LEBANON TRANSPORTATION SYSTEM PLAN

VOLUME 2

Lebanon, Oregon
November 2018

Memo #1 Public and Stakeholder Engagement Strategy

MEMORANDUM

DATE: March 16, 2016

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates
Patrick Mahedy, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Task 2.1 Public and Stakeholder Engagement Strategy P14180-012

Lebanon has recognized that citizen involvement is necessary in making wise and legitimate decisions through its Comprehensive Plan. The following strategy reflects the city's Comprehensive Plan policies regarding citizen involvement and provides specific actions for engaging citizens and stakeholders in the Transportation System Plan (TSP) development process.

The city will involve the public and stakeholders primarily through a series of committee meetings, community events, and work sessions with elected officials, in addition to the distribution of project information through a variety of media, including a project website. The following describes each of these outreach mechanisms.

Advisory Committees

A technical advisory committee and a project advisory committee will inform and guide the plan. All committee meetings will be held at either the Library Public Library or the Santiam Travel Station.

Technical Advisory Committee (TAC) – The primary function of the TAC will be to review drafts and provide comments on technical and regulatory issues. This committee will consist of representatives from affected agencies and service providers, including staff from the Lebanon planning and public works departments, Linn County, Linn Shuttle, the Department of Land Conservation and Development, the Oregon Department of Transportation, and others.

The TAC will meet five times. In the first meeting, the TAC will get a project introduction, and review and discuss the Plans and Policies Review, Regulatory Review and Goals, Objectives and Evaluation Criteria. In the second meeting, the TAC will review and discuss existing and future transportation conditions. At the third meeting, the TAC will brainstorm potential transportation solutions. In the fourth meeting, the TAC will review and discuss recommended transportation solutions. The TAC in its final meeting will review and discuss the draft TSP prior to beginning the public hearings process. The city will not advertise the TAC meetings for public attendance.

Project Advisory Committee (PAC) – The primary function of the PAC is to provide recommendations for the project, acting as community representatives. They represent a wide array of interests, including: Samaritan Lebanon Hospital, Lebanon Senior Center, Veterans' Affairs, Lebanon Fire District, advocates of pedestrian and bicycle travel, school representatives, merchants associations, and a representative for freight.

The PAC will meet five times. The first meeting will provide a project orientation and begin the discussion of the vision, goals, and objectives that best describe how the transportation system should be developed and managed in Lebanon. The second meeting will be a review and discussion of existing and future transportation conditions. In the third meeting, the PAC will brainstorm potential transportation solutions. The fourth meeting will be a review and discussion of recommended transportation solutions. The final meeting will be a review and discussion of the draft TSP prior to beginning the public hearings process.

PAC meetings will welcome public attendance; however, non-PAC members must hold questions and comments until a designated period at the end of the meeting. Advertisement of meetings will be through the project website, the city's website, and media notices in the local newspaper.

Community Events

The city will host three community events during the project. The first will introduce the TSP project and obtain input regarding existing and future transportation needs and interests, as well as key areas of interest for inclusion in the vision, goals, and objectives. The second community event will obtain input on potential solutions to address transportation needs. The final community event (prior to beginning the public hearings process) will present the draft TSP. One of the community events could be held during the Lebanon Strawberry Festival which occurs in June.

Advertisement of the community events will be through a project website, the city's website, and media notices in the local newspaper. The city may supplement advertising through social media, the local radio station, and posters/flyers displayed in public areas or at other community events (e.g., farmers market).

Elected Officials Work Sessions and Briefings

The city councilors and planning commissioners of Lebanon will engage in the TSP development process through a series of two work sessions. The first work session will offer an orientation, an opportunity for officials to offer direction, and provide input on existing conditions and the vision, goals, and objectives. The second work session will gain input on future conditions, potential transportation solutions, and the preliminary public feedback.

Demographic Analysis

As part of the outreach to engage citizens and stakeholders in the TSP project, the city will make special efforts to involve minority and low-income groups. The demographic data summarized below sets a citywide baseline that was compared to more localized areas of the city to help identify areas that have higher concentrations of these populations.

Minority Residents

According to the 2013 American Community Survey, nearly 90 percent of the population of Lebanon is Caucasian. Residents of Hispanic or Latino, and American Indian and Alaska Native origin represent nearly eight percent of the population (four percent each). Although proficient English is spoken by 99 percent of Lebanon residents, key project documents will be translated into Spanish upon request. As shown in Figure 1, a greater proportion of minorities are located just north of Oak Street, north of Lebanon High School, and east of Seven Oak Middle School. (Based on census block groups that exceed the citywide average.)

Several Native American tribes, such as the Confederated Tribes of the Grand Ronde, Confederated Tribes of Siletz Indians, and the Confederated Tribes of Warm Springs, may have interest in the region. Therefore, the city will distribute project information to representatives of those tribes to keep them informed and facilitate their ability to participate in the process.

Impoverished Residents

Approximately 20 percent of residents within Lebanon were below the poverty level in 2013, just above that of the statewide average. The median annual household income was around $44,000. As shown in Figure 2, a greater proportion of residents with an income below the poverty level are located just north of West Oak Street, north and east of Lebanon High School, and near the southwest corner of the city. (Based on census block groups that exceed the citywide average.)

Residents Over Age 65

The majority of the residents in Lebanon are between the age of 18 and 64 (59 percent), slightly below that of the statewide average. About 25 percent of residents are under the age of 18 (about 3,900 residents), and 15 percent are 65 years and older (nearly 2,500 residents), both being slightly above the statewide average. As shown in Figure 3, most of the residents 65 years and older live near the southern end of the city. (Based on census block groups that exceed the citywide average.)

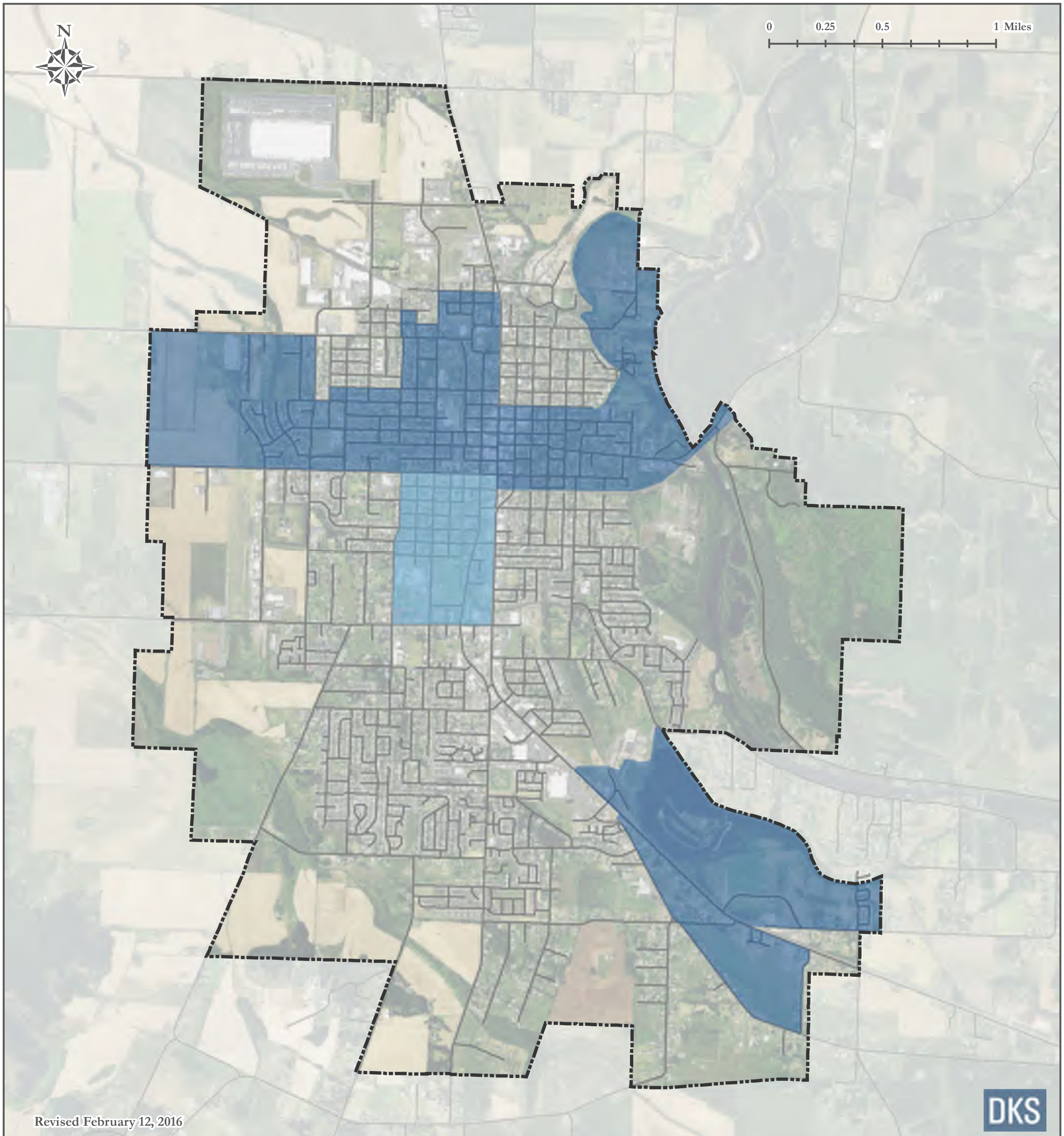
Disabled Residents

Over 20 percent of residents 18 years and older have a disability, about five percent higher than the statewide average. As shown in Figure 4, high proportions of disabled residents over the age of 18 are located just east of Highway 20. (Based on census block groups that exceed the citywide average.)

Distribution and Review of Work Products

The city will email project work products directly to TAC and PAC members, and post them to the project website for access by the general public. TAC and PAC members will be able to comment directly through regular committee meetings. The general public will be able to comment during the public comment period at the end of PAC meetings, at public open houses, and through the project website. The project website will facilitate public input by including a comment mapping feature. The project team will review comments input through the website and include them as part of the project record of public comments.

I Location of Minority Residents



Legend:

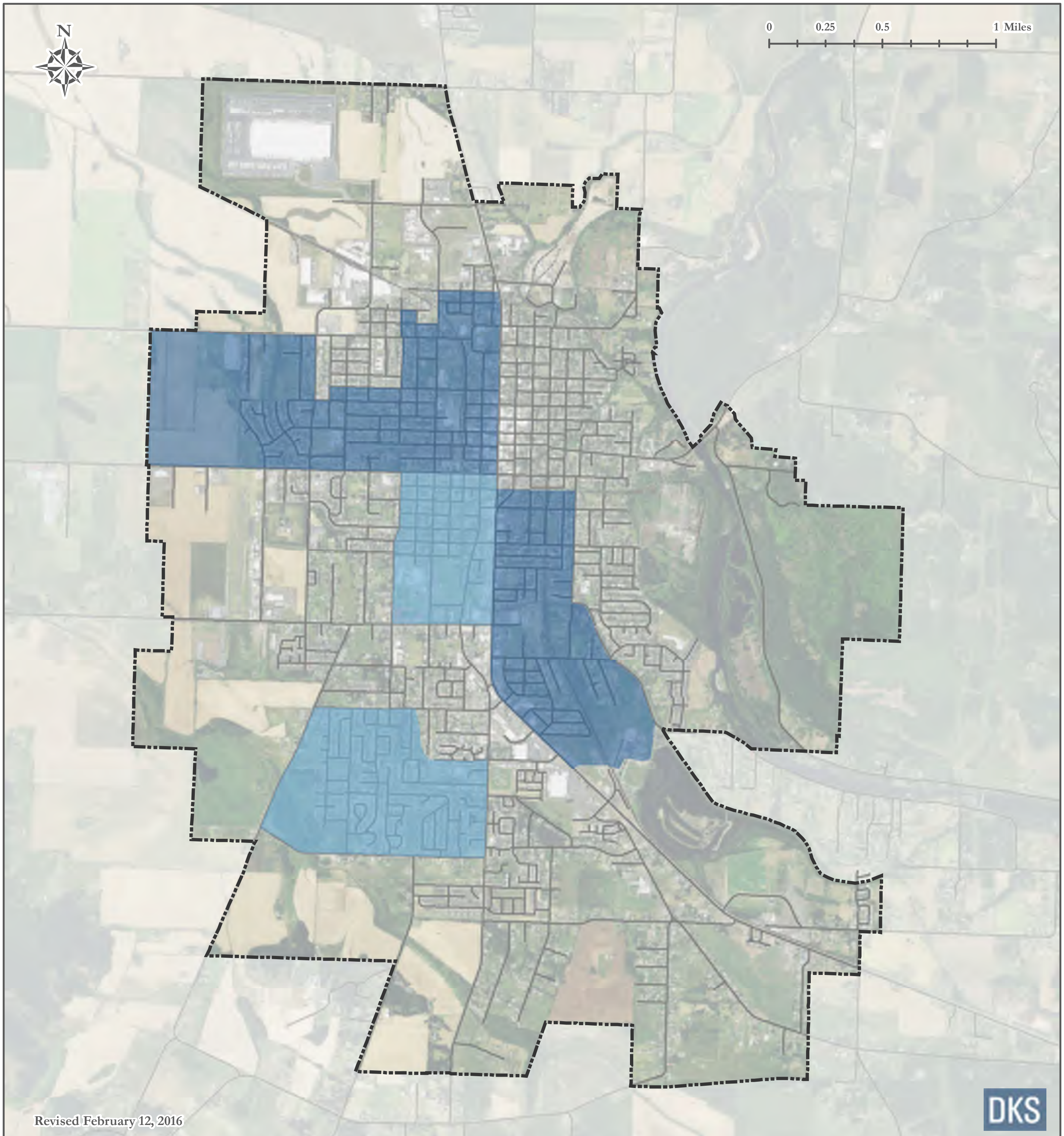
- Slightly greater than citywide average (20% - 50% over average)
- Considerably greater than citywide average (+50% over average)
- Urban Growth Boundary

Description:

Locations with a greater proportion of minority residents based on 2013 census block groups that exceed the 2013 ACS citywide average.

