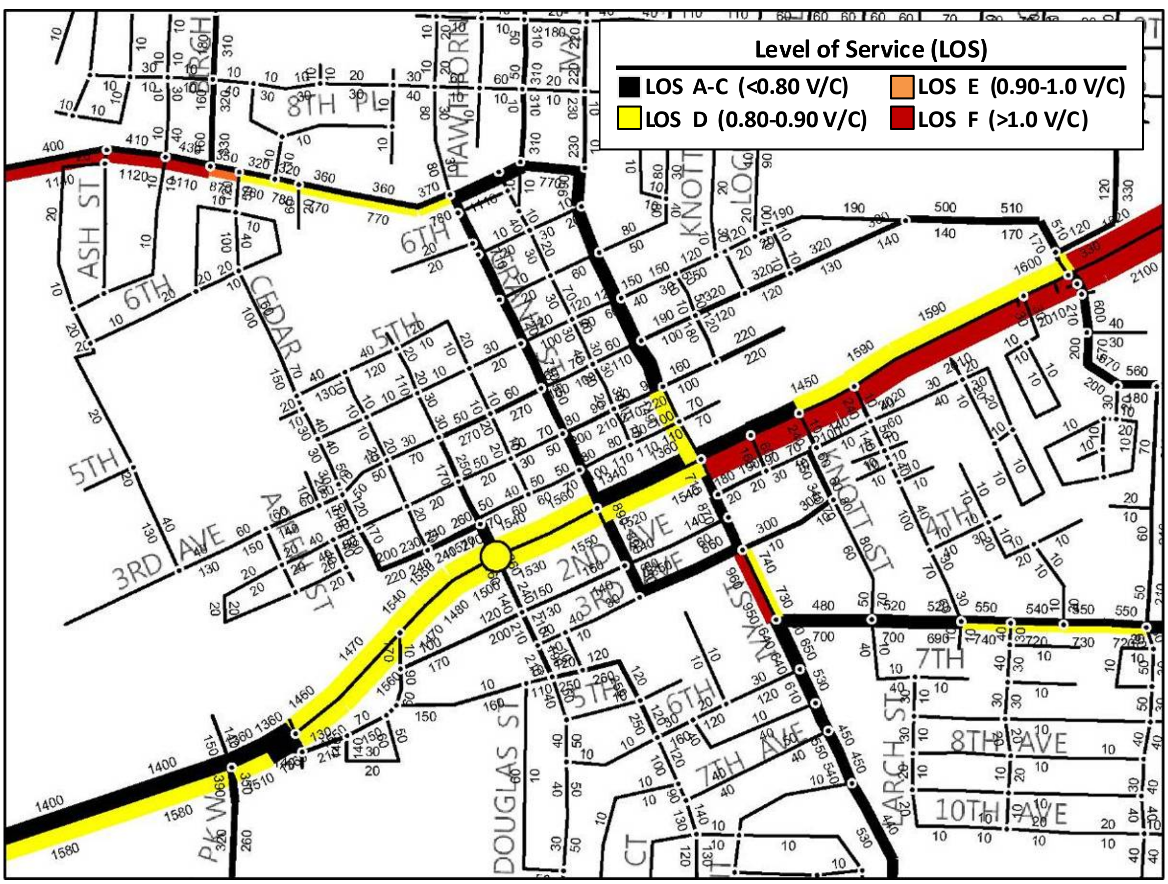
Cut Sheet 7: Modified Downtown Circulation (Alternate Flow)

Segments of Ivy Street, Grant Street, Knights Bridge Road, and SW 3rd Avenue would be converted to one-way travel, but flow would occur in opposite direction than is usual for a one-way flow system (as shown at right).

Compared with the normal flow alternative, this would slightly improve OR 99E operations because the heavy eastbound left turn movement off OR 99E to downtown would occur at Grant Street instead of Ivy Street. However, drawbacks include less direct access from OR 99E to major retail areas, crossing maneuvers at start and end points prevent free movements, and the school drop-off would be on the wrong side of Grant Street.

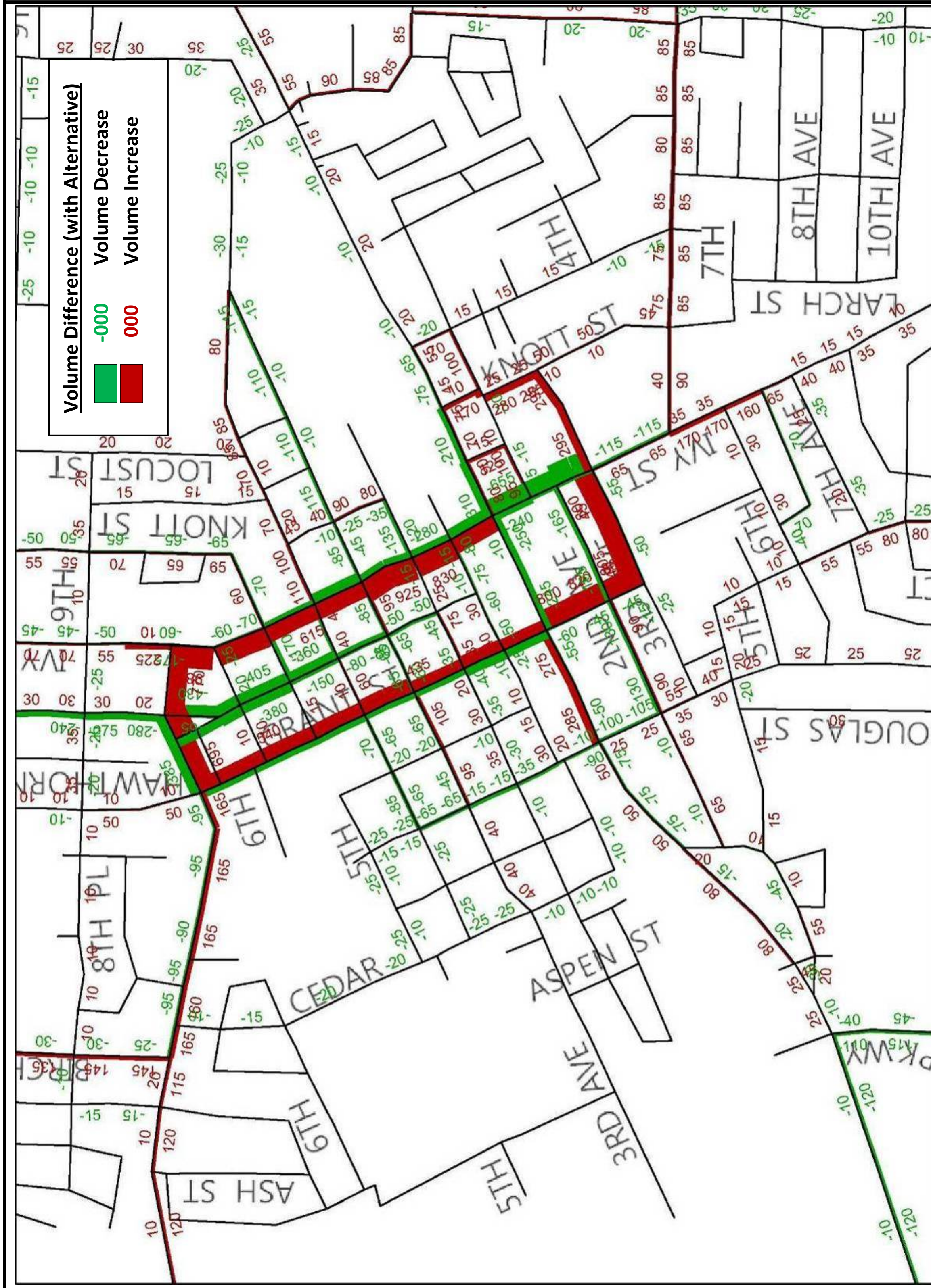


Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 7 (cont.): Modified Downtown Circulation (Alternate Flow)

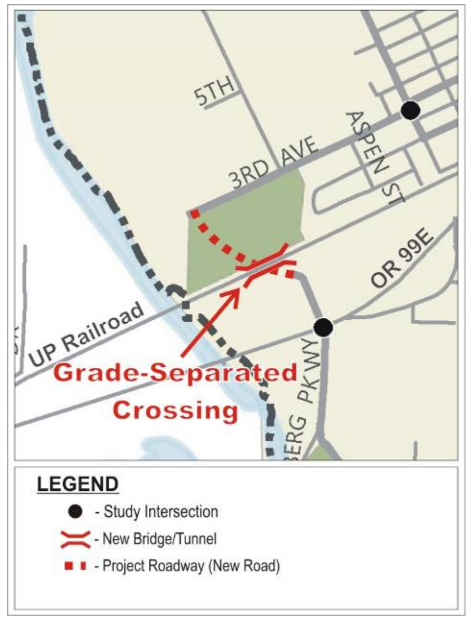


Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

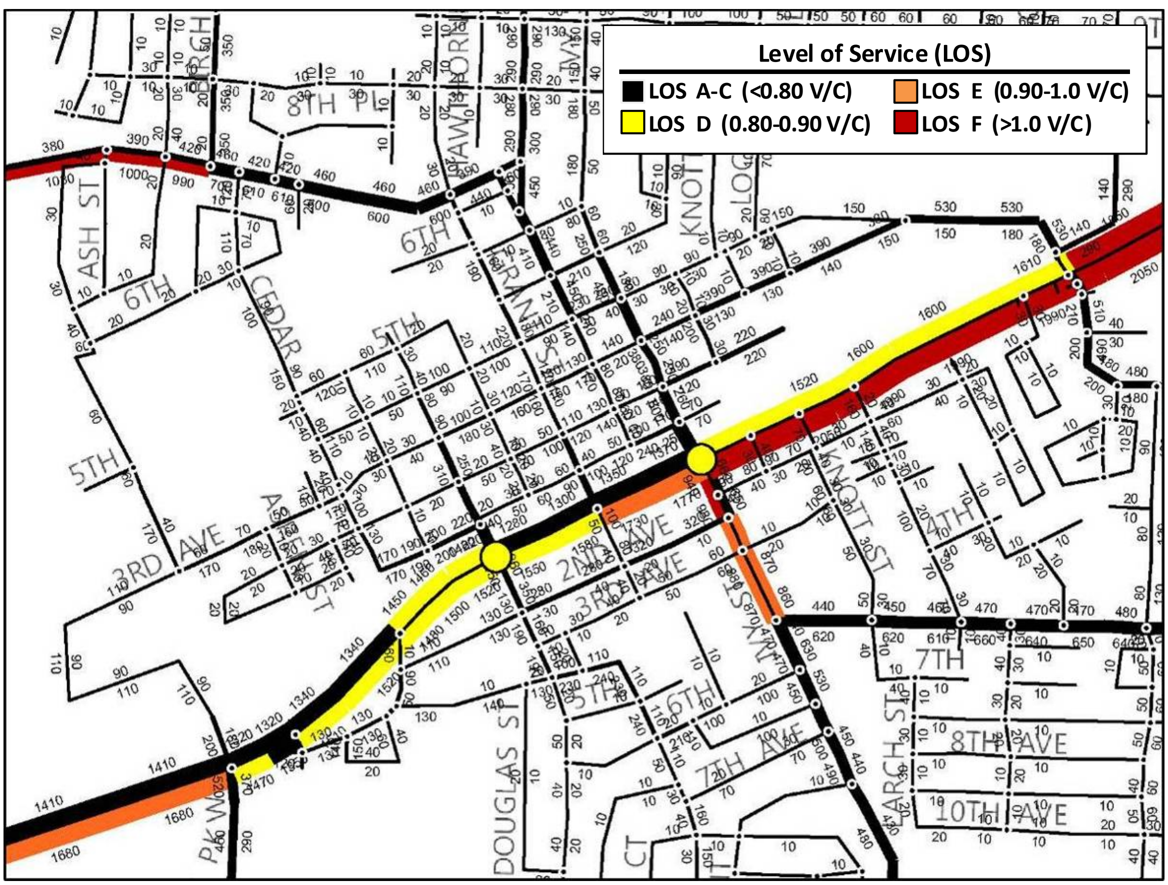
Cut Sheet 8: Berg Parkway Extension to 3rd Avenue

A grade-separated crossing of the Union Pacific Railroad track would be provided to connect Berg Parkway and NW 3rd Avenue.

This would relieve some congestion on OR 99E between Berg Parkway and Elm Street by serving approximately 2,000 vehicles per day. In addition, this route would serve a high percentage of truck traffic that is generated at the industrial area on North Baker Drive (instead of trucks routing through neighborhoods to access OR 99E at Elm Street). In addition, this connection would provide a grade-separated crossing for all travel modes. However, it would be a very costly way to service the low traffic volumes that it would benefit.

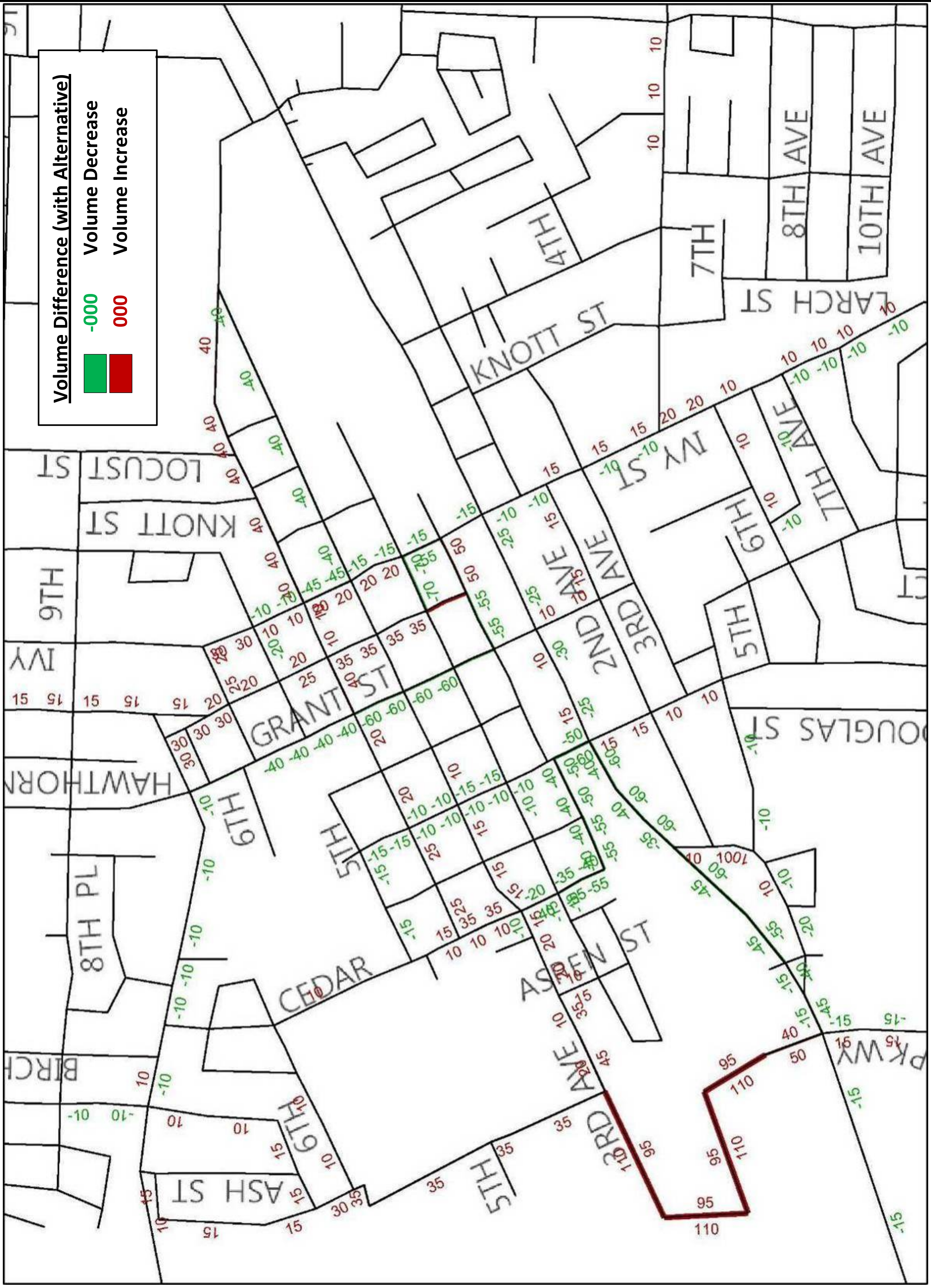


Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 8 (cont.): Berg Parkway Extension to 3rd Avenue



Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Table 12: Downtown OR 99E Capacity Alternatives – Evaluation Criteria Analysis

Criteria (by TSP Goal)	Downtown OR 99E Capacity Alternatives			
	1A	1B	2	3
	Modified CBD Circulation (Knights Bridge)	*Modified CBD Circulation (6th Avenue)*	*Modified CBD Circulation (Alternate Flow)*	*Berg Parkway Extension to 3rd Avenue*
Livability				
Reduces/discourages through travel (especially truck traffic) on streets with fronting residential uses	+1	-	+1	+1
Consistent with Canby Comprehensive Plan policies, goals, and objectives	-	-	-	+1
Safety				
Improves intersection and/or railroad crossing safety	+1	+1	+1	-
Improves pedestrian/bicycle street crossing safety	-	-	-1	+1
Economic Vitality				
Improves access/connection to I-5 and OR 99E	+1	+1	+1	+1
Improves industrial area freight access/connectivity	-	-	-	+1
No negative impacts to existing developments and/or downtown viability	+1	+1	-1	-
Sustainability				
Protects environmentally sensitive areas	-	-	-	-
Reduces vehicle miles traveled and improves flow of vehicles to reduce greenhouse gas emissions	-	-1	-1	-
Travel Choices				
Pedestrian and bicycle facility improvements connect key locations (e.g., schools and transit stops)	-	-	-	+1
Quality Design				
Enhances street aesthetics, particularly downtown	-	-	-	-
Reliability and Mobility				
Reduces local traffic use of OR 99E	-	-	-	-
Intersections meet operating standards	+1	+1	+1	-
Addresses key bottlenecks	+1	+1	+1	-
Efficient and Innovative Funding				
Maximizes use of available funding programs/sources	-	-	-	-1
Provides significant increase in mobility (for all modes) compared to cost	+1	+1	+1	-1
Compatibility				
Consistent with or improves facilities planned by road authority (City, ODOT, or Clackamas County)	+1	-	+1	-
Total	**8**	**5**	**4**	**4**

Canby Pioneer Industrial Area and NE Master Plan Area Access

Providing efficient access to the Canby Pioneer Industrial Area while limiting impacts to adjacent neighborhoods is a key concern for Canby. As a major industrial area, the most important connection is to OR 99E. The needs of the NE Canby Master Plan Area were considered together with those of the Canby Pioneer Industrial Area because it is located between OR 99E and the Canby Pioneer Industrial Area.

A list of potential solutions was identified, and the preliminary analysis and screening results are documented in Table 13.

Table 13: Industrial Area and NE Master Plan Area Access – Initial Screening

Alternative	Screening Result
Otto Road extension to Canby Pioneer Industrial Park	Keep as an alternative to further refine.
Roundabout at Mulino/SE 1st Avenue/Haines Road	Keep as an alternative to further refine (and possibly include as an element of a larger OR 99E/Otto Road access alternative).

Based on the initial screening, two alternatives were selected for further evaluation:

- Otto Road Extension to Canby Pioneer Industrial Area
- Mulino/SE 1st Avenue/Haines Road Roundabout

These alternatives are discussed in Cut Sheets 9 and 10. Included on the cut sheets are figures showing the alternative schematic, model volumes and roadway performance, and how the alternative would affect traffic volumes on study area roadways relative to the 2030 No-Build scenario.

Following the cut sheets, Table 14 shows the results of an evaluation based on the TSP goals. Based on the results, the following alternative should be included in the preferred solutions package:

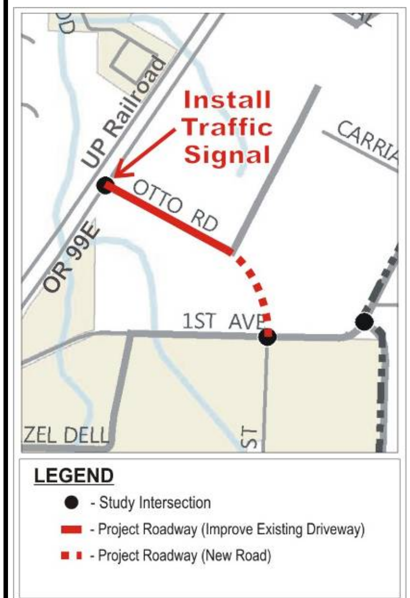
Recommended Solution Package Component:

- Otto Road Extension to Canby Pioneer Industrial Area

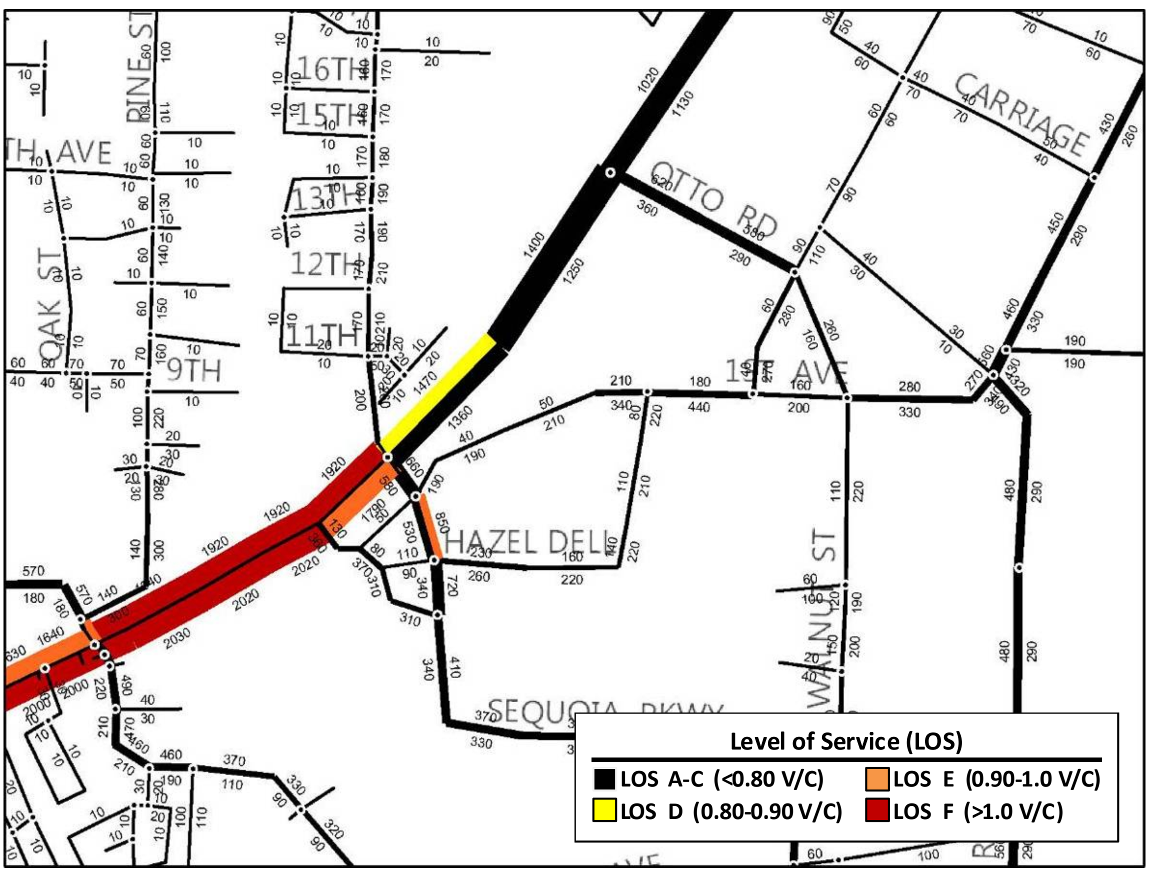
Cut Sheet 9: Otto Road Extension to Industrial Area

Improve Otto Road and extend between OR 99E and SE 1st Avenue. Install a traffic signal at OR 99E/Otto Road and a roundabout at Otto Road/SE 1st Avenue.

This significantly reduces northbound Sequoia Parkway approach traffic to OR 99E by carrying up to 9,000 vehicles per day. Use of Haines Road for access to OR 99E on the northeast is also greatly reduced. Otto Road connection would reduce the reliance of the Canby Pioneer Industrial Area on Township Road and other roadways through existing residential areas that connect to OR 99E. However, Otto Road itself is planned to serve the NE Canby Master Plan area, which was planned for a mixed use residential area. Therefore, modifications to the NE Canby Master Plan, which has not yet been adopted by the City, should be considered that would better integrate the upgraded function of Otto Road with surrounding land uses.

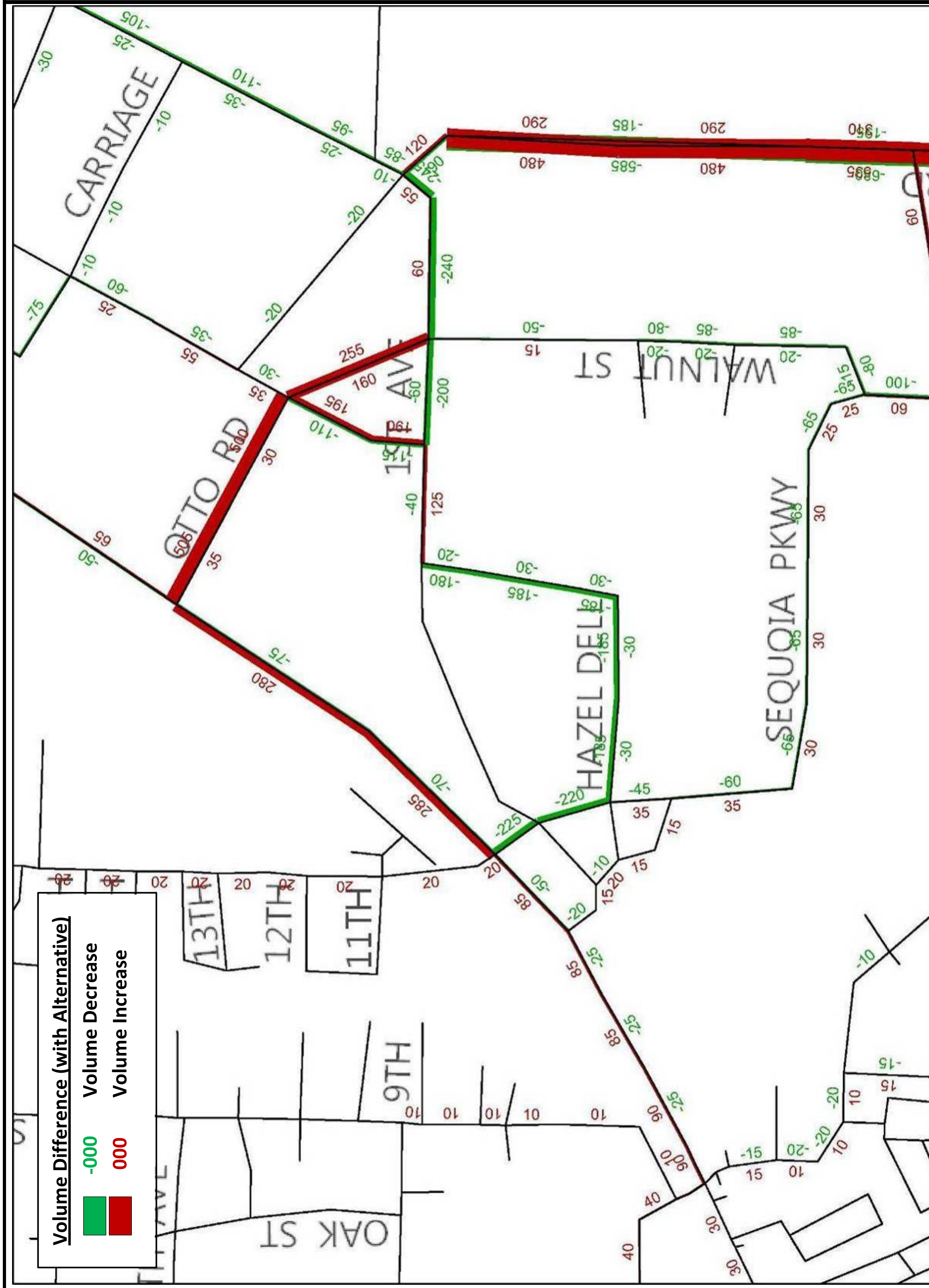


Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 9 (cont.): Otto Road Extension to Industrial Area



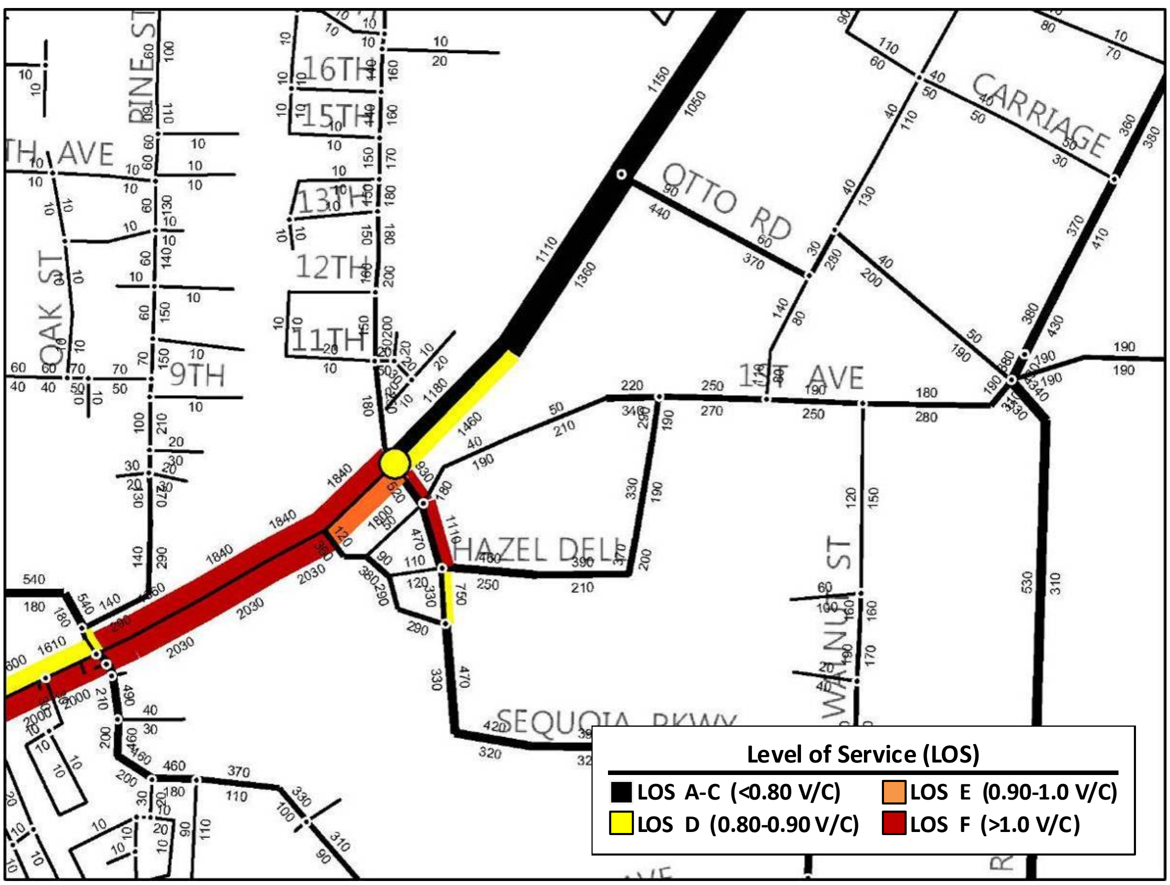
Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Cut Sheet 10: Mulino Road/SE 1st Avenue/Haines Road Improvements

Install five-leg roundabout to allow realignment of SE 1st Avenue/Mulino Road/Haines Road intersection. Due to proximity, also include Bremer Road. NE Canby Master Plan also identifies a future roadway connecting at this intersection.