2 Location of Impoverished Residents

LEBANON 2040
Connecting people and places



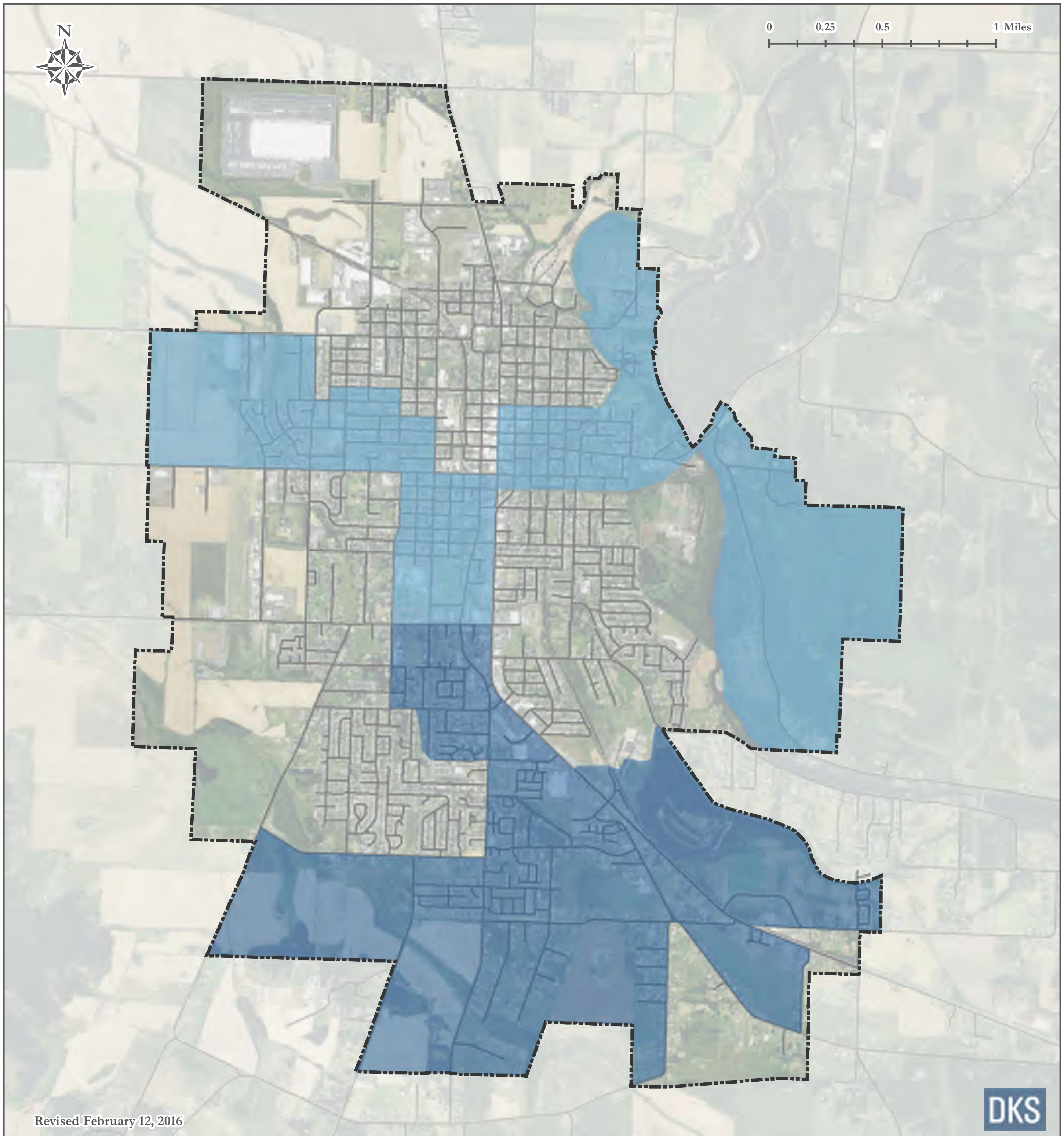
Legend:

- Slightly greater than citywide average (20% - 50% over average)
- Considerably greater than citywide average (+50% over average)
- Urban Growth Boundary

Description:

Locations with a greater proportion of impoverished residents based on 2013 census block groups that exceed the 2013 ACS citywide average.

3 Location of Residents Over Age 65



Legend:

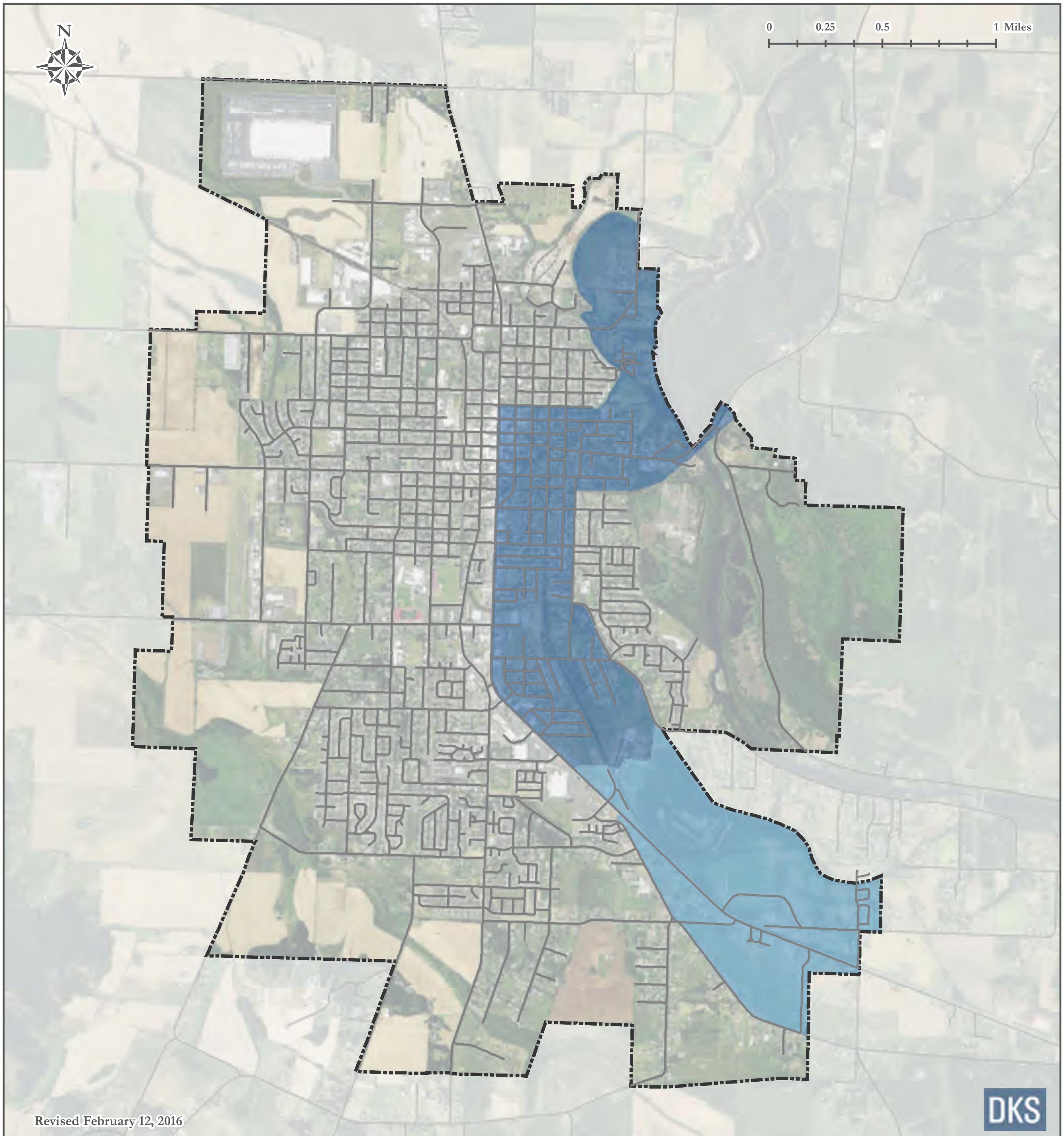
- Slightly greater than citywide average (20% - 50% over average)
- Considerably greater than citywide average (+50% over average)
- Urban Growth Boundary

Description:

Locations with a greater proportion of residents over age 65 based on 2013 census block groups that exceed the 2013 ACS citywide average.

4

Location of Residents Over Age 18 with Disabilities



Legend:

- Slightly greater than citywide average (20% - 50% over average)
- Considerably greater than citywide average (+50% over average)
- Urban Growth Boundary

Description:

Locations with a greater proportion of residents over age 18 with disabilities based on 2013 census block groups that exceed the 2013 ACS citywide average.

Memo #2 Plan Review Summary

MEMORANDUM

DATE: August 5, 2016

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates
Patrick Mahedy, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #2: Plan Review Summary P14180-012

This memorandum summarizes planning documents, policies, and regulations that are applicable to the Lebanon Transportation System Plan (TSP) update (see Attachment A for a complete list). The City's current TSP will serve as the foundation for the update process, upon which new information obtained from system analysis and stakeholder input will be applied to address changing transportation needs through the year 2040. As new strategies for addressing transportation needs are proposed, compliance and coordination with the plans, policies, and regulations described in this document will be required.

Note that this document does not include the full list of projects recommended from these plans. The list of previously recommended projects will be provided in Technical Memorandum #9 Solutions Evaluation.

Transportation System Planning in Oregon

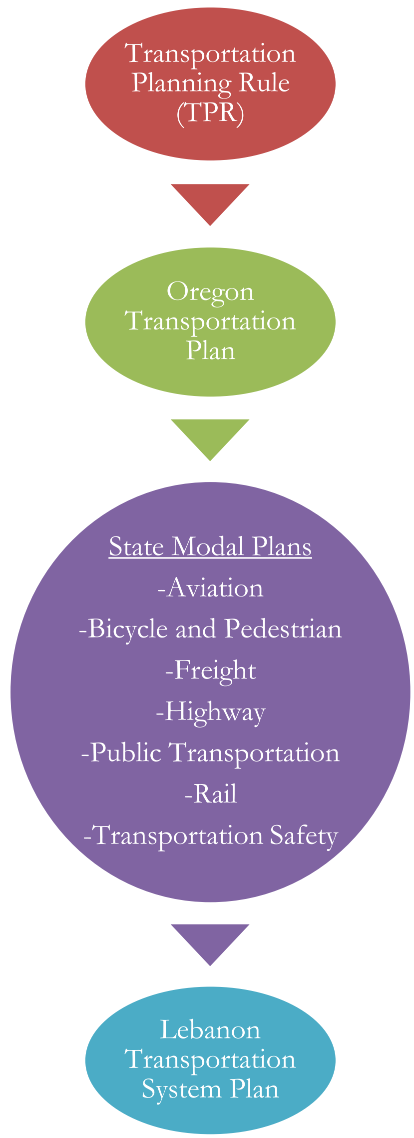
Transportation system planning in Oregon is required by Statewide Planning Goal 12 – Transportation.[1] The Transportation Planning Rule (TPR), OAR 660-012, describes how to implement Statewide Planning Goal 12.[2]

By implementing Statewide Planning Goal 12 (Transportation), the TPR promotes the development of safe, convenient, and economic transportation systems that are designed to reduce reliance on the automobile. Key elements include direction for preparing, coordinating, and implementing transportation system plans. In particular, OAR 660-012-0060 addresses amendments to plans and land use regulations and includes measures to be taken to ensure allowed land uses are consistent with the identified function and capacity of

[1] Statewide Planning Goals: http: //www.oregon.gov/LCD/goals.shtml
[2] Transportation Planning Rule: http: //arcweb.sos.state.or.us/rules/OARS_600/OAR_660/660_012.html

existing and planned transportation facilities. This rule includes criteria for identifying significant effects of plan or land use regulation amendments on transportation facilities, actions to be taken when a significant effect would occur, identification of planned facilities, and coordination with transportation facility providers.

Amendments to the TPR since adoption of the City's previous TSP include new language in 660-012-060 that allows a local government to exempt a zone change from the "significant effect" determination if the proposed zoning is consistent with the comprehensive plan map designation and the TSP. The amendments also allow a local government to amend a functional plan, comprehensive plan, or land use regulation without applying mobility standards if the subject area is within a designated multi-modal mixed-use area (MMA). In order to implement these recent amendments to the TPR, the plan amendment language in the City's zoning code may need to be revised during the implementation phase of this TSP update.



OAR 660-012-0045 requires each local government to amend its land use regulations to implement the TSP. It also requires local government to adopt land use or subdivision ordinance regulations consistent with applicable federal and state requirements, to protect transportation facilities, corridors and sites for their identified functions. This policy is achieved through a variety of measures, including access control measures, standards to protect future operations of roads, and expanded notice requirements and coordinated review procedures for land use applications. Measures also include a process to apply conditions of approval to development proposals, and regulations assuring that amendments to land use designations, densities, and design standards are consistent with the functions, capacities, and performance standards of facilities identified in the TSP.

Specifically, the TPR requires:

- The state to prepare a TSP, referred to as the Oregon Transportation Plan (OTP); and
- Counties and cities to prepare local TSPs that are consistent with the OTP.

As the guiding document for local TSPs, the OTP[3] establishes goals, policies, strategies and initiatives that address the core challenges and opportunities facing transportation in Oregon. The goals and policies are further implemented by various modal plans, including the Aviation System Plan, Bicycle and Pedestrian Plan, Freight Plan, Highway Plan, Public Transportation Plan, Rail Plan and the Transportation Safety Action Plan. Each of the OTP's seven goals are defined by more specific policies and strategies:

OTP Goal 1, Mobility and Accessibility, aims to enhance Oregon's quality of life and economic vitality by providing a balanced, efficient, cost-effective and integrated multimodal transportation system that ensures appropriate access to all areas of the state, the nation and the world, with connectivity among modes and places.

- **Policy 1.1: Development of an Integrated Multimodal System.** It is the policy of the State of Oregon to plan and develop a balanced, integrated transportation system with modal choices for the movement of people and goods.
  - **Strategy 1.1.1:** Plan and develop a multimodal transportation system that increases the efficient movement of people and goods for commerce and production of goods and services that is coordinated with regional and local plans. Require regional and local transportation plans to address existing and future centers of economic activity, routes and modes connecting passenger facilities and freight facilities, intermodal facilities and industrial land, and major intercity and intra-city transportation corridors and supporting transportation networks.
  - **Strategy 1.1.2:** Promote the growth of intercity bus, truck, rail, air, pipeline and marine services to link all areas of the state with national and international transportation facilities and services. Increase the frequency of intercity services to provide travel options.
  - **Strategy 1.1.4:** In developing transportation plans to respond to transportation needs, use the most cost-effective modes and solutions over the long term, considering changing conditions and based on the following:

    - Managing the existing transportation system effectively.

    - Improving the efficiency and operational capacity of existing transportation infrastructure and facilities by making minor improvements to the existing system.

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[3] Oregon Transportation Plan: http://www.oregon.gov/ODOT/TD/TP/OTP.shtml

- Adding capacity to the existing transportation system.

- Adding new facilities to the transportation system.

- **Policy 1.2: Equity, Efficiency and Travel Choices.** It is the policy of the State of Oregon to promote a transportation system with multiple travel choices that are easy to use, reliable, cost-effective and accessible to all potential users, including the transportation disadvantaged.
    - **Strategy 1.2.1:** Develop and promote inter and intra-city public transportation.
    - **Strategy 1.2.2:** Better integrate, locate, and design passenger and freight multimodal transportation facilities and connections to expedite travel and provide travel options. Locate and design transportation facilities to connect with other modes.
- **Policy 1.3: Relationship of Interurban and Urban Mobility.** It is the policy of the State of Oregon to provide intercity mobility through and near urban areas in a manner which minimizes adverse effects on urban land use and travel patterns and provides for efficient long distance travel.
    - **Strategy 1.3.1:** Use a regional planning approach and inter-regional coordination to address problems that extend across urban growth boundaries.
    - **Strategy 1.3.2:** In coordination with affected jurisdictions, develop and manage the transportation network so that local trips can be conducted primarily on the local system and the interstate and statewide facilities can primarily serve intercity movement and interconnect the systems. Develop, maintain and improve parallel roadways, freight rail, transit, bus rapid transit, commuter rail and light rail to provide alternatives to using intercity highways for local trips where possible.

What this means for the Lebanon TSP Update: **The TSP update will promote the growth of existing and future centers of economic activity, routes and modes connecting passenger facilities and freight facilities, intermodal facilities and industrial land, and major intercity and intra-city transportation corridors and supporting transportation networks. It will also promote the most cost-effective modes and solutions over the long term that are easy to use, reliable and accessible to all potential users, including the transportation disadvantaged. The TSP will also coordinate with the Lebanon Transit Plan update.**

OTP Goal 2, Management of the System, aims to improve the efficiency of the transportation system by optimizing the existing transportation infrastructure capacity with improved operations and management.

- **Policy 2.1: Capacity and Operational Efficiency.** It is the policy of the State of Oregon to manage the transportation system to improve its capacity and operational efficiency for the long term benefit of people and goods movement.
    - **Strategy 2.1.1:** Promote transportation demand management and other transportation system operations techniques that reduce peak period travel, help shift traffic volumes away from the peak period and improve traffic flow. Such techniques may include high occupancy vehicle lanes with express transit service, truck-only lanes, van/carpools, park-and-ride facilities, parking management programs, telework, flexible work schedules, peak period pricing, ramp metering, traveler information systems, traffic signal optimization, route diversion strategies, incident management and enhancement of rail, transit, bicycling and walking.
    - **Strategy 2.1.2:** Protect the integrity of statewide transportation corridors and facilities from encroachment by such means as managing access to state highways, limiting interchanges, creating safe rail crossings and controlling incompatible land use around airports, ports, pipelines and other intermodal passenger and freight facilities.
    - **Strategy 2.1.3:** Use advanced traveler information devices, incident management, speed management, improvements to signaling systems and other technologies to extend the efficiency, safety and capacity of transportation systems. Develop protocols and implement methods for alternate routing to respond to incidents.
    - **Strategy 2.1.4:** Enhance efficiency and reduce conflicts among transportation users, for example by reducing bottlenecks and geometric constraints, and improving or removing modal crossings. Provide for a network of arterials and highways to efficiently move goods and services while enhancing safety and community movements on local streets. Provide for signal prioritization and road patterns that support public transit. Support rail reconfiguration and additional tracks that benefit passenger and freight movements.

What this means for the Lebanon TSP Update: The TSP update will prioritize travel demand management and transportation system operations techniques that fine tune existing systems and policies over costly major roadway capacity improvements.

OTP Goal 3, Economic Vitality, promotes the expansion and diversification of Oregon's economy through the efficient and effective movement of people, goods, services and information in a safe, energy-efficient and environmentally sound manner.

- **Policy 3.2 – Moving People to Support Economic Vitality.** It is the policy of the State of Oregon to develop an integrated system of transportation facilities, services and information so that intrastate, interstate and international travelers can travel easily for business and recreation.
  - **Strategy 3.2.2:** In regional and local transportation system plans, support options for traveling to employment, services and businesses. These include, but are not limited to, driving, walking, bicycling, ridesharing, public transportation and rail.
  - **Strategy 3.2.4:** Address scenic values in state, regional and local planning, improvements and maintenance. Support state and federal Scenic Byways and Tour Routes and connections to parks and recreation areas.
  - **Strategy 3.2.5:** Promote tourism via air, bicycles, motor vehicles, rail and ships. Support connections to recreational trails.
- **Policy 3.3 – Downtowns and Economic Development.** It is the policy of the State of Oregon to provide transportation improvements to support downtowns and to coordinate transportation and economic development strategies.
  - **Strategy 3.3.1:** Coordinate private and public resources to provide transportation improvements and services to help stimulate active and vital downtowns, economic centers and main streets.

What this means for the Lebanon TSP Update: The TSP update will identify projects that support a prosperous and competitive economy by preserving and enhancing business opportunities, and ensuring the efficient movement of people and goods to recreational, employment, housing and other destinations in Lebanon (e.g., freight movement).

OTP Goal 4, Sustainability, seeks to provide a transportation system that meets present needs without compromising the ability of future generations to meet their needs from the joint perspective of environmental, economic and community objectives. This system is consistent with, yet recognizes differences in, local and regional land use and economic development plans. It is efficient and offers choices among transportation modes. It distributes benefits and burdens fairly and is operated, maintained and improved to be sensitive to both the natural and built environments.

- **Policy 4.1 – Environmentally Responsible Transportation System.** It is the policy of the State of Oregon to provide a transportation system that is environmentally responsible and encourages conservation and protection of natural resources.
  - **Strategy 4.1.1:** Practice stewardship of air, water, land, wildlife and botanical resources. Take into account the natural environments in the planning, design,

construction, operation and maintenance of the transportation system. Create transportation systems compatible with native habitats and species and help restore ecological processes, considering such plans as the Oregon Conservation Strategy and the Oregon Plan for Salmon and Watersheds. Where adverse impacts cannot reasonably be avoided, minimize or mitigate their effects on the environment. Work with state and federal agencies and other stakeholders to integrate environmental solutions and goals into planning for infrastructure development and provide for an ecosystem-based mitigation process.

  - **Strategy 4.1.2:** Encourage the development and use of technologies that reduce greenhouse gases.

- **Policy 4.3 – Creating Communities.** It is the policy of the State of Oregon to increase access to goods and services and promote health by encouraging development of compact communities and neighborhoods that integrate residential, commercial and employment land uses to help make shorter trips, transit, walking and bicycling feasible. Integrate features that support the use of transportation choices.

  - **Strategy 4.3.1:** Support the sustainable development of land with a mix of uses and a range of densities, land use intensities and transportation options in order to increase the efficiency of the transportation system. Support travel options that allow individuals to reduce vehicle use.

  - **Strategy 4.3.2:** Promote safe and convenient bicycling and walking networks in communities. Fill in missing gaps in sidewalk and bikeway networks, especially to important community destinations such as schools, shopping areas, parks, medical facilities and transit facilities. Enhance walking, bicycling and connections to public transit through appropriate community and main street design. Promote facility designs that encourage walking and biking.

  - **Strategy 4.3.4:** Promote transportation facility design, including context sensitive design, which fits the physical setting, serves and responds to the scenic, aesthetic, historic and environmental resources, and maintains safety and mobility.

  - **Strategy 4.3.5:** Reduce transportation barriers to daily activities for those who rely on walking, biking, rideshare, car-sharing and public transportation by providing: Access to public transportation and the knowledge of how to use it. Facility designs that consider the needs of the mobility-challenged including seniors, people with disabilities, children and non-English speaking populations.

What this means for the Lebanon TSP Update: The TSP update will identify solutions that support people through-put, and that reduce transportation barriers to daily activities for walkers, bikers and public transportation users. The solutions will be environmentally responsible and should fit the physical setting and context of the surrounding land use.

OTP Goal 5, Safety and Security, aims to plan, build, operate and maintain the transportation system so that it is safe and secure.

- **Policy 5.1 – Safety.** It is the policy of the State of Oregon to continually improve the safety and security of all modes and transportation facilities for system users including operators, passengers, pedestrians, recipients of goods and services, and property owners.
    - **Strategy 5.1.3:** Ensure that safety and security issues are addressed in planning, design, construction, operation and maintenance of new and existing transportation systems, facilities and assets.
- **Policy 5.2 – Security.** It is the policy of the State of Oregon to provide transportation security consistent with the leadership of federal, state and local homeland security entities.
    - **Strategy 5.2.3:** Improve the evacuation and emergency response capabilities of the urban and rural transportation system.

What this means for the Lebanon TSP Update: The TSP update will identify projects that help the transportation system maintain and improve individual safety and security and maximize public safety and service access.

OTP Goal 6, Funding the Transportation System, seeks to create a transportation funding structure that will support a viable transportation system to achieve state and local goals today and in the future.

- **Policy 6.1 – Funding Structure.** It is the policy of the State of Oregon to develop a transportation finance structure that addresses the public funding aspects of all modes and reinforces plan strategies. This structure should include provisions for flexibility in the use of new funding sources and new partnerships to achieve system integration while also protecting transportation funds for transportation purposes.
    - **Strategy 6.1.2:** Develop and maintain adequate resources for demonstrated and proven transportation needs for all transportation modes and jurisdictions.

What this means for the Lebanon TSP Update: **The TSP update will include an assessment of the level of transportation funding projected to be available through the 20-year planning horizon in comparison to the cost of developing a transportation system that is able to meet the City's needs. Opportunities to establish stable funding sources will be discussed and project prioritization will consider the feasibility of funding.**

OTP Goal 7, Coordination, Communication and Cooperation, ensures coordination, communication and cooperation among transportation users, providers and those most affected by transportation activities to align interests, remove barriers and bring innovative solutions so the transportation system functions as one system.

- **Policy 7.1 – A Coordinated Transportation System.** It is the policy of the State of Oregon to work collaboratively with other jurisdictions and agencies with the objective of removing barriers so the transportation system can function as one system.
    - **Strategy 7.1.1:** Examine transportation functions among and within state and local agencies and providers in order to make the delivery of transportation services and facilities more efficient. Consider consolidation of functions where it can improve efficiency, accountability and service delivery.
- **Policy 7.3 – Public Involvement and Consultation.** It is the policy of the State of Oregon to involve Oregonians to the fullest practical extent in transportation planning and implementation in order to deliver a transportation system that meets the diverse needs of the state.
    - **Strategy 7.3.1:** In all phases of decision-making, provide affected Oregonians early, open, continuous, and meaningful opportunity to influence decisions about proposed transportation activities. When preparing and adopting a multimodal transportation plan, modal/topic plan, facility plan or transportation improvement program, conduct and publicize a program for citizen, business, and tribal, local, state and federal government involvement. Clearly define the procedures by which these groups will be involved.
    - **Strategy 7.3.3:** Seek out and facilitate the involvement of those potentially affected including traditionally underserved populations.

What this means for the Lebanon TSP Update: **The TSP update will offer public involvement opportunities to all stakeholders and residents, and will coordinate with other jurisdictions and agencies to ensure the transportation system limits barriers and functions as one system.**

Why does Lebanon need an Updated TSP?

The City's current Transportation System Plan was adopted in 2007. Since then, several regulations and requirements have been integrated or modified in the TPR, OTP, and State Modal Plans and overall driving, walking and biking habits have evolved in the City. Since 2008, the north end of the City has experienced rapid growth with the advent of the Western University of Health Sciences campus. The current effort will develop a TSP for Lebanon that brings them into compliance with the TPR and more appropriately serves their transportation needs.

How is the Transportation System Defined?

The following sections summarize the state and local roadway classifications and land use designations for areas of Lebanon derived from the identified documents. This information ultimately determines the adopted standards, regulations, and policies that apply to the multi-modal transportation system in Lebanon.

Lebanon Classification for Roadways

To manage the roadway network, the City classified the roadways based on a hierarchy according to the intended purpose of each road. From highest to lowest intended usage, the classifications are principal arterials, arterials, collectors, and local streets. Roadways with a higher intended usage generally provide more efficient traffic movement (or mobility) through the City, while roadways with lower intended usage provide greater access for shorter trips to local destinations such as businesses or residences.

- **Principal Arterials** are intended to serve as the main travel route through the City. These roadways serve the highest volume of motor vehicle traffic and are primarily utilized for longer distance regional trips. The only roadways in the City classified as principal arterials are US 20 and OR 34.
- **Arterial Streets** are intended to act as a corridor connecting many parts of the City and serve traffic traveling to and from principal arterial roadways. These roadways provide greater accessibility to neighborhoods, often connecting to major activity generators and provide efficient through movement for local traffic. In Lebanon, 2nd Street-Academy Street from OR 34 to Airport Road, Airport Road, Brewster Road from Berlin Road east to the Urban Growth Boundary, Berlin Road from Brewster Road south to the Urban Growth Boundary, Oak Street from the west Urban Growth Boundary to the eastern terminus, River Drive, Stoltz Hill Road from Vaughan Lane south to the Urban Growth Boundary, South Main Road, Tennessee Road, Walker Road, and Wheeler Street are classified as arterials.
- **Collector Streets** often connect the neighborhoods to the arterial roadways. These roadways serve as major neighborhood routes and generally provide more direct

property access or driveways than arterial roadways. In Lebanon, Hansard Avenue, 5th Street from Walker Road to Reeves Parkway and from Vaughan Lane south to the Urban Growth Boundary, 7th Street from Walker Road to Oak Street and from Grant Street to OR 34, 9th Street from Rose Street to OR 34, 10th Street from Oak Street to OR 34, from F Street to E Street and from Vaughn Lane to Walker Road, 12th Street from Airport Road to OR 34, Stoltz Hill Road from Vaughan Lane to Airport Road, Airway Road from Airport Road to Oak Street, Grove Street from Milton Street to Wheeler Street, Williams Street from Milton Street to Wheeler Street, Franklin Street, Berlin Road from Brewster Road to Grant Street, Rose Street from 10th Street to 5th Street, Sherman Street from 12th Street to Park Street, Grant Street from 10th Street to Berlin Road, Maple Street from 2nd Street to Park Street, Elmore Street from 2nd Street to Grove Street, Oak Street from Airway Road west to the Urban Growth Boundary, E Street, Milton Street, F Street from 12th Street to 10th Street, Russell Drive, Vaughan Lane, Crowfoot Road from South Main Road to US 20, Weirich Drive, Cascade Drive, Weldwood Drive, Central Avenue, and Rock Hill Drive are classified as major collectors.

- **Local Streets** provide more direct access to residences without serving through travel in Lebanon. These roadways are often lined with residences and are designed to serve lower volumes of traffic with a statutory speed limit of 25 miles per hour. All remaining streets in Lebanon are classified as locals.

What this means for the Lebanon TSP Update: The functional classification system for the City will be revisited for the TSP update. Multi-modal classifications will be considered.

ODOT Classifications for State Highways in Lebanon

OHP Goal 1, Policy 1A (State Highway Classification System) categorizes state highways for planning and management decisions. Within Lebanon, state highways are classified as Regional Highways (see summary at the end of this section). Regional Highways typically provide connections and links to regional centers, Statewide or interstate Highways, or economic or activity centers of regional significance. The management objective is to provide safe and efficient, high-speed, continuous-flow operation in rural areas and moderate to high-speed operations in urban and urbanizing areas. A secondary function is to serve land uses in the vicinity of these highways. Inside Special Transportation Areas (see Special Designations below), local access is a priority.

Special Designations: OHP Goal 1, Policy 1B identifies special highway segment designations for specific types of land use patterns to foster compact development on state highways in which the need for appropriate local access outweighs the considerations of highway mobility. Within Lebanon, Special Transportation Area (STA) designations include:

- US 20 between Rose Street and Oak Street, and

- OR 34 between the rail crossing just west of South 3rd Street and US 20.

The primary objective of a STA is to provide access to and circulation amongst community activities, businesses, and residences and to accommodate pedestrian, bicycle, and transit movement along and across the highway. While traffic moves through an STA and automobiles may play an important role in accessing an STA, convenience of movement within an STA is focused upon pedestrian, bicycle, and transit modes. STAs look like traditional "Main Streets" and are generally located on both sides of a state highway. Direct street connections and shared on-street parking are encouraged. Local auto, pedestrian, bicycle, and transit movements to the area are generally as important as the through movement of traffic. Because of this, ODOT's mobility targets and design standards in STA's are intended to allow for lower speed operations.

What this means for the Lebanon TSP Update: The downtown portion of US 20 in Lebanon that has the STA characteristics identified in the OHP is already designated as a STA. Additional highway segments in Lebanon should be considered if they have STA characteristics.

State Highway Freight System: OHP Goal 1, Policy 1C addresses the need to balance the movement of goods and services with other uses. It states that the timeliness of freight movements should be considered when developing and implementing plans and projects on freight routes. Within Lebanon, US 20 south of OR 34, and OR 34 are classified as Oregon Freight Routes and Federal Truck Routes, while US 20 north of OR 34 is only classified as a Federal Truck Route.

What this means for the Lebanon TSP Update: Transportation solutions along highways through Lebanon must be accommodating to the Truck Route designation. Federal Truck Routes require 12' travel lanes, with potential for 11' travel lanes within STA's with lower trucks volumes.