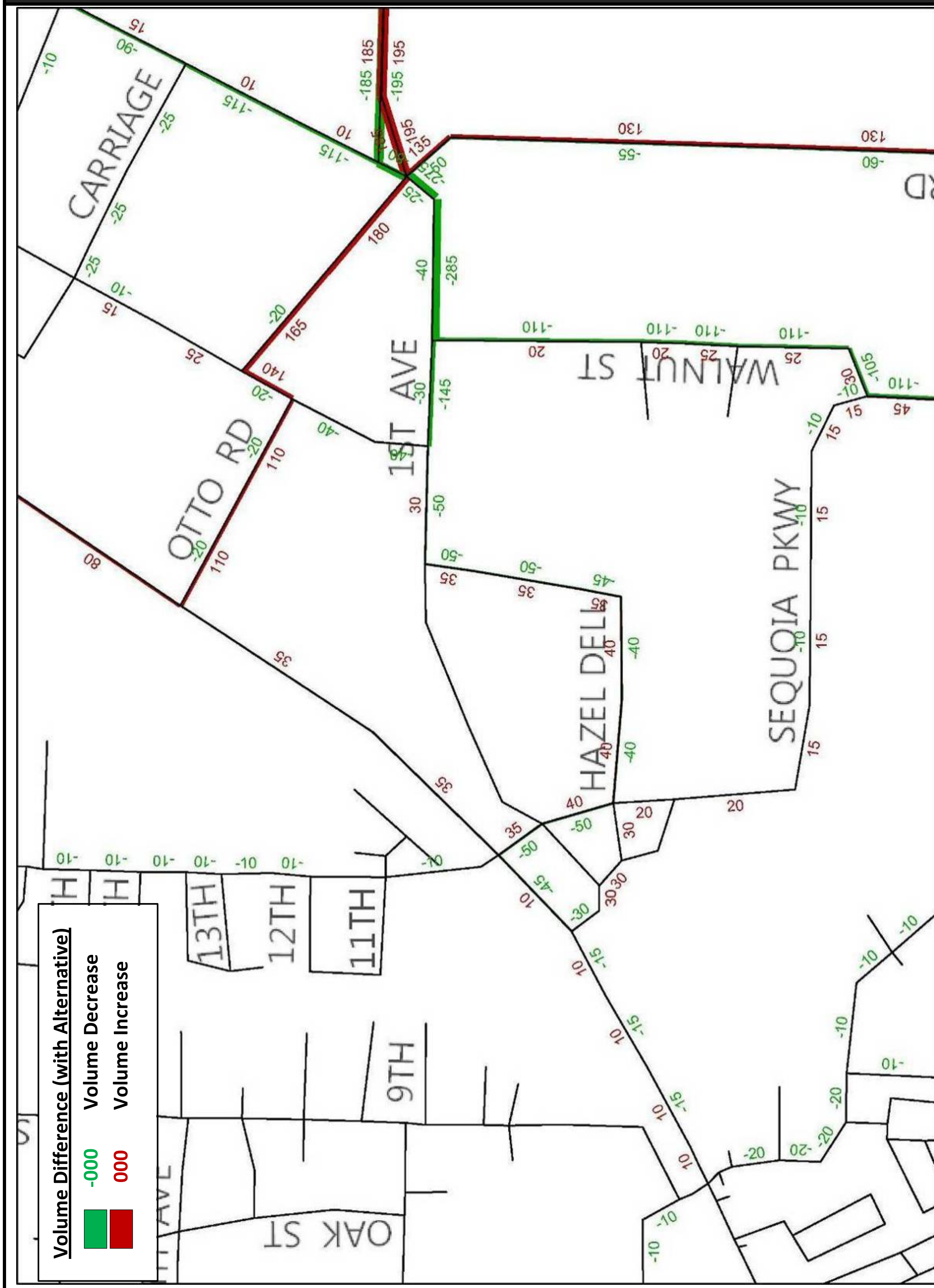
This addresses existing intersection alignment concerns (due to the proximity of Bremer Road to Mulino Road). The effect on traffic circulation is fairly minor for most roads in the area. Otto Road would experience an increase in traffic of up to 1,000 vehicles per day.

Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 10 (cont.): Mulino Road/SE 1st Avenue/Haines Road Improvements



Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Table 14: Industrial Area and NE Master Plan Area Access – Evaluation Criteria Analysis

Criteria (by TSP Goal)	Canby Pioneer Industrial Area and NE Master Plan Area Access Alternatives	
	5A	6
	Otto Road Extension to Industrial Area	*Mulino/SE 1st/ Haines Road Improvements*
Livability		
Reduces/discourages through travel (especially truck traffic) on streets with fronting residential uses	+1	-
Consistent with Canby Comprehensive Plan policies, goals, and objectives	+1	-
Safety		
Improves intersection and/or railroad crossing safety	-	+1
Improves pedestrian/bicycle street crossing safety	-	-
Economic Vitality		
Improves access/connection to I-5 and OR 99E	+1	-
Improves industrial area freight access/connectivity	+1	+1
No negative impacts to existing developments and/or downtown viability	+1	-1
Sustainability		
Protects environmentally sensitive areas	-	-
Reduces vehicle miles traveled and improves flow of vehicles to reduce greenhouse gas emissions	+1	-
Travel Choices		
Pedestrian and bicycle facility improvements connect key locations (e.g., schools and transit stops)	+1	-
Quality Design		
Enhances street aesthetics, particularly downtown	-	-
Reliability and Mobility		
Reduces local traffic use of OR 99E	-	-
Intersections meet operating standards	+1	-
Addresses key bottlenecks	+1	-
Efficient and Innovative Funding		
Maximizes use of available funding programs/sources	+1	-1
Provides significant increase in mobility (for all modes) compared to cost	+1	-1
Compatibility		
Consistent with or improves facilities planned by road authority (City, ODOT, or Clackamas County)	+1	-
Total	**11**	**-1**

East-West Corridor Improvements North of OR 99E

Congestion on OR 99E can be reduced by providing improved parallel routes serving local traffic to allow these vehicles to avoid using the highway. On the northeast side of town, the Molalla Forest Road multi-use trail runs north-south and limits connectivity between the east and west sides of town. A new east-west connection would be a good way to provide a parallel route and improve circulation. A list of potential solutions was identified, and the preliminary analysis and screening results are documented in Table 15.

Table 15: East-West Corridor Improvements North of OR 99E – Initial Screening

Alternative	Screening Result
10th Street extension between Grant and Birch	Only provides local connectivity (little capacity benefit). Do not analyze further, but City should consider for local street connectivity.
10th Street extension over Molalla Forest Road multi-use trail	Keep as a possible frontage road alignment to connect NE 4th Avenue to Otto Road overpass (in place of the Pine Street frontage road)
Close NE 4th Avenue (Pine Street) crossing of Union Pacific Railroad	Good option for reducing conflicts to increase safety and may also allow for potential improvements at the Otto Road railroad crossing. Include in combination with other alternatives.
Frontage Road between Pine St and new Otto Rd with closure of Pine St/OR 99E and Grade-separated overcrossing at Otto Rd	Keep as an alternative to further refine.
Otto Road overcrossing (without OR 99E access)	Access to OR 99E would definitely be needed in conjunction with overpass. Otherwise, costs will exceed benefits
Otto Road interchange (or interchange/traffic signal hybrid) with frontage road to Pine St and closure of Pine St RR crossing	Good start in providing a better connection to the highway, but further analysis and fine-tuning needed.
NE 4th Ave realignment to connect to N Pine St, with other leg of Pine St (i.e., which crosses the railroad tracks and intersects OR 99E) teeing into it	New alternative presented for analysis.
OR 99E/4th Street-Pine Street improvements, including the installation of a westbound right-turn lane, converting the southbound approach geometry to two left turn lanes and a through-right lane plus a left-turn lane, moving the southbound approach stop bar behind the railroad tracks, and adjusting the signal timing to run with split phased for the northbound and southbound approaches	Possible lower-cost improvement to consider as interim solution while efforts are made to implement the Otto Road overcrossing improvement

Based on the initial screening, three alternatives were developed for further evaluation. These alternatives consist of various combinations of the preliminary alternatives that were identified and screened:

- Otto Road Extension to NE 4th Avenue as Frontage Road
- Otto Road Overcrossing and 10th Avenue Extension
- Realignment of NE 4th Avenue and Pine Street with OR 99E/4th Street-Pine Street intersection improvements

These alternatives are discussed in Cut Sheets 11 through 13. Following the cut sheets, the criteria evaluation is provided in Table 16 and supports the inclusion of the following alternative as part of the preferred solutions package (though a connection to NE 4th Avenue is preferred due to less impact to existing development):

Recommended Solution Package Component:

- Otto Road Overcrossing with Frontage Road to NE 4th Avenue

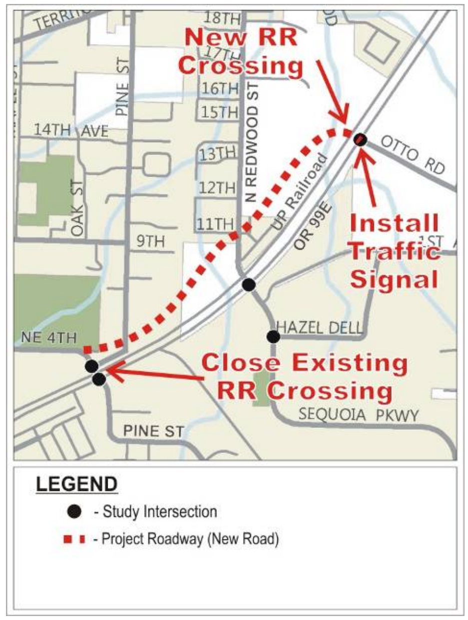
Financially-Constrained Solution Package Component:

- Realignment of NE 4th Avenue and Pine Street with OR 99E/4th Street-Pine Street intersection improvements

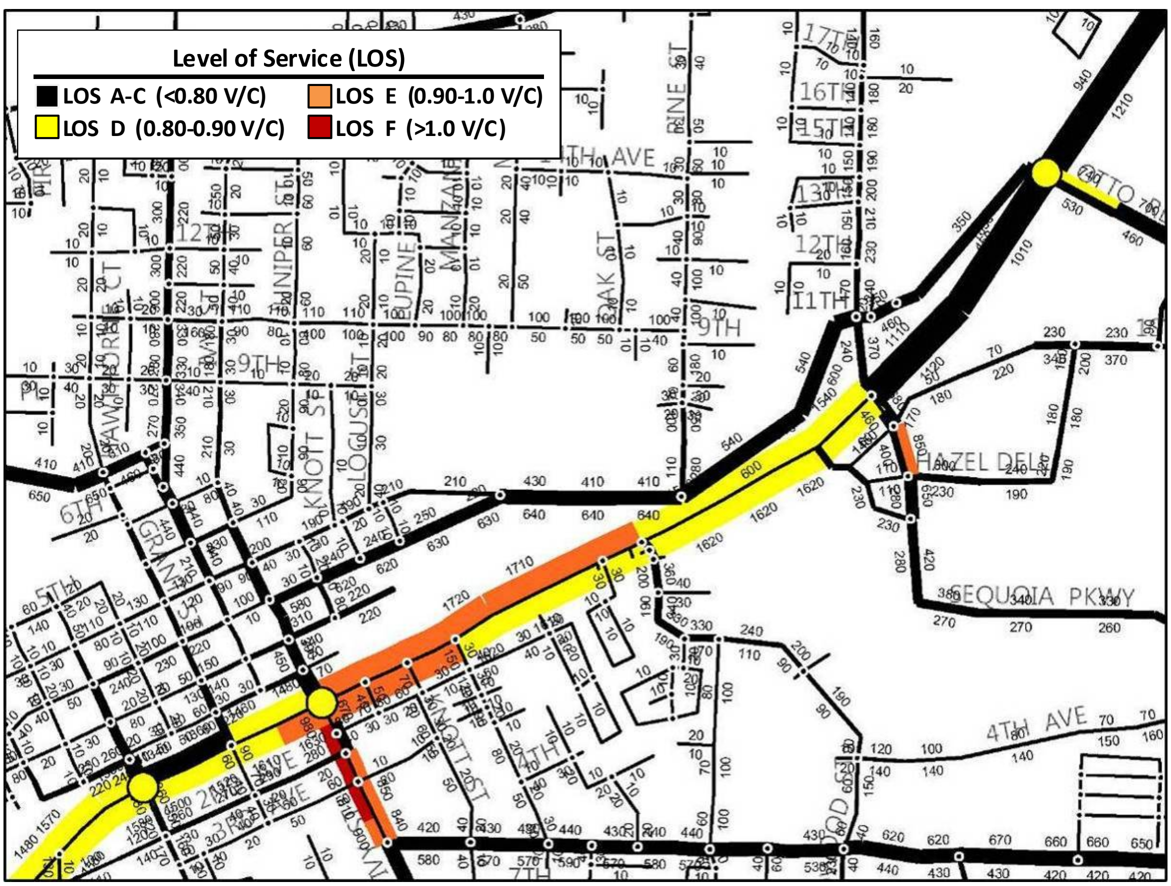
Cut Sheet 11: Otto Road Extension to NE 4th Avenue as Frontage Road

Extend Otto Road across Union Pacific Railroad and provide a frontage road through developed and undeveloped land to connect to NE 4th Avenue. Also, close existing railroad crossing at Pine Street/NE 4th Avenue

This would significantly reduce traffic on OR 99E (up to 8,000 vehicles per day between Sequoia Parkway and Pine Street) because of additional parallel route. It also closes the dangerous railroad crossing at Pine Street/NE 4th Avenue. A railroad crossing would be required at Otto Road, and ODOT Rail would only support a grade-separated crossing. There would also likely be significant impacts to residences near Redwood Street, depending on the alignment.

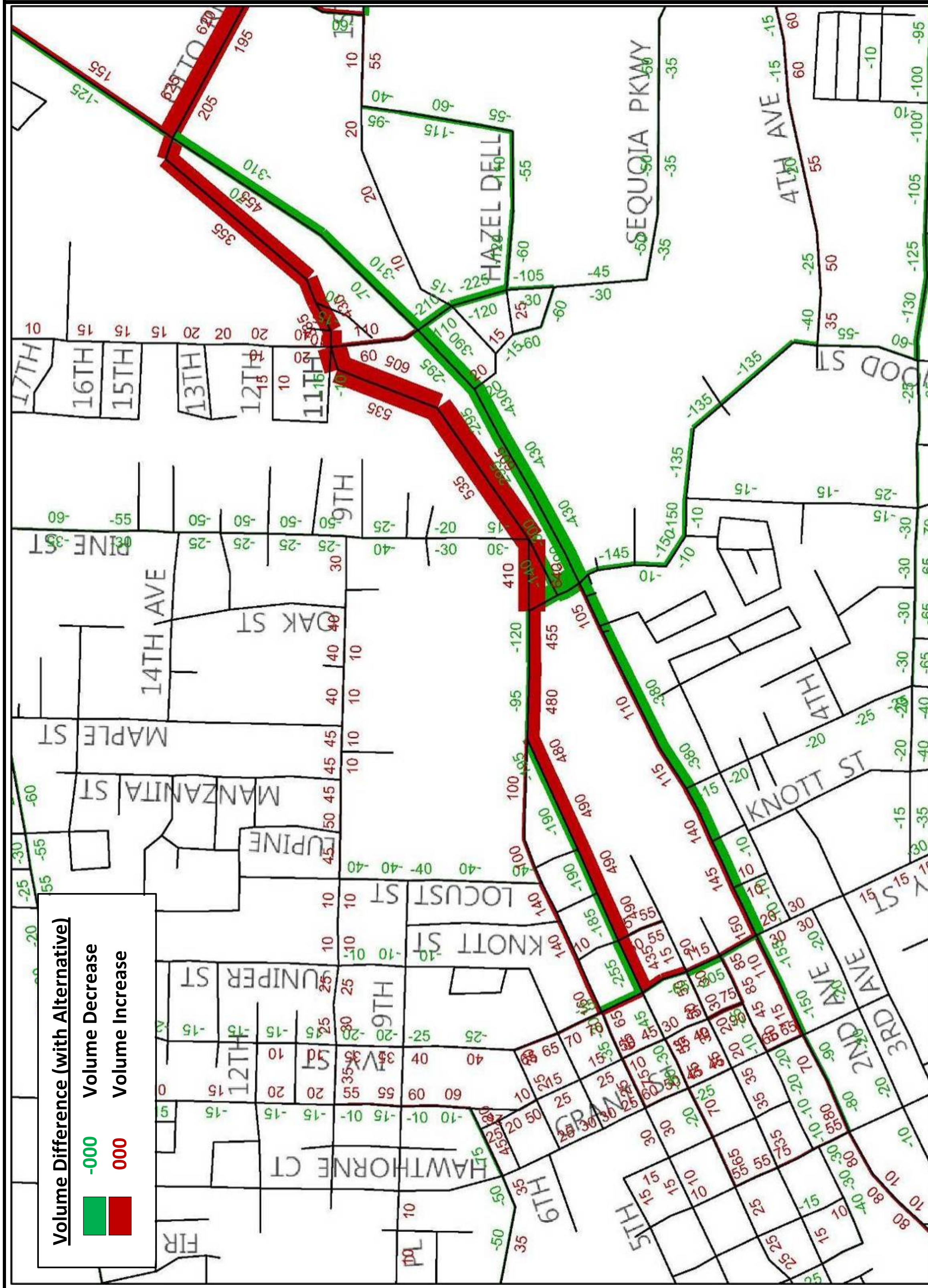


Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 11 (cont): Otto Road Extension to 4th Avenue as Frontage Road



Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

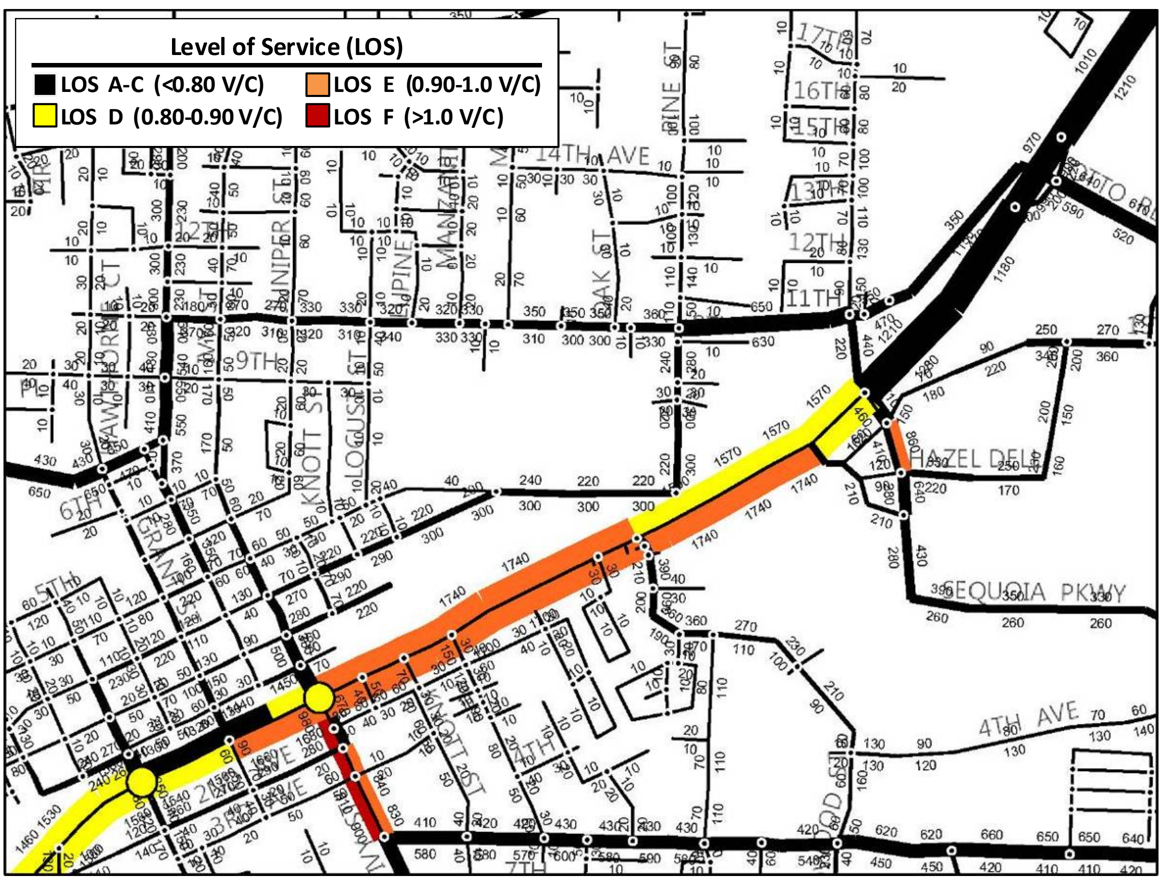
Cut Sheet 12: Otto Road Overcrossing and Extension to 10th Avenue

Construct bridge over OR 99E and the Union Pacific Railroad and provide a frontage road through developed and undeveloped land to connect to NE 10th Avenue (or connect to NE 4th Avenue instead).

This provides a high-capacity connection to OR 99E for Otto Road that can be both the gateway to the Industrial Area and the main entrance to the Clackamas County Fairgrounds. The frontage road would carry up to 13,000 vehicles per day.

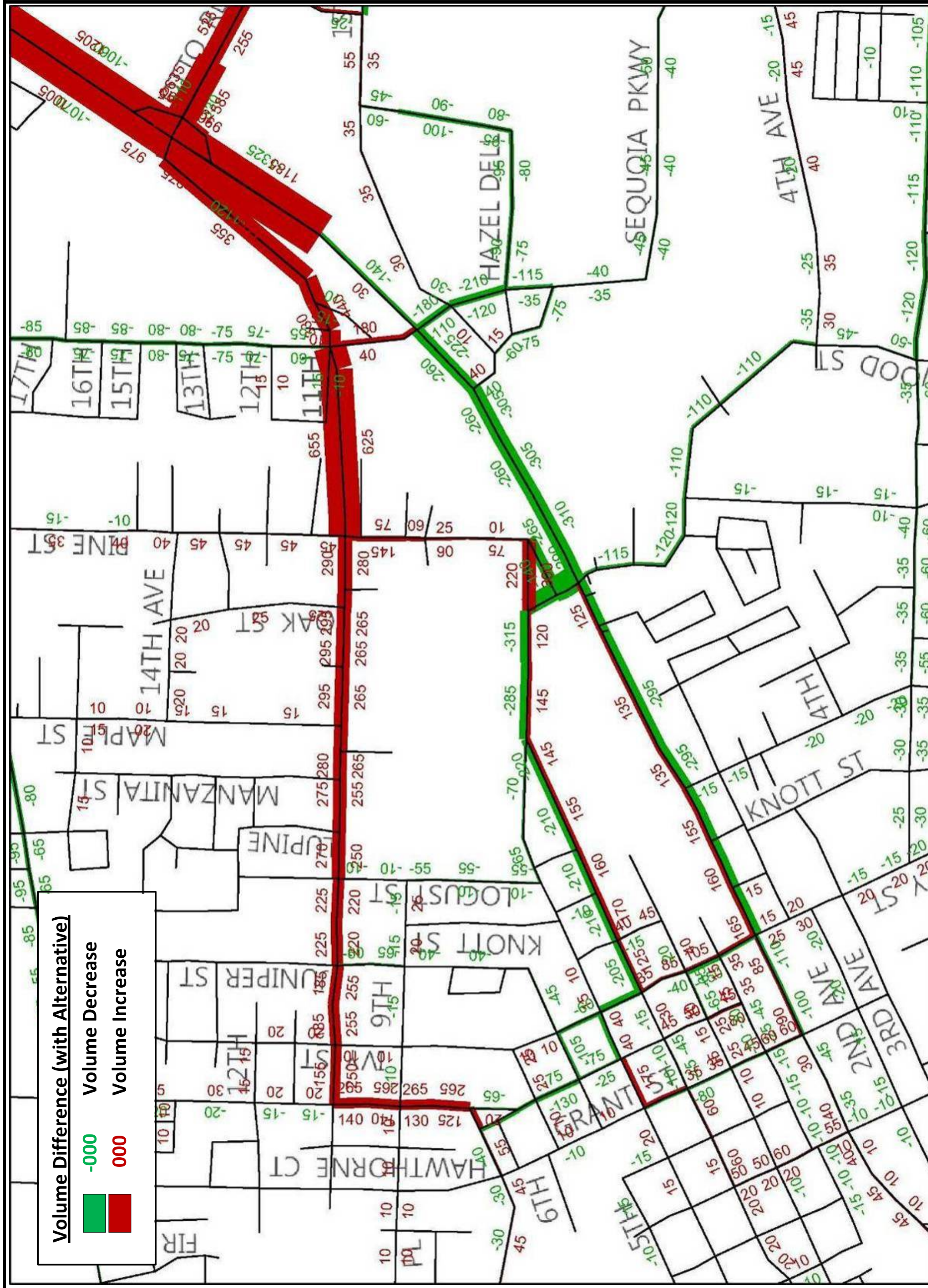
If the connection is to 10th Street, it would significantly increase traffic through the neighborhood (up to 6,000 vehicles per day) and would require the acquisition of multiple existing developed parcels.

Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 12 (cont.): Otto Road Overcrossing and Extension to 10th Avenue



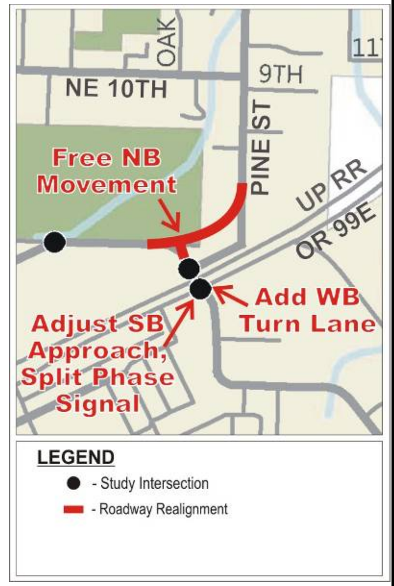
Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Cut Sheet 13: Pine St Realignment & Improvements at OR 99E and NE 4th Ave

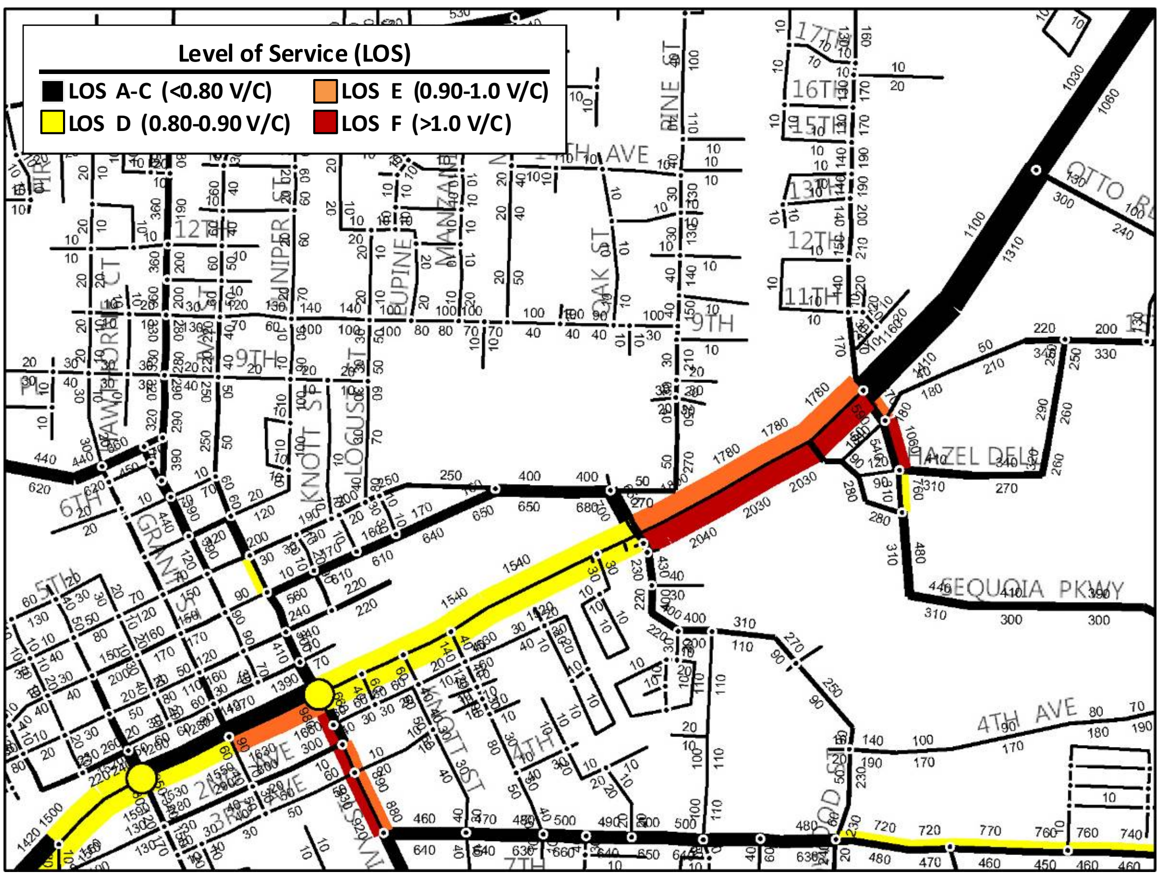
Relocates Pine Street/NE 4th Avenue intersection farther from Union Pacific Railroad track and creates a T-intersection. While the railroad crossing is still open, the northbound approach to 4th Street/Pine Street should not be stop controlled. Should the crossing be closed, then the east-west approaches should become the through movements.

Also installs a westbound right-turn lane at OR 99E/Pine Street, converts the southbound approach to two left-turn lanes and a through-right, moves the southbound approach stop bar behind the railroad tracks, and adjusts the signal timing to run with split phases for northbound and southbound approaches.

This would improve safety at the crossing and reduce eastbound traffic volumes on OR 99E by 5,000 daily vehicles (which would use NE 4th Avenue instead).

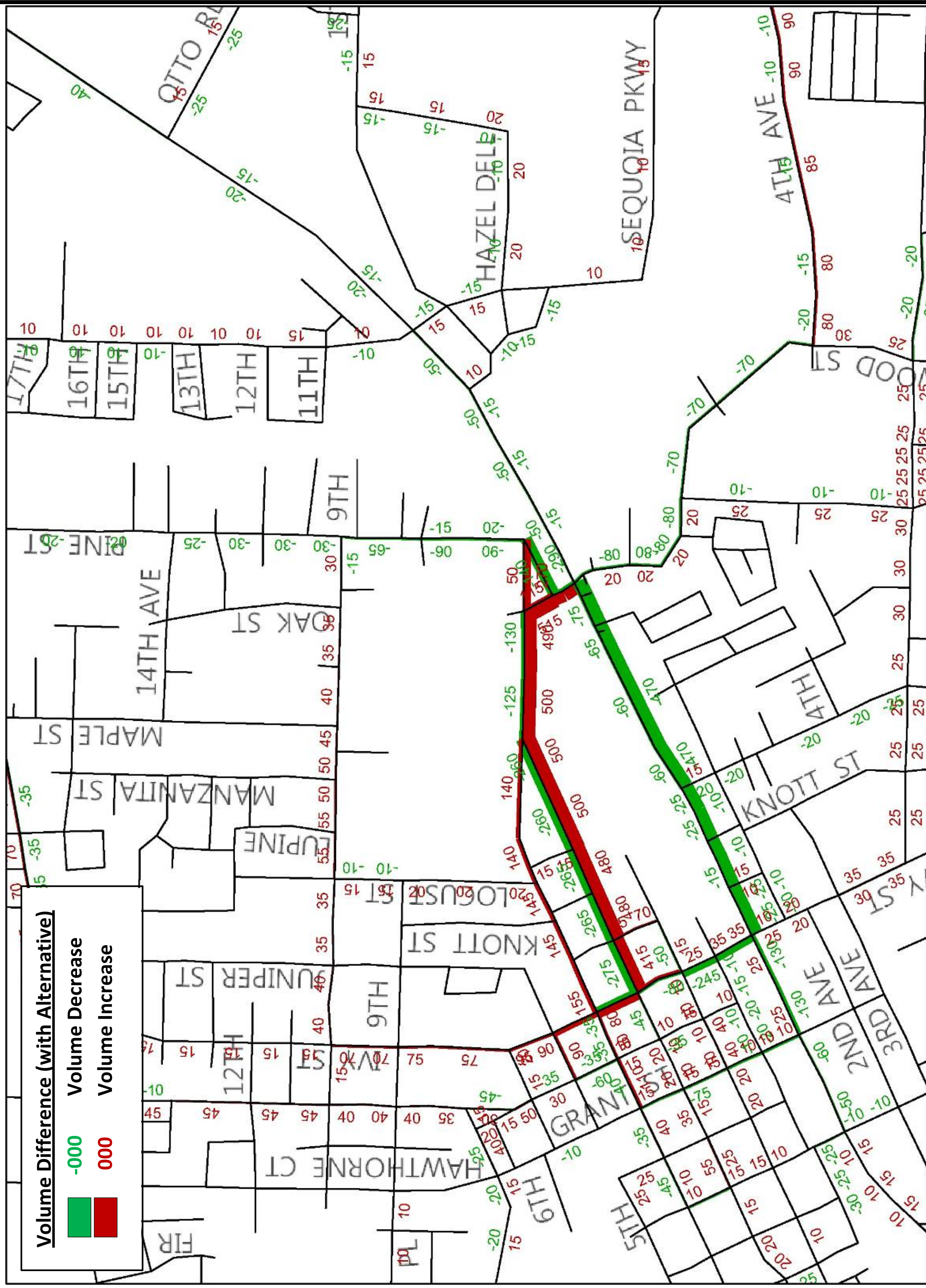


Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 13 (cont.): Pine Street Realignment & Improvements



Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Table 16: East-West Corridor Improvements North of OR 99E – Evaluation Criteria Analysis

Criteria (by TSP Goal)	East-West Imps. North of OR 99E		
	5B	5C	10
	Otto Rd Ext. to 4th Ave. as Frontage Road	*Otto Rd Overcrossing and Ext. to 10th Ave as Frontage Rd*	*Realignment of NE 4th Avenue and Pine Street with OR 99E/4th-Pine St improvements*
Livability			
Reduces/discourages through travel (especially truck traffic) on streets with fronting residential uses	-	-1	-
Consistent with Canby Comprehensive Plan policies, goals, and objectives	-	+1	-
Safety			
Improves intersection and/or railroad crossing safety	-	+1	+1
Improves pedestrian/bicycle street crossing safety	-	+1	-
Economic Vitality			
Improves access/connection to I-5 and OR 99E	-	-	+1
Improves industrial area freight access/connectivity	-	+1	-
No negative impacts to existing developments and/or downtown viability	-1	-1	+1
Sustainability			
Protects environmentally sensitive areas	-	-	-
Reduces vehicle miles traveled and improves flow of vehicles to reduce greenhouse gas emissions	+1	+1	-
Travel Choices			
Pedestrian and bicycle facility improvements connect key locations (e.g., schools and transit stops)	+1	+1	-
Quality Design			
Enhances street aesthetics, particularly downtown	-	-	-
Reliability and Mobility			
Reduces local traffic use of OR 99E	+1	+1	+1
Intersections meet operating standards	+1	+1	-1
Addresses key bottlenecks	+1	+1	+1
Efficient and Innovative Funding			
Maximizes use of available funding programs/sources	-	+1	-
Provides significant increase in mobility (for all modes) compared to cost	+1	-1	+1
Compatibility			
Consistent with or improves facilities planned by road authority (City, ODOT, or Clackamas County)	-	+1	-
Total	**5**	**7**	**5**

East-West Corridor Improvements South of OR 99E

One way to reduce congestion on OR 99E is to provide improved parallel routes that can serve local traffic and allow these vehicles to avoid using the highway. On the south side of town, the Oregon Pacific Railroad and Molalla Forest Road multi-use trail run north-south and limit connectivity between the east and west sides of town to three main roadways: SE 4th Avenue, Township Road, and SE 13th Avenue. Therefore, a parallel route and improved circulation could be provided by constructing an additional railroad crossing or improvements along one of these three roadways (Township Road in particular because it is the main roadway and has future capacity concerns). A list of potential solutions was identified, and the preliminary analysis and screening results are documented in Table 17.

Table 17: East-West Corridor Improvements South of OR 99E – Initial Screening

Alternative	Screening Result
SE 2nd Ave extensions through mobile home park and over Oregon Pacific Railroad to Sequoia Pkwy	The nearby bridge at SE 4th Street has sufficient capacity, and costs will exceed benefit. Do not consider further.
SE 4th Avenue Extension to Mulino Road	Primarily provides improved connectivity rather than capacity and should be included, though it is a potential developer-driven improvement.
Realignment of offset SW 2nd Avenue and SE 2nd Avenue intersections with Ivy Street	Desirable and feasible, but do not consider as a capacity project.
Realignment of Township with SW 6th Avenue	Too much property impact. Do not consider further.
Roundabout or traffic signal at Township Road/Ivy Street	Desirable and doable, though it may increase traffic on Township and the need for corridor-wide improvements. A traffic signal is another option if a single-lane roundabout doesn't meet operating standards.
Sequoia Pkwy extension south from Township to SE 13th (with bridge over both Oregon Pacific Railroad and Molalla Forest Road multi-use trail)	Not needed and would be cost prohibitive. It would be better to provide access to OR 99E than to spend money on a new bridge.
Roundabout at Mulino Road/SE 13th Avenue	Desirable improvement for safety, but still need to determine whether creek makes it infeasible. Do not consider as a capacity project.

Based on the initial screening, the following two alternatives were developed for further evaluation:

- Township/Ivy Roundabout (or Traffic Signal)
- Township Road Widened to 3 Lanes

These alternatives are discussed in Cut Sheets 14 and 15. Following the cut sheets, the criteria evaluation is provided in Table 18 and supports the inclusion of the following alternative as part of the preferred solutions package. A traffic signal was selected instead of a roundabout because it provides adequate capacity at a much lower cost (primarily because a single-lane roundabout is not expected to be adequate).

<u>Recommended Solution Package Component:</u>

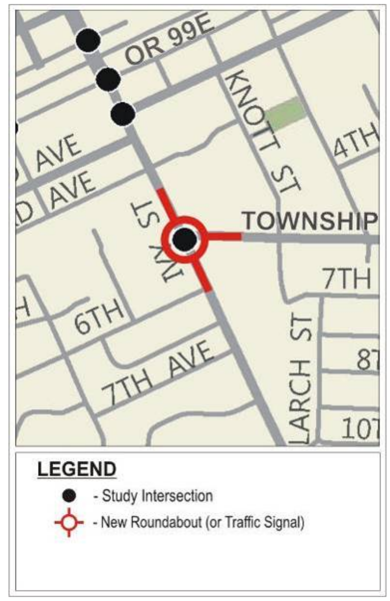
- Township/Ivy Traffic Signal

Cut Sheet 14: Township/Ivy Roundabout (or Traffic Signal)

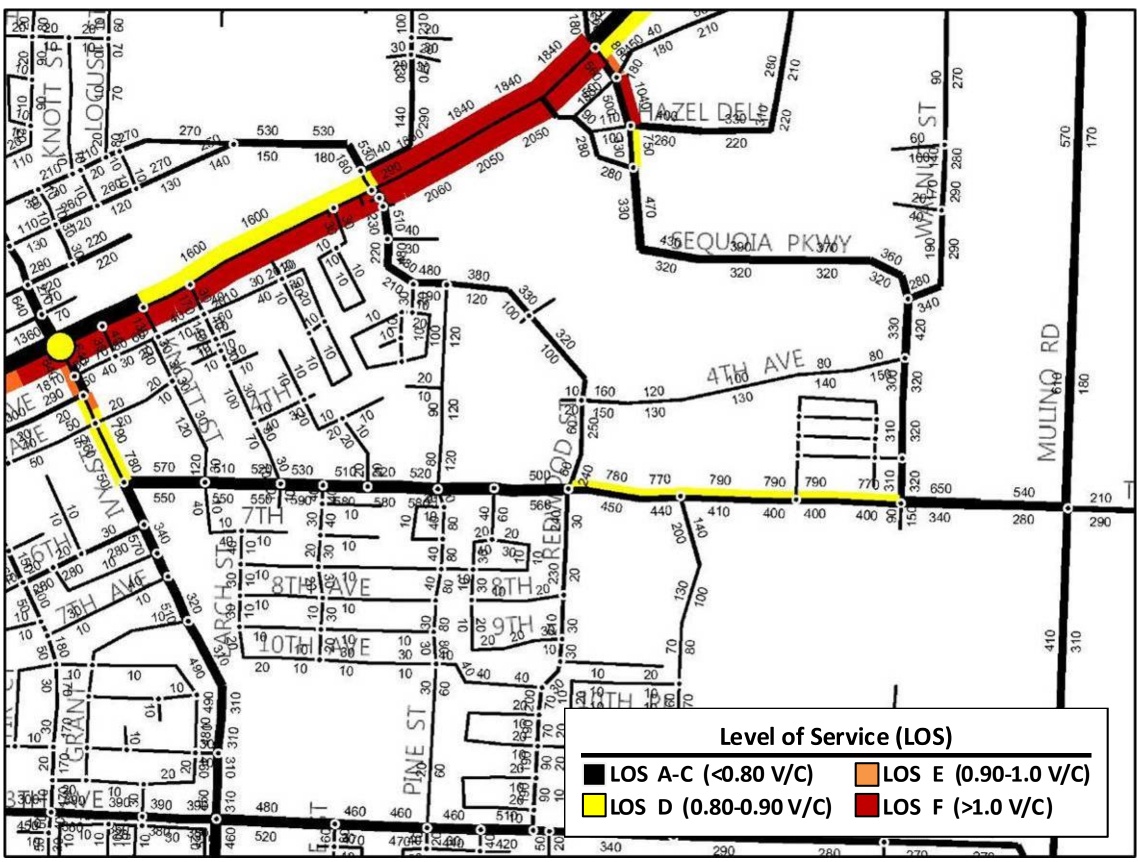
Install a single-lane roundabout or traffic signal.

A roundabout would reduce traffic (up to 2,000 vehicles per day) and improve operations on South Ivy Street. It would also increase westbound traffic and reduce eastbound traffic on Township Road. Furthermore, it would provide a safer intersection, but would operate near capacity due primarily to the high southbound left-turn volume. Based on intersection volumes, a multi-lane roundabout would be required, which would have substantial right-of-way and building impacts.

A traffic signal is also an option and would not be expected to cause a significant change in traffic volumes relative to the roundabout. While a traffic signal would have higher annual operating costs, the footprint of the signalized intersection would match the existing intersection configuration and not require significant right-of-way acquisition.

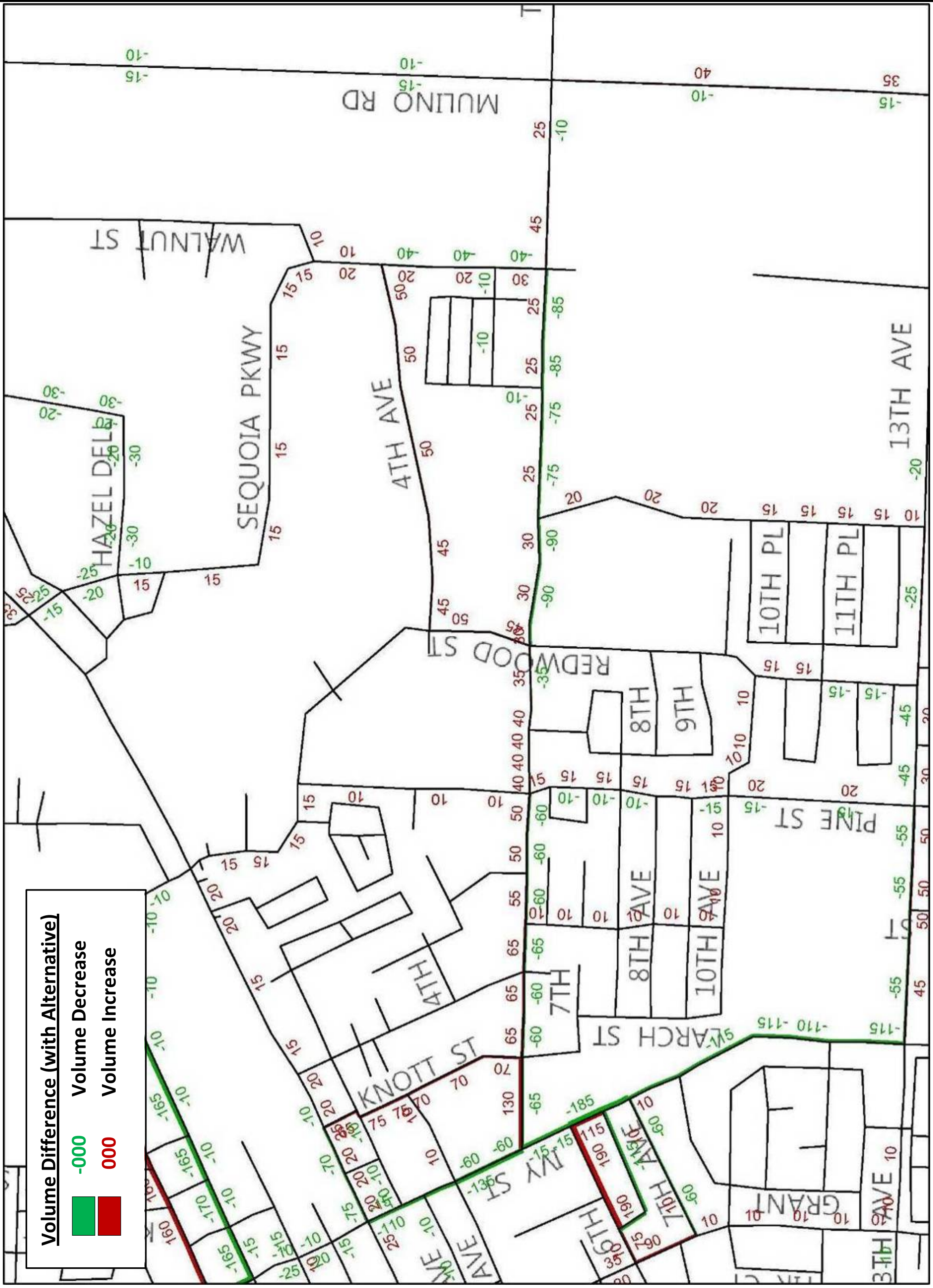


Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 14 (cont.): Township/Ivy Roundabout (or Traffic Signal)

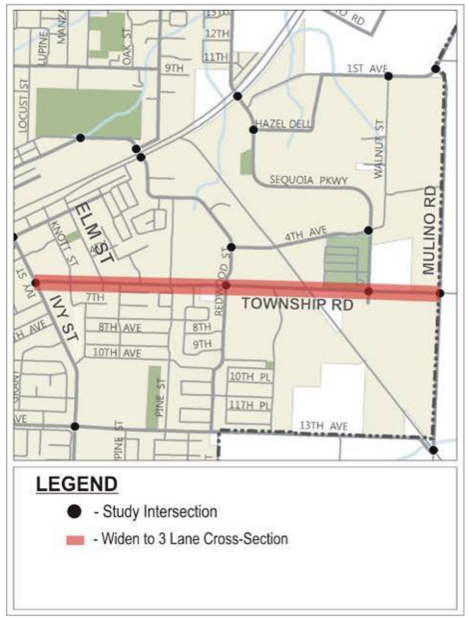


Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

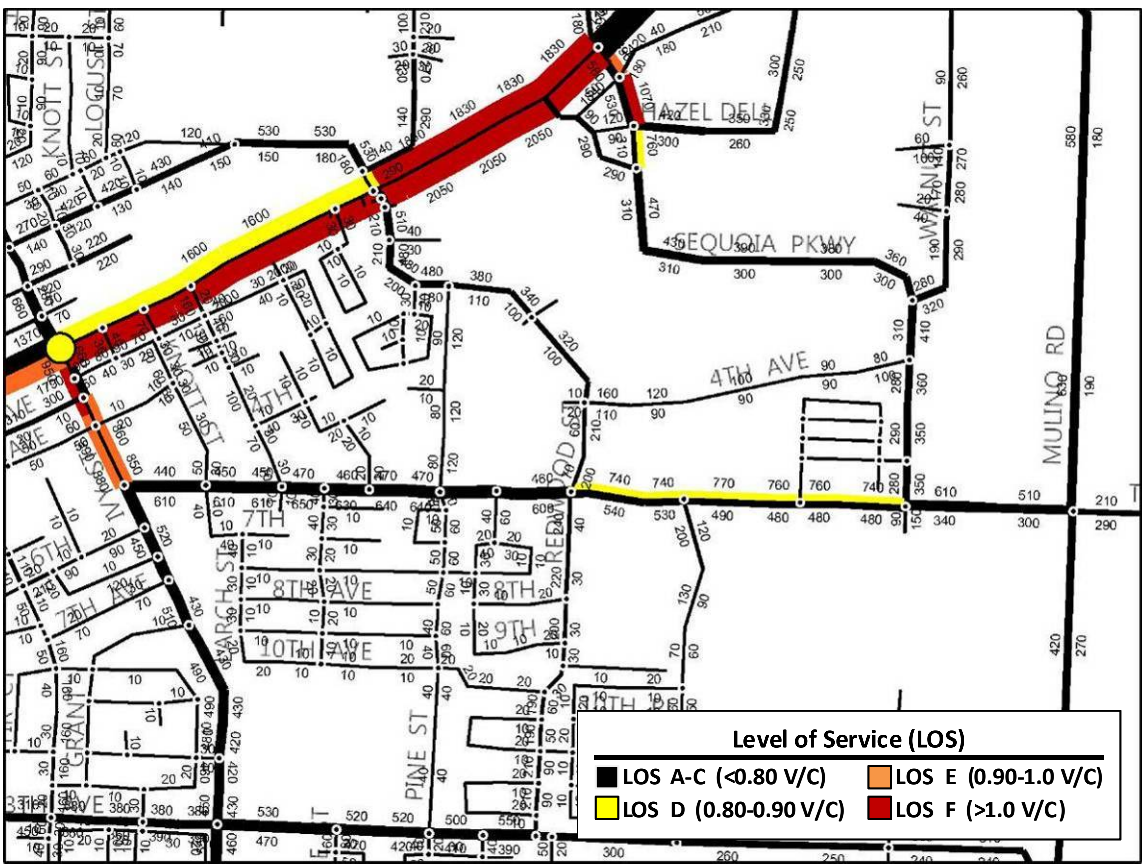
Cut Sheet 15: Township Road Widened to 3 Lanes

Widen Township Road to include a center turn lane.

This provides minimal changes to corridor volumes, but increases safety and slightly improved operations expected for study intersections along Township Road. This improvement would not significantly reduce side-street delay for vehicles accessing Township Road and additional intersection improvements may be needed at various locations.



Alternative Schematic



Model Volume and Performance (2030 P.M. Peak Hour)

Cut Sheet 15 (cont.): Township Road Widened to 3 Lanes

Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Table 18: East-West Corridor Improvements South of OR 99E – Evaluation Criteria Analysis

Criteria (by TSP Goal)	East-West Imp. South of OR 99E	
	12	13
	Township/Ivy Roundabout or Traffic Signal	*Township Road Widened to 3 Lanes*
Livability		
Reduces/discourages through travel (especially truck traffic) on streets with fronting residential uses	-	-
Consistent with Canby Comprehensive Plan policies, goals, and objectives	-	-
Safety		
Improves intersection and/or railroad crossing safety	+1	+1
Improves pedestrian/bicycle street crossing safety	+1	+1
Economic Vitality		
Improves access/connection to I-5 and OR 99E	-	-
Improves industrial area freight access/connectivity	-	-
No negative impacts to existing developments and/or downtown viability	-	-
Sustainability		
Protects environmentally sensitive areas	-	-
Reduces vehicle miles traveled and improves flow of vehicles to reduce greenhouse gas emissions	-	-
Travel Choices		
Pedestrian and bicycle facility improvements connect key locations (e.g., schools and transit stops)	-	-
Quality Design		
Enhances street aesthetics, particularly downtown	+1	+1
Reliability and Mobility		
Reduces local traffic use of OR 99E	-	-
Intersections meet operating standards	+1	-
Addresses key bottlenecks	+1	-
Efficient and Innovative Funding		
Maximizes use of available funding programs/sources	-	-
Provides significant increase in mobility (for all modes) compared to cost	+1	-
Compatibility		
Consistent with or improves facilities planned by road authority (City, ODOT, or Clackamas County)	-	-
Total	**6**	**3**

Preferred Motor Vehicle Solutions Package

The preferred motor vehicle solutions package includes the following projects:

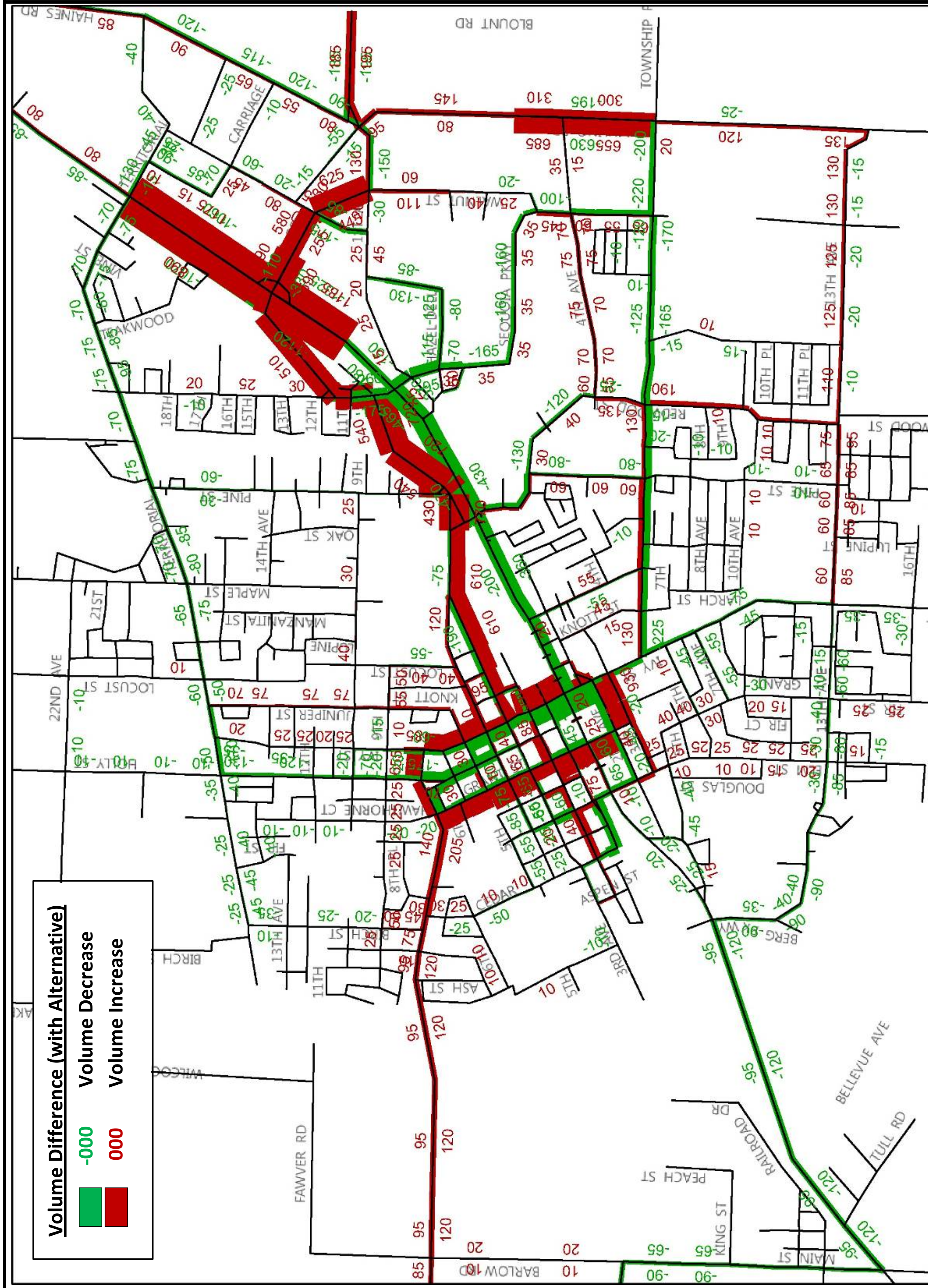
- Employer Focused Travel Demand Management (TDM)
- Adaptive Signal System on OR 99E
- STA Designation and Associated Improvements on OR 99E between Elm Street and Locust Street
- Modified Downtown Circulation Scenario (Knights Bridge Road, SW 2nd Avenue)
- Otto Road Extension to Canby Pioneer Industrial Area
- Otto Road Overcrossing with Frontage Road to NE 4th Avenue (with NE 4th Avenue/Pine Street Realignment)
- Township Road/Ivy Street Traffic Signal (instead of roundabout, due primarily to capacity and right-of-way constraints)

In addition, the preferred solutions package also includes the following improvements at various intersections because they are needed to compliment the major roadway projects and improve operating conditions at isolated locations:

- Install an eastbound right-turn lane on OR 99E at Grant Street
- Install a westbound right-turn lane on OR 99E at Ivy Street
- Prohibit eastbound and westbound through movements at the Ivy Street/North 1st Avenue and Grant Street/NW 1st Avenue intersections
- Realign east leg of South Ivy Street/SE 2nd Avenue intersection
- Install a roundabout at the Township Road/Redwood Street intersection
- Install a roundabout at the Township Road/Mulino Road intersection
- Install a roundabout at the Otto Road/SE 1st Street intersection
- Install a roundabout at the SE 1st Avenue/Haines Road/Mulino Road/Bremer Road intersection
- Convert the Township Road/Sequoia Parkway intersection to all-way stop control and install eastbound and westbound left-turn lanes on Township Road
- Restripe the northbound Cedar Street approach to Knights Bridge Road to include a right-turn lane

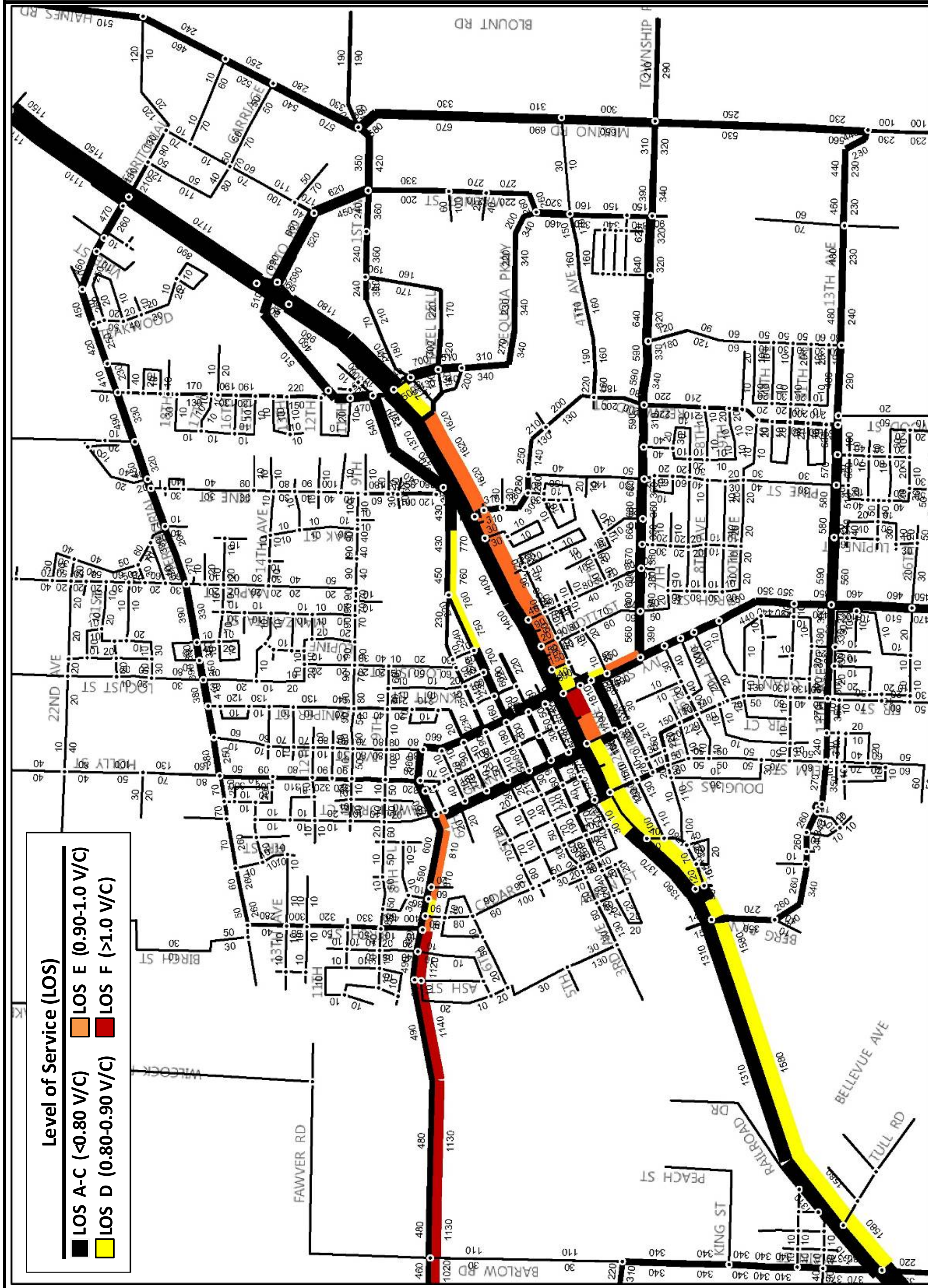
The forecast analysis tool was used to estimate the overall network traffic volumes associated with the preferred solutions package. These model volumes and the resulting roadway performance of the Preferred Solutions Package scenario are provided in Cut Sheet 16.

Cut Sheet 16: Preferred Solutions Package



Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Cut Sheet 16 (cont.): Preferred Solutions Package



Model Volume and Performance (2030 P.M. Peak Hour)

Intersection Operations (Preferred Solutions Package)

Because the entire city transportation network must work together as a whole, traffic analysis was performed assuming all preferred transportation alternatives are implemented. The signalized, two-way stop controlled, and all-way stop controlled intersection operations were determined based on the *2000 Highway Capacity Manual* methodology,[5] while roundabout operations were determined using methodology prepared by the National Cooperative Highway Research Program (NCHRP).[6] This methodology is currently being implemented by ODOT and will be utilized in the new *2010 Highway Capacity Manual (HCM)*, which has not yet been released.

The intersection operations resulting from the preferred solutions package are listed in Table 19. As shown, nearly all study intersections would meet applicable operating standards in 2030 (with the assumption that an STA designation would be made for OR 99E between Locust Street and Elm Street). The only signalized intersection that does not meet standards is outside of the City's jurisdiction (OR 99E/S Barlow Road). One of the unsignalized intersections (OR 99E/Haines Road) that does not meet standards is also outside of the City's jurisdiction. The other two unsignalized intersections that do not meet existing standards experience high side street delays, but this is not considered critical because their v/c ratios do not exceed 0.90.

Table 19: 2030 Operating Conditions (Preferred Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	50.3	D	**<u>0.97</u>**
OR 99E/Berg Pkwy	ODOT	≤ 0.85	18.6	B	0.82
OR 99E/Elm St	ODOT	≤ 0.95	39.0	D	0.91
OR 99E/Grant St	ODOT	≤ 0.95	21.9	C	0.88
OR 99E/Ivy St	ODOT	≤ 0.95	24.4	C	0.86
OR 99E/Pine St	ODOT	≤ 0.85	14.3	B	0.78
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	27.2	C	0.73
OR 99E/Otto Road (South)	ODOT	≤ 0.75	7.9	A	0.49
OR 99E/Otto Road (North)	ODOT	≤ 0.75	8.4	A	0.43
OR 99E/Territorial Rd	ODOT	≤ 0.75	21.3	C	0.70
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	22.1	C	0.90
S Township Rd/S Ivy St	Clackamas Co.	LOS D	10.9	B	0.60
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	18.7	B	0.79

Table 19 continued on next page.

[5] *2000 Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.

[6] See NCHRP Report 572.

(Continued) Table 19: 2030 Operating Conditions (Preferred Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
All-way Stop Controlled					
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	19.3	C	0.81
NE Territorial Rd/N Holly St	City of Canby	LOS D	10.7	B	0.42
S Township Rd/Sequoia Pkwy	City of Canby	LOS D	19.3	C	0.77
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	18.8	C	0.80
Roundabout					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	22.6	C	0.85
SE 1st Ave/S Mulino Rd	Clackamas Co.	LOS D	21.8	C	0.79
SE 1st Ave/S Walnut St	City of Canby	LOS D	16.4	C	0.65
S Township Rd/S Redwood St	City of Canby	LOS D	17.0	C	0.78
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	19.6	E/C	**<u>0.90</u>**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	17.0	A/C	0.51
NW 1st Ave/N Grant St	City of Canby	LOS E	1.0	A/A	0.39
NW 1st Ave/N Ivy St	City of Canby	LOS E	18.2	A/C	0.42
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	**<u>A/F</u>**	0.40
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	>50	**<u>A/F</u>**	0.79
Knights Bridge Rd/N Holly St	City of Canby	LOS E	40.6	A/E	0.82
NW 3rd Ave/N Cedar St	City of Canby	LOS E	11.8	A/B	0.13
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	25.2	A/D	0.27
NE Territorial Rd/N Redwood St	City of Canby	LOS E	25.4	A/D	0.45
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	43.6	A/E	0.72
SE 4th Ave/S Redwood St	City of Canby	LOS E	13.7	A/B	0.32
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	16.3	A/C	0.20

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
<u>Bold Underlined</u> values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
<u>Bold Underlined</u> values do not meet standards.

Motor Vehicle Planning Level Project Costs (Preferred Solutions Package)

Planning level costs of the preferred motor vehicle projects were estimated and are provided in Table 20. As shown, the total cost for all projects is approximately $50.3 million. As applicable, these motor vehicle costs include the construction of sidewalks and bike lanes on new roadways, the provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways.

Table 20: Motor Vehicle Planning Level Project Costs (Preferred Solutions Package)

Preferred Motor Vehicle Project	Planning Level Cost
Non-Capacity Improvements	
STA Designation and Associated Improvements on OR 99E	$3,770,000
Adaptive Signal System on OR 99E	$400,000
Employer Focused Travel Demand Management (TDM)	$0
Large-Scale Capacity Improvements	
Otto Road Overcrossing with Frontage Road to NE 4th Avenue	$29,305,000
NE 4th Avenue/Pine Street Realignment	$1,255,000
Otto Road Extension to Canby Pioneer Industrial Area	$6,170,000
Modified Downtown Circulation Scenario (Ivy Street, Grant Street, Knights Bridge Road, and SW 3rd Avenue Conversion to One-Way Streets)	$1,945,000
Roundabout Improvements	
SE 1st Avenue/Haines Road/Mulino Road/Bremer Road Roundabout	$2,000,000
Township Road/Redwood Street Roundabout	$1,000,000
Township Road/Mulino Road Roundabout	$1,000,000
Otto Road/SE 1st Street Roundabout	$1,000,000
Isolated Intersection Capacity Improvements	
OR 99E/Grant Street Eastbound Right-Turn Lane	$500,000
OR 99E/Ivy Street Westbound Right-Turn Lane	$500,000
Township Road/Ivy Street Traffic Signal	$300,000
Township Road/Sequoia Parkway All-Way Stop with Eastbound and Westbound Left-Turn Lanes	$510,000
Ivy Street/North 1st Avenue Eastbound /Westbound Through Movement Prohibition	$10,000
Grant Street/NW 1st Avenue Eastbound /Westbound Through Movement Prohibition	$10,000
South Ivy St/SE 2nd Avenue East Leg Realignment	$610,000
Knights Bridge Road/Cedar Street Northbound Right-Turn Lane (Only Requires a Restripe)	$5,000
TOTAL	**$50,290,000**

Berg Parkway Extension with Railroad Crossing

The extension of Berg Parkway to NW 3rd Avenue (via a grade-separated crossing of the Union Pacific Railroad) was found to score well against the evaluation criteria as discussed in Cut Sheet 8 and evaluated in Table 12. However, this project has a high cost and it does not provide significant benefit towards meeting mobility standards for operations of the roadway network (compared to the Otto Road overcrossing and frontage road to the fairgrounds). Therefore, it is not currently recommended as part of the preferred solution package.

However, the Berg Parkway extension does have benefits that make it worth pursuing if other funding sources become available, such as:

- It would serve a high percentage of truck traffic that is generated at the industrial area on North Baker Drive (instead of trucks routing through neighborhoods to access OR 99E at Elm Street).
- It would accommodate emergency service access across the railroad tracks. This would be particularly important during times when a train is blocking the nearby at-grade crossings.

In addition, the Berg Parkway Extension may serve as the first phase of a potential long-term solution to better connect Canby to I-5 via a bypass of Barlow that would extend Arndt Road over the Molalla River to NW 3rd Street. If Clackamas County were to pursue this option in the future, the Berg Parkway Extension should become part of the preferred motor vehicle projects for Canby.

Financially-Constrained Motor Vehicle Solutions Package

The preferred motor vehicle solutions package identified previously in this memorandum includes multiple small and medium sized projects along with one very large project: the Otto Road overcrossing and frontage road to NE 4th Avenue accounts for over 50 percent of the estimated solutions package cost (see Table 20). Due to the level of funding required and the expected difficulty of obtaining right-of-way and constructing the frontage road, an additional financially-constrained motor vehicle solutions package was considered that essentially scales back the Otto Road and frontage road projects to a first phase construction that could ultimately lead towards the preferred solution. This package differs from the Preferred Solutions Package in the following ways:

Improvements Removed from Package

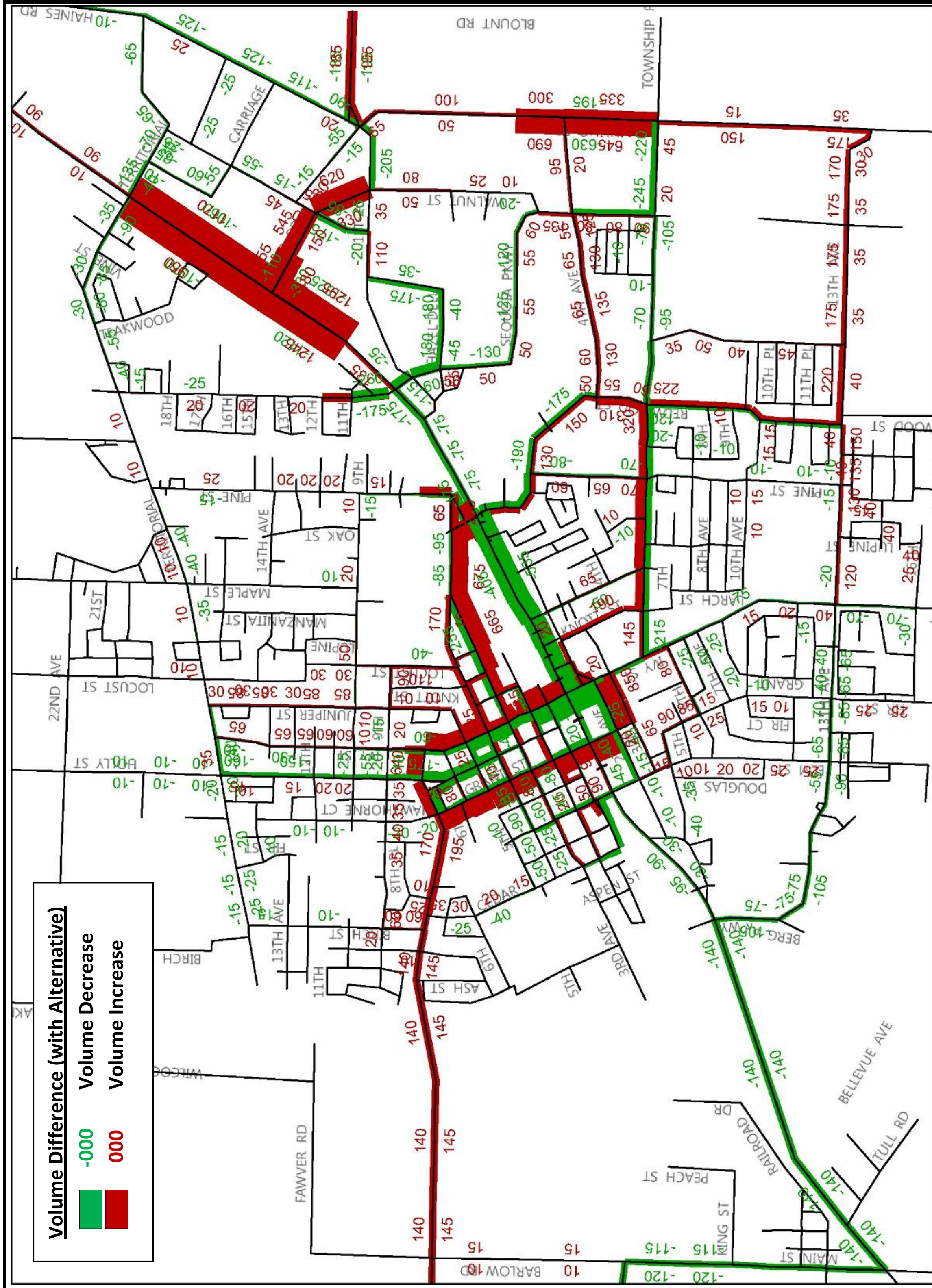
- Otto Road Overcrossing with Frontage Road to NE 4th Avenue

Improvements Added to Package

- Install a traffic signal at an improved, three-legged OR 99E/Otto Road intersection to accommodate the recommended Otto Road Extension to the Pioneer Industrial Area (see Cut Sheet 9).
- Improve the OR 99E/Pine Street intersection by installing a westbound right-turn lane, converting the southbound approach to two left turn lanes and a shared through-right lane, moving the southbound approach stop bar behind the railroad tracks, and adjusting the signal timing to run with split phases for northbound and southbound approaches.
- Relocate the Pine Street/NE 4th Avenue intersection so that it is farther from the Union Pacific Railroad track, creating a T-intersection (which accommodates future use of the east-west approaches as the major roadway when the recommended frontage road is constructed and the Pine Street/NE 4th Avenue railroad crossing is closed). Until the frontage road is constructed and while the railroad crossing is still open, the northbound approach should be allowed the free movement to prevent queues from backing up over the railroad tracks.

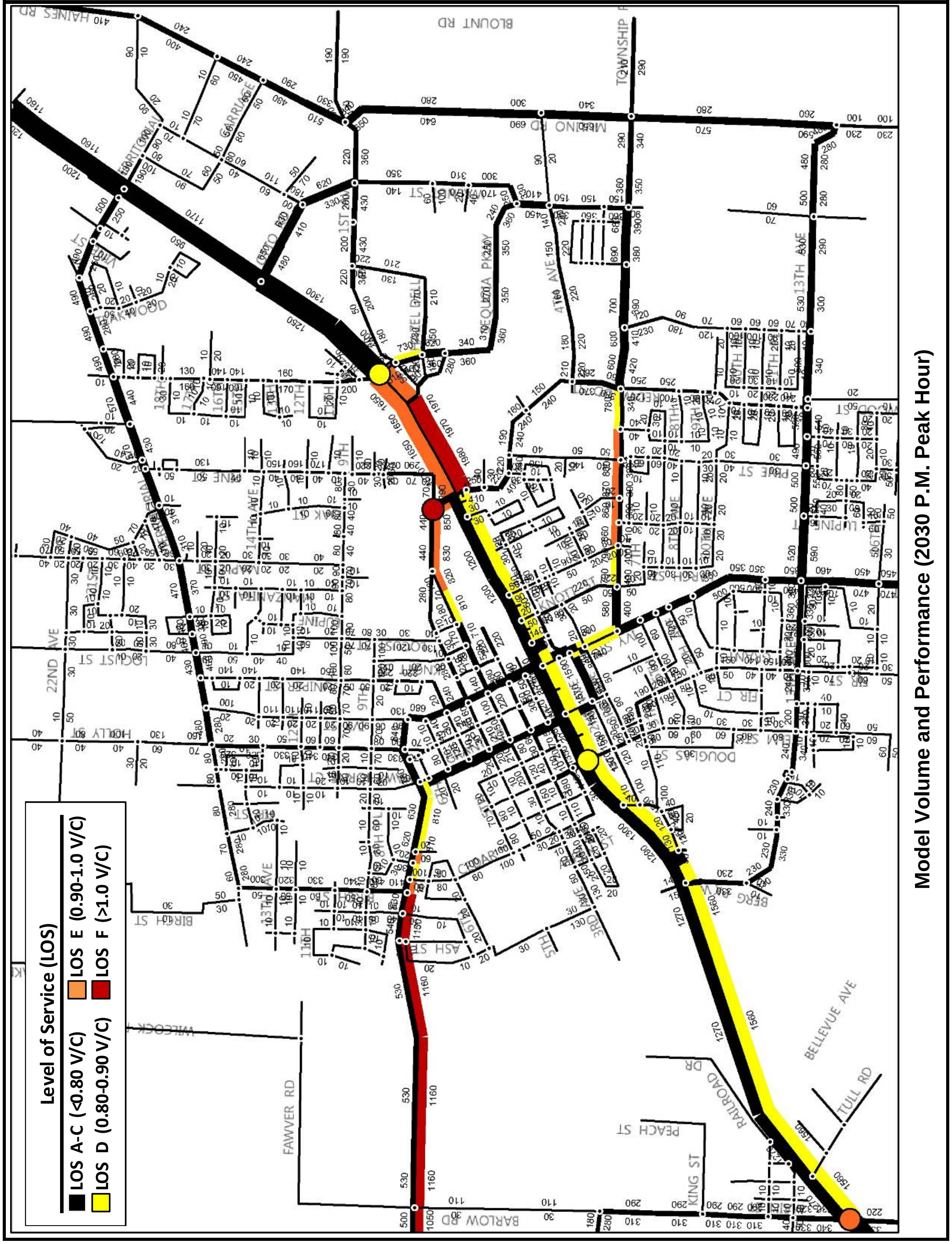
The forecast analysis tool was used to estimate the overall network traffic volumes associated with the financially-constrained solutions package. These model volumes and the resulting roadway performance of the Financially-Constrained Solutions Package scenario are provided in Cut Sheet 17.

Cut Sheet 17: Financially-Constrained Solutions Package



Model Difference Plot – Alternative System Circulation (2030 P.M. Peak Hour)

Cut Sheet 17 (cont.): Financially-Constrained Solutions Package



Intersection Operations (Financially-Constrained Solutions Package)

Similar to the preferred solutions package analysis, traffic analysis was performed for the financially-constrained solutions package assuming all associated transportation alternatives are implemented. The same operations analysis methodologies were also used. The intersection operations resulting from the financially-constrained solutions package are listed in Table 21. As shown, most of the study intersections would still meet applicable operating standards in 2030. The key operational-related findings associated with the financially-constrained solutions package include the following:

- The study intersections on OR 99E between Locust Street and Elm Street would still only meet operating standards assuming this section of OR 99E obtains an STA designation.
- Of the four signalized intersections that do not meet standards, one is outside of the City's jurisdiction (OR 99E/S Barlow Road) and the others (OR 99E/Pine Street, OR 99E/Sequoia Parkway, and OR 99E/Otto Road) still provide sufficient capacity to meet demand (i.e., v/c's are less than 1.0).
- Of the five two-way stop controlled intersections that do not meet standards, one is outside of the City's jurisdiction (OR 99E/Haines Road) and the others experience high side street delays. In all but one of the instances, this is not considered critical because the worst movement's v/c ratio does not exceed 0.90. The one exception is at the realigned Pine Street/NE 4th Avenue intersection, where the low-volume minor westbound approach is projected to have a v/c ratio in excess of 1.0.

Table 21: 2030 Operating Conditions (Financially-Constrained Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	43.6	D	**0.94**
OR 99E/Berg Pkwy	ODOT	≤ 0.85	15.7	B	0.72
OR 99E/Elm St	ODOT	≤ 0.95	47.5	D	0.93
OR 99E/Grant St	ODOT	≤ 0.95	15.9	B	0.82
OR 99E/Ivy St	ODOT	≤ 0.95	32.2	C	0.81
OR 99E/Pine St	ODOT	≤ 0.85	51.3	D	**0.91**
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	34.5	C	**0.78**
OR 99E/Otto Rd	ODOT	≤ 0.75	44.4	D	**0.79**
OR 99E/Territorial Rd	ODOT	≤ 0.75	17.8	B	0.68
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	11.1	B	0.81
S Township Rd/S Ivy St	Clackamas Co.	LOS D	15.9	B	0.71
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	16.3	B	0.70

Table 21 continued on next page.

(Continued) Table 21: 2030 Operating Conditions (Financially-Constrained Solutions Package

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
All-way Stop Controlled					
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	26.7	D	0.90
NE Territorial Rd/N Holly St	City of Canby	LOS D	11.8	B	0.53
S Township Rd/Sequoia Pkwy	City of Canby	LOS D	19.4	C	0.73
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	22.3	C	0.85
Roundabout					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	18.4	C	0.81
SE 1st Ave/S Mulino Rd	Clackamas Co.	LOS D	16.8	C	0.67
SE 1st Ave/S Walnut St	City of Canby	LOS D	18.2	C	0.68
S Township Rd/S Redwood St	City of Canby	LOS D	34.2	D	0.86
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	>50	D/F	**<u>>2.0</u>**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	23.7	A/C	0.60
NW 1st Ave/N Grant St	City of Canby	LOS E	0.5	A/A	0.33
NW 1st Ave/N Ivy St	City of Canby	LOS E	15.2	A/C	0.35
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	**<u>B/F</u>**	0.44
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	>50	**<u>A/F</u>**	0.80
Knights Bridge Rd/N Holly St	City of Canby	LOS E	41.1	A/E	0.83
NW 3rd Ave/N Cedar St	City of Canby	LOS E	13.4	A/B	0.28
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	27.5	A/D	0.27
NE 4th Ave/N Pine St	City of Canby	LOS E	>50	**<u>A/F</u>**	**<u>>2.0</u>**
NE Territorial Rd/N Redwood St	City of Canby	LOS E	47.9	A/E	0.67
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	>50	**<u>A/F</u>**	0.86
SE 4th Ave/S Redwood St	City of Canby	LOS E	20.1	A/C	0.44
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	18.8	A/C	0.26

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
<u>Bold Underlined</u> values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
<u>Bold Underlined</u> values do not meet standards.