Reduction Review Routes: An Administrative Rule was recently adopted to provide clear direction in the implementation of ORS 366.215. The rule requires review of all potential actions that will alter, relocate, change or realign a Reduction Review Route that could result in permanent reductions in vehicle-carrying capacity. Reduction of vehicle-carrying capacity means a permanent reduction in the horizontal or vertical clearance of a highway section, by a permanent physical obstruction to motor vehicles located on useable right-of-way subject to Commission jurisdiction, unless such changes are supported by the Stakeholder Forum. If ODOT identifies that an action may result in a reduction of vehicle-carrying capacity, a Stakeholder Forum will be convened to help advise ODOT regarding the effect of the proposed action on the ability to move motor vehicles through a section of highway. Within Lebanon, US 20 and OR 34 are classified as a Reduction Review Routes.

What this means for the Lebanon TSP Update: Transportation improvements recommended on Reduction Review Routes, including US 20 and OR 34, will include a record of the proposed roadway dimensions and sufficient detail to allow for a review of Vehicle-Carrying Capacity during future design.

Lifeline Routes: OHP Goal 1, Policy 1E designates routes for emergency response in the event of an earthquake, categorized as Tier 1, 2 and 3. The routes identified as Tier 1 are considered to be the most significant and necessary to ensure a functioning statewide transportation network. A functioning Tier 1 lifeline system provides traffic flow through the state and to each region. The Tier 2 lifeline routes provide additional connectivity and redundancy to the Tier 1 lifeline system. The Tier 2 system allows for direct access to more locations and increased traffic volume capacity, and it provides alternate routes in high-population regions in the event of outages on the Tier 1 system. The Tier 3 lifeline routes provide additional connectivity and redundancy to the lifeline systems provided by Tiers 1 and 2. There are no designated lifeline routes in Lebanon.

What this means for the Lebanon TSP Update: The City can use the TSP update to designate local lifeline routes to ensure their intended function is considered in system investment and management decisions.

Summary of ODOT Classifications

Updates to the TSP will support the existing highway classifications and will enhance the ability of the highways in Lebanon to serve their defined functions. The following summarizes the classifications of state highways in Lebanon:

- **US 20** (Santiam Highway, No. 16) is classified as a Regional Highway, part of the National Highway System (NHS), a Federal Truck Route, and a Reduction Review Route. South of OR 34, US 20 is designated as an Oregon Freight Route. Between Rose Street and Oak Street, US 20 is designated as an STA.
- **OR 34** (Corvallis-Lebanon Highway, No. 210) is classified as a Regional Highway, part of the NHS, a Federal Truck Route, an Oregon Freight Route, and a Reduction Review Route. Between the rail crossing just west of South 3rd Street and US 20, OR 34 is designated as an STA.

How is the Transportation System Managed?

City Mobility Standards: The 2007 Lebanon TSP specifies level of service (LOS) "E" and a volume to capacity (v/c) ratio of 1.00 as the minimum performance standard during the peak-hour for signalized intersections under City jurisdiction. At unsignalized intersections under City jurisdiction, a v/c ratio of 0.90 is specified as the mobility standard during the peak-hour.

What this means for the Lebanon TSP Update: City street performance will be evaluated in part, using a mobility standard requiring operation of LOS E and a v/c of 1.00 or better at signalized intersections, and v/c of 0.90 or better at unsignalized intersections. The City may wish to revisit the mobility standard identified in the 2007 TSP and customize it to meet the current needs of the City.

State Highway Mobility Targets: OHP Goal 1, Policy 1F sets mobility targets for ensuring a reliable and acceptable level of mobility on the highway system. Each intersection along state highways has a mobility target requiring that the highway operate at or below a specified volume to capacity (v/c) ratio. The mobility targets shown in Table 1 are applicable to highways in Lebanon (pursuant to Policy 1F, Table 6).

- **Volume to capacity (V/C) ratio.** A decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used (i.e., the saturation) at a turn movement, approach leg, or intersection. It is determined by dividing the peak hour traffic volume by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. As the ratio approaches 1.00, congestion increases and performance is reduced. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and will experience excessive queues and long delays.

Table 1: Highway Intersection Mobility Targets

Highway (Segment)	Posted Speed / Special Designation	Highway Signalized Intersections	Unsignalized Intersections	
			Highway Approaches	Side Street Approaches to Highway
OR 34 (from the UGB east to Tucker Lane)	55 mph/ Freight Route	0.85 v/c	0.85 v/c	0.90 v/c
OR 34 (from Tucker Lane to the railroad crossing)	25-35 mph/ Freight Route	0.90 v/c	0.90 v/c	0.95 v/c
OR 34 (from the railroad crossing to US 20)	25 mph/ Freight Route, STA	0.95 v/c	0.95 v/c	1.0 v/c
US 20 (from the UGB south to the Lebanon Hospital north driveway)	40 mph/ none	0.85 v/c	0.85 v/c	0.90 v/c
US 20 (from the Lebanon Hospital north driveway to OR 34)	30 mph/ none	0.90 v/c	0.90 v/c	0.95 v/c
US 20 (from OR 34 to Rose Street)	30 mph/ Freight Route	0.90 v/c	0.90 v/c	0.95 v/c
US 20 (from Rose Street to Oak Street)	25-30 mph/ Freight Route, STA	0.95 v/c	0.95 v/c	1.0 v/c
US 20 (from Oak Street to south of Market Street)	30-35 mph/ Freight Route	0.90 v/c	0.90 v/c	0.95 v/c
US 20 (from south of Market Street south to the UGB)	45-55 mph/ Freight Route	0.85 v/c	0.85 v/c	0.90 v/c

OHP Action 1F.3, of Policy 1F allows local jurisdictions to consider alternate mobility standards for state highways where it would be infeasible to meet the standards listed in Table 1 above. The alternative standards shall be clear and objective and must be related to v/c ratios. The standards must demonstrate that it would be infeasible to meet the highway mobility standards listed in Table 1 above and must be adopted as part of the local TSP. In addition, the TSP shall include all feasible actions for:

- Providing a network of local streets, collectors and arterials to relieve traffic demand on state highways and to provide convenient pedestrian and bicycle ways;
- Managing access and traffic operations to minimize traffic accidents, avoid traffic backups on freeway ramps, and make the most efficient use of highway capacity;
- Managing traffic demand, where feasible, to manage peak hour traffic loads on state highways;
- Providing alternative modes of transportation; and
- Managing land use to limit vehicular demand on state highways consistent with the Land Use and Transportation Policy (1B).

The TSP shall include a financially feasible implementation program and shall demonstrate strong public and private commitment to carry out the identified improvements and other actions. The alternate highway mobility standards will become effective only after the Transportation Commission has adopted them.

What this means for the Lebanon TSP Update: System performance for US 20 and OR 34 will be measured, in part, using the adopted mobility targets. The TSP update will evaluate the need for adopting alternate mobility targets for US 20 and OR 34 if there are no feasible project alternatives identified to meet the existing mobility targets.

Access Management on Local Roadways: Access spacing guidelines in the TSP recommend strategies for consolidating and managing access along streets in the City, but do not establish minimum spacing standards for driveways or public roadways under their jurisdiction.

What this means for the Lebanon TSP Update: The TSP update will develop access spacing standards for streets in Lebanon. Access spacing standards can help increase the safety of streets by creating an environment that matches the street functional classification and forestalling costly major capacity improvements.

Access Management on Highways: The Oregon Access Management Rule[4] (OAR 734-051) attempts to balance the safety and mobility needs of travelers along state highways with the access needs of property and business owners. ODOT's rules manage access to the state's highway facilities in order to maintain highway function, operations, safety, and the preservation of public investment consistent with the policies of the 1999 OHP. Access management rules allow ODOT 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 access spacing standards and establish a formal appeals process in relation to access issues is identified. These rules enable the State to 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.

OHP Goal 3, Policy 3A and OAR 734-051 set access spacing standards for driveways and approaches to the state highway system.[5] The standards are based on state highway classification and differ based on posted speed. The applicable standards for highways in Lebanon can been seen in Table 2.

Table 2: Highway Access Spacing Standards

Highway (Segment)	Posted Speed Limit	Minimum Intersection Spacing
OR 34 (from the UGB east to Tucker Lane)	55 mph	990 feet
OR 34 (from Tucker Lane to 9th Street)	35 mph	350 feet
OR 34 (from 9th Street to US 20)	25 mph	250 feet
US 20 (from the UGB south to the Lebanon Hospital north driveway)	40 mph	500 feet
US 20 (from the Lebanon Hospital north driveway to Rose Street)	30 mph	350 feet

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4 Access Management Rule: http://arcweb.sos.state.or.us/rules/OARS_700/OAR_734/734_051.html

5 ODOT Access Management Standards (Appendix C): www.oregon.gov/ODOT/TD/TP/OHP_AM.shtml

Table 2: Highway Access Spacing Standards

Highway (Segment)	Posted Speed Limit	Minimum Intersection Spacing
US 20 (from Rose Street to Elmore Street)	25 mph	250 feet
US 20 (from Elmore Street to south of Market Street)	30-35 mph	350 feet
US 20 (from south of Market Street to south of Burdell Boulevard)	45 mph	500 feet
US 20 (from south of Burdell Boulevard south to the UGB)	55 mph	990 feet

What this means for the Lebanon TSP Update: **ODOT access spacing standards for highways should be incorporated into the TSP, along with supporting policies that work towards meeting the access spacing standards in Table 2.**

Major Projects: OHP Goal 1, Policy 1G requires maintaining performance and improving safety by improving efficiency and management before adding capacity. The intent of policy 1G and Action 1G.2 is to ensure that major improvement projects to state highway facilities have been through a planning process that involves coordination between state, regional, and local stakeholders and the public, and that there is substantial support for the proposed improvement.

What this means for the Lebanon TSP Update: **The TSP update will consider project alternatives that improve or manage the existing transportation system before implementing higher cost street capacity enhancement projects.**

Projects off Highways: OHP Goal 2, Policy 2B establishes ODOT's interest in projects on local roads that maintain or improve safety and mobility performance on state roadways, and supports local jurisdictions in adopting land use and access management policies.

What this means for the Lebanon TSP Update: The TSP will include sections describing existing and future land use patterns, access management and implementation measures, and will consider solutions that reduce the need for local trips on highways.

Traffic Safety: OHP Goal 2, Policy 2F identifies the need for projects in the state to improve safety for all users of the state highway system through engineering, education, enforcement, and emergency services. One component of the TSP is to identify existing crash patterns and rates and to develop strategies to address safety issues. Proposed projects will aim to reduce the vehicle crash potential and/or improve bicycle and pedestrian safety by providing upgraded facilities that meet current standards.

What this means for the Lebanon TSP Update: The TSP update will develop projects that ensure the transportation system maintains and improves individual safety and security by maximizing the comfort and convenience of walking, biking and transit transportation options, public safety and service access.

Alternative Passenger Modes: OHP Goal 4, Policy 4B, requires that highway projects encourage the use of alternative passenger modes to reduce local trips. The TSP will also consider ways to support and increase the use of alternative passenger modes to reduce trips on highways and other facilities.

What this means for the Lebanon TSP Update: The TSP update will incorporate the recommended improvements from the Transit Plan, and will consider additional solutions that will enhance multi-modal travel in Lebanon.

Transportation Demand Management: OHP Goal 4, Policy 4D, encourages efficient use of the state transportation system through investment in transportation demand management strategies.

What this means for the Lebanon TSP Update: The TSP update will consider transportation demand management strategies to create greater mobility, reduce auto trips, make more efficient use of the roadway system, and minimize air pollution.

Projects on Highways: The Highway Design Manual[6] (HDM) provides uniform design standards and procedures for ODOT and is in general agreement with the 2011 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 should be used for all projects on highways in Lebanon to determine design requirements, including the minimum required volume to capacity ratios for use in the design of highway projects.

What this means for the Lebanon TSP Update: System performance of highway improvement projects will be measured, in part, using the HDM v/c ratios. While HDM standards must be applied to ODOT facilities, design exceptions can be granted to those standards where conditions justify such action in order to balance the policies and objectives of the Oregon Transportation Plan and Lebanon TSP, and with consideration given to the availability of transportation funding.

Oregon Bicycle and Pedestrian 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. The plan identifies 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 achieve 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 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

[6] ODOT Highway Design Manual: http: //www.oregon.gov/ODOT/HWY/ENGSERVICES/hwy_manuals.shtml

pedestrian and bicycle facilities. Design standards are recommended and information on safety is provided.

[Note: The Oregon Bicycle and Pedestrian Plan is currently being updated.]

What this means for the Lebanon TSP Update: **The Bicycle and Pedestrian Plan serves as the guiding policy for bicycle and pedestrian planning. The Lebanon TSP should implement the goals and policies of the Plan to ensure safe multimodal infrastructure. The subsequent, updated design guide (2011) portion represents ODOT's standards for constructing state-owned facilities. The standards for constructing or maintaining bicycle and pedestrian infrastructure are recommended by ODOT, but not required for use by local jurisdictions.**

Other Background Information for the TSP Update

The following sections summarize additional background information or guidance documents that will be used in updating the Lebanon TSP.

Lebanon Comprehensive Plan, 2004: The Lebanon Comprehensive Plan, adopted in 2004, includes the City's transportation goals and policies[7]. Comprehensive Plan Chapter 8, Transportation, provides the policy framework for the development and maintenance of the City's streets, transit, bicycle and pedestrian ways, utility transmission corridors, railroads, and air transportation facilities. It also provides a brief synopsis of transportation plans included in the 2004 draft TSP.

Overall, there are 87 policies in the chapter on transportation, categorized by the transportation-related topics listed below[8]:

- **General policies.** (Section 10.0, Policies 1-10)
- **Transportation System Planning.** (Section 11.0, Policies 11-20)
- **Auto Traffic and Circulation.** (Section 12.0, Policies 21-28)

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[7] Note that the 2007 Transportation System Plan does not currently contain policies. According to the Comprehensive Plan, polices contained in the TSP, which was adopted after the updated Comprehensive Plan, "will further supplement and implement the transportation polices contained in this Comprehensive Plan."

[8] Policies are numbered P-1 through P-86, however there are two P-65 policies; a P-65 in the Section 17.0, Transit and in Section 18.0, Rail

- **Local Connectivity.** (Section 13.0, Policies 29-33)
- **Auto Parking.** (Section 14.0, Policies 34-37)
- **Bicycles.** (Section 15.0, Policies 38-50)
- **Pedestrians.** (Section 16.0, Policies 51-62)
- **Transit.** (Section 17.0, Policies 63-65)
- **Rail** (Section 18.0, Policies 65-70)
- **Airport** (Section 19.0, Policies 74-80)
- **Truck/freight Route** (Section 20.0, Policies 81-82)
- **Downtown** (Section 21.0, Policies 83-86)

Policies in Chapter 8, Transportation, that reference specific transportation facilities and their importance or need include the following:

- P-18: The following corridors shall be considered primary and important entryways or gateways into the City, A. Highway 20 North/Northwest of the City, B. Highway 20 South/Southeast of City, C. Highway 34 West of the City, D. Grant Street at the bridge over the South Santiam River.
- P-81: The City shall continue exploring ways, for example the Reeves Parkway, to provide a better truck route alternative to the existing Wheeler/Williams/Milton Streets route.

Transportation-related policies can be also be found in several other chapters of the Comprehensive Plan, including:

- **Chapter 3 (Urbanization), Public Facilities Capability.** Policies provide direction on maintaining and expanding the transportation system.
- **Chapter 3 (Urbanization), Energy.** A single policy (P-2) to support the development of alternative modes of transportation as a means to reduce costs.
- **Chapter 5 (Population and Economy), General Policies for Land Use.** Policies provide general direction on integrating transportation facilities with commercial development and the downtown area.
- **Chapter 6 (Housing),** Housing and Transportation Connectivity. The majority of these policies focus on improving the pedestrian and bikeway network for all users as part of new development and infill development.
- **Chapter 7 (Community Friendly Development), Community Friendly Development.** Approximately half of these policies focus on pedestrian and bicycle friendly street design standards as a way to promote transportation options.
- **Chapter 9 (Public Facilities and Services), General policies and Parks.** General policies are largely duplicated from policies found in chapter 3 and provide direction

on maintaining and expanding the transportation system. Park policies direct the Parks Master Plan to be consistent with TSP.