Motor Vehicle Planning Level Project Costs (Financially-Constrained Package)

Planning level costs of the preferred motor vehicle projects were estimated and are provided in Table 22. As shown, the total cost for all projects is approximately $23.3 million. As applicable, these motor vehicle costs include the construction of sidewalks and bike lanes on new roadways, the provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways.

Table 22: Motor Vehicle Planning Level Project Costs (Financially-Constrained Package)

Preferred Motor Vehicle Project	Planning Level Cost
Non-Capacity Improvements	
STA Designation and Associated Improvements on OR 99E	$3,770,000
Adaptive Signal System on OR 99E	$400,000
Employer Focused Travel Demand Management (TDM)	$0
Large-Scale Capacity Improvements	
Otto Road Extension to Canby Pioneer Industrial Area	$6,170,000
OR 99E/Otto Road Traffic Signal (Associated with Otto Road Extension)	$300,000
Pine Street Improvements at OR 99E and Adjacent Railroad Crossing	$2,000,000
NE 4th Avenue/Pine Street Realignment	$1,255,000
Modified Downtown Circulation Scenario (Ivy Street, Grant Street, Knights Bridge Road, and SW 3rd Avenue Conversion to One-Way Streets)	$1,945,000
Roundabout Improvements	
SE 1st Avenue/Haines Road/Mulino Road/Bremer Road Roundabout	$2,000,000
Township Road/Redwood Street Roundabout	$1,000,000
Township Road/Mulino Road Roundabout	$1,000,000
Otto Road/SE 1st Street Roundabout	$1,000,000
Isolated Intersection Capacity Improvements	
OR 99E/Grant Street Eastbound Right-Turn Lane	$500,000
OR 99E/Ivy Street Westbound Right-Turn Lane	$500,000
Township Road/Ivy Street Traffic Signal	$300,000
Township Road/Sequoia Parkway All-Way Stop with Eastbound and Westbound Left-Turn Lanes	$510,000
Ivy Street/North 1st Avenue eastbound /westbound through movement prohibition	$10,000
Grant Street/NW 1st Avenue eastbound /westbound through movement prohibition	$10,000
South Ivy St/SE 2nd Avenue East Leg Realignment	$610,000
Knights Bridge Road/Cedar Street Northbound Right-Turn Lane (Only Requires a Restripe)	$5,000
TOTAL	**$23,285,000**

Financial Outlook

Project costs were previously provided for pedestrian, bicycle, and motor vehicle projects that are recommended for inclusion in the preferred and financially-constrained solutions packages. Overall costs for each mode are shown in Table 23 for the preferred solutions package and Table 24 for the financially-constrained solutions package. As shown in the two tables, the total cost is estimated to be approximately $59.3 million for the preferred solutions package and $32.3 million for the financially-constrained solutions package.[7]

Table 23: Planning Level Costs for All Modes (Preferred Solutions Package)

Transportation Mode	Planning Level Cost of Preferred Solutions Package
Pedestrian	$4,400,000
Bicycle	$4,570,000
Motor Vehicle	$50,290,000
TOTAL	**$59,260,000**

Table 24: Planning Level Costs for All Modes (Financially-Constrained Solutions Package)

Transportation Mode	Planning Level Cost of Financially-Constrained Solutions Package
Pedestrian	$4,400,000
Bicycle	$4,570,000
Motor Vehicle	$23,285,000
TOTAL	**$32,255,000**

Based on current revenue streams and expenditures, it is estimated that the City of Canby will have approximately $32.8 million available for transportation improvements through the year 2030. Therefore, it is feasible that with existing revenue streams, the City would be able to fund all improvements included in the financially-constrained solutions package.

Canby currently has transportation systems development charges (SDCs) in the range of $2,500 per p.m. peak hour trip. If Canby slightly more than doubles their SDC fee rates[8] to be more comparable to nearby communities, then they can bring in approximately $26.6 million in additional funds (for a total of $59.4 million in available funds). Therefore, the preferred solutions package could be feasibly funded given the potential for increased funding streams.

[7] As applicable, these motor vehicle costs include the construction of sidewalks and bike lanes on new roadways, the provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways.

[8] The City's transportation SDC rate would need to be approximately $5,800 per p.m. peak hour trip.

Refined Solutions Packages With One-Way Downtown Streets

Following the preparation of the prior sections of this Transportation Solutions Report, additional refinements were performed for the each of the modal solutions packages based on feedback received through the public review process prior to public hearings. These refined scenarios still include the one-way street concept in the downtown area, but include several adjustments to the recommended solutions. The operations analysis and cost estimates were also prepared for the both the revised Financially-Constrained Solutions Package and the Preferred Solutions Package.

Financially-Constrained Solutions Package

Refinements to the Financially-Constrained Solutions Package included the following:

Multi-Modal

- Selecting NW 6th Avenue between North Grant Street and North Ivy Street as the preferred northern couplet segment (and constructing bike lanes and sidewalks on this section); however, Knights Bridge Road was still considered a secondary option
- Adjusting the Otto Road Extension so that its main connection to the Industrial Area is at a five-leg roundabout with Mulino Road, Haines Road, and SE 1st Avenue instead of the Walnut Street/SE 1st Avenue intersection (which would no longer be a roundabout); this protects the residential livability of SE 1st Avenue and also anticipates future growth potential east of Mulino (new roadway would still include bike lanes and sidewalks)
- Converting sections of NE 3rd Avenue and NE 4th Avenue (from Locust Street on the west to their common intersection on the east) to one-way counterclockwise travel to provide sufficient right-of-way for bike lanes and sidewalks on these sections
- Adding the two-lane SE 4th Avenue Extension (located in the southern portion of the Pioneer Industrial Area) as a TSP project (including bike lanes and sidewalks)
- Removing the SW 2nd Avenue/SE 2nd Avenue Realignment project along South Ivy Street as a TSP project

Pedestrian

- Adding an ADA Improvements program strategy with yearly funding as a TSP project

Bicycle

- Removing bike lanes from downtown streets, particularly along Grant Street
- Adding bicycle boulevard enhancements on North Holly Street between the multi-use trail near downtown and NW 6th Avenue (or Knights Bridge Road depending on the selected couplet option)

The intersection operations resulting from the Financially-Constrained Solutions Package are listed in Table 25. As shown, most of the study intersections would meet applicable operating standards in 2030. The key operational-related findings associated with the Financially-Constrained Solutions Package include the following:

- The study intersections on OR 99E between Locust Street and Elm Street would only meet operating standards assuming this section of OR 99E obtains an STA designation.
- Of the four signalized intersections that do not meet standards, one is outside of the City's jurisdiction (OR 99E/S Barlow Road) and the others (OR 99E/Pine Street, OR 99E/Sequoia Parkway, and OR 99E/Otto Road) still provide sufficient capacity to meet demand (i.e., v/c's are less than 1.0).
- Of the five two-way stop controlled intersections that do not meet standards, one is outside of the City's jurisdiction (OR 99E/Haines Road) and the others experience high side street delays. However, this is not considered critical because for each intersection, the worst movement's v/c ratio does not exceed 0.90.

Table 25: 2030 Operating Conditions (Financially-Constrained Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	60	E	**1.07**
OR 99E/Berg Pkwy	ODOT	≤ 0.85	16.3	B	0.74
OR 99E/Elm St	ODOT	≤ 0.95	45.7	D	0.90
OR 99E/Grant St	ODOT	≤ 0.95	15.4	B	0.79
OR 99E/Ivy St	ODOT	≤ 0.95	28.9	C	0.75
OR 99E/Pine St	ODOT	≤ 0.85	52.1	D	**0.91**
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	34.6	C	**0.80**
OR 99E/Otto Rd	ODOT	≤ 0.75	43.9	D	**0.78**
OR 99E/Territorial Rd	ODOT	≤ 0.75	17.6	B	0.66
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	10.8	B	0.79
S Township Rd/S Ivy St	Clackamas Co.	LOS D	15.4	B	0.71
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	16.3	B	0.70
All-way Stop Controlled					
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	27.5	D	0.91
NE Territorial Rd/N Holly St	City of Canby	LOS D	10.9	B	0.44
S Township Rd/Sequoia Pkwy	City of Canby	LOS D	20.9	C	0.75
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	22.2	C	0.85

Table 25 continued on next page.

(Cont.) Table 25: 2030 Operating Conditions (Financially-Constrained Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
All-way Stop Controlled (Continued)					
SE 1st Ave/S Walnut St	City of Canby	LOS D	13.0	B	0.60
Knights Bridge Rd/N Holly St	City of Canby	LOS D	8.0	A	0.26
Roundabout					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	25.9	D	0.83
SE 1st Ave/S Mulino Rd/Otto Rd	Clackamas Co.	LOS D	15.8	C	0.72
S Township Rd/S Redwood St	City of Canby	LOS D	34.3	D	0.86
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	>50	D/F	**>2.0**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	14.3	A/B	0.32
NW 1st Ave/N Grant St	City of Canby	LOS E	1.0	A/A	0.31
NW 1st Ave/N Ivy St	City of Canby	LOS E	11.2	A/B	0.37
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	**B/F**	0.44
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	44.0	A/E	0.64
NW 3rd Ave/N Cedar St	City of Canby	LOS E	13.2	A/B	0.26
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	21.6	A/C	0.83
NE 4th Ave/N Pine St	City of Canby	LOS E	>50	**A/F**	0.75
NE Territorial Rd/N Redwood St	City of Canby	LOS E	>50	**A/F**	0.71
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	>50	**A/F**	0.94
SE 4th Ave/S Redwood St	City of Canby	LOS E	20.4	A/C	0.44
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	19.0	A/C	0.26

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
Bold values do not meet standards.

Cost estimates were prepared for the new projects included in the Financially-Constrained Solutions Package and were revised for other projects as necessary. The new and revised cost estimates are listed in Table 26 and are broken down by the primary mode that the costs were associated with.

These costs include roadway improvements, construction of sidewalks and bike lanes on new roadways, provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways. Because these costs are based on general unit costs for transportation improvements and do not reflect unique project elements that can significantly modify project costs, each of these project costs will need further refinement to determine right-of-way requirements and costs associated with special design details as projects are pursued.

Table 26: Planning Level Project Costs Listed by Primary Mode (Financially-Constrained)

Project	Planning Level Cost
Large-Scale Capacity Improvements (Motor Vehicle)	
Modified Downtown One-Way Streets (Ivy Street, Grant Street, NW 6th Avenue, and SW 2nd Avenue Conversion to One-Way Streets)[a]	$2,690,000
Otto Road Extension to Canby Pioneer Industrial Area (including two roundabouts)	$8,915,000
NE 4th Avenue/Pine Street Realignment	$1,255,000
SE 4th Avenue Extension between Sequoia Parkway and Mulino Road	$3,140,000
Sidewalks (Pedestrian)	
NE 3rd Ave and NE 4th Ave (between Locust St and shared intersection) converted to one-way travel and installation of bike lanes and sidewalks[b]	Pedestrian = $220,000 Bicycle = $16,000
Program Strategy (Pedestrian)	
Safe Routes to School (Initial plan plus $50,000 yearly funding)	$1,050,000
ADA Improvements (Initial plan plus $50,000 yearly funding)	$1,050,000
Bike Lanes or Boulevards (Bicycle)	
Holly Street Bicycle Boulevard from Knights Bridge Rd to Multi-Use Trail	$37,000

[a] Two options are available for one-way westbound travel on the north section of Project L1. NW 6th Ave is the preferred option over the construction of a Knights Bridge Road Extension and could be an interim choice regardless. However, a more detailed design process is needed to make a final determination.
[b] Project identified in both pedestrian and bicycle improvement lists, with corresponding portions of total cost provided in each list (i.e., sidewalk costs in pedestrian list and bike lane costs in bicycle list).

The overall costs by mode are summarized in Table 27. As listed, the total cost is estimated to be approximately $39.3 million, which exceeds the total available revenue of $36.0 million[9] by approximately $3 million. Therefore, the City would need to obtain additional revenue in order to fund the entire Financially-Constrained Solutions Package. Some options include Urban Renewal Fund contributions, grants, developer contributions, or increasing transportation SDCs. Canby currently has transportation SDCs in the range of $2,500 per p.m. peak hour trip. If Canby chooses to slightly increase their SDC fee rates to approximately $2,850 per p.m. peak hour trip, then they can bring in approximately $3.3 million in additional funds. However, a combination of slightly increased SDCs and developer contributions is likely to fulfill the funding gap.

In addition, there is also insufficient funding expected for non-roadway improvements due to limitations in the City's current SDC methodology. However, if the City amends its transportation SDC methodology so that funds can be used for all modes, then the City

[9] These new revenue estimates were revised and are documented in Chapter 9 of the TSP.

would be able to fund all improvements included in the Financially-Constrained Solutions Package using existing funding streams.

Table 27: Planning Level Costs for All Modes (Financially-Constrained Package)

Transportation Mode	Planning Level Cost
Non-Capacity Improvements	
Pedestrian	$6,550,000
Bicycle	$4,486,000
Motor Vehicle (Non-Capacity Improvements)	$4,170,000
Total	**$15,206,000**
Capacity Improvements	
Motor Vehicle (Capacity Improvements)	$24,135,000
TOTAL	**$39,341,000**

Preferred Solutions Package

There were two additional refinements to the Preferred Solutions Package that were identified previously in this Transportation Solutions Report but were not originally included in the package:

- Extend Berg Parkway to NW 3rd Avenue via a grade-separated crossing of the Union Pacific Railroad; it was not to be determined whether a bridge over the railroad tracks or a tunnel under the tracks is preferred.
- Close the Pine Street-NE 4th Avenue crossing of the Union Pacific Railroad with a gate that only allows service to emergency vehicles.

The intersection operations resulting from the revised Preferred Solutions Package are listed in Table 28. As shown, nearly all study intersections would meet applicable operating standards in 2030 (with the assumption that an STA designation would be made for OR 99E between Locust Street and Elm Street). Two signalized intersections would not meet standards. One is outside of the City’s jurisdiction (OR 99E/S Barlow Road), and the other is OR 99E/Sequoia Parkway (which just slightly exceeds operating standards). One of the unsignalized intersections (OR 99E/Haines Road) that does not meet standards is also outside of the City’s jurisdiction. The other two unsignalized intersections that do not meet existing standards experience high side street delays, but this is not considered critical because their v/c ratios do not exceed 0.90.

Table 28: 2030 Operating Conditions (Preferred Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	58.0	E	**1.03**
OR 99E/Berg Pkwy	ODOT	≤ 0.85	19.6	B	0.76
OR 99E/Elm St	ODOT	≤ 0.95	34.6	C	0.82
OR 99E/Grant St	ODOT	≤ 0.95	19.9	B	0.88
OR 99E/Ivy St	ODOT	≤ 0.95	24.9	C	0.87
OR 99E/Pine St	ODOT	≤ 0.85	12.9	B	0.78
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	33.3	C	**0.82**
OR 99E/Otto Road (South)	ODOT	≤ 0.75	4.0	A	0.48
OR 99E/Otto Road (North)	ODOT	≤ 0.75	5.3	A	0.42
OR 99E/Territorial Rd	ODOT	≤ 0.75	21.1	C	0.69
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	16.9	B	0.84
S Township Rd/S Ivy St	Clackamas Co.	LOS D	11.5	B	0.60
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	25.9	C	0.86
All-way Stop Controlled					
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	20.7	C	0.83
NE Territorial Rd/N Holly St	City of Canby	LOS D	10.1	B	0.39
S Township Rd/Sequoia Pkwy	City of Canby	LOS D	18.4	C	0.74
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	16.2	C	0.74
SE 1st Ave/S Walnut St	City of Canby	LOS D	11.9	B	0.53
Knights Bridge Rd/N Holly St	City of Canby	LOS D	8.5	A	0.29
Roundabout					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	25.5	D	0.88
SE 1st Ave/S Mulino Rd/Otto Rd	Clackamas Co.	LOS D	34.4	D	0.89
S Township Rd/S Redwood St	City of Canby	LOS D	18.9	C	0.80
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	19.6	E/C	**0.90**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	17.0	A/C	0.51
NW 1st Ave/N Grant St	City of Canby	LOS E	1.0	A/A	0.39
NW 1st Ave/N Ivy St	City of Canby	LOS E	18.2	A/C	0.42
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	**A/F**	0.40
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	>50	**A/F**	0.79
NW 3rd Ave/N Cedar St	City of Canby	LOS E	11.8	A/B	0.13

Table 28 continued on next page.

(Continued) Table 28: 2030 Operating Conditions (Preferred Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Two-way Stop Controlled (Continued)					
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	25.2	A/D	0.27
NW 3rd Ave/N Cedar St	City of Canby	LOS E	11.8	A/B	0.13
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	25.2	A/D	0.27
NE Territorial Rd/N Redwood St	City of Canby	LOS E	25.4	A/D	0.45
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	43.6	A/E	0.72
SE 4th Ave/S Redwood St	City of Canby	LOS E	13.7	A/B	0.32
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	16.3	A/C	0.20

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
Bold values do not meet standards.

Cost estimates were prepared for the new projects included in the Preferred Solutions Package and were revised for other projects as necessary. The new and revised cost estimates are listed in Table 29.

Table 29: Preferred Package Motor Vehicle Projects with Planning Level Costs

Location	Motor Vehicle Project		Planning Level Cost
Additional Preferred Solutions Package Projects			
OR 99E/Otto Road	**L8**	Install overcrossing of OR 99E and Union Pacific Railroad with ramps and traffic signals providing access to OR 99E on the south side of the overcrossing and a frontage road along the north side of OR 99E connecting Otto Road to Pine Street	$32,360,000
OR 99E/Pine Street and Adjacent Union Pacific Railroad Crossing	**L9**	Close Union Pacific Railroad crossing and install gate that only allows service to emergency vehicles	$250,000
Berg Parkway Extension	**L10**	Extend Berg Parkway to NW 3rd Avenue via a grade-separated crossing of the Union Pacific Railroad	$16,505,000
TOTAL ADDITIONAL COST FOR PREFERRED SOLUTIONS PACKAGE			**$49,115,000**

While the Preferred Solutions Package is the recommended ultimate solution for 2030, there are two alternative approaches that may be taken by the City:

- The City could pursue the Preferred Solutions Package as a stand-alone package.
- The City could pursue the Financially-Constrained Package as an interim step with the Preferred Solutions Package as the ultimate improvement package.

The total costs associated with the two alternative approaches for pursuing the Preferred Solutions Package are provided in Table 30. As shown, if the Financially-Constrained Package is included as an interim step, the total Preferred Solutions Package cost would be approximately $77.4 million. However, by pursuing the Preferred Solutions Package as a standalone package, the City could reduce overall costs to approximately $75.1 million because it could avoid constructing the two Financially-Constrained Solutions Package improvements that are not included in the Preferred Solutions Package (i.e., OR 99E/Pine Street and OR 99E/Otto Road projects).

Another important consideration is that because of the significant nature of an Otto Road overcrossing and frontage road—and the length of time it may take to plan and construct it—it may be worth incurring the additional costs in order to have the improved operations in the short-term to allow continued growth within the City.

Table 30: Total Preferred Package Costs (Two Alternatives)

Package Component	Planning Level Cost
Financially-Constrained Package as Interim Step	
Total Financially-Constrained Package Cost	$28,305,000
Additional Preferred Solutions Package Projects Cost (see Table 29)	$49,115,000
TOTAL COST	**$77,420,000**
Preferred Solutions Package as Standalone	
Total Financially-Constrained Package Cost	$28,305,000
Financially-Constrained Package Projects not Included in Preferred Package	-$2,300,000
Additional Preferred Solutions Package Projects Cost (see Table 29)	$49,115,000
TOTAL COST	**$75,120,000**

The overall Preferred Solutions Package costs by mode are summarized in Table 31. These costs assume the Financially-Constrained Package is an interim step, with the Preferred Solutions Package as the ultimate improvement package. As listed, the total cost for the Preferred Solutions Package is estimated to be approximately $88.5 million.[10]

[10] As applicable, these motor vehicle costs include the construction of sidewalks and bike lanes on new roadways, the provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways.

Table 31: Planning Level Costs for All Modes (Preferred Package with Financially-Constrained Package as Interim Step)

Transportation Mode	Planning Level Cost
Non-Capacity Improvements	
Pedestrian	$6,550,000
Bicycle	$4,486,000
Motor Vehicle (Non-Capacity Improvements)	$20,675,000
Total	**$31,711,000**
Capacity Improvements	
Motor Vehicle (Capacity Improvements)	$56,745,000
TOTAL	**$88,456,000**

Similar to the Financially-Constrained Solutions Package, there is insufficient funding available from existing revenue streams to fund the Preferred Solutions Package, and the City would need to obtain additional revenue. Some funding options include urban renewal funds, grants, developer contributions, and transportation SDCs. Transportation SDCs could fund the majority of the projects, with the main exception being the Berg Parkway Extension, which would need to be funded using Urban Renewal funds, grants, developer contributions, or other sources.

One way in which Canby could fund the remaining projects (i.e., all projects with the exception of the Berg Parkway Extension) would be to (1) amend their transportation SDC methodology so that funds can be used for all modes and (2) increase their SDC fee rates to approximately $6,350 per p.m. peak hour trip. This is more than double their existing rate of $2,500 per p.m. peak hour trip, but it is more comparable to nearby communities. By doing so, the City could bring in approximately $36.2 million in additional funds.

Increasing its SDC rates is only one option available to the City of Canby for increasing its funding streams. It is likely that the City would be able to obtain contributions from ODOT, Clackamas County, and the City's Urban Renewal District (URD). These contributions would offset needed increases in City SDCs. Therefore, the Preferred Solutions Package could be feasibly funded given the potential for increased funding streams.

Revised Solution Packages without One-Way Downtown Streets

Through the TSP Adoption process, including public Planning Commission Hearings, a significant amount of public testimony was provided against one-way streets. Due to this lack of public support (particularly from downtown business community) a revised TSP network scenario was created that removed the one-way streets in downtown from both the Financially-Constrained and Preferred Solutions Packages in the Canby TSP. In addition, the following associated motor vehicle, pedestrian, and bicycle projects associated with the one-way street improvements were also removed:

Motor Vehicle Projects Removed

- Eastbound right-turn lane on OR 99E at Grant Street
- Westbound right-turn lane on OR 99E at Ivy Street
- Turn restrictions at North Grant Street/NW 1st Avenue

Pedestrian Projects Removed

- Sidewalks on NW 6th Avenue between North Grant Street and North Ivy Street

Bicycle Projects Removed

- Bike lanes on NW 6th Avenue between North Grant Street and North Ivy Street
- Bike lanes on North Ivy Street between OR 99E and North 1st Avenue
- Bike lanes on SW 2nd Avenue between South Grant Street and South Ivy Street

Instead of a one-way downtown street system, the following new or revised projects were identified to help to improve the transportation network (i.e., "Do the Best We Can") and are part of both the final Financially-Constrained and Preferred Solutions Packages:

New/Revised Motor Vehicle Projects

- Westbound right-turn lane on SW 2nd Avenue at South Grant Street
- Eastbound right-turn lane on SW 2nd Avenue at South Ivy Street
- Partial diverter on west leg of SW 3rd Avenue at South Ivy Street intersection and pedestrian crossing with median refuge island on south leg
- North Ivy Street/North 1st Avenue traffic control changes, including removal of southbound stop sign, restriction of east leg to right-in/right-out, and installation of diverter on west leg to only allow southbound right turns
- Removal of southbound stop sign at North Grant Street/NW 1st Avenue

New/Revised Bicycle Projects

- Improve North Ivy Street rail crossing by filling in gaps adjacent to rails

The three motor vehicle projects on SW 2nd and SW 3rd Avenues are intended to divert traffic from SW 3rd Avenue to SW 2nd Avenue and to encourage more use of the Grant Street signal on OR 99E. Therefore, these projects should be constructed together. The bicycle project addresses the existing gap in the bicycle network on North Ivy Street by improving the railroad crossing and is consistent with the decision to not stripe bike lanes in downtown Canby. Traffic operations and financial analyses were performed for both the Financially-Constrained and Preferred Solutions Packages.

Financially-Constrained Solutions Package

The intersection operations resulting from the Financially-Constrained Solutions Package are listed in Table 32. As shown, most of the study intersections would meet applicable operating standards in 2030. The key operational-related findings associated with the Financially-Constrained Solutions Package include the following:

- None of the study intersections on OR 99E between Locust Street and Elm Street would meet operating standards unless this section of OR 99E obtains an STA designation. Even with the STA designation, however, the intersection of OR 99E/Ivy Street would still not meet operating standards.
- Of the four signalized intersections that do not meet standards, one is outside of the City's jurisdiction (OR 99E/S Barlow Road) and the others (OR 99E/Ivy Street, OR 99E/Pine Street, and OR 99E/Sequoia Parkway) still provide sufficient capacity to meet demand (i.e., v/c's are less than 1.0).
- Of the five two-way stop controlled intersections that do not meet standards, one is outside of the City's jurisdiction (OR 99E/Haines Road) and the others experience high side street delays. However, this is not considered critical when the intersection's whose worst movement has a v/c ratio less than 0.90.

Table 32: 2030 Operating Conditions (Financially-Constrained Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	69.0	E	**1.13**
OR 99E/Berg Pkwy	ODOT	≤ 0.85	18.8	B	0.79
OR 99E/Elm St	ODOT	≤ 0.95	39.6	D	0.84
OR 99E/Grant St	ODOT	≤ 0.95	33.6	C	0.86
OR 99E/Ivy St	ODOT	≤ 0.95	58.7	E	**0.96**
OR 99E/Pine St	ODOT	≤ 0.85	50.1	D	**0.94**
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	37.8	D	**0.81**
OR 99E/Otto Rd	ODOT	≤ 0.75	43.1	D	0.75
OR 99E/Territorial Rd	ODOT	≤ 0.75	19.3	B	0.67

Table 32 continued on next page.

(Cont.) Table 32: 2030 Operating Conditions (Financially-Constrained Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized (Continued)					
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	11.9	B	0.80
S Township Rd/S Ivy St	Clackamas Co.	LOS D	12.3	B	0.65
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	16.3	B	0.69
All-way Stop Controlled					
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	16.5	C	0.73
NE Territorial Rd/N Holly St	City of Canby	LOS D	12.7	B	0.52
S Township Rd/Sequoia Pkwy	City of Canby	LOS D	20.0	C	0.73
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	18.3	C	0.78
SE 1st Ave/S Walnut St	City of Canby	LOS D	12.8	B	0.60
Knights Bridge Rd/N Holly St	City of Canby	LOS D	10.1	B	0.38
Roundabout					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	16.8	C	0.71
SE 1st Ave/S Mulino Rd/Otto Rd	Clackamas Co.	LOS D	10.4	B	0.55
S Township Rd/S Redwood St	City of Canby	LOS D	15.8	C	0.74
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	>50	C/F	**1.00**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	17.5	A/C	0.30
NW 1st Ave/N Grant St	City of Canby	LOS E	30.0	A/D	0.35
NW 1st Ave/N Ivy St	City of Canby	LOS E	11.8	A/B	0.30
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	**A/F**	0.85
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	32.2	A/D	0.50
NW 3rd Ave/N Cedar St	City of Canby	LOS E	13.0	A/B	0.25
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	20.3	A/C	0.81
NE 4th Ave/N Pine St	City of Canby	LOS E	>50	**A/F**	0.77
NE Territorial Rd/N Redwood St	City of Canby	LOS E	>50	**A/F**	0.80
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	>50	**A/F**	0.94
SE 4th Ave/S Redwood St	City of Canby	LOS E	17.5	A/C	0.35
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	16.4	A/C	0.22

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
Bold values do not meet standards.

Cost estimates were prepared for the new projects included in the Financially-Constrained Solutions Package and were revised for other projects as necessary. The new and revised cost estimates are listed in Table 33 and are broken down by primary transportation mode. Because these costs are based on general unit costs for transportation improvements and do not reflect unique project elements that can significantly modify project costs, each of these project costs will need further refinement to determine right-of-way requirements and costs associated with special design details as projects are pursued.

Table 33: Planning Level Project Costs Listed by Primary Mode (Financially-Constrained)

Project	Planning Level Cost
Intersection Capacity Improvements (Motor Vehicle)	
South Grant Street/SW 2nd Avenue Westbound Right-Turn Lane[a]	$100,000
South Ivy Street/SW 2nd Avenue Eastbound Right-Turn Lane[a]	$100,000
South Ivy Street/SW 3rd Avenue Partial Diverter and Pedestrian Refuge[a]	$40,000
North Ivy Street/North 1st Avenue Traffic Control Changes	$10,000
North Grant Street/North 1st Avenue Traffic Control Changes	$10,000
Railroad Crossing Improvements (Bicycle)	
Improved North Grant Street Rail Crossing of UPRR	$100,000
Improved North Ivy Street Rail Crossing of UPRR	$100,000
Bike Lanes or Boulevards (Bicycle)	
Holly Street Bicycle Boulevard (Knights Bridge Rd to Multi-Use Trail)	$30,000
Holly Street Bike Lanes (NW 22nd Avenue to NW 6th Avenue)	$663,000
Knights Bridge Road Bike Lanes (west edge of UGB to Grant St)	$35,000

[a] These three motor vehicle projects are intended to divert traffic from SW 3rd Avenue to SW 2nd Avenue and should be constructed together.

Overall costs of the Financially-Constrained Solutions Package are listed in Table 34 by mode, and the total cost is approximately $36.1 million. Because the total cost exceeds the total available revenue of $36.0 million[11] by approximately $0.1 million, the City would need to obtain additional revenue to fund the entire Financially-Constrained Solutions Package. Some funding options include Urban Renewal Fund contributions, grants, developer contributions, or increasing transportation SDCs. Canby currently has transportation SDCs in the range of $2,500 per p.m. peak hour trip. If Canby chooses to slightly increase their SDC fee rates by approximately $10 per p.m. peak hour trip, then they can bring in the approximately $0.1 million in additional funds that they need to fund this solutions package. However, a combination of slightly increased SDCs and developer contributions is likely to fulfill the funding gap.

In addition, there is also insufficient funding expected for non-roadway improvements due to limitations in the City's current SDC methodology. However, if the City amends its

[11] These new revenue estimates were revised and are documented in Chapter 9 of the TSP.

transportation SDC methodology so that funds can be used for all modes, then the City would be able to fund all improvements included in the Financially-Constrained Solutions Package using existing funding streams.

Table 34: Planning Level Costs for All Modes (Financially-Constrained Package)

Transportation Mode	Planning Level Cost
Non-Capacity Improvements	
Pedestrian	$6,550,000
Bicycle	$4,690,000
Motor Vehicle (Non-Capacity Improvements)	$4,170,000
Total	**$15,410,000**
Capacity Improvements	
Motor Vehicle (Capacity Improvements)	$20,685,000
TOTAL	**$36,095,000**

Preferred Solutions Package

The intersection operations resulting from the Preferred Solutions Package are listed in Table 35. As shown, nearly all study intersections would meet applicable operating standards in 2030 (with the assumption that an STA designation would be made for OR 99E between Locust Street and Elm Street). Only one signalized intersection would not meet the applicable standard, and this intersection is outside of the City's jurisdiction (OR 99E/S Barlow Road). One of the unsignalized intersections (OR 99E/Haines Road) that does not meet standards is also outside of the City's jurisdiction. The other unsignalized intersection that does not meet the existing standard (South Hazel Dell Way/Sequoia Parkway) experiences high side street delays, but this is not considered critical because the v/c ratio of its worst movement does not exceed 0.90.

Table 35: 2030 Operating Conditions (Preferred Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized					
OR 99E/S Barlow Rd	ODOT	≤ 0.75	64.7	E	**1.08**
OR 99E/Berg Pkwy	ODOT	≤ 0.85	22.1	C	0.87
OR 99E/Elm St	ODOT	≤ 0.95	40.8	D	0.83
OR 99E/Grant St	ODOT	≤ 0.95	61.6	E	0.91
OR 99E/Ivy St	ODOT	≤ 0.95	57.3	E	0.93
OR 99E/Pine St	ODOT	≤ 0.85	14.7	B	0.73
OR 99E/Sequoia Pkwy	ODOT	≤ 0.75	27.5	C	0.72
OR 99E/Otto Road (South)	ODOT	≤ 0.75	3.6	A	0.48
OR 99E/Otto Road (North)	ODOT	≤ 0.75	4.5	A	0.42

Table 35 continued on next page.

(Continued) Table 35: 2030 Operating Conditions (Preferred Solutions Package)

Intersection	Jurisdiction	Mobility Standard	Intersection Performance		
			Delay	*LOS*	*V/C*
Signalized (Continued)					
OR 99E/Territorial Rd	ODOT	≤ 0.75	21.4	C	0.62
Knights Bridge Rd/S Arndt Rd	Clackamas Co.	LOS D	15.1	B	0.85
S Township Rd/S Ivy St	Clackamas Co.	LOS D	10.7	B	0.62
SE 13th Ave/S Ivy St	Clackamas Co.	LOS D	16.0	B	0.68
All-way Stop Controlled					
SE 13th Ave/S Mulino Rd	Clackamas Co.	LOS D	14.8	B	0.68
NE Territorial Rd/N Holly St	City of Canby	LOS D	11.5	B	0.45
S Township Rd/Sequoia Pkwy	City of Canby	LOS D	15.4	C	0.65
SE 4th Ave/Sequoia Pkwy	City of Canby	LOS D	16.0	C	0.74
SE 1st Ave/S Walnut St	City of Canby	LOS D	14.3	B	0.64
Knights Bridge Rd/N Holly St	City of Canby	LOS D	10.9	B	0.50
Roundabout					
S Township Rd/S Mulino Rd	Clackamas Co.	LOS D	14.3	B	0.71
SE 1st Ave/S Mulino Rd/Otto Rd	Clackamas Co.	LOS D	22.9	C	0.79
S Township Rd/S Redwood St	City of Canby	LOS D	12.1	B	0.67
Two-way Stop Controlled					
OR 99E/Haines Rd	ODOT	≤ 0.70	>50	C/F	**1.73**
SE 2nd Ave/S Ivy St	Clackamas Co.	LOS D	14.6	A/B	0.30
NW 1st Ave/N Grant St	City of Canby	LOS E	28.4	A/D	0.36
NW 1st Ave/N Ivy St	City of Canby	LOS E	11.9	A/B	0.30
Knights Bridge Rd/N Birch St	City of Canby	LOS E	>50	A/F	0.46
Knights Bridge Rd/N Cedar St	City of Canby	LOS E	36.7	A/E	0.56
NW 3rd Ave/N Cedar St	City of Canby	LOS E	12.9	A/B	0.30
Two-way Stop Controlled (Continued)					
NE 3rd Ave/NE 4th Ave	City of Canby	LOS E	18.5	A/C	0.78
NE Territorial Rd/N Redwood St	City of Canby	LOS E	34.7	A/D	0.62
S Hazel Dell Way/Sequoia Pkwy	City of Canby	LOS E	>50	**A/F**	0.75
SE 4th Ave/S Redwood St	City of Canby	LOS E	13.8	A/B	0.35
SE 13th Ave/Molalla Forest Rd	City of Canby	LOS E	15.1	A/C	0.18

Signalized and All-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Intersection
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection
Bold values do not meet standards.

Two-Way Stop Controlled intersections:
Delay = Average Stopped Delay per Vehicle (seconds) for Worst Approach
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement (typically a major movement)
Bold values do not meet standards.

While the Preferred Solutions Package is the recommended ultimate solution for 2030, there are two alternative approaches that may be taken by the City:

- The City could pursue the Preferred Solutions Package as a stand-alone package.
- The City could pursue the Financially-Constrained Package as an interim step with the Preferred Solutions Package as the ultimate improvement package.

The total costs associated with the two alternative approaches for pursuing the Preferred Solutions Package are provided in Table 36. As shown, if the Financially-Constrained Package is included as an interim step, the total Preferred Solutions Package cost would be approximately $74.0 million. However, by pursuing the Preferred Solutions Package as a standalone package, the City could reduce overall costs to approximately $71.7 million because it could avoid constructing the two Financially-Constrained Solutions Package improvements that are not included in the Preferred Solutions Package (i.e., OR 99E/Pine Street and OR 99E/Otto Road traffic signal projects).

Another important consideration is that because of the significant nature of an Otto Road overcrossing and frontage road—and the length of time it may take to plan and construct it—it may be worth incurring the additional costs in order to have the improved operations in the short-term to allow continued growth within the City.

Table 36: Total Preferred Package Costs (Two Alternatives)

Package Component	Planning Level Cost
Financially-Constrained Package as Interim Step	
Total Financially-Constrained Package Cost	$24,855,000
Additional Preferred Solutions Package Projects Cost	$49,115,000
TOTAL COST	**$73,970,000**
Preferred Solutions Package as Standalone	
Total Financially-Constrained Package Cost	$24,855,000
Financially-Constrained Package Projects not Included in Preferred Package	-$2,300,000
Additional Preferred Solutions Package Projects Cost	$49,115,000
TOTAL COST	**$71,670,000**

The overall Preferred Solutions Package costs by mode are summarized in Table 37. These costs assume the Financially-Constrained Package is an interim step, with the Preferred Solutions Package as the ultimate improvement package. As listed, the total cost for the Preferred Solutions Package is estimated to be approximately $85.2 million.[12] Also, because the Berg Parkway evaluation in this Transportation Solutions Report indicates that the main benefits of this grade-separated railroad crossing are connectivity-related and that

[12] As applicable, these motor vehicle costs include the construction of sidewalks and bike lanes on new roadways, the provision of curbs and crosswalks at new or upgraded intersections, and repaving costs on improved ODOT roadways.

it does not have significant capacity benefits, its estimated cost is included in the "non-capacity" section of Table 37.

Table 37: Planning Level Costs for All Modes (Preferred Package with Financially-Constrained Package as Interim Step)

Transportation Mode	Planning Level Cost
Non-Capacity Improvements	
Pedestrian	$6,550,000
Bicycle	$4,690,000
Motor Vehicle (Non-Capacity Improvements)	$20,675,000
Total	**$31,915,000**
Capacity Improvements	
Motor Vehicle (Capacity Improvements)	$53,295,000
TOTAL	**$85,210,000**

Similar to the Financially-Constrained Solutions Package, there is insufficient funding available from existing revenue streams to fund the Preferred Solutions Package, and the City would need to obtain additional revenue. Some funding options include urban renewal funds, grants, developer contributions, and transportation SDCs. Transportation SDCs could fund the majority of the projects, with the main exception being the Berg Parkway Extension, which would need to be funded using Urban Renewal funds, grants, developer contributions, or other sources.

One way in which Canby could fund the remaining projects (i.e., all projects with the exception of the Berg Parkway Extension) would be to (1) amend their transportation SDC methodology so that funds can be used for all modes and (2) increase their SDC fee rates to approximately $6,000 per p.m. peak hour trip. This is more than double their existing rate of $2,500 per p.m. peak hour trip, but it is still comparable to nearby communities. By doing so, the City could bring in approximately $32.9 million in additional funds, which would bring their total available funds to approximately $68.9 million. When the Berg Parkway Extension ($16.5 million) is not included in the project total, the remaining planning level project costs equal $68.7 million.

Increasing its SDC rates is only one option available to the City of Canby for increasing its funding streams. It is likely that the City would be able to obtain contributions from ODOT, Clackamas County, and the City's Urban Renewal District (URD), as described in the following section. These contributions would offset needed increases in City SDCs. Therefore, the Preferred Solutions Package could be feasibly funded given the potential for increased funding streams.

Revised Solution Packages with Sequoia Parkway Extension

Near the end of the TSP Adoption process, City Council decided the TSP should be modified to include the Sequoia Parkway Extension and designate SE/SW 13th Street as an arterial roadway (and a truck route between Ivy and OR 99E). The Sequoia Parkway Extension improvement would extend the current street stub south of Township Road to SE 13th Avenue, adding connectivity to portions of the industrial park. Because of neighborhood concerns that the Sequoia Parkway Extension and designation of SE/SW 13th Street as an arterial could potentially increase traffic (particularly truck traffic) on SE 13th Avenue, City Council decided that the roadway extension should not be constructed until a safety study is performed and traffic calming and other safety improvements are constructed on SW/SE 13th Avenue between Berg Parkway and the new Sequoia Parkway intersection. Together, these two improvements would add connectivity to the Canby Pioneer Industrial Park while protecting residential neighborhoods and pedestrian activity along SE 13th Avenue.

Table 38 lists the two additional projects and their associated planning level cost estimates. The Sequoia Parkway Extension has a high estimated cost because it would require a grade-separated railroad crossing and would need to be built to industrial roadway standards.

Table 38: Additional Projects Related to Sequoia Parkway Extension

Location	Motor Vehicle Project	Planning Level Cost
Non-Capacity Improvements		
SE/SW 13th Avenue (Berg Parkway to Sequoia Parkway Extension)	Perform safety study and constructed traffic calming and other safety improvements prior to constructing Sequoia Parkway Extension	$750,000
Sequoia Parkway Extension (Township Rd to SE 13th Avenue)	Install two-lane collector roadway with grade-separated rail crossing (includes sidewalks and bike lanes)	$5,500,000

Sensitivity testing was performed for the updated roadway system with the new Sequoia Parkway Extension and indicated that the Sequoia Extension would not cause sufficiently significant traffic impacts to justify reevaluating the system as part of the TSP Update. Therefore, the system volumes and operations analysis previously performed were not modified.

Appendix L: Project Cost Estimates

Planning Level Unit Costs

$105 per linear foot of sidewalk

Sidewalks along Roadway Segment/Corridor

Project		Location	Motor Vehicle Project	Roadway Length (ft)	# of Sides	Total Length	Cost	Rounded	
S1	Install sidewalks (north side)	OR 99E (north side, Knott St to Locust St)	STA						
S2	Install sidewalks	NE 3rd Ave (Locust St to NE 4th Ave) and NE 4th Ave (Locust St to NE 3rd Ave)					$223,373	$220,000	
S3	Install sidewalks	NE 4th Ave (NE 3rd Ave to Fairgrounds)		700	2	1,400	$147,000	$150,000	
S4	Fill in sidewalk gaps	S Ivy St (OR 99E to Lee Elementary)		2,850	1.625	4,631	$486,281	$490,000	
S5	Install sidewalks	Pine St (OR 99E to NE 4th Ave)	Realignment						
S6	Fill in sidewalk gaps	Knights Bridge Rd (west edge of UGB to Grant St)		2,900	1.75	5,075	$532,875	$220,000	1
S7	Fill in sidewalk gaps	N Holly St (Knights Bridge Rd to NW Territorial Rd)		2,750	1.9	5,225	$548,625	$550,000	
S8	Fill in sidewalk gaps	Territorial Rd (Holly St to OR 99E)		7,800	1.5	11,700	$1,228,500	$1,230,000	
S9	Install sidewalks	NE 10th Ave (Holly St to Pine St)		3,950	2	7,900	$829,500	$830,000	
S10	Install sidewalks	Otto Rd (OR 99E to SE 1st Ave)	New Road and Traffic Signal						
S11	Fill in sidewalk gaps	S Ivy St (S 13th Ave to S 16th Ave)		1,100	0.9	990	$103,950	$100,000	
S12	Install sidewalks	S Township Rd (OP RR tracks to Sequoia Pkwy)		1,208	1.6	1,933	$202,944	$200,000	
S13	Install sidewalks	SE 4th Ave (Sequoia Pkwy to Mulino Rd)	New Road						

Enhanced Pedestrian Crossing

Project		Location	Motor Vehicle Project	Cost	Rounded	
C1	Improve crosswalk and ramps	OR 99E and UPRR (at Elm St)		$40,000	$40,000	2
C2	Improve crosswalk and ramps, install pedestrian refuge island	OR 99E and UPRR (at Grant St)		$30,000	$30,000	3
C3	Improve crosswalk and ramps, install pedestrian refuge island	OR 99E and UPRR (at Ivy St)		$30,000	$30,000	3
C4	Install pedestrian refuge island	OR 99E (between Ivy St and Locust St)	STA			
C5	Install crosswalk and ramps	S Ivy St (north leg at Township Rd)	Signal			
C6	Provide crosswalk	Township Rd (at Sequoia Pkwy)	All-way stop			
C7	Improve crosswalk and ramps	OR 99E and UPRR (at Pine St)	Pine St Imps.			
C8	Install crosswalk, ramps, and pedestrian refuge island	S Ivy St (south leg at SW 3rd Ave)	Intersection Imps.			

Multi-Use Connection

Project		Location	Motor Vehicle Project	Cost	Rounded	
T1	Connect multi-use trail to sidewalks on south side of OR 99E	OR 99E and Molalla Forest Road Trail		$360,000	$360,000	4
T2	Install multi-use trail	North of RR tracks (parallel to OR 99E from Elm St to Molalla Forest Rd Trail)		$3,435,000	bicycle project	

Program Strategy

Project		Location	Motor Vehicle Project	Yearly Cost	Years	Cost	Rounded
P1	Prepare plan and provide yearly funding	Safe Routes to School (yearly funding)		$50,000	21	$1,050,000	$1,050,000
P2	Prepare plan and provide yearly funding	ADA improvements (yearly funding)		$50,000	21	$1,050,000	$1,050,000

TOTAL $6,550,000

1 Some of this project is already underway and costs are accounted for
2 Assume $10,000 a corner
3 $10,000 a corner; one corner to be rebuilt with new right-turn lane
4 600 ft connection, 12 ft wide with 600 ft wall (cost this one like a road project)

Planning Level Unit Costs

$6	Bike lane striping only (with stencils included)
$75	per linear foot of bike lane (adding pavement to side of road, with no right-of-way purchase)
$215	per linear foot to widen (with pavement and right-of-way)
$385	per linear foot to retrofit a bike lane when there is already a curb and sidewalk (+ ROW)
$17	Bike Boulevard

Railroad Crossing Improvements

Project		Location	Motor Vehicle Project	Roadway Length (ft)	# of Sides	Total Length	Cost	Rounded	
R1	Improve rail crossing (fill in gaps adjacent to rails)	UPRR (at Elm St)					$100,000	$100,000	
R2	Improve rail crossing (fill in gaps adjacent to rails)	UPRR (at Grant St)					$100,000	$100,000	
R3	Provide rail crossing	UPRR (at Ivy St)					$100,000	$100,000	
R4	Provide rail crossing	UPRR (at Pine St-NE 4th Ave)	Pine St Imps						1
R5	Move guardrail and improve rail crossing (fill in gaps adjacent to rails)	OPRR (at Township Rd)					$100,000	$100,000	

Bike Lanes

Project		Location	Motor Vehicle Project	Roadway Length (ft)	# of Sides	Total Length	Cost	
B1	Bike boulevard	Holly St (NW 6th Ave to Multi-use trail)		1,750	1	1,750	$29,750	$30,000
B2	stripe bike lanes	Knights Bridge Rd (west edge of UGB to Holly St)		3,400	2	6,800	$40,800	$41,000
B3	Stripe bike lanes	N Holly St (Knights Bridge Rd to Territorial)		3,250	2	6,500	$39,000	
B3	Widen roadway and install bike lanes	N Holly St (Territorial Rd to NW 22nd Ave)		2,150	2	4,300	$623,500	
B3	**TOTAL for B3**	N Holly St (NW 22nd Ave to Knights Bridge Rd)		5,400				$663,000
B4	Install bike lanes	NE 3rd Ave (Locust St to NE 4th Ave) and NE 4th Ave (Locust St to NE 3rd Ave)		1,800	2	2,700	$16,200	$16,000
B5	Install bike lanes	NE 4th Ave (NE 3rd Ave to Fairgrounds Entrance)		700	2	1,400	$105,000	$105,000
B6	Install bike lanes	Pine St Realignment	Realignment					
B7	Install bike lanes	Otto Rd	New Road					
B8	Install bike lanes	SE 4th Ave	New Road					

Multi-Use Connection

Project		Location	Motor Vehicle Project			
T1	Connect multi-use trail to sidewalks on south side of OR 99E	OR 99E and Molalla Forest Road Trail		$360,000	ped project	
T2	Install multi-use trail	North of RR tracks (parallel to OR 99E from Elm St to Molalla Forest Rd Trail)		$3,435,000	$3,435,000	2

TOTAL $4,690,000

1 add 100,000 to couplet
2 this in one option (12 ft multi-use trail, include right-of-way cost)

City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Connection between Molalla Forest Road Trail and OR 99E sidewalk

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	7200	SF	$	0.05	$	360
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	0	SF	$	1.25	$	-
Pavement	7200	SF	$	8.00	$	57,600
Pavement Elevated/Subgrade	0	SF	$	150.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	LF	$	12.00	$	-
Wall	600	LF	$	120.00	$	72,000
Lighting	600	LF	$	60.00	$	36,000
Full Drainage	600	LF	$	100.00	$	60,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signals	0	Unit	$	300,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	0	LF	$	3.00	$	-
SUBTOTAL					$	225,960
Traffic Control				5%	$	11,298
Mobiliization				10%	$	22,596
Design/Administration/Management				15%	$	33,894
Contingency				25%	$	56,490
Project Development				5%	$	11,298
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	20.00	$	-
	PROJECT COST:				**$**	**361,536**
					$	**360,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*
6/23/2010 2:10

City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) New Multi-Use Trail Parallelling OR 99E on north side of Union Pacific Railroad
Distance = 5100 ft

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	61200	SF	$	0.05	$	3,060
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	0	SF	$	1.25	$	-
Pavement	61200	SF	$	8.00	$	489,600
Pavement Elevated/Subgrade	0	SF	$	150.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	LF	$	12.00	$	-
Wall	600	LF	$	120.00	$	72,000
Lighting	5100	LF	$	60.00	$	306,000
Full Drainage	5100	LF	$	100.00	$	510,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signals	0	Unit	$	300,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	0	LF	$	3.00	$	-
SUBTOTAL					$	1,380,660
Traffic Control				5%	$	69,033
Mobiliization				10%	$	138,066
Design/Administration/Management				15%	$	207,099
Contingency				25%	$	345,165
Project Development				5%	$	69,033
Sales Tax				0.0%	$	-
Right Of Way	61200	SF	$	20.00	$	1,224,000
	PROJECT COST:				**$**	**3,433,056**
					$	**3,435,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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6/23/2010 2:10

City of Canby
Cost Estimate Summary

PROJECT ELEMENT: 1) Replace current 6' width of pavement with curb and sidewalk (NE 3rd and 4th)
Distance = 1800 ft

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	21600	SF	$	0.33	$	7,128
Clear & Grub	21600	SF	$	0.05	$	1,080
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	0	SF	$	1.25	$	-
Pavement	0	SF	$	8.00	$	-
Pavement Elevated/Subgrade	0	SF	$	150.00	$	-
Sidewalk	21600	SF	$	4.00	$	86,400
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	LF	$	12.00	$	-
Wall	0	LF	$	120.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	1800	LF	$	25.00	$	45,000
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	0	LF	$	1.50	$	-
SUBTOTAL					$	139,608
Traffic Control				5%	$	6,980
Mobiliization				10%	$	13,961
Design/Administration/Management				15%	$	20,941
Contingency				25%	$	34,902
Project Development				5%	$	6,980
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	30.00	$	-
	PROJECT COST:				**$**	**223,373**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

DKS *Associates*
1/6/2011 11:23

City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Retrofit Bike Lane

Project Description:

Linear foot cost for adding a bicycle lane where sidewalks do not exist and adjacent right of way would not be required.

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	5	SF	$	0.05	$	0
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	5	SF	$	1.25	$	6
Pavement	5	SF	$	8.00	$	40
Pavement Elevated/Subgrade	0	SF	$	150.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	LF	$	12.00	$	-
Wall	0	LF	$	120.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	1	LF	$	1.50	$	2
SUBTOTAL					$	48
Traffic Control				5%	$	2
Mobiliization				10%	$	5
Design/Administration/Management				15%	$	7
Contingency				25%	$	12
Project Development				5%	$	2
Sales Tax				0.0%	$	-
Right Of Way		SF	$	20.00	$	-
	PROJECT COST:				**$**	**77**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

***DKS** Associates*
6/23/2010 2:10

City of Canby
Cost Estimate Summary

PROJECT ELEMENT: 1) Retrofit Bike Lane + Purchase of Right of Way

Project Description:

Linear foot cost for adding a bicycle lane where sidewalks do not exist and adjacent right of way would be required.

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	6	SF	$	0.05	$	0
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	6	SF	$	1.25	$	8
Pavement	6	SF	$	8.00	$	48
Pavement Elevated/Subgrade	0	SF	$	150.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	LF	$	12.00	$	-
Wall	0	LF	$	120.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	1	LF	$	1.50	$	2
SUBTOTAL					$	57
Traffic Control				5%	$	3
Mobiliization				10%	$	6
Design/Administration/Management				15%	$	9
Contingency				25%	$	14
Project Development				5%	$	3
Sales Tax				0.0%	$	-
Right Of Way	6	SF	$	20.00	$	120
PROJECT COST:					**$**	**212**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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6/23/2010 2:10

City of Canby
Cost Estimate Summary

PROJECT ELEMENT: 1) Retrofit Bike Lane (if existing sidewalks need to be removed and reinstalled)

Project Description:

Linear foot cost for adding a bicycle lane where sidewalks already exist and adjacent right of way would be required.

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	0	SF	$	0.05	$	-
Remove Curb	1	LF	$	10.00	$	10
Remove Sidewalk	6	SF	$	1.50	$	9
Grading	0	SF	$	1.25	$	-
Pavement	6	SF	$	8.00	$	48
Pavement Elevated/Subgrade	0	SF	$	150.00	$	-
Sidewalk	6	SF	$	4.00	$	24
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	1	LF	$	12.00	$	12
Wall	0	LF	$	120.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	1	LF	$	25.00	$	25
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	0	LF	$	1.50	$	-
SUBTOTAL					$	128
Traffic Control				5%	$	6
Mobiliization				10%	$	13
Design/Administration/Management				15%	$	19
Contingency				25%	$	32
Project Development				5%	$	6
Sales Tax				0.0%	$	-
Right Of Way	6	SF	$	30.00	$	180
	PROJECT COST:				**$**	**385**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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City of Canby
Cost Estimate Summary

PROJECT ELEMENT: 1) Stripe roadway

Project Description:

Linear foot cost for adding a bicycle lane where sidewalks already exist and adjacent right of way would be required.