The Santiam Special Planning Area is an overlay zone that straddles the South Santiam River southeast of Lebanon's Downtown District. Approval of development proposals in this Special Planning Area require demonstration that plans are able to successfully coordinate with the City's special studies that pertain to this area relating to such things as transportation.

The Academy Square Area, as identified in Chapter 4, Land Use of the Comprehensive Plan is planned as a community center and park. This area was classified as a STA from ODOT (see STA section earlier in this document).

What this means for the Lebanon TSP Update: The TSP update process will provide an opportunity to review transportation policies and update them, as well as supporting sections of the Comprehensive Plan transportation element, to better represent current state and local practices and objectives. Potential policy changes may reflect issues that have been evolving since the TSP was last updated, such as strategies to optimize transportation management and maximizing the efficiency of the existing transportation system, and the role the transportation system plays in human health. Particular attention will be given to ensuring that the TSP will be consistent with existing City policies.

Lebanon Development Code: Title 16 of the Lebanon Municipal Code contains the City's Development Code (LDC), which implements the Transportation System Plan through development requirements. Transportation-related requirements can be found in the Land Use and Land Use Zones (Article 2, LDC 16.03 – 16.11), Community Development and Use Standards (Article 3, LDC 16.12 – 16.19), Land Use and Development Reviews, Decision Requirements and Procedures (Article 4, LDC 16.20 – 16.28), and Exceptions to Code Standards (Article 5, LDC 16.29 – 16.30).

Article 2, Land Use and Land Use Zones, includes the Steep Slope Development Overlay Zone (SSD-OZ) and the Special Transportation Area Overlay zone (STA-OZ) in LDC 16.11. The SSD-OZ provides regulations and modifications related to street standards within the zone. The STA-OZ, which modifies access standards, is primarily located in the core of the Downtown area, and focuses on portions of Highway 20.

Article 3, Community Development and Use Standards, contains the majority of transportation-related standards. Access management for automobiles, pedestrians, and bicycles as well as regulations for traffic impact studies are addressed in LDC 16.12; traffic impact study requirements for land divisions (LDC 16.22) cross-references Chapter 16.12. Permitted and conditional transportation uses, as well as design standards for streets, alleys, and pathways, are addressed in LDC 16.13. Off-street parking and loading requirements for automobiles and bicycles are addressed in LDC 16.14.

Regulations and approval criteria related to transportation facilities are found in Conditional Use (LDC 16.21), Land Divisions, Property Line Adjustments, and Vacations (LDC 16.22), LCP Map, Zoning Map, and UGB Amendments (LDC 16.27), and LCP and LDC Text Amendments (LDC 16.28). Planned Developments (LDC 16.23) allows modifications to the standards found in Article 3, including transportation-related standards, through a quasi-judicial judicial review process.

Article 5, Exceptions to Code Standards, provides standards and procedures for variances and adjustments. Decision criteria for granting adjustments to Vehicular Access and Circulation Standards and Parking and Loading Standards are address in Variance and Adjustments (LDC 16.29).

What this means for the Lebanon TSP Update: The identified Development Code provisions will inform the TSP update and potentially will need to be updated to reflect outcomes of this process. These provisions may be supplemented or changed to ensure consistency between the updated TSP and the Development Code, to strengthen compliance of the Development Code with the TPR, and to advance other City objectives related to land use and transportation. Recommendations for potential modifications to the Development Code will be detailed in Technical Memorandum #3.

Economic Opportunity Analysis, 2007: The 2007 Economic Opportunities Analysis (EOA) is an update to the previously EOA adopted in 2004. It provides a technical economic analysis of existing conditions and 20-year employment forecasts, consistent with Planning Goal 9 and OAR 660-009. The need for the update was necessary due to unanticipated development (e.g. the land use amendment to allow Lowe's regional distributional warehouse).

The analysis finds that Lebanon has enough buildable acres to accommodate industrial and commercial development through 2057. The analysis also finds that Lebanon has a comparative advantage relative to other communities in the Willamette Valley with its proximity to I-5 and its ability to attract industrial uses.

Highway 34 was identified as a critical transportation corridor, providing the most direct connection to I-5. Traffic volumes in 2005 from ODOT indicate there was still capacity on the corridor. The place identified as most likely to exceed congestion levels in the future is the turn-off at Denny School Road. The need for additional capacity on Highway 34 was "unclear" at the time of the report, however it was found that additional distribution centers would not have a huge impact on traffic volumes in the future.

At the time the EOA was developed, the City applied for and won a grant through the Connect Oregon program to construct a new rail reload facility near Highway 34 and Lebanon's industrial lands. The newer, larger, and more accessible facility allows future growth to meet demand.

What this means for the Lebanon TSP Update: The TSP update process will include transportation modeling to identify future transportation needs, providing a system-wide, up-to-date transportation analysis on which to base recommended improvements. The planning process will consider the findings of the EOA as they relates to improved multi-modal transportation service and connections to existing employment areas.

Lebanon Capital Improvement Plan, 2014-2018: The Capital Improvement Plan (CIP) is a five-year plan identifying capital improvement expenditures throughout the community. It includes capital fund and allocations for transportation, parks, wastewater, drainage, and water infrastructure improvements. The projects in the CIP are prioritized based on current needs and the expected growth of the City.

What this means for the Lebanon TSP Update: The current TSP update will include capital improvement projects as part of the future conditions analysis and in the development of proposed improvements. The capital improvement projects that have a committed funding source will be included in the future baseline transportation.

2040 Lebanon Vision Statement: The 2040 Lebanon Vision Statement describes goals for what citizens hope the community of Lebanon will be like in 2040. The document contains the pillars to making Lebanon a friendly and thriving community. The categories in the 2040 vision statement included the following:

- **Downtown is the Heart of the Community:** Downtown is recognized as the center of Lebanon where people gather to celebrate and connect.
- **Healthy Lifestyles:** Healthy choices and recreation opportunities in Lebanon enable healthy and active citizens.
- **Managed Growth:** Lebanon welcomes growth that reinforces its plans for the future.
- **Infrastructure:** Lebanon sustains an infrastructure system (transportation, telecommunications, power, water and sewer) that supports future growth plans.
- **Safe Neighborhoods:** Proactive law enforcement and community intervention keep Lebanon safe.

- **Small Town Values:** Friendliness is the key element of Lebanon's social make-up and the City actively welcomes new community members. Lebanon embraces all community members and is compassionate toward the needs of the people.

What this means for the Lebanon TSP Update: The vision for Lebanon's future will be used to guide all recommendations for the TSP update, and to ensure investments in the transportation system are consistent with investments made in other aspects of the community.

City of Lebanon Parks Master Plan, 2006: The City of Lebanon Parks Master Plan focuses on capital development needs and strategies to improve Lebanon's parks and recreation services between the years of 2006 and 2026. The parks master plan is the City's long-term vision and plan of action for the community's parks and contains an inventory of current parks as well as land acquisition plans for future parks. The community needs assessment within the plan identified increased ADA accessibility, and bicycle and pedestrian trail connectivity as key park facility needs. In addition, walking/hiking was found to be the most common outdoor activity enjoyed by the citizens of Lebanon.

What this means for the Lebanon TSP Update: The TSP update will consider the findings and recommendations to help inform the development of the Plan. The TSP Update could support improved regional connectivity through coordination with Linn County and other neighboring communities to create multiuse paths and trails.

Lebanon Trails Strategic Plan, 2009: The Lebanon Trails Strategic Plan is meant to serve as an addendum to the 2006 City of Lebanon Parks Master Plan. The plan includes the routes and costs of the proposed trails within the City and the Project Walden area. It also includes a list of existing trails and multi-use paths. Many of the proposed trails have possible impacts on existing sidewalks, roadways, and intersections.

What this means for the Lebanon TSP Update: The TSP update will consider the findings and recommendations to help inform the development of the Plan, including the recommended trail alignments.

Storm Drainage Master Plan, 1989: The 1989 Storm Drainage Master Plan was created to provide for the orderly provision of drainage service within the City, while providing adequate flood protection at a reasonable cost. The plan contains recommended drainage system standards as well as floodplain analysis and mapping.

What this means for the Lebanon TSP Update: The TSP update will consider the findings and recommendations to help inform the development of the Plan.

Russell Drive Area Mixed Use Neighborhood Center Plan, 2003: The Russell Drive Area Mixed Use Neighborhood Center Plan provides recommendations for the future development and redevelopment of the Russell Drive area. The plan promotes the principles of pedestrian scaled design, provision of urban infrastructure and services, and preservation of neighborhood character. It includes a planned street connection between Airport Road and Russel Drive, along with many other neighborhood street improvements. Specific street type sections for streets in the neighborhood are also show in the plan.

What this means for the Lebanon TSP Update: The recommended improvements from the Plan were incorporated into the 2007 TSP. The TSP update will determine how to incorporate the vision for the Russell Drive area to help inform the development of the Plan.

Russell Drive Area Mixed Use Neighborhood Center Final Implementation Plan, 2003: The 2003 Final Implementation plan included language to create a new overlay zone in the City for the Russell Drive area, with area-specific development and design standards. The plan also added new supplementary provisions to the commercial and residential design standards of the City of Lebanon.

What this means for the Lebanon TSP Update: The Development Code should incorporate the recommended street standards specific to the Russell Drive area. The City street classifications and standards may be supplemented or changed to ensure consistency between the updated TSP and the plan recommendations.

Northwest Lebanon Urban Renewal Area Plan, Amended 2012: The Northwest Lebanon Urban Renewal Area Plan was prepared to further encourage development in the area that is consistent with the Lebanon Comprehensive Plan. The Renewal Plan is intended to guide the provision of infrastructure necessary for the orderly and proper development of the area, and to allow for strategic site improvements and assistance to private development as part of local job creation and community enhancement efforts. Through implementation of the plan, economic development will be stimulated by the elimination of blighting conditions, provision of supporting public facilities, and general improvements in the overall appearance, condition, and function of the area.

What this means for the Lebanon TSP Update: The project list for the Northwest Lebanon Urban Renewal Area Plan potentially will need to be updated to reflect outcomes of the TSP update process.

Cheadle Lake Urban Renewal Plan, 2000: The Cheadle Lake Urban Renewal Plan was prepared to further encourage rehabilitation and redevelopment that is consistent with the Lebanon Comprehensive Plan and Zoning Regulations. The plan is intended to guide the provision of infrastructure necessary for the orderly and proper redevelopment of the area. Through implementation of the plan, economic development will be stimulated by the elimination of blighting conditions, provision of supporting public facilities, and general improvements in the overall appearance condition, and function of the area. Some of the goals of the plan are listed below:

- Improve access/egress to the commercial and residential areas south of Airport Road
- Reduce traffic congestion on Highway 20 by developing a new frontage road east of the highway

What this means for the Lebanon TSP Update: The TSP update will determine how to incorporate the recommended goals for the Cheadle Lake Urban Renewal Plan to help inform the development of the Plan. The project list for the Cheadle Lake Urban Renewal Plan potentially will need to be updated to reflect outcomes of the TSP update process.

North Gateway Urban Renewal Plan, 2008: The driving factor behind the North Gateway Urban Renewal Plan is the ongoing partnership between Samaritan Health Services and the Western University of Health Sciences. The North Gateway Urban Renewal Plan contains goals, objectives and projects for the development of the North Gateway Urban Renewal Area.

What this means for the Lebanon TSP Update: The TSP update will determine how to incorporate the recommended goals and objectives for the North Gateway Urban Renewal Plan to help inform the development of the Plan. The project list for the North Gateway Urban Renewal Plan potentially will need to be updated to reflect outcomes of the TSP update process.

Lebanon Airport Master Plan Phase 1, 2015: Phase 1 of the Lebanon State Airport Master Plan included an inventory of existing conditions, forecasts for future use, and facility requirements. Phase 2 and 3 of the Master Plan are still being drafted. The current runway is bounded on both sides by two important vehicle and trucking routes in Lebanon, Oak Street to the North and Airport Way to the South. Future phases of the plan will consider extending the runway from 2747 feet to 3000 feet and will determine if it is feasible to acquire the land for and remove roads from the runway protection zones.

What this means for the Lebanon TSP Update: The TSP update will consider the recommended improvements from the plan for the Lebanon Airport Master Plan. The Airport Master plan will ultimately refine the aviation element of the TSP.

Linn County Coordinated Public Transit-Human Services Transportation Plan, 2007: The Linn County Coordinated Public Transit-Human Services Transportation Plan establishes a framework to better support the delivery of transportation services to seniors, persons with disabilities and residents with low income. The plan identifies transportation needs and outlines opportunities to coordinate and enhance community transportation services.

What this means for the Lebanon TSP Update: The transit element of the TSP update will consider the potential opportunities from the plan for addressing transit needs.

Attachment A: Applicable Plans and Policies

The following plans and policies were reviewed for the Lebanon TSP Update:

City of Lebanon

- City of Lebanon Transportation System Plan, 2007
- Lebanon's Economic Development Analysis, 2008
- Lebanon Comprehensive Plan, 2004
- Lebanon Development Code, 2008
- City of Lebanon Capital Improvements Plan, 2014-2018
- Lebanon 2040 Final Report, 2015
- Lebanon Parks Master Plan, 2006
- Lebanon Trails Strategic Plan, 2009
- Lebanon Storm Drainage Master Plan, 1989
- Russel Drive Area Mixed Neighborhood Center Plan, 2003
- Northwest Lebanon Urban Renewal Area Plan Amendments, 2012
- Cheadle Lake Urban Renewal Area Plan, 2008
- North Gateway Urban Renewal Area Plan, 2008
- Lebanon Airport Master Plan Phase 1, 2015

Linn County

- Linn County Transportation Plan Code of the Comprehensive Plan, 2005
- Linn County Public Transit – Human Services Transportation Plan, 2007

State of Oregon

- Oregon Transportation Plan, 2006
- Oregon Aviation Plan, 2007
- Oregon Bicycle and Pedestrian Plan, 1995
- Oregon Freight Plan, 2011
- Oregon Highway Plan, Amended 2013
- Oregon Public Transportation Plan, 1997
- Oregon Rail Plan, 2014
- Oregon Transportation Safety Action Plan
- ORS 366.215, Reduction of Vehicle-Carrying Capacity
- Oregon Transportation Options Plan, 2015
- Oregon Planning Rule
- Statewide Transportation Improvement Program
- Oregon TSP Guidelines, 2008
- Access Management Rule

Memo #3 Regulatory Review

MEMORANDUM

DATE: August 5, 2016

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski and Kevin Chewuk, DKS Associates
Darci Rudzinski and CJ Doxsee, Angelo Planning Group

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #3: Regulatory Review P14180-012

The purpose of this memorandum is to discuss and identify Lebanon Development Code (LDC or "code") provisions that may need to be updated in order to: (1) be consistent with and implement the updated TSP; and (2) comply with the Oregon Transportation Plan (OTP) and the Transportation Planning Rule (TPR).

Draft Transportation System Plan (TSP)

The objectives, outcomes, and recommendations of the TSP update process are expected to result in needed policy and regulatory amendments to ensure consistency between adopted City documents. These amendments are likely to be related to issues that have received State and local attention since the TSP was adopted in 2007, such as the emphasis on multimodal transportation modes and finding ways to better manage and maximize the existing transportation system.