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	0	SF	$	0.05	$	-
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	0	SF	$	1.25	$	-
Pavement	0	SF	$	8.00	$	-
Pavement Elevated/Subgrade	0	SF	$	150.00	$	-
Sidewalk	0	SF	$	4.00	$	-
Curb and gutter	0	LF	$	14.00	$	-
Landscaping	0	LF	$	12.00	$	-
Wall	0	LF	$	120.00	$	-
Lighting	0	LF	$	60.00	$	-
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	1	LF	$	1.50	$	2
SUBTOTAL					$	2
Traffic Control				5%	$	0
Mobiliization				10%	$	0
Design/Administration/Management				15%	$	0
Contingency				25%	$	0
Project Development				5%	$	0
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	30.00	$	-
PROJECT COST:					**$**	**2**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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Canby Preferred Alternative Cost Estimate

References a cost-estimate sheet

Project	Desc	Cost	
N1	STA - Elm to Locust	3,770,000	
N2	OR 99E Adaptive Signal System	400,000	
N3	SW/SE 13th Ave Safety Study	750,000	
L1	Otto Extension	8,915,000	
L3	Pine/4th Realignment	1,255,000	
L5	SE 4th Extension	3,140,000	
L7	Sequoia Pkwy Extension	5,500,000	
L8	Otto Interchange	17,940,000	
L8	Frontage Road	14,420,000	
L9	Pine Rail Crossing Closure	250,000	curb and gate for emergency vehicles
L10	Berg Extension	16,505,000	
O1	1st/Haines/Mulino Roundabout	2,000,000	realign approaches, house take
O2	Township/Redwood Roundabout	1,000,000	
O3	Township/Mulino Roundabout	1,000,000	
I1	Ivy/Township Traffic Signal	300,000	
I2	Township/Sequoia/Walnut AWSC and EBLT, WBRT	510,000	
I3	Ivy/1st Street Access closure	10,000	
I4	Grant/1st Street Access closure	10,000	
I5	Cedar/Knightsbridge NBRT	5,000	restripe
I6	Grant/SW 2nd Ave WBRT	100,000	95,000 estimate (but round up to be safer)
I7	S Ivy/SW 2nd Ave EBRT	100,000	85,000 estimate (but round up to be safer)
I8	S Ivy/SW 3rd Ave partial diverter and ped island	40,000	$10K for diverter and $30K for ped island
	TOTAL	**77,920,000**	

Canby Financially Constrained Cost Estimate

Project	Desc	Cost	
			Same as Preferred Solutions Package
N1	STA - Elm to Locust	3,770,000	
N2	OR 99E Adaptive Signal System	400,000	
N3	SW/SE 13th Ave Safety Study	750,000	
L1	Otto Extension	8,915,000	
L2	Otto Rd/99E Traffic Signal	300,000	
L3	Pine/4th Realignment	1,255,000	
L4	Widen Rail at 99E/Pine SB approach and signal mod	1,500,000	
L4	99E/Pine WBRT	500,000	
L5	SE 4th Extension	3,140,000	
L6	NE 3rd Ave and NE 4th Ave roadway conversion	-	Costs included with bike project
O1	1st/Haines/Mulino Roundabout	2,000,000	realign approaches, house take
O2	Township/Redwood Roundabout	1,000,000	
O3	Township/Mulino Roundabout	1,000,000	
I1	Ivy/Township Traffic Signal	300,000	
I2	Township/Sequoia/Walnut AWSC and EBLT, WBRT	510,000	
I3	Ivy/1st Street Access closure	10,000	
I4	Grant/1st Street Access closure	10,000	
I5	Cedar/Knightsbridge NBRT	5,000	restripe
I6	Grant/SW 2nd Ave WBRT	100,000	
I7	S Ivy/SW 2nd Ave EBRT	100,000	
I8	S Ivy/SW 3rd Ave partial diverter and ped island	40,000	
	TOTAL	**25,605,000**	

City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Repave OR 99E and Install STA-Related Improvements
Distance 2650 ft

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	174900	SF	$	0.33	$	57,717
Clear & Grub	0	SF	$	0.05	$	-
Remove Curb	5300	LF	$	10.00	$	53,000
Remove Sidewalk	31800	SF	$	1.50	$	47,700
Grading	0	SF	$	1.25	$	-
Pavement	169600	SF	$	8.00	$	1,356,800
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	53000	SF	$	4.00	$	212,000
Curb and gutter	10600	LF	$	14.00	$	148,400
Landscaping	2650	LF	$	12.00	$	31,800
Wall	0	LF	$	120.00	$	-
Lighting	5300	LF	$	60.00	$	318,000
Full Drainage	0	LF	$	100.00	$	-
Drainage Modifications	2650	LF	$	25.00	$	66,250
Driveway Adjustments	30	Driveways	$	2,000.00	$	60,000
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	2650	LF	$	1.50	$	3,975
SUBTOTAL					$	2,355,642
Traffic Control				5%	$	117,782
Mobiliization				10%	$	235,564
Design/Administration/Management				15%	$	353,346
Contingency				25%	$	588,911
Project Development				5%	$	117,782
Sales Tax				0.0%	$	-
Right Of Way	0	SF	$	20.00	$	-
PROJECT COST:					**$**	**3,769,027**
					$	**3,770,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Extend Otto to NE Area
Distance 2600
Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	208000	SF	$	0.05	$	10,400
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	208000	SF	$	1.25	$	260,000
Pavement	130000	SF	$	8.00	$	1,040,000
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	31200	SF	$	4.00	$	124,800
Curb and gutter	5200	LF	$	14.00	$	72,800
Landscaping	2600	LF	$	12.00	$	31,200
Wall	0	LF	$	120.00	$	-
Lighting	2600	LF	$	60.00	$	156,000
Full Drainage	2600	LF	$	100.00	$	260,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	2	EA		$500,000	$	1,000,000
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	10400	LF	$	1.50	$	15,600
SUBTOTAL					$	2,970,800
Traffic Control				5%	$	148,540
Mobiliization				10%	$	297,080
Design/Administration/Management				15%	$	445,620
Contingency				25%	$	742,700
Project Development				5%	$	148,540
Sales Tax				0.0%	$	-
Right Of Way	208000	SF	$	20.00	$	4,160,000
PROJECT COST:					**$**	**8,913,280**
					$	**8,915,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Pine Street/NE 4th Ave Realignment
Distance 500

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	14000	SF	$	0.33	$	4,620
Clear & Grub	30000	SF	$	0.05	$	1,500
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	30000	SF	$	1.25	$	37,500
Pavement	30000	SF	$	8.00	$	240,000
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	6000	SF	$	4.00	$	24,000
Curb and gutter	1000	LF	$	14.00	$	14,000
Landscaping	500	LF	$	12.00	$	6,000
Wall	0	LF	$	120.00	$	-
Lighting	500	LF	$	60.00	$	30,000
Full Drainage	500	LF	$	100.00	$	50,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	500	LF	$	1.50	$	750
SUBTOTAL					$	408,370
Traffic Control				5%	$	20,419
Mobiliization				10%	$	40,837
Design/Administration/Management				15%	$	61,256
Contingency				25%	$	102,093
Project Development				5%	$	20,419
Sales Tax				0.0%	$	-
Right Of Way	30000	SF	$	20.00	$	600,000
PROJECT COST:					**$**	**1,253,392**
					$	**1,255,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Extend /SE 4th to Mulino
Distance 1100
Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	90200	SF	$	0.05	$	4,510
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	90200	SF	$	1.25	$	112,750
Pavement	55000	SF	$	8.00	$	440,000
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	13200	SF	$	4.00	$	52,800
Curb and gutter	2200	LF	$	14.00	$	30,800
Landscaping	1100	LF	$	12.00	$	13,200
Wall	0	LF	$	120.00	$	-
Lighting	1100	LF	$	60.00	$	66,000
Full Drainage	1100	LF	$	100.00	$	110,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	3300	LF	$	1.50	$	4,950
SUBTOTAL					$	835,010
Traffic Control				5%	$	41,751
Mobiliization				10%	$	83,501
Design/Administration/Management				15%	$	125,252
Contingency				25%	$	208,753
Project Development				5%	$	41,751
Sales Tax				0.0%	$	-
Right Of Way	90200	SF	$	20.00	$	1,804,000
PROJECT COST:					**$**	**3,140,016**
					$	**3,140,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Extend Sequoia Pkwy From Township to SE 13th Ave (over railroad)
Roadway Distance 2000 ft
Bridge Distance 100 ft

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	12000	SF	$	0.33	$	3,960
Clear & Grub	148000	SF	$	0.05	$	7,400
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	100000	SF	$	1.25	$	125,000
Pavement	100000	SF	$	8.00	$	800,000
Pavement Elevated/Subgrade	5000	SF	$	200.00	$	1,000,000
Sidewalk	24000	SF	$	4.00	$	96,000
Curb and gutter	4000	LF	$	14.00	$	56,000
Landscaping	4000	LF	$	12.00	$	48,000
Wall	0	LF	$	120.00	$	-
Lighting	2000	LF	$	60.00	$	120,000
Full Drainage	2000	LF	$	100.00	$	200,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	2000	LF	$	1.50	$	3,000
SUBTOTAL					$	2,459,360
Traffic Control				5%	$	122,968
Mobiliization				10%	$	245,936
Design/Administration/Management				15%	$	368,904
Contingency				25%	$	614,840
Project Development				5%	$	122,968
Sales Tax				0.0%	$	-
Right Of Way	124000	SF	$	12.50	$	1,550,000
PROJECT COST:					**$**	**5,484,976**
					$	**5,500,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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1/6/2011 11:32

City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Otto Grade Seperation and Jug Handles
Distance 3000

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	162000	SF	$	0.05	$	8,100
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	0	SF	$	1.25	$	-
Pavement	162000	SF	$	8.00	$	1,296,000
Pavement Elevated/Subgrade	21600	SF	$	200.00	$	4,320,000
Sidewalk	36000	SF	$	4.00	$	144,000
Curb and gutter	6000	LF	$	14.00	$	84,000
Landscaping	0	LF	$	12.00	$	-
Wall	5700	LF	$	120.00	$	684,000
Lighting	3000	LF	$	60.00	$	180,000
Full Drainage	3000	LF	$	100.00	$	300,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signals	3	Unit	$	300,000.00	$	900,000
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	3000	LF	$	3.00	$	9,000
SUBTOTAL					$	7,925,100
Traffic Control				10%	$	792,510
Mobiliization				10%	$	792,510
Design/Administration/Management				15%	$	1,188,765
Contingency				50%	$	3,962,550
Project Development				5%	$	396,255
Sales Tax				0.0%	$	-
Right Of Way	144000	SF	$	20.00	$	2,880,000
	PROJECT COST:				**$**	**17,937,690**
					$	**17,940,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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6/23/2010 2:18

City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Construct Frontage Road from Otto Rd interchange to Pine St
Distance 4000

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	320000	SF	$	0.05	$	16,000
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	320000	SF	$	1.25	$	400,000
Pavement	200000	SF	$	8.00	$	1,600,000
Pavement Elevated/Subgrade	0	SF	$	200.00	$	-
Sidewalk	48000	SF	$	4.00	$	192,000
Curb and gutter	8000	LF	$	14.00	$	112,000
Landscaping	4000	LF	$	12.00	$	48,000
Wall	0	LF	$	120.00	$	-
Lighting	4000	LF	$	60.00	$	240,000
Full Drainage	4000	LF	$	100.00	$	400,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	4000	LF	$	1.50	$	6,000
Building Takes	2	EA	$	500,000.00	$	1,000,000
Redo Molalla Forest Rd Ped Bridge	1	EA	$	1,000,000.00	$	1,000,000
SUBTOTAL					$	5,014,000
Traffic Control				5%	$	250,700
Mobiliization				10%	$	501,400
Design/Administration/Management				15%	$	752,100
Contingency				25%	$	1,253,500
Project Development				5%	$	250,700
Sales Tax				0.0%	$	-
Right Of Way	320000	SF	$	20.00	$	6,400,000
	PROJECT COST:				**$**	**14,422,400**
					$	**14,420,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

DKS *Associates*
1/6/2011 11:27

City of Canby TSP
Cost Estimate Summary

PROJECT ELEMENT: 1) Extend Berg From 99E to NW 3rd Street (assume over railroad)
Distance 1000 ft

Project Description:

	UNITS		UNIT COSTS		ESTIMATED COST	
Remove Pavement	0	SF	$	0.33	$	-
Clear & Grub	50000	SF	$	0.05	$	2,500
Remove Curb	0	LF	$	10.00	$	-
Remove Sidewalk	0	SF	$	1.50	$	-
Grading	80000	SF	$	1.25	$	100,000
Pavement	12500	SF	$	8.00	$	100,000
Pavement Elevated/Subgrade	46500	SF	$	200.00	$	9,300,000
Sidewalk	3000	SF	$	4.00	$	12,000
Curb and gutter	2000	LF	$	14.00	$	28,000
Landscaping	1000	LF	$	12.00	$	12,000
Wall	0	LF	$	120.00	$	-
Lighting	1000	LF	$	60.00	$	60,000
Full Drainage	1000	LF	$	100.00	$	100,000
Drainage Modifications	0	LF	$	25.00	$	-
Driveway Adjustments	0	Driveways	$	2,000.00	$	-
Roundabouts	0	EA		$500,000	$	-
Traffic Signal Modification	0	Unit	$	50,000.00	$	-
Signing and Striping	0	EA	$	500.00	$	-
Signing and Striping	1000	LF	$	1.50	$	1,500
SUBTOTAL					$	9,716,000
Traffic Control				5%	$	485,800
Mobiliization				10%	$	971,600
Design/Administration/Management				15%	$	1,457,400
Contingency				25%	$	2,429,000
Project Development				5%	$	485,800
Sales Tax				0.0%	$	-
Right Of Way	48000	SF	$	20.00	$	960,000
PROJECT COST:					**$**	**16,505,600**
					$	**16,505,000**

Notes: High contingencies are due to uncertainty regarding storm drainage/utility needs.
Storm drain base cost = $75.00/LF, assumes storm drain connections only at $28.00/LF.
These issues should be further resolved in project development. Assumes no ROW costs.
Note: Costs are for constant 2005 dollars; annual adjustments are necessary to address inflation
to get to year of construction project estimates (presently 3 to 4 % per year is adequate)

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Appendix M: Revenue and Expenditure Stream Forecasts

City of Canby Transportation Related Finances

Revenue Source	FY2005	FY2006	FY2007	FY2008	FY2009	Average	Future Yearly Estimate* (2010 through 2030)	Total Future Estimate (Base Year Dollars)
General Funds (State/Federal Sources)								
State Highway Fund (gas taxes)	679,265.41	690,437.47	676,497.40	648,863.17	583,489.33	655,710.56	655,000.00	13,755,000.00
Federal Fund Exchange	0.00	0.00	452,917.34	0.00	388,697.00	168,322.87	170,000.00	3,570,000.00
CDBG (Specific Project Grant)	0.00	0.00	15,962.70	26,577.50	0.00	8,508.04		0.00
Grants	0.00	0.00	414,694.61	640,238.05	0.00	210,986.53		0.00
General Funds (City Sources)								
Local Gas Tax	0.00	0.00	0.00	0.00	234,412.46	46,882.49	250,000.00	5,250,000.00
Street Maintenance Fee	0.00	0.00	0.00	0.00	254,305.92	50,861.18	250,000.00	5,250,000.00
Construction Excise Tax	60,795.78	177,398.69	93,018.69	36,429.38	7,359.59	75,000.43	75,000.00	1,575,000.00
Street Repair Fee's (charges for services)	200.00	200.00	2,464.50	2,450.00	760.45	1,214.99		0.00
Erosion Control Fee's (charges for services)	15,037.00	27,955.80	14,753.00	17,174.20	3,578.00	15,699.60	15,000.00	315,000.00
Miscellaneous Revenue	11,381.23	11,000.88	8,783.26	25,948.39	11,407.21	13,704.19	15,000.00	315,000.00
Interest Revenue	3,057.38	5,471.48	14,061.44	11,975.16	5,193.92	7,951.88	10,000.00	210,000.00
Restricted Funds								
Transportation System Development Charges (SDCs)	202,068.40	628,174.21	726,467.77	742,163.38	106,510.13	481,076.78	1,120,000.00	23,520,000.00
Total Revenue	**971,805.20**	**1,540,638.53**	**2,419,620.71**	**2,151,819.23**	**1,595,714.01**	**1,735,919.54**	**2,560,000.00**	**53,760,000.00**

Expenditure Category	FY2005	FY2006	FY2007	FY2008	FY2009	Average	Future Yearly Estimate (2010 through 2030)	Total Future Estimate (Base Year Dollars)
Admin								
Personal Services	320,590.72	349,942.11	364,251.11	325,705.28	447,885.80	361,675.00	400,000.00	8,400,000.00
Material & Services	190,989.80	199,635.49	202,747.58	181,247.79	247,863.53	204,496.84	205,000.00	4,305,000.00
Capitol Outlay Equipment	79,317.00	0.00	0.00	0.00	13,686.07	18,600.61	20,000.00	420,000.00
Maintenance and Other								
Maintenance	87,221.12	94,491.76	56,370.38	73,574.37	59,000.00	74,131.53	60,000.00	1,260,000.00
Capacity Improvements								
SDC Capital Improvement Expenditures	11,523.50	59,369.25	1,015,344.69	374,392.52	263,456.82	344,817.36		0.00
Non-Capacity Improvements								
Other Capital Projects	45,590.43	87,826.21	735,031.66	417,353.50	0.00	257,160.36		0.00
Federal Fund Exchange Expenditures	184,102.79	238,818.72	0.00	0.00	388,697.00	162,323.70		0.00
CDBG (Specific Project Grant)	0.00	0.00	24,636.70	29,790.00	34,042.45	17,693.83		0.00
Contribution to Other Uses								
Operating (OP) Transfer to General Fund	50,000.00	60,000.00	61,800.00	66,554.00	85,000.00	64,670.80	65,000.00	1,365,000.00
OP Transfer To Fleet	66,785.00	70,000.00	75,000.00	80,000.00	86,929.00	75,742.80	75,000.00	1,575,000.00
OP Transfer to Technical Services	5,100.00	2,775.00	3,000.00	6,000.00	6,180.00	4,611.00	5,000.00	105,000.00
Reserve Transfer to Fleet	15,000.00	16,000.00	20,000.00	25,000.00	0.00	15,200.00	15,000.00	315,000.00
Total Expenditures	**1,056,220.36**	**1,178,858.54**	**2,558,182.12**	**1,579,617.46**	**1,632,740.67**	**1,601,123.83**	**845,000.00**	**17,745,000.00**

General Category	FY2005	FY2006	FY2007	FY2008	FY2009	Average	Future Yearly Estimate (2010 through 2030)	Total Future Estimate (Base Year Dollars)
Beginning Available Funds		-84,415.16	277,364.83	138,803.42	711,005.19		673,978.53	
Total Revenue	971,805.20	1,540,638.53	2,419,620.71	2,151,819.23	1,595,714.01	1,735,919.54	2,560,000.00	53,760,000.00
Total Expenditures	1,056,220.36	1,178,858.54	2,558,182.12	1,579,617.46	1,632,740.67	1,601,123.83	845,000.00	17,745,000.00
Ending Fund Balance	**-84,415.16**	**277,364.83**	**138,803.42**	**711,005.19**	**673,978.53**	**134,795.71**	**2,388,978.53**	**36,015,000.00**

Appendix N: Implementing Ordinances Memorandum

Angelo planning group LAND USE PLANNING • TRANSPORTATION PLANNING • PROJECT MANAGEMENT

Memorandum

Date: May 13, 2010

To: Matilda Deas, City of Canby
Sonya Kazen, Oregon Department of Transportation

cc: Chris Maciejewski, DKS Associates
Brad Coy, DKS Associates

From: Matt Hastie, Angelo Planning Group
Serah Breakstone, AICP, Angelo Planning Group

Re: Canby Transportation System Plan Update – Recommended Amendments to the Canby Code for TSP and TPR Compliance

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The purpose of this memorandum is to provide the City of Canby with regulatory language that will implement the updated Transportation System Plan (TSP) and ensure consistency with the Oregon Transportation Planning Rule (TPR).

Section I of this memo provides an analysis of the Canby Code as it relates to the TPR. During the previous 2002 Canby TSP update, a similar analysis was conducted and code amendments were recommended in order to bring Canby into compliance with the TPR. Most of the recommended code amendments were adopted at that time. However, in some cases, it appears that recommended language was not adopted and certain sections of the TPR may not have been addressed in detail. In addition, the TPR was updated in 2005 and those updates have not yet been addressed. The TPR compliance analysis identifies applicable sections of the TPR and whether or not they appear to have been addressed during the 2002 TSP update. It also includes a brief discussion of Canby's existing code and offers recommendations for bringing the code further into compliance with the TPR. Where additional language or revisions to existing language are recommended, this memo provides corresponding code revisions in Section II.

The discussion of recommended revisions in Section II is generally organized by reference to the applicable section(s) of the TPR that prompt a change in the city's implementing ordinances, followed by the recommended revisions. The TPR requirement, the recommendation for revisions to the Canby Code, and any outstanding issues are presented in text boxes.

Section III of this memo provides additional code and policy amendments that are recommended in order to implement the TSP. These revisions are aimed at addressing a variety of goals, objectives or policies proposed to be adopted as part of the TSP and which will require new code provisions for implementation. Examples include requirements associated with multi-use pathways, barriers along rail lines and access to Highway 99E. This section also references transportation-related code amendments that are being proposed as part of a separate "Code Assistance" project aimed at implementing low impact development practices in Canby.

In both Sections II and III, revisions to existing code language are presented with deletions shown in ~~strikethrough~~ and additions shown as underlined. Where APG has developed new code language, this also will be shown as underlined. To the extent possible, proposed text is organized using the numbering hierarchy provided by the Canby Code. The city may find that suggested language is more appropriately placed elsewhere in the Canby Code, or may wish to include references in more than one section. In such cases, the city will need to revise the section and subsection headings and numbering accordingly. The city is advised to review the recommendations carefully to ensure that proposed language does not conflict with other existing code language and, where conflicts do exist, to identify additional areas of the adopted ordinance that should be modified to better comply with the TPR. It is also possible that some additional amendments to proposed language may be necessary to more adequately express the city's needs.

SECTION I: Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in 2002 TSP Update?**	**Comments/Recommendations**
(1) Each local government shall amend its land use regulations to implement the TSP.		
(a) The following transportation facilities, services and improvements need not be subject to land use regulations except as necessary to implement the TSP and, under ordinary circumstances do not have a significant impact on land use.	Yes.	During the 2002 TSP update, new language was added to Section 16.08.130, General Provisions to identify the types of transportation improvements that are permitted outright and those that are permitted through a conditional use process. **No further code amendments are recommended to comply with this section of the TPR.**
(b) To the extent, if any, that a transportation facility, service, or improvement concerns the application of a comprehensive plan provision or land use regulation, it may be allowed without further land use review if it is permitted outright or if it is subject to standards that do not require interpretation or the exercise of factual, policy or legal judgment.	Yes.	
(c) Local governments shall provide a review and approval process that is consistent with 660-012-0050 (Transportation Project Development). Local governments shall amend regulations to provide for consolidated review of land use decisions required to permit a transportation project.	Partially.	Section 16.89.040 (Type II Procedures) states that the city will notify "other affected agencies, as appropriate, for review of the application." No notice to ODOT is required for the Type II procedure. Section 16.89.050 (Type III Decision) states that any application involving access to a state highway will be forwarded to ODOT for review and comment regarding compliance with state highway standards. However, Section 16.89.050 applies only to Type III applications. The notice requirements for Type IV decisions are the same as those for Type III. **<u>Recommendation:</u> The language for Type II and Type III decisions should be broadened so that ODOT receives notice for any development, zone change or map or text amendment that could potentially impact an ODOT**

SECTION I: Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in 2002 TSP Update?**	**Comments/Recommendations**
		facility. Additionally, language regarding notice to other affected agencies could provide more detail and should apply to both Type II and Type III decisions.
(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities for their identified functions.		
(a) Access control measures.	Yes.	Chapter 16.46 contains adequate standards for access management on city streets. These standards include allowable number of access points, access spacing minimums, and joint/cross access standards for those developments that cannot meet the access spacing minimums. **<u>Recommendation:</u> Section 16.46.080 – State Highway Standards refers to Appendix G of the TSP for access standards on state highways. This reference will need to be updated to reference the Motor Vehicle Chapter of the new TSP.**
(b) Standards to protect the future operations of roadways and transit corridors	Partially.	This section of the TPR was addressed in the previous TSP update; however, it appears that not all of the recommended language from that update was adopted into the Canby code. An effective way to ensure that roadways are protected for their planned function and capacity is to require a transportation impact analysis (TIA) as part of a development application. Canby has some existing provisions for requiring a TIA, but the language is vague and located in several different sections of the code. **<u>Recommendation:</u> The city should adopt a new chapter or subsection that clearly outlines TIA requirements and criteria. The city may also want to**

SECTION I: Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in 2002 TSP Update?**	**Comments/Recommendations**
		cross-reference the TIA requirements in the Subdivision and Planned Unit Development chapters. Additionally, the city may want to strengthen language in Division VII Street Alignments that requires dedication and/or setbacks for future road widening projects identified in the TSP.
(c) Measures to protect public use airports by controlling land uses within airport noise corridors and imaginary surfaces, and by limiting physical hazards to air navigation	No.	Not applicable.
(d) Coordinated review of future land use decisions affecting transportation facilities, corridors or sites	Partially.	See comments under 660-12-0045(1)(c). **Recommendation:** **The language for Type II and Type III decisions should both require notice to ODOT. Additionally, language regarding notice to other affected agencies could provide more detail and should apply to both Type II and Type III decisions.**
(e) Process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities	No.	Section 16.49.050 allows the city to place conditions on site and design review approvals to require land dedications for right-of-way and bicycle/pedestrian pathways. It also allows the city to place conditions requiring off-site improvements for affected public utility facilities. Section 16.50.040 allows the city to place conditions on conditional use approvals to improve the street and/or dedicate right-of-way. There does not appear to be language that specifically gives the city authority to apply conditions that are intended to minimize impacts to transportation facilities. **Recommendation:** **The Development Code should explicitly give the city the**

SECTION I: Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in 2002 TSP Update?**	**Comments/Recommendations**
		ability to apply conditions of approval to new development and should specify that the objective is to minimize impacts to transportation facilities.
(f) Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: land use applications that require public hearings, subdivision and partition applications, applications which affect private access to roads, applications within airport noise corridor and imaginary surfaces which affect airport operations.	Partially.	See comments under 660-12-0045(1)(c) **<u>Recommendation:</u> The language for Type II and Type III decisions should both require notice to ODOT. Additionally, language regarding notice to other affected agencies could provide more detail and should apply to both Type II and Type III decisions.**
g) Regulations assuring amendments to land use designations, densities, design standards are consistent with the function, capacities, and levels of service of facilities designated in the TSP.	Yes.	The 2002 TSP update process included a new section (Section16.88.190, Conformance with the TSP) to ensure that amendments to plans or land use regulations are consistent with the TSP. **<u>Recommendation:</u> No further amendments are recommended to implement this section of the TPR.**
(3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth in 660-012-0040(3)(a-d):		
(a) Provide bicycle parking in multifamily developments of 4 units or more, new retail, office and institutional developments, transit transfer stations and park-and-ride lots	Yes.	Section 16.10.100, Bicycle Parking, meets this TPR requirement. **<u>Recommendation:</u> No further amendments are recommended to implement this section of the TPR.**
(b) Provide "safe and convenient" (per subsection 660-012-0045.3(d)) pedestrian and bicycle connections from new subdivisions/multifamily development to neighborhood activity centers;	Yes.	Section 16.49.065(B) requires safe and convenient bicycle and pedestrian access consistent with this TPR section. Section 16.86.020 requires bikeways along arterial and major collector streets,

SECTION I: Transportation Planning Rule Compliance Analysis

TPR Requirement (OAR Section 660-12-0045)	Addressed in 2002 TSP Update?	Comments/Recommendations
bikeways are required along arterials and major collectors; sidewalks are required along arterials, collectors, and most local streets in urban areas except controlled access roadways		consistent with the TSP. This section also requires sidewalks along arterials, collectors, connectors, and local streets. **<u>Recommendation:</u> No further amendments are recommended to implement this section of the TPR.**
(c) Off-site road improvements required as a condition of development approval must accommodate bicycle and pedestrian travel, including facilities on arterials and major collectors	Partially.	Section 16.49.050(2)(E) allows the city to apply conditions to a Site and Design Review application requiring off-site improvements to "public utility facilities" where needed to mitigate impacts resulting from the project. The language does not specifically refer to off-site road improvements. **<u>Recommendation:</u> The section could be revised to include a specific reference to road improvements and note that bicycle and pedestrian facilities must be included.**
(e) Provide internal pedestrian circulation within new office parks and commercial developments	Yes.	Section 16.49.065(A) requires internal walkway system consistent with this TPR section. **<u>Recommendation:</u> No further amendments are recommended to implement this section of the TPR.**
(6) As part of the pedestrian and bicycle circulation plans, local governments shall identify improvements to facilitate bicycle and pedestrian trips to meet local travel needs in developed areas.	Yes.	The 2002 TSP update included new policy language in the Transportation Element of the Comprehensive Plan (Policy No. 13) related to providing a network of bicycle and pedestrian circulation within the city. **<u>Recommendation:</u> This requirement will be re-evaluated by the current TSP update planning process. The requirement will be met by adopting improvements in developed areas that meet the needs identified in the TSPs pedestrian and bicycle circulation elements.**

SECTION I: Transportation Planning Rule Compliance Analysis		
TPR Requirement (OAR Section 660-12-0045)	**Addressed in 2002 TSP Update?**	**Comments/Recommendations**
(7) Local governments shall establish standards for local streets and accessways that minimize pavement width and total ROW consistent with the operational needs of the facility.	Yes.	Section 16.86.040 contains roadway cross-sections that indicate a 40-foot right-of-way for local streets and 60-foot right-of-way for neighborhood connectors. Section 16.86.050 allows for reduced roadway widths for local and neighborhood connectors if certain conditions are met. Depending on street-side parking, local streets may be reduced to 20 feet of right-of-way and neighborhood connectors may be reduced to 22 feet of right-of-way. **<u>Recommendation:</u> As part of the concurrent Canby code assistance project, the city intends to remove specific cross-section standards from Section 16.86.040 and instead reference the TSP and/or Public Works Standards.** **The reduced roadway width language in Section 16.86.050 will need to be revised for consistency with the new cross-section widths included with this TSP update. Again, this will be done as part of the code update project. Therefore, no additional amendments are recommended in this memo.**
OAR 660-12-0060 Plan & Land Use Regulation Amendments Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility.	Partially.	Since the 2002 Canby TSP update, this section of the TPR has been amended (March 2005) and now includes new provisions for local jurisdictions on how to make a determination as to whether or not an amendment to the city's adopted plans or land use regulations has a significant affect on a transportation facility. The Canby Code has existing language that addresses this section of the TPR, but has not been updated to reflect the 2005 TPR amendments. **<u>Recommendation:</u> Revise the Canby Code to incorporate new language from the 2005 TPR amendment.**

SECTION II: Proposed Amendments to the Canby Code for TPR Compliance

Requirements: Local governments must provide for consolidated review of land use decisions required to permit a transportation project (OAR Section 660-12-0045(1)(c)).