Policy amendments will reflect issues identified through the TSP update. Transportation-related goals and policies can be found in Comprehensive Plan Chapter 8 – Transportation. The goals and policies reflect the local, regional, and State goals and policies existing at the time of TSP adoption. Transportation goals and policies will be reviewed in light of existing and future projected conditions and will be modified to reflect updated TSP recommendations, as well as recent state policy changes, such as those focused on greenhouse gas reduction, mobility, and access management.

Code amendments may also be necessary to implement the recommendations of the updated TSP. Examples include modifying street standards and other multimodal, system, and transportation facility design standards. Some preliminary recommended changes are identified in Table 1, based on State requirements related to implementing local transportation system plans (see Transportation Planning Rule section in this memorandum). These and other code changes, as well as recommended policy amendments, will be identified and developed in Technical Memorandum #12 Implementing Ordinances.

Oregon Transportation Plan (OTP)

The OTP, last updated in 2006, is the State's comprehensive transportation plan. The planning horizon of the current plan extends through 2030. Its purpose is to establish goals, policies, strategies, and initiatives for long-range transportation planning in the state. A summary of the OTP is provided in Technical Memorandum #2 (Plans and Policy Review).

The OTP emphasizes maximizing the investment in the existing transportation system, integrating transportation and land use regulations, and integrating the transportation system across jurisdictions and modes. The following are key initiatives in the OTP:

- 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.

OTP policy and investment strategies are translated into plans for specific transportation modes in order to implement statewide multimodal priorities. The Aviation System Plan, Bicycle and Pedestrian Plan, Freight Plan, Highway Plan, Public Transportation Plan, Rail Plan and the Transportation Safety Action Plan are modal plans that have been reviewed for this project to ensure that the updated TSP will be consistent with policies, strategies, and design guidelines in these State plans (See Technical Memorandum #2).

Transportation Planning Rule (TPR)

The Transportation Planning Rule or "TPR" (OAR 660-012) implements Statewide Planning Goal 12 (Transportation), which is intended to promote the development of safe, convenient, and economic transportation systems that are designed to maximize the benefit of investment and reduce reliance on the automobile. The TPR includes direction for preparing, coordinating, and implementing TSPs. In particular, TPR Section -0045 requires local governments to amend their land use regulations to implement the TSP. It also requires local governments to adopt land use and subdivision regulations to protect transportation facilities for their identified functions.

TPR Section -0060 (Plan and Land Use Regulation Amendments) specifies measures to be taken to ensure that allowed land uses are consistent with the identified function and capacity of existing and planned transportation facilities. These include access control measures, standards to protect future operations of roads, expanded notice requirements and coordinated review procedures for land use applications, a process to apply conditions of approval to development proposals, and regulations ensuring that amendments to land use designations, densities, and design standards are consistent with the functions, capacities, and performance standards of facilities identified in the TSP. Section -0060 establishes criteria for identifying the significant effects of plan or land use regulation amendments on transportation facilities, actions to be taken when a significant effect would occur, identification of planned facilities, and coordination with transportation facility providers.

Table 1 provides an evaluation of the Lebanon Development Code based on Sections -0045 and -0060 of the TPR. The evaluation includes findings confirming existing code language compliance with the TPR. In a few instances, the table provides recommendations for amending code language to better address TPR requirements. Recommended amendments are limited to ensuring consistency between the updated TSP standards and regulatory requirements in the Development Code and specific recommendations that will strengthen the viability of transit in the community.

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
OAR 660-012-0045	
(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: (A) Operation, maintenance, and repair of existing transportation facilities identified in the TSP, such as road, bicycle, pedestrian, port, airport and rail facilities, and major regional pipelines and terminals; (B) Dedication of right-of-way, authorization of construction and the construction of facilities and improvements, where the improvements are consistent with clear and objective dimensional standards;	Each zone classifies "operation, maintenance, and repair of existing transportation facilities identified in the TSP" as a permitted use. Uses listed in Section 16.13.020(A) (Transportation improvements—Outright permitted and conditionally permitted uses) are permitted outright. Transportation uses include operation maintenance, repair, and preservation activities of facilities and changes in the frequency and intensity of transit, rail and airport services. Acquisition of right-of-way for public roads, highways, and other transportation improvements deemed necessary in the public interest or designated in the TSP are also listed as permitted outright in Section 16.13.020(A). Recommendation: **Existing code provisions address this TPR requirement. No further changes to the code are recommended.**

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
(C) Uses permitted outright under ORS 215.213(1)(m) through (p) and 215.283(1)(k) through (n), consistent with the provisions of 660-012-0065;[1] and (D) Changes in the frequency of transit, rail and airport services. (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.	
(c) In the event that a transportation facility, service or improvement is determined to have a significant impact on land use or requires interpretation or the exercise of factual, policy or legal judgment, the local government shall provide a review and approval process that is consistent with 660-012-0050. To facilitate implementation of the TSP, each local government shall	The general provisions for review procedures (Section 16.20.070(F)) allow the acceptance and review of applications to be consolidated. In terms of coordination with other transportation agencies, notification is provided to any governmental agency with an intergovernmental agreement or as required by State statute for administrative decisions (Section 16.20.040) and for quasi-judicial

[1] Transportation uses in ORS 215 are included in list(s) of uses that may be established in exclusive farm use zones; OAR 660-112-0065 (Transportation Improvements on Rural Lands) identifies transportation facilities, services and improvements which may be permitted on rural lands consistent with Goals 3, 4, 11, and 14 without a goal exception.

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
amend regulations to provide for consolidated review of land use decisions required to permit a transportation project.	decisions (Section 16.20.050). In addition notification is provided to the transportation authorities and owners for all land use applications which affect a transportation facility or private access to roads for quasi-judicial review (Section 16.20.050). Recommendation: **Existing code provisions address this TPR requirement. No further changes to the code are recommended.**
(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities corridors and sites for their identified functions. Such regulations shall include:	
(a) Access control measures, for example, driveway and public road spacing, median control and signal spacing standards, which are consistent with the functional classification of roads and consistent with limiting development on rural lands to rural uses and densities;	Access spacing requirements are found in Section 16.12.030, Motor vehicle access and management requirements, Subsection G. Code requirements reference street classifications and associated access management standards in the TSP. In addition, the Development Codes specifies that access consolidation, shared access, and/or access separation greater than that required in Subsection G may be required for access to the city, county or state roadways for the purpose of protecting the function, safety and operation of the facility for all users and that, in some cases, directional connections (i.e., right in/out, right in only, or right out only) may be required. Recommendation: **Existing code provisions address this TPR requirement. Note that references to TSP Figure 6-2 (Future**

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
	Functional Classification) in Section 16.12.030 may need to be updated in order to be consistent with the updated TSP. It is recommended that the access spacing standards in the Development Code be updated as needed through the TSP update process.
(b) Standards to protect the future operations of roads, transitways and major transit corridors	The City code protects the future operations of transportation facilities through the Traffic Impact Studies (TIS) and Traffic Impact Analysis (TIA) requirements, and to some extent the Public Facilities and Service Impact Studies, where the City can require an assessment of impacts to the transportation system, including pedestrian ways and bikeways. Section 16.12.010, Purpose and Traffic Impacts, provides requirements and mitigation measures associated with traffic studies; Section 16.20.110 in the Review and Decision Making Procedures Chapter includes thresholds for when a study is required. Commercial, industrial, public, and multifamily developments require a Public Facilities and Service Impact Studies; a TIS may also be required if deemed necessary by the Planning Official in consultation with the City Engineer and/or appropriate road authority (Section 16.03.080). Traffic studies may also be required as part of subdivisions, partitions, planned developments, and conditional use applications.

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
	Chapter 16.28 provides decision criteria and procedures for amendments to the Comprehensive Plan and Development Code. Amendments are required to be consistent with the TSP, including the function, capacity, and performance standards of transportation facilities. Recommendation: **Existing code provisions address this TPR requirement. The City may want to clarify the difference between a traffic impact analysis (TIA) and traffic impact study (TIS). Note, 16.03.080(B)(8) and 16.21.050(B)(8) use the term "Traffic Impact Analysis Study."**
(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;	Measures to protect public use airports are found in Section 16.11.020 (Airport Overlay Zones). The Airport Use Zone (AU-OZ) is a subcomponent of the Airport Control Zone (AC-OZ) and establishes criteria for compatibility of uses. Recommendation: **Existing code provisions address this TPR requirement. No changes to the code are recommended.**
(d) A process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites;	See response to -0045(1)(c).
(e) A process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities, corridors or sites;	Conditions of approval are authorized in the code for Administrative (Section 16.20.040(D)), Quasi-judicial (16.20.050.I), and Legislative decisions (Section 16.20.060(G)).

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
	The Planning Commission has the authority to impose conditions related to transportation access and facilities for conditional uses (Section 16.21.060) and subdivisions and partitions (Sections 16.22.050 and 16.22.090). In addition, the Planning Commission may establish conditions for planned developments as part of a detailed review process (Chapter 16.23) Recommendations: **Existing code provisions address this requirement. No changes to the code are recommended.**
(f) Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: (A) Land use applications that require public hearings; (B) Subdivision and partition applications; (C)Other applications which affect private access to roads; and (D)Other applications within airport noise corridor and imaginary surfaces which affect airport operations.	See response to -0045(1)(c)
(g) Regulations assuring amendments to land use designations, densities, and design standards are consistent with the functions, capacities and performance standards of facilities identified in the TSP.	See response related to traffic impact study requirements, Section -0045(2)(b), and to plan and land use regulation amendments, Section -0060.

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
(3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth below. The purposes of this section are to provide for safe and convenient pedestrian, bicycle and vehicular circulation consistent with access management standards and the function of affected streets, to ensure that new development provides on-site streets and accessways that provide reasonably direct routes for pedestrian and bicycle travel in areas where pedestrian and bicycle travel is likely if connections are provided, and which avoids wherever possible levels of automobile traffic which might interfere with or discourage pedestrian or bicycle travel.	
(a) Bicycle parking facilities as part of new multi-family residential developments of four units or more, new retail, office and institutional developments, and all transit transfer stations and park-and-ride lots.	Bicycle parking facilities are required for all use types in all zones, except for single-family residential. Minimum bicycle parking requirements are provided for multiple family dwellings, and various retail, office, and institutional uses in Table 16.14.070-1. There is not currently any minimum bicycle parking requirements for transit transfer stations or park-and-ride lots. Bicycle parking requirements within the Central Business Commercial Zone (Z-CCM) (Table 16.14.070-1) refers to the most current Lebanon Downtown Plan. Recommendation: **Consider adding minimum bicycle parking requirements for transit transfer stations and park-and-ride lots in Chapter 16.14 Off-Street Parking and Loading.**
(b) On-site facilities shall be provided which accommodate safe and convenient pedestrian and bicycle access from within new subdivisions, multi-family developments, planned developments, shopping centers, and commercial districts to adjacent residential areas and transit stops, and to neighborhood activity centers	Chapter 16.12 of the Development Code is dedicated to transportation access, access management, and circulation for vehicles (Section 16.12.030), bicycles (Section 16.12.040), and pedestrians (Section 16.12.050).

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
within one-half mile of the development. Single-family residential developments shall generally include streets and accessways. Pedestrian circulation through parking lots should generally be provided in the form of accessways. (A) "Neighborhood activity centers" includes, but is not limited to, existing or planned schools, parks, shopping areas, transit stops or employment centers; (B) Bikeways shall be required along arterials and major collectors. sidewalks shall be required along arterials, collectors and most local streets in urban areas except that sidewalks are not required along controlled access roadways, such as freeways; (C) Cul-de-sacs and other dead-end streets may be used as part of a development plan, consistent with the purposes set forth in this section; (D) Local governments shall establish their own standards or criteria for providing streets and accessways consistent with the purposes of this section. Such measures may include but are not limited to: standards for spacing of streets or accessways; and standards for excessive out-of-direction travel;	Standards for on-site pedestrian access and management (Section 16.12.050) require continuous pathways, extending throughout the site and connecting with all future phases and adjacent spaces whenever possible. In addition, developments which are subject to site design review are required to have pathways connect to all building entrances parking areas, and adjacent developments. Standards for pedestrian circulation through parking lots are limited to commercial and office park developments (Section 16.12.050(F)(5)). Similar requirements exist which require parking lots adjacent to building be separated by a raised walkway, however the requirements are not applicable to the entire parking area (Section 16.15.020(C)). Bicycle parking facilities are required for all use types in all land use zones, except for single-family residential, in accordance with Table 16.14.070-1 of the LDC (see TPR -0045(3)(a)). Bicycle lanes are required on new construction of arterials, unless specified in the bikeway plan, and on collectors, in accordance with Table 16.13.030-1 and Table 16.13.030-2. Sidewalks are also required on arterials and collectors in the same tables.

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
(E) Streets and accessways need not be required where one or more of the following conditions exist: (i) Physical or topographic conditions make a street or accessway connection impracticable. Such conditions include but are not limited to freeways, railroads, steep slopes, wetlands or other bodies of water where a connection could not reasonably be provided; (ii) Buildings or other existing development on adjacent lands physically preclude a connection now or in the future considering the potential for redevelopment; or (iii) Where streets or accessways would violate provisions of leases, easements, covenants, restrictions or other agreements existing as of May 1, 1995, which preclude a required street or accessway connection.	On- and/or off-street bike lanes or paths, pursuant to Section 16.12.040(A), are to be provided consistent with the street standards and specifications in the Lebanon Transportation System Plan (TSP). Standards for street spacing can be found in in Section 16.13.030 and require a minimum of 300 feet between intersections, unless warranted by site specific considerations. Maximum block lengths and perimeters are addressed in Section 16.12.030(K) are dependent on the type of zone. Cul-de-sacs are limited to when full street connections are not possible or when other standards preclude through-street extensions (Section 16.12.030(K)). In addition, cul-de-sacs are subject to street cross-section standards and are limited in length (Sections 16.13.030(E) and (L)). Standards for access spacing can be found in Section 16.12.030(G), where it refers to standards in the Lebanon TSP. Similarly, the number of access points is restricted based on the use (Section 16.12.030(I))Exceptions for block length standards for street connectivity and block formation are allowed when specific conditions exist when specific conditions exist such as geographical or natural features, existing development, or when block lengths are divided by pathways or alleys (Section 16.12.030(K)(3)).

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
	Exceptions to streets and accessways standards for both pedestrians and bicyclists are allowed when specific conditions exist such as physical or topographic, existing buildings, or legal constraints (Section 16.12.060). Recommendations: **Existing code provisions address this requirement. No changes to the code are recommended.**
(c) Off-site road improvements are otherwise required as a condition of development approval, they shall include facilities accommodating convenient pedestrian and bicycle and pedestrian travel, including bicycle ways on arterials and major collectors	See response related to conditions of approval, Section -0045(2)(e).
(e) Internal pedestrian circulation within new office parks and commercial developments shall be provided through clustering of buildings, construction of accessways, walkways and similar techniques.	Standards for accessway and walkway connections within commercial and office park developments are specifically addressed in Section 16.12.050(F)(5). This code section provides options for meeting the requirements of internal pedestrian connections. Recommendations: **Existing code provisions address this requirement. No changes to the code are recommended.**
(4) To support transit in urban areas containing a population greater than 25,000, where the area is already served by a public transit system or where determination has been made that a public transit system is feasible, local governments shall adopt land use and subdivisions as provided in (a)-(g) below.	Note that Lebanon's population is not currently large enough to trigger this TPR requirement. However, the City's proximity to larger employment districts in Albany and Corvallis and community interest in developing a Transit Development Plan suggests that considering development requirements related to providing transit facilities or promoting transit ridership may be timely.

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
(a) Transit routes and transit facilities shall be designed to support transit use through provision of bus stops, pullouts and shelters, optimum road geometrics, on-road parking restrictions and similar facilities, as appropriate	Transit stops are mentioned in Section 16.12.040(B) as part of Safe and Convenient Bicycle Facilities under Bicycle Access and Management Requirements, but not under Pedestrian Access and Management Requirements (Section 16.12.050). In addition, transit stops are mentioned in the purpose statement of Transportation Improvements, and Design Standards for Streets and Alley (Section 16.13.010). However. Lebanon's development code does not currently include specific standards for supporting transit routes and transit facilities. Recommendation: **Consider adding requirements specifically designed to support transit facilities.**
(b) New retail, office and institutional buildings at or near major transit stops shall provide for convenient pedestrian access to transit through the measures listed in (A) and (B) below. (A) Walkways shall be provided connecting building entrances and streets adjoining the site; (B) Pedestrian connections to adjoining properties shall be provided except where such a connection is impracticable. Pedestrian connections shall connect the on site circulation system to existing or proposed streets, walkways, and driveways about the property. Where adjacent properties are undeveloped or have potential for redevelopment, streets, accessways and	Although access standards do not specifically include transit facilities, the- includes Pedestrian Access and Management Standards (Section 16.12.050). Standards require continuous pathways, extending throughout the site and connecting with all future phases and adjacent spaces whenever possible. In addition, developments which are subject to site design review are required to have pathways connect to all building entrances parking areas, and adjacent developments. Recommendation: **Consider adding requirements specifically designed to support transit facilities.**

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
walkways on site shall be laid out or stubbed to allow for extension to the adjoining property; (C) In addition to (A) and (B) above, on sites at major transit stops provide the following: (i) Either locate buildings within 20 feet of the transit stop, a transit street or an intersecting street or provide a pedestrian plaza at the transit stop or street intersection; (ii) A reasonably direct pedestrian connection between the transit stop and building entrances on the site (iii) A transit passenger landing pad accessible to disabled persons (iv) An easement or dedication for a passenger shelter if requested by the transit provide; and (v) Lighting at the transit stop.	
(c) Local governments may implement 4(b)(A) and (B) above through the designation of pedestrian districts and adoption of appropriate implementing measures regulating development within pedestrian districts. Pedestrian districts must comply with the requirement of (4)(b)(C) above.	Pedestrian paving width standards for sidewalks in a pedestrian district or STA are provided for in Table 16.12.050-1, however there are not any additional standards or regulations for pedestrian districts in the Development Code. Recommendation: **The City may consider adding additional requirements specific to pedestrian district, in addition to or in lieu of 4(b)(A) and (B) above, provided that pedestrian districts**

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
	are identified in other adopted plans.
(d) Designated employee parking areas in new developments shall provide preferential parking for carpools and vanpools	The development code currently does not include regulations or standards to allow preferential parking carpools or vanpools for new developments. Recommendation: **The City may wish to consider requiring new developments with more than a specified number of employees or required vehicular parking spaces to dedicate preferential parking space(s) for employee carpools and vanpools.**
(e) Existing development shall be allowed to redevelop a portion of existing parking areas for transit-oriented uses, including bus stops and pullouts, bus shelters, park and ride stations, transit-oriented developments, and similar facilities, where appropriate	The development code currently does not include regulations or standards which allow portions of existing parking areas to be redeveloped for transit-orients uses. Recommendation: **The City may wish to amend Chapter 16.14 to allow the redevelopment of existing parking areas for transit-oriented uses.**
(f) Road systems for new development shall be provided that can be adequately served by transit, including provision of pedestrian access to existing and identified future transit routes. This shall include, where appropriate, separate accessways to minimize travel distances.	The development currently does not include regulations or standards specific to transit compatible road systems. Recommendation: **The City may wish to amend Chapter 16.12 to require that new development provide pedestrian access to existing and planned transit routes.**

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
(g) Along existing or planned transit routes, designation of types and densities of land uses adequate to support transit.	Existing or planned transit routes for fixed-route transit do not currently exist. Recommendation: **When updating the transit element of the TSP, consideration should be given to land uses that would support the viability of transit.**
(6) In developing a bicycle and pedestrian circulation plan as required by 660-012-0020(2)(d), local governments shall identify improvements to facilitate bicycle and pedestrian trips to meet local travel needs in developed areas. Appropriate improvements should provide for more direct, convenient and safer bicycle or pedestrian travel within and between residential areas and neighborhood activity centers (i.e., schools, shopping, transit stops). Specific measures include, for example, constructing walkways between cul-de-sacs and adjacent roads, providing walkways between buildings, and providing direct access between adjacent uses.	The TSP update will identify improvements to facilitate bicycle and pedestrian trips. This code audit summarizes bicycle and pedestrian improvements that are required through development review and approval, including the following: Walkways between cul-de-sacs and adjacent roads – See response and recommendations related to cul-de-sacs, Section -0045(3)(b). Walkways between buildings – See response and recommendations related to accessways, Section -0045(3)(e). Access between adjacent uses – See response and recommendations related to accessways, Section -0045(3)(e). Recommendations: **Existing code provisions address this requirement. No changes to the code are recommended.**
(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. The intent of this requirement is that local	Local street standards for width and right-of-way are found in Section 16.13.030. Table 16.13.030-1 provides typical street cross-section standards for arterials, collectors, local streets, cul-de-sacs, and alleys

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Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
governments consider and reduce excessive standards for local streets and accessways in order to reduce the cost of construction, provide for more efficient use of urban land, provide for emergency vehicle access while discouraging inappropriate traffic volumes and speeds, and which accommodate convenient pedestrian and bicycle circulation. Notwithstanding section (1) or (3) of this rule, local street standards adopted to meet this requirement need not be adopted as land use regulations.	(also found in TSP Table 6-1). ROW and street design standards are found in Table 16.13.030-2 (also in TSP Tables 6-2 through 6-5). ROW standards for local streets and cul-de-sacs range between 50-56 feet, depending on if parking is provided on one or both sides. Parking is required on one side, or both side if there is multifamily residential housing. Lane width 20 feet for two-way traffic. Standards for local streets also require sidewalks (5 feet) and planter strips (5.5 feet). ROW standards for alleys range between 16-20 feet, depending on if emergency access is required. Standards for sidewalks and planter strips are not included for alleys. Exceptions may be granted for local streets when connecting to existing substandard local streets or when conforming to an approved site development plan which determines it's impractical to connect with existing streets because of a topographical or other existing land conditions. Such site development plans are required to be based on the volume of traffic, capacity for adjoining streets, and need for public convenience or safety. Recommendation: **The TSP update process will evaluate the cross-sections established in the 2007 TSP to ensure that right-of-way and pavement dimensions are sufficient to serve the operational needs of each roadway functional classification**

Table 1 – TPR Review of the City of Lebanon Development Code (Municipal Code Title 16)

TPR Requirement	Development Code References and Recommendations
	without requiring excessive paved widths. The street standards should clarify pavement width for each cross-section. Standards should be made consistent between the updated TSP and development code.
OAR 660-12-0060	
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.	16.28.070 (Consistency with Transportation System Plan) provides guidance for determining significant effects on transportation facilities and actions to achieve consistency if significant impacts are found. Recommendations: **Existing code provisions address this requirement. No changes to the code are recommended.**

Memo #4 Goals, Objectives and Evaluation Criteria

MEMORANDUM

DATE: August 5, 2016

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #4: Goals, Objectives and Evaluation Criteria P14180-012

The purpose of this memorandum is to initiate the process of developing the transportation-related vision, goals, objectives, and evaluation criteria that will help guide the development of Lebanon's TSP, and future investment decisions. This effort will continue through the planning process, shaped by input received from the first Project Advisory and Technical Advisory Committee meetings and the general public.

Setting Direction for Transportation Planning

Collectively, the transportation-related goals, objectives, and evaluation criteria describe what the community wants the transportation system to do in the future, as summarized by a **vision statement**. A vision statement generally consists of an imaginative description of the desired condition in the future. It is important that the vision statement for transportation align with the community's core values.

Goals and objectives create manageable stepping stones through which the broad vision statement can be achieved. **Goals** are the first step down from the broader vision. They are broad statements that should focus on outcomes, describing a desired end state. Goals should be challenging, but not unreasonable.

Each goal must be supported by more finite **objectives**. In contrast to goals, objectives should be specific and measurable. Where feasible, providing a targeted time period helps with objective prioritization and achievement. When developing objectives, it is helpful to identify key issues or concerns that are related to the attainment of the goal.

The solutions recommended through the TSP must be consistent with the goals and objectives. To accomplish this, measurable **evaluation criteria** that are based on the goals and objectives will be developed. For the Lebanon TSP, they will be used to inform the selection and prioritization of projects and policies for the plan by describing how well the alternatives considered support goal areas.

Developing Updated TSP Goals and Objectives

The goals and objectives from Lebanon's current TSP (developed in 2007), Comprehensive Plan (developed in 2004), and 2040 Vision Statement are summarized later in this document, and provide a starting point for setting the direction for the new TSP. They cover a wide range of topics that could be applied to the TSP.

From that review, the project team developed an initial set of goals and objectives as a starting point for the Lebanon TSP update. The new draft goals and objectives provided below will be shared with the Project Advisory and Technical Advisory Committees at their first meeting, and the general public, with further input sought to refine them. At this time, all goals and objectives are considered to be of equal importance.

After receiving input, the project team will create a final set of goals and objectives, and develop corresponding evaluation criteria.

Transportation Vision Statement

The design of transportation infrastructure promotes safe, comfortable travel, shows respect for the City's resources, and showcases the natural environment. All transportation modes flow smoothly and safely to and throughout the City, meeting the needs of residents, businesses, visitors, and people of all physical and financial conditions. Connectivity facilitates travel between and within each neighborhood, where walking and biking environments complement mixed-use development.

TSP Goals

- **Goal 1: An equitable, balanced and well-connected multi-modal transportation system.**

  Objective 1a: Ensure that the transportation system provides equitable access to underserved and vulnerable populations, and is friendly and accommodating to travelers of all ages.

  Objective 1b: Ensure the pedestrian, and bike throughways are clear of obstacles and obstructions (e.g., utility poles, grates).

  Objective 1c: Provide connections for all modes that meet applicable Lebanon and Americans with Disabilities Act (ADA) standards.

- **Goal 2: Convenient facilities for pedestrians and bicyclists.**

  Objective 2a: Allow more walking and biking by providing for their needs (e.g., street lighting, bike parking).

  Objective 2b: Improve commuting and recreational walking and biking connections to community facilities and amenities.

  Objective 2c: Enhance way finding signage for those walking and biking, directing them to bus stops, and key routes and destinations.

  Objective 2d: Promote walking, bicycling, and sharing the road through public information and events.

  Objective 2e: Make necessary changes to the land development code to allow compatible uses to locate within walking and biking distance of each other (e.g., residential use and employment).

- **Goal 3: Transit service and amenities that encourage a higher level of ridership.**

  Objective 3a: Locate transit stops where safe and convenient for users.

  Objective 3b: Encourage additional transit services and coordinate with transit providers to improve the coverage, quality and frequency of services, where needed.

  Objective 3c: Provide for transit user needs beyond basic provision of service (e.g., by providing sidewalk and bicycle connections, shelters, benches, technology) to encourage higher levels of use.

  Objective 3d: Identify locations for designated Park-and-Ride lots.

- **Goal 4: Efficient travel to and through the City.**

  Objective 4a: Develop and preserve north-south arterial and collector corridors through the City to provide alternative routes to US 20 for local traffic, and improve connectivity across OR 34.

  Objective 4b: Develop and preserve east-west arterial and collector corridors through the City to provide alternative routes to OR 34 for local traffic, and improve connectivity across US 20.

  Objective 4c: Make new or improved transportation connections to enhance system efficiency.

  Objective 4d: Distribute travel information for motorists to maximize the reliability and effectiveness of US 20 and OR 34.

  Objective 4e: Implement the City mobility standard to help maintain a minimum level of motor vehicle travel efficiency for local streets. State and County standards for mobility will be supported by the City on facilities under the respective jurisdiction.

- **Goal 5: Safe and active residents.**

Objective 5a: At high collision locations, improve safety for walking, biking, and driving.

Objective 5b: Enhance existing crossings of US 20 and OR 34 for safe walking and biking (e.g., install rapid flashing beacons, and aids for vulnerable populations, such as chirpers, at signalized pedestrian crossings).

Objective 5c: Provide new crossings for pedestrians and bicyclists where needed.

Objective 5d: Improve the visibility of travelers in constrained areas, such as on blind curves.

Objective 5e: Promote walking and bicycling by educating users regarding good traffic behavior and consideration for all.

- **Goal 6: A sustainable transportation system.**

Objective 6a: Reduce reliance on US 20 and OR 34 for local trips.

Objective 6b: Avoid impacts to the scenic, natural and cultural resources in the City.

Objective 6c: Support alternative vehicle types (e.g., with electric vehicle plug-in stations).

Objective 6d: Encourage an arrangement of land use that would shorten trip lengths significantly or reduce the need for motor vehicle travel within the City.

Objective 6e: Maintain the existing transportation system assets to preserve their intended function and useful life.

Objective 6f: Improve travel reliability and safety with system management solutions.

Objective 6g: Establish stable and diverse revenue sources to meet the need for transportation investments in the City.

Objective 6h: Determine transportation system investment priorities through open and transparent processes.

Objective 6i: Develop and support reasonable alternative mobility targets that align with economic and physical limitations on US 20 and OR 34 and City streets where necessary.

- **Goal 7: A transportation system that supports a prosperous and competitive economy**.

Objective 7a: Design elements of the transportation system to be aesthetically pleasing to through travelers, residents, visitors, and users of adjoining land.

Objective 7b: Identify transportation improvements that will enhance access to employment.

Objective 7c: Design streets and street improvements to capture and highlight views.

Objective 7d: Improve the freight system efficiency, access, capacity and reliability.

- **Goal 8: Coordinate with local and state agencies and transportation plans.**

  Objective 8a: Work with the Cascades West Area Commission on Transportation and the South Valley / Mid Coast Regional Solutions Center to promote projects that improve regional linkages.

  Objective 8b: Develop TSP policy and municipal code language to implement the TSP update.

  Objective 8c: Coordinate transportation projects, policy issues, and development actions with all affected government agencies in the area, including Linn County, and the Oregon Department of Transportation.

  Objective 8d: Coordinate local neighborhood plans and visions with the TSP.

Existing Goals and Objectives

The following sections include goals and objectives from the 2007 Lebanon Transportation System Plan, 2004 Lebanon Comprehensive Plan, and 2040 Lebanon Vision Statement. These are provided to understand the direction the community has previously established for transportation decisions and to provide ideas to facilitate the process of developing a new vision with goals and objectives that reflect current interests.

2007 Lebanon TSP

The current Lebanon TSP highlights the following goals and objectives:

Goal 1: Transportation System Level of Service

Objectives:

- Develop access management standards that meet the requirements of the Transportation Planning Rule (TPR) and take into account the needs of the community.
- Identify existing and future roadway capacity deficiencies and their appropriate remedies.
- Develop alternative routes for both local and regional through traffic to reduce congestion.
- Improve connectivity throughout the City to reduce traffic demand on major arterials and key collectors.

Goal 2: Multimodal Transportation System

Objectives:

- Identify areas of conflict between trucks, automobiles, air traffic, bicyclists, rail traffic and pedestrians, particularly in residential areas, and create improvements that reduce those and other potential conflicts.
- Coordinate multimodal system integration between automobiles, trucks, air traffic, rail, transit and non-motorized modes (bicycles and pedestrians).