Local governments must adopt land use or subdivision ordinance standards to ensure that there is coordinated review of future land use decisions affecting transportation facilities, corridors or sites (OAR Section 660-12-0045(2)(d)).

Local jurisdictions must adopt regulations to provide notice to public agencies providing transportation facilities of land use applications that require public hearings, subdivision and partition applications, and applications which affect private access to roads, applications within airport noise corridor and imaginary surfaces which affect airport operations (OAR Section 660-12-0045(2)(f)).

Recommendation: The Canby Code should be amended to clarify requirements for notice to ODOT for applicable land use applications and notice procedures specific to land use reviews for transportation-related facilities. Chapter 16.89 Application and Review Procedures should be revised as follows.

Chapter 16.89 Application and Review Procedures

16.89.040 Type II procedure.

C. Public notice.

1. Before making a Type II decision, the Planning Director shall mail notice meeting the requirements of state law to:

- **a.** All owners of real property and, if the owner's address is different from the site address, all residents of property, within the distance prescribed in Table 16.89.020.
- **b.** Any person who submits a written request to receive notice; and
- **c.** Any governmental agency which is entitled to notice under an intergovernmental agreement entered into with the City. The City may notify other affected agencies, as appropriate, for review of the application.
- **d.** Any application that involves access to OR 99E or that is expected to impact the state highway system must be provided to the Oregon Department of Transportation for their review and comment regarding conformance with state access management and mobility standards and requirements.

2. Notice of any proposal that includes a new transportation facility or improvement, and where these facilities or improvements include or may impact a collector or arterial street, will be sent to the ODOT and any special interest transportation groups as appropriate. Special interest transportation groups could include trucking organizations, bicycle and pedestrian interest groups, and interest groups for people with disabilities. Information that should be conveyed with the notice includes the following:

- **a.** Project location
- **b.** Proposed land use action

c. Location of project access point(s)

~~2.~~ **3.** The public notice shall allow a 10-day period for submitting written comments before a decision is made on the permit.

~~3.~~ **4.** The City shall prepare an affidavit of mailing for the public notice and make the affidavit part of the application file.

16.89.050 Type III Decision.

D. Public notice.

1. At least 20 days prior to a public hearing on a Type III decision or a Type II appeal decision, the Planning Director shall mail notice meeting the requirements of state law to:

- **a.** All owners of real property and, if the owner's address is different from the site address, all residents of property, within the distance prescribed in Table 16.89.020;
- **b.** The appointed chair of any neighborhood association whose boundaries include the subject property;
- **c.** Any person who submits a written request to receive notice; and
- **d.** Any governmental agency which is entitled to notice under an intergovernmental agreement entered into with the City. The City may notify other affected agencies, as appropriate, for review of the application.
- **e.** For appeals, the appellant and all persons who provided testimony.

2. Notice of any proposal that includes a new transportation facility or improvement, and where these facilities or improvements include or may impact a collector or arterial street, will be sent to the ODOT and any special interest transportation groups as appropriate. Special interest transportation groups could include trucking organizations, bicycle and pedestrian interest groups, and interest groups for people with disabilities. Information that should be conveyed with the notice includes the following:

- **a.** Project location
- **b.** Proposed land use action
- **c.** Location of project access point(s)

[Renumber rest of section]

~~7.~~ **8.** Any application that involves access to ~~the state highway system~~ OR 99E or that is expected to impact the state highway system ~~shall~~ must be provided to the Oregon Department of Transportation for their review and comment regarding conformance with state access management standards and requirements.

Requirements: Local governments must adopt land use or subdivision ordinance standards to regulate access control and protect the future operations of roadways and transit corridors. (OAR Section 660-12-0045(2)(a-b)).

Local governments must adopt a process that allows conditioning development proposals in order to minimize impacts and protect transportation facilities (OAR Section 660-12-0045(2)(e)).

Recommendation: These sections of the TPR address the need to account for potential development impacts to roadways and transit corridors and to ensure that transportation facilities continue to meet community needs. An effective way to ensure that roadways are protected for their planned function and capacity is to require a transportation impact study (TIS) as part of a development application. Currently the city may require a TIS for projects that are likely to generate more than 100 trips per day based on a Trip Generation Study (per the definition in Section 16.04.635). Section 16.10.070(7) allows the Planning Director to require additional traffic analysis for off-street parking areas. In addition, Section 16.49.050(2)(f) allows conditions to be placed on Site and Design Review applications that could include a traffic analysis.

In order to better meet the TPR requirement, recommended code changes (below) require a TIS for all new development that would potentially impact the roadway system. The following draft language for a new TIS code section (located in Chapter 16.08 General Provisions) would require a traffic study under prescribed conditions and lists the required elements of such a study. The proposed language also makes explicit that transportation related conditions of approval may be applied to development proposals.

Proposed amendments to Section 16.62 Subdivisions and Section 16.76 Planned Unit Developments are included to cross reference the TIS submittal requirement.

New standards are also included to ensure a basic level of roadway safety and functionality.

In addition, new language pertaining to deviations from access management standards has been added to Chapter 16.46.

Chapter 16.08 General Provisions

16.08.150 Traffic Impact Study (TIS).

A. Purpose. The purpose of this section of the code is to implement Section 660-012-0045(2)(b) of the State Transportation Planning Rule, which requires the city to adopt a process to apply conditions to development proposals in order to minimize adverse impacts to and protect transportation facilities. This section establishes the standards to determine when a proposal must be reviewed for potential traffic impacts; when a Traffic Impact Study must be submitted with a development application in order to determine whether conditions are needed to minimize impacts to and protect transportation facilities; what information must be included in a Traffic Impact Study; and who is qualified to prepare the Study.

B. Initial scoping. During the pre-application conference, the city will review existing transportation data to determine whether a proposed development will have impacts on the transportation system. It is the responsibility of the applicant to provide enough detailed information for the city to make a determination. If the city cannot properly evaluate a proposed development's impacts without a more detailed study, a transportation impact study (TIS) will be required to evaluate the adequacy of the transportation system to serve the proposed development and determine proportionate mitigation of impacts. After the pre-application conference, the city will provide the applicant with a "scoping checklist" to be used when conducting the TIS.

C. Determination. Based on information provided by the applicant about the proposed development, the city will determine when a TIS is required and will consider the following when making that determination.

1. Changes in land use designation, zoning designation, or development standard.
2. Changes in use or intensity of use.
3. Projected increase in trip generation.
4. Potential impacts to residential areas and local streets.
5. Potential impacts to priority pedestrian and bicycle routes, including, but not limited to school routes and multimodal street improvements identified in the TSP.
6. Potential impacts to intersection level of service (LOS).

D. TIS General Provisions

1. All transportation impact studies, including neighborhood through-trip and access studies, shall be prepared and certified by a registered Traffic or Civil Engineer in the State of Oregon.
2. Prior to TIS scope preparation and review, the applicant shall pay to the city the fees and deposits associated with TIS scope preparation and review in accordance with the adopted fee schedule. The city's costs associated with TIS scope preparation and review will be charged against the respective deposits. Additional funds may be required if actual costs exceed deposit amounts. Any unused deposit funds will be refunded to the applicant upon final billing.
3. The TIS shall be submitted with a concurrent land use application and associated application materials. The city will not accept a land use application for processing if it does not include the required TIS.
4. The city may require a TIS review conference with the applicant to discuss the information provided in the TIS once it is complete. This conference would be in addition to any required pre-application conference pursuant to Section XXX. If such a conference is required, the city will not accept the land use application for processing until the conference has taken place. The applicant shall pay the TIS review conference fee at the time of conference scheduling, in accordance with the adopted fee schedule.
5. A TIS determination is not a land use action and may not be appealed.

E. TIS Scope**.** The city shall determine the study area, study intersections, trip rates, traffic distribution, and required content of the TIS based on information provided by the applicant about the proposed development.

1. The study area will generally comprise an area within a ½-mile radius of the development site. If the city determines that development impacts may extend more than ½ mile from the development site, a larger study area may be required.
2. If notice to ODOT or other agency is required pursuant to noticing requirements in Chapter 16.89, the city will coordinate with those agencies to provide a comprehensive TIS scope.

F. TIS Content. A project-specific TIS checklist will be provided to the applicant by the city once the city has determined the TIS scope. A TIS shall include all of the following elements, unless waived by the city.

1. Introduction and Summary. This section shall include existing and projected trip generation including vehicular trips and mitigation of approved development not built to date; existing level and proposed level of service standard for city and county streets and volume to capacity for state roads; project build year and average growth in traffic between traffic count year and build year; summary of transportation operations; proposed mitigation(s); and traffic queuing and delays at study area intersections.
2. Existing Conditions. This section shall include a study area description, including information about existing study intersection level of service.
3. Impacts. This section should include the proposed site plan, evaluation of the proposed site plan, and a project-related trip analysis. A figure showing the assumed future year roadway network (number and type of lanes at each intersection) also shall be provided.
4. Mitigation. This section shall include proposed site and area-wide specific mitigation measures. Mitigation measures shall be roughly proportional to potential impacts.
5. Appendix. This section shall include traffic counts, capacity calculations, warrant analysis, and any other information necessary to convey a complete understanding of the technical adequacy of the TIS.

G. TIS Methodology. The City will include the required TIS methodology with the TIS scope.

H. Neighborhood Through-Trip Study. Any nonresidential development projected to add more than 25 through-vehicles per day to an adjacent residential local street or neighborhood route will require assessment and mitigation of residential street impacts. Through-trips are defined as those to and from a proposed development that have neither an origin nor a destination in the neighborhood. The through-trip study shall include all of the following:

1. Existing number of through-trips per day on adjacent residential local streets or neighborhood routes.
2. Projected number of through-trips per day on adjacent residential local streets or neighborhood routes that will be added by the proposed development.
3. Traffic management strategies to mitigate for the impacts of projected through-trips consistent.

I. Mitigation. Transportation impacts shall be mitigated at the time of development when the TIS identifies an increase in demand for vehicular, pedestrian, bicycle, or transit transportation facilities within the study area. The following measures may be used to meet mitigation requirements. Other mitigation measures may be suggested by the applicant or recommended by a state authority (e.g., ODOT) in circumstances where a state facility will be impacted by a proposed development. The city shall determine if the proposed mitigation measures are adequate.

1. On- and off-site improvements beyond required frontage improvements.
2. Development of a transportation demand management program.
3. Payment of a fee in lieu of construction.
4. Correction of off-site transportation deficiencies within the study area that are not substantially related to development impacts.
5. Construction of on-site facilities or facilities located within the right-of-way adjoining the development site that exceed minimum required standards and that have a transportation benefit to the public.

J. Conditions of Approval. The city may deny, approve, or approve with appropriate conditions a development proposal in order to minimize impacts and protect transportation facilities.

1. Where the existing transportation system will be impacted by the proposed development, dedication of land for streets, transit facilities, sidewalks, bikeways, paths, or accessways may be required to ensure that the transportation system is adequate to handle the additional burden caused by the proposed use.
2. Where the existing transportation system is shown to be burdened by the proposed use, improvements such as paving, curbing, installation or contribution to traffic signals, traffic channelization, construction of sidewalks, bikeways, accessways, paths, or streets that serve the proposed use may be required.
3. The city may require the development to grant a cross-over access easement(s) to adjacent parcel(s) to address access spacing standards on arterials and collector roadways or site-specific safety concerns. Construction of shared access may be required at the time of development if feasible, given existing adjacent land use. The access easement must be established by deed.

16.08.160 Safety and Functionality Standards.

The City will not issue any development permits unless the proposed development complies with the city's basic transportation safety and functionality standards, the purpose of which is to ensure that development does not occur in areas where the surrounding public facilities are inadequate. Upon submission of a development permit application, an applicant shall demonstrate that the development property has or will have all of the following:

A. Adequate street drainage, as determined by the city.
B. Safe access and clear vision at intersections, as determined by the city.
C. Adequate public utilities, as determined by the city.
D. Access onto a public street with the minimum paved widths as stated in Subsection E below.
E. Adequate frontage improvements as follows:
   1. For local streets, a minimum paved width of 16 feet along the site's frontage.
   2. For nonlocal streets, a minimum paved width of 20 feet along the site's frontage.
   3. For all streets, a minimum horizontal right-of-way clearance of 20 feet along the site's frontage.
F. Compliance with mobility standards identified in the TSP.

Chapter 16.46 Access Limitations on Project Density

16.46.080 State highway standards.

A. Refer to ~~Appendix G~~ the Motor Vehicle Chapter of the Transportation System Plan.
~~(Ord. 1043 section 3, 2000)~~

~~**16.46.035 Restricted access.**~~

~~The City may allow an access to a City street that does not meet the spacing requirements of Table 16.46.030 if the proposed access is restricted (prevents certain turning movements). The City may require an applicant to provide an engineered traffic study, access management plan, or other information as needed to demonstrate that the roadway will operate within the acceptable standards with the restricted access in place. (Ord. 1237, 2007)~~

16.46.070 Exception standards ~~for City facilities.~~

A. An exception may be allowed from the access spacing standards ~~on City facilities~~ if the applicant can provide proof of unique or special conditions that make strict application of the provisions impractical. Applicants shall include proof that:

1. Indirect or restricted access cannot be obtained;

2. No engineering or construction solutions can be reasonably applied to mitigate the condition; and

3. No alternative access is available from a street with a lower functional classification than the primary roadway.

B. Access Management Plan Required. An applicant requesting an access exception must submit an access management plan. The access management plan shall explain the need for the modification and demonstrate that the modification maintains the classified function and integrity of the facility. An access management plan shall be prepared and certified by a traffic or civil engineer registered in the State of Oregon. An access management plan shall at minimum contain the following:

1. The minimum study area shall include the length of the site's frontage plus the distance of the applicable access spacing standard, measured from each property line or access point(s), whichever is greater. For example, a property with 500 feet of frontage on a minor arterial (required 600 foot access spacing standard) shall have a minimum study area which is 1,700 feet in length.

2. The potential safety and operational problems associated with the proposed access point. The access management plan shall review both existing and future access for all properties within the study area as defined above.

3. A comparison of all alternatives examined. At a minimum, the access management plan shall evaluate the proposed modification to the access spacing standard and the impacts of a plan utilizing the County standard for access spacing. Specifically, the access management plan shall identify any impacts on the operations and/or safety of the various alternatives.

4. A list of improvements and recommendations necessary to implement the proposed access modification, specifically addressing all safety and operational concerns identified.

5. References to standards or publications used to prepare the access management plan.

B. The granting of the exception shall be in harmony with the purpose and intent of these regulations and shall not be considered until every feasible option for meeting access standards is explored.

C. No exception shall be granted where such hardship is self-created.

D. Reasons for denying access spacing exception applications include, but are not limited to, traffic safety concerns, expected or planned traffic increases due to development or road construction, and emergency service provision issues. (Ord. 1043 section 3, 2000; Ord 1237, 2007)

Chapter 16.62 Subdivisions - Applications
16.62.020 Standards and criteria.
Applications for a subdivision shall be evaluated based upon the following standards and criteria:

E. A Traffic Impact Study (TIS) may be required in accordance with Section 16.08.150.

Chapter 16.76 PUD Requirements
16.76.020 General requirements.

K. A Traffic Impact Study (TIS) may be required in accordance with Section 16.08.150.

Chapter 16.86 Street Alignment Regulations
16.86.020 General provisions.

A. The ~~street circulation map of the Comprehensive Plan~~ Transportation System Plan shall be used to determine which streets are to be arterials, collectors, and neighborhood connectors. All new streets are required to comply with the roadway design standards provided in Section XXX of the TSP. ~~Based upon this, new arterial street rights-of-way shall be between sixty and eighty feet in width, depending upon the previously determined plan for each such street. New collector street rights-of-way shall have a minimum width of sixty feet. New neighborhood connectors shall have a minimum right-of-way width of sixty feet. All new streets shall comply with the roadway standards shown in Section 16.86.040.~~ The city may require right-of-way dedication and/or special setbacks as necessary to ensure adequate right-of-way is available to accommodate future road widening projects identified in the TSP.

Requirements: Local governments must adopt land use or subdivision ordinance standards to ensure that off-site road improvements required as a condition of approval accommodate bicycle and pedestrian travel, including facilities along arterial and major collector roads (OAR Section 660-12-0045(3)(c)).

Recommendation: Revise Section 16.49.050(2)(E) to include a specific reference to road improvements and note that bicycle and pedestrian facilities must be included along arterial and major collector streets.

16.49.050 Conditions placed on site and design review approvals.

2. The following types of conditions are specifically contemplated by subsection (1) of this section, and the listing below is intended to be illustrative only and not to be construed as a limitation of the authority granted by this section.

E. Off-Site Improvements. Improvements in public ~~utility~~ facilities, including public utilities, not located on the project site where necessary to assure adequate capacity and where service demand will be created or increased by the proposed development. The costs of such improvements may be paid for in full while allowing for recovery of costs from users on other development sites, or they may be pro-rated to the proposed development in proportion to the service demand projected to be created on increases by the project. If determined appropriate by the city based on specific site conditions, off-site roadway improvements may be required to accommodate bicycle and pedestrian travel consistent with the TSP and applicable sections of this code.

Requirements: Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility. (OAR Section 660-12-0060).

Recommendation: This TPR requirement ensures that amendments to the comprehensive plan and land use regulations are reviewed for their impact on transportation facilities identified in the TSP. To better comply with the TPR, it is recommended that Canby Code include clarification that approval of amendments to land use designations, densities, and design standards is contingent on findings of consistency with the planned transportation system, as adopted in the City's TSP.

Below are proposed revisions to Section 16.88.190 Conformance with Transportation System Plan. The purpose of these revisions is to update code language to be consistent with the 2005 updates to the TPR. New language is included to provide guidance in determining when a code amendment is considered to have a significant impact on transportation facilities. The revised language also identifies methods to ensure that proposed amendments to the comprehensive plan or to the development code are consistent with the TSP when the amendment significantly affects a transportation facility.

16.88.190 Conformance with Transportation System Plan and Transportation Planning Rule

A. A proposed comprehensive plan amendment, zone change or land use regulation change, whether initiated by the city or by a private interest, shall be reviewed to determine whether it significantly affects a transportation facility, in accordance with the Transportation Planning Rule (OAR 660-012-0060). A plan or land use regulation amendment significantly affects a transportation facility if it:

1. Changes the functional classification of an existing or planned transportation facility;

2. Changes standards implementing a functional classification system;

3. As measured at the end of the planning period identified in the adopted plan:

a. Allows types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of a transportation facility; or

b. Would reduce the performance ~~level of service~~ of the facility below the ~~that~~ minimum acceptable performance standard ~~level~~ identified in the Transportation System Plan;

c. Would worsen the performance of a facility that is otherwise projected to perform below the minimum acceptable performance standard identified in the Transportation System Plan.

~~**4.**~~

B. Amendments to the comprehensive plan and land use regulations which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and performance standards (e.g., level of service, volume to capacity ratio, etc.) of the facility identified in the Transportation System Plan. This shall be accomplished by one of the following:

~~**1.** Limiting allowed land uses to be consistent with the planned function of the transportation facility;~~

~~**2.** Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses consistent with the requirement of the Transportation Planning Rule; or~~

~~**3.** Altering land use designations, densities, or design requirements to reduce demand for automobile travel and meet travel needs through other modes.~~

1. Adopting measures that demonstrate allowed land uses are consistent with the planned function, capacity, and performance standards of the transportation facility.

2. Amending the TSP or comprehensive plan to provide transportation facilities, improvements or services adequate to support the proposed land uses consistent with the requirements of Section -0060 of the TPR. Such amendments shall include a funding plan or other mechanism so that the facility, improvement or service will be provided by the end of the planning period.

3. Altering land use designations, densities, or design requirements to reduce demand for vehicle travel and meet travel needs through other modes of transportation.

4. Amending the TSP to modify the planned function, capacity or performance standards of the transportation facility.

5. Providing other measures as a condition of development, including transportation system management measures, demand management or minor transportation improvements.

C. A Traffic Impact Study may be required in accordance with Section 16.08.150 ~~by the City~~. (Ord. 1043, section 3, 2000; Ord 1237, 2007)

SECTION III: Additional Proposed Amendments & Code Assistance

The following code amendments are being suggested in order to implement policies identified in the TSP update. Only applicable policies, meaning those that may require some implementing code language, have been included in this discussion. The corresponding policy language is provided in a text box, followed by the recommended code revisions or additions. In some cases, policies will be implemented or supported by code amendments being recommended as part of the concurrent Canby Code Assistance project. A description of how the Code Assistance project will implement the applicable policy is also provided in this section.

Goal 2, Policy a. Design and maintain safe and secure pedestrian and bicycle ways between residential neighborhoods, parks, schools, the Clackamas County fairgrounds, downtown Canby, and other activity areas.

Goal 5, Policy m. Notify and coordinate new development plans with the Canby School District to ensure that proposed developments provide safe routes to nearby schools.

Canby Code Assistance Project

- Provides recommended code amendments that require new subdivisions to support the objectives of the Safe Routes to Schools Program. During subdivision review, city staff will coordinate with the appropriate school district representative to ensure safe routes to school are considered in subdivision layout and design. (Section 16.62.020(E)).
- Provides recommended fencing standards that require some kind of visibility for public pathways that abut private property. Options for the developer include lower fence heights, greater setbacks from the pathway, or fencing materials that provide some transparency. (Section 16.08.110(H)).
- Recommends reducing maximum block length in residential zones from 600 feet to 400 feet. Recommends deleting language that allows 800-foot blocks along arterial streets. (Section 16.64.020(B)).
- Recommends deleting language that allows long blocks parallel to arterial streets without providing mid-block pedestrian ways. (Section 16.64.030(C)).
- Requires pedestrian or bicycle connections between cul-de-sacs and closest adjacent streets, accessways, parks or rights-of-way. (16.64.010(H)(4)).

Goal 2, Policy e. Adopt and implement access control and spacing standards for all streets under the City's jurisdiction to improve safety and promote efficient through-street movement. Access control measures should be generally consistent with Clackamas County and ODOT access guidelines to ensure consistency on City, County, and State roadways

Proposed Implementing Language.

16.46.030 Access connection.

A. Spacing of accesses on City streets. The number and spacing of accesses on City streets shall be as specified in Table 16.46.030. Proposed developments or land use actions that do not comply with these standards will be required to obtain an access spacing exception and address the joint and cross access requirements of this Chapter. (Ord. 1043 section 3, 2000; Ord. 1076, 2001; Ord. 1237, 2007)

16.46.035 Restricted access.

The City may allow an access to a City street that does not meet the spacing requirements of Table 16.46.030 if the proposed access is restricted (prevents certain turning movements). The City may require an applicant to provide an engineered traffic study, access management plan, or other information as needed to demonstrate that the roadway will operate within the acceptable standards with the restricted access in place. (Ord. 1237, 2007)

TABLE 16.46.030
Access Management Guidelines for City Streets

Functional Classification	Minimum Spacing	Residential Use	Commercial or Industrial Use
Highway 99E	As provided in Appendix G of the Transportation System Plan.		
Arterial	300 feet	No direct access for new private drives serving fewer than five dwellings.	Shared access driveways required if spacing standards not met; encouraged otherwise. Major street left turn lanes determined through review.
Collector	150 feet	Shared access driveways are encouraged where appropriate to meet spacing standards.	Shared access driveways are encouraged. Major street left turn lanes determined through review.
Neighborhood Connector	One access per lot	Shared access driveways are encouraged.	Maximum of one 45-foot wide access per 200 feet of frontage or fraction thereof.
Downtown Street (C-1 zone)	Alley access must be used if available. One	No new direct accesses.	Shared access driveways required.

access per block if alley
access is not available.

Goal 3, Policy d. Evaluate land development projects to determine possible adverse traffic impacts. Adopt additional standards that specifically address when detailed traffic analysis is required, what elements of analysis will be required for each case, and what constitutes an acceptable analysis.

Goal 3, Policy e. Ensure that all new development contributes a fair share toward on-site and off-site transportation system improvements.

Proposed Implementing Language

- The proposed amendments for TPR compliance in Section II above include recommended new language for requiring a Traffic Impact Analysis (TIA). That language will implement the above policy and therefore, no additional amendments are proposed here.

Goal 4, Policy d. Incorporate natural stormwater drainage systems in the design of new streets and street improvement projects, where feasible and appropriate.

Goal 4, Policy e. Reduce surface storm water impacts where possible through the use of permeable pavements, design, and construction of narrower streets and reduced parking requirements where appropriate and feasible.

Canby Code Assistance Project

- The primary purpose of the Code Assistance project is to incorporate more low-impact development (LID) practices into Canby's Code. The code amendments recommended in the Code Assistance project include provisions to encourage or require techniques to manage stormwater using natural drainage systems, permeable surface materials, reduced parking standards, narrow street standards, and other methods of reducing impervious surfaces. The code amendments recommended in the Code Assistance project will help support and implement the above sustainability policies.

Goal 5, Policy b. Require new developments abutting the Molalla Forest Road multi-use pathway to provide or accommodate a pedestrian/bicycle access to the path unless it is not deemed necessary due to a nearby, convenient access that is already existing or planned.

Proposed Implementing Language

Chapter 16.49 Site and Design Review
16.49.065 Bicycle and pedestrian facilities.
Developments coming under design review shall meet the following standards:

D. Developments that abut the Molalla Forest Road multi-use path shall provide a pedestrian/bicycle access to the path. The city may determine the development to be exempt from this standard if there is an existing or planned access to the path within 300 feet of the development.

Chapter 16.64 Subdivision Design Standards
16.64.030 Easements.

D. Developments that abut the Molalla Forest Road multi-use path shall provide a pedestrian/bicycle access to the path. The city may determine the development to be exempt from this standard if there is an existing or planned access to the path within 300 of the development.

~~**D.**~~ **E.** Solar Easements. Subdividers shall be encouraged to establish solar easements and utilize appropriate solar design in their development proposals. Solar easements shall be shown on the final plat and in the deed restrictions of the subdivision. The Planning Commission may require the recordation of special easements or other documents intended to protect solar access. (Ord. 740 section 10.4.40(C)(3), 1984; Ord. 1043 section 3, 2000; Ord 1237, 2007)

Goal 6, Policy i. Require developments along rail lines to plan sites and transportation facilities to allow for rail service without blocking motor vehicle traffic. Require developments to install features to block rail noise and to provide barrier fences or walls as appropriate to ensure safety and reduce rail impacts.

Goal 6, Policy k. Encourage planned unit developments along Hwy 99E to facilitate consolidated access to the highway. Consider adoption of site design standards and criteria for access to Hwy 99E to address driveway spacing and provide for pedestrian and bicycle access to the sidewalk and transit.

Proposed Implementing Language

Chapter 16.64 Subdivision Design Standards

16.64.015 Access

F. Access shall be consistent with the access management standards adopted in the Transportation System Plan. (Ord. 1043 section 3, 2000)

G. Access along Hwy 99… [If the city wants to adopt new access design standards for Hwy 99, this may be the appropriate place in the code for new language.]

16.64.070 Improvements.

K. Other Improvements.

1. Curb cuts and driveway installation are not required of the subdivider but, if installed, shall be according to city standards.
2. Street tree planting is required of the subdivider and shall be according to city requirements. (Ord. 899 section 4, 1993)
3. The developer shall make necessary arrangements with utility companies or other persons or corporations affected, for the installation of underground lines and facilities. Electrical lines and other wires, including but not limited to communication, street lighting and cable television, shall be placed underground, unless overhead installation has been specifically approved by the commission because of unique circumstances at the site.
4. Developments along existing rail lines may be required to provide barrier fences, walls, sound barriers, or other features as deemed appropriate by the city to ensure safety and reduce rail impacts.

Policy a. Enhance local street system connectivity wherever practical and feasible to reduce reliance on Highway 99E, decrease out-of-direction travel, and provide adequate access for emergency response vehicles and for the safety and convenience of the general public.

Proposed Implementing Language

Chapter 16.86 Street Alignment Regulations

16.86.060 Street Connectivity.

When developing the street network in Canby, the emphasis should be upon a connected continuous grid pattern of local, collector, and arterial streets rather than discontinuous curvilinear streets and cul-de-sacs. Deviation from this pattern of connected streets shall only be permitted in cases of extreme topographical challenges including excessive slopes (35 percent plus), hazard areas, steep drainage-ways and wetlands. In such cases, deviations may be allowed but the connected continuous pattern must be reestablished once the topographic challenge is passed.