Goal 3: Mobility and Safety

Objectives:

- Adopt appropriate level-of-service standards for City intersections.
- Develop a local street plan to determine the transportation network that would be established during the neighborhood development planning process.
- Improve safety in neighborhoods and locations adjacent to schools and other activity centers.
- Monitor local traffic problems and recommend solutions.

Goal 4: Freight Mobility and Access

Objectives:

- Create an alternate freight route for freight trips without local origins and destinations. This would minimize truck traffic through downtown Lebanon on US 20 and other local routes.
- Maintain and develop efficient truck routes that provide direct connections to highways, railroads, and the airport and minimize impacts to residential areas and the downtown Special Transportation Area (STA).
- Enhance local access for truck traffic serving local businesses. Consideration should be given to improving truck loading zones and turning radii at local street intersections.
- Consider the facilitation of truck movements when developing and maintaining the local street network in the City's industrial areas.

Goal 5: Bicycle and Pedestrian Safety

Objectives:

- Develop standards for bicycle pedestrian facilities in compliance with state and federal requirements.
- Construct missing sidewalks on both arterial and collector streets.

- Identify needed safety enhancements at locations with a demonstrated history of accidents involving bicycles or pedestrians.

Goal 6: Bicycle and Pedestrian System Continuity and Connectivity

Objectives:

- Identify activity centers that should be connected by bicycle and pedestrian facilities.
- Identify measures to improve bicycle and pedestrian connectivity.
- Adopt street standards that provide bicycle and pedestrian facilities and amenities.
- Identify needed connections from Lebanon's bicycle and pedestrian facilities to the regional system and provide continuity between the City's and the county's bicycle and pedestrian facility planning.

Goal 7: Land Use Regulations to Support Non-motorized Modes

Objectives:

- Evaluate the existing development code for deficiencies in supporting bicycle and pedestrian friendly development.
- Based on identified development code deficiencies, modify the zoning and development code to encourage more bicycle and pedestrian friendly development patterns.
- Institute comprehensive plan policies that support the development of a continuous bicycle and pedestrian system.

Goal 8: Reduce Reliance on the Automobile

Objectives:

- Promote alternative modes and rideshare/carpool programs through community awareness and education.
- Plan for future expanded transit service by coordinating with regional transit service efforts.
- Seek grants and loans from state and federal agencies and other funding for projects that evaluate and improve the environment for alternative modes of transportation.
- Seek further improvement of transit systems in the City.

Goal 9: Provide for the Transportation Disadvantaged

Objectives:

- Continue to support inter- and intra-community programs for the transportation disadvantaged where such programs are needed and are economically feasible.
- Increase all citizens' transportation choices.
- Hold all regional transportation systems accountable for level and quality of service.
- Enhance public transportation sustainability.
- Pursue a program that retrofits existing pedestrian facilities to ensure ADA compliance.

Goal 10: Prepare for Future Transit Services

Objectives:

- Identify fixed-route bus stop locations and future park-and-ride lots to support carpooling, vanpooling, ride sharing, and transit use.
- Refine standards for future development projects to provide adequate public transportation facilities.

2004 Lebanon Comprehensive Plan

The 2004 Lebanon Comprehensive Plan includes the following transportation related goals:

- Developing and maintaining a well-planned, comprehensive transportation system that balances the needs of future land development with a system that serves all users.
- Providing a transportation policy plan as a guide for development of a systematic network of traffic ways related to the patterns and needs of community activity.
- Promoting connectivity and efficient multi-modal access within and between developments and neighborhoods.
- Promoting efficient access to land development and maintaining operational levels of traffic flow in terms of safety, capacity, functional classification, and performance standards.
- Complying with all applicable Statewide Planning Goal 12 requirements for transportation.
- Complying with all applicable Statewide Planning Goal 11, Public Facilities and Services, requirements for transportation.
- Complying with all applicable requirements of the State's Airport Planning Rule (OAR 660, Division 13).

2040 Lebanon Vision Statement

The categories in the 2040 vision statement included the following:

- **Downtown is the Heart of the Community:** Downtown is recognized as the center of Lebanon where people gather to celebrate and connect.
- **Healthy Lifestyles:** Healthy choices and recreation opportunities in Lebanon enable healthy and active citizens.
- **Managed Growth:** Lebanon welcomes growth that reinforces its plans for the future.
- **Infrastructure:** Lebanon sustains an infrastructure system (transportation, telecommunications, power, water and sewer) that supports future growth plans.
- **Safe Neighborhoods:** Proactive law enforcement and community intervention keep Lebanon safe.
- **Small Town Values:** Friendliness is the key element of Lebanon's social make-up and the City actively welcomes new community members. Lebanon embraces all community members and is compassionate toward the needs of the people.

Memo #5 Existing Conditions

DKS

MEMORANDUM

DATE: April 18, 2017

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates
Patrick Mahedy, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #5: Existing Conditions P14180-012

This memorandum provides a summary of the existing transportation conditions for Lebanon, providing answers to the following questions:

- What makes Lebanon unique?
- Where do people want to go?
- What factors affect how people travel?
- How are people choosing to travel?
- What transportation infrastructure is available?
- What is the condition of the existing transportation system?

What Makes Lebanon Unique?

Situated along the bank of the South Santiam River in Oregon's Central Willamette Valley, Lebanon is a burgeoning community of businesses and residences. With a population of nearly 16,000 residents[1], home of the Medical College of the Western University of Health Sciences and Linn-Benton Community College, and many large employers, Lebanon has an expanding local economy. With easy access to Interstate 5 and available industrial land, the local economy is primed for continued growth.

Lebanon is a short trip from Corvallis and Albany, and offers an abundance of nearby recreational activities. Lebanon also has an active downtown providing a venue for various events, including a farmers market. Lebanon is also home to the annual Strawberry Festival.

Downtown Lebanon

[1] Portland State University Population Research Center. Certified Population Estimate July 1, 2015.

Where do People Want to Go?

One of the first steps in planning for an effective transportation system is gaining an understanding of the key destinations that people travel to throughout the City. Demand for travel is created by locations where people go to work, school, or to take care of other daily needs. These destinations are referred to as activity generators (or trip attractors). Activity generators represent important starting and ending points for travel in Lebanon, and they provide a basis for assessing important travel patterns.

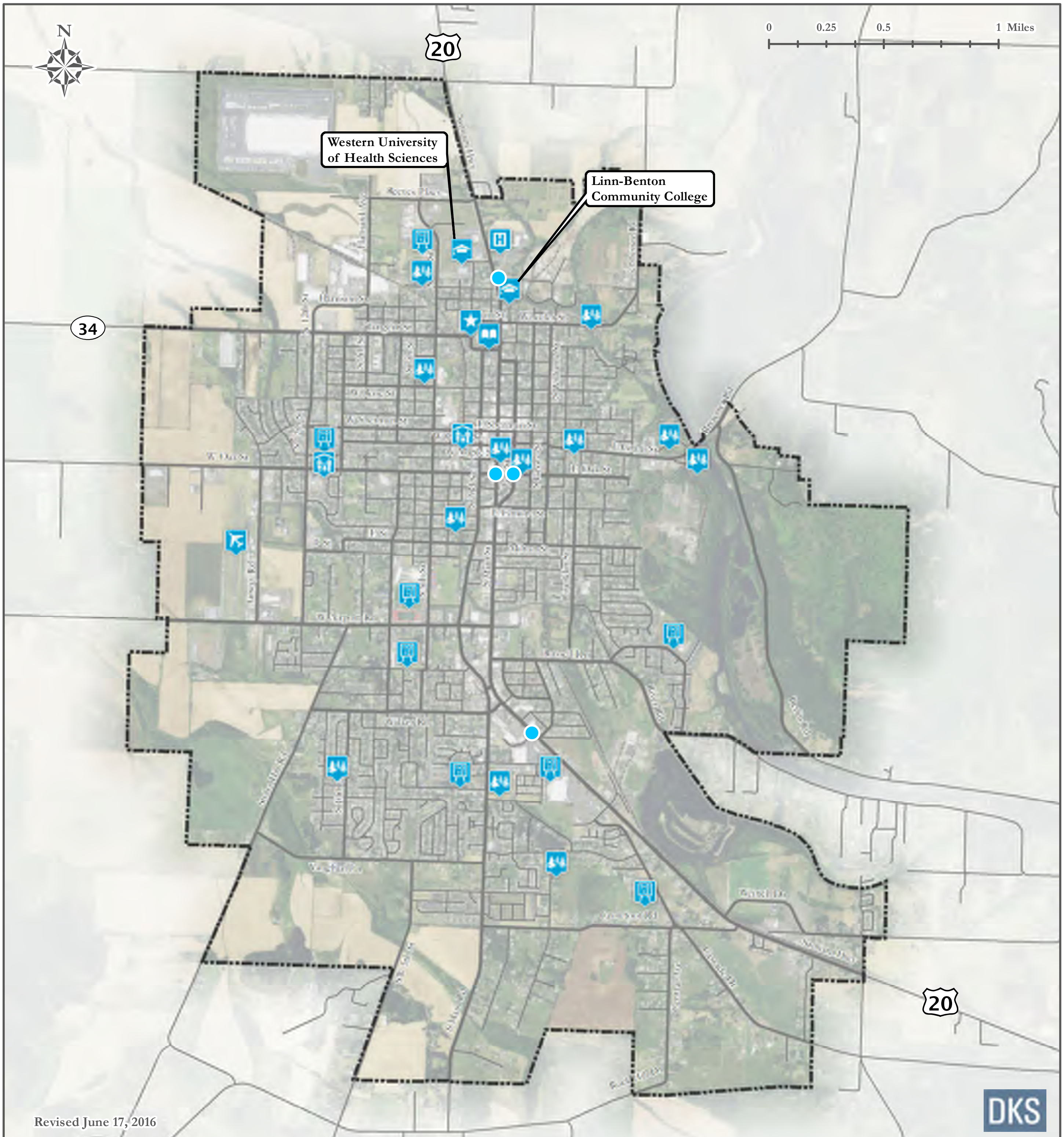
Within the City

Lebanon has numerous activity generators that attract residents, college students, and visitors alike. The most common categories of activity generators in the City include the following (see Figure 1 for general locations):

- Recreational/Entertainment (e.g., Downtown Lebanon for the farmers market, and events, Khun Cinema, Cheadle Lake Park, Willamette Speedway)
- Schools (e.g., Western University of Health Sciences, Linn-Benton Community College, Lebanon High School)
- Places of employment (e.g., Lowes Regional Distribution Center, Entek International, Samaritan Lebanon Community Hospital)
- Shopping (e.g., Downtown Lebanon, grocery stores, shopping centers, restaurants)
- Community/Government (e.g., City Hall, Lebanon Public Library, Lebanon Senior Center, Lebanon Community Pool)
- Public Transportation (e.g., Bus stops)

Each of these categories of activity generators represents important starting and ending points for travel and provides a good basis for planning ideal routes.

I Activity Generators



Legend:

Major Activity Generators:

- Airport
- Hospital
- Library
- Park
- School
- College
- Community Amenity
- Senior Center
- Linn County Shuttle Stop
- Urban Growth Boundary
- Arterial or Collector Street

Outside of the City

Having safe and efficient access to areas outside of the City is critical for many people who either live or work outside of Lebanon. Much of the traffic in Lebanon, especially during the more congested weekday peak periods, is related to employment. As shown in Table 1, more than 60 percent of the workers in Lebanon live in another City that is located more than ten miles away. Residents of Lebanon also contribute to travel between cities, as shown in Table 2. Nearly three fourths of workers living in Lebanon commute to employment locations at least ten miles outside of the City. Lebanon is also becoming a student housing destination for Oregon State University, which also contributes to the commuting between the cities.

Table 1: Where Lebanon Workers Live

Lebanon workers who:	Percent of Lebanon Residents	Distance from Lebanon
Live in Lebanon	38%	-
Live outside Lebanon	62%	-
Live in Albany	*15%*	*15+ miles*
Live in Sweet Home	*8%*	*13+ miles*
Live in Corvallis	*6%*	*18+ miles*
Live in Salem / Keizer	*4%*	*35+ miles*
Live in Eugene / Springfield	*4%*	*40+ miles*
Live in Portland Metro Area	*4%*	*70+ miles*
Live in Other Cities	*21%*	*10+ miles*

Source: Home Destination Report, On The Map, US Census Bureau, 2014

Table 2: Where Lebanon Residents Work

Lebanon residents who:	Percent of Lebanon Workers	Distance from Lebanon
Work in Lebanon	28%	-
Work outside Lebanon	72%	-
Work in Albany	*18%*	*15+ miles*
Work in Corvallis	*12%*	*18+ miles*
Work in Portland Metro Area	*11%*	*70+ miles*

Table 2: Where Lebanon Residents Work

Lebanon residents who:	Percent of Lebanon Workers	Distance from Lebanon
Work in Salem / Keizer	*8%*	*35+ miles*
Work in Eugene / Springfield	*7%*	*40+ miles*
Work in Sweet Home	*2%*	*13+ miles*
Work in Other Cities	*14%*	*10+ miles*

Source: Work Destination Report, On The Map, US Census Bureau, 2014

What Factors Affect How People Travel?

Travelers often weigh a variety of factors when deciding how to commute to their destination. Whether the trip will be via motor vehicle, walking, bicycle, or public transportation, the choice is often a balance between ease and convenience of travel, travel cost, and travel time.

Where are you going? Whether you are going to work, school, shopping, or to a park, your trip type (or your destination point) often determines your mode of transportation. Those destined for a park or school generally have a higher likelihood to walk or bicycle than those going to work or shopping. The distance of that destination plays a role in mode choice. Trips that are shorter generally present a better opportunity to walk or bicycle; longer distance trips more often require transit or motor vehicle modes.

Will you have to cross a busy road or walk or bike along a road without comfortable facilities? The availability of sidewalks, shared-use paths, curb ramps to provide wheelchair access, crosswalks, and bicycle lanes increases the comfort and access of walking and biking. The lack of or poor quality of these facilities, particularly on higher volume or higher speed roadways, discourages people from utilizing non-motorized vehicle modes of transportation.

Where you work and how long it takes you to get there. Lebanon residents who work outside of the City (as well as people who work in Lebanon but live elsewhere) are likely to commute by motor vehicle due to travel distance and commute time. However, some commuters may choose to bike or use transit if the regional transportation system offers convenient and comfortable biking facilities or transit services between cities.

What public transportation service is available? Distance to bus stops, frequency of service, route coverage, connections to other transportation options, and amenities at stops are some of the factors that play a role in a user's decision to utilize public transportation.

For those who cannot afford or are unable to drive, transit is an attractive option for making longer trips.

Age and income. Demographic characteristics, such as age and income, play a key role in selecting a mode of transportation. Lebanon residents with lower incomes, as well as the youngest and oldest residents, often account for more trips via walking, biking, and public transportation.

As seen in Table 3, the northeast part of the City has the lowest median household income, and accounts for the highest proportion of residents over 65. This may be an area of the City where transit enhancements could be focused.

About 26 percent of Lebanon residents living in the southwest part of the City are school-age children. The northwest part of Lebanon has the highest median household income (nearly $50,000), which is up to $10,000 more than the income of households located in other sections of Lebanon.

Table 3: Key Demographics in Lebanon

Demographic	Northwest Lebanon	Northeast Lebanon	Southwest Lebanon	Southeast Lebanon
Age (by percent of residents)				
School-Aged (Under 18)	22%	18%	26%	17%
College-Aged (18-24)	8%	7%	8%	8%
Middle-Aged (25 to 64)	54%	48%	48%	56%
Retired-Aged (65+)	16%	27%	18%	19%
Median Household Income	$49,124	$40,920	$45,372	$44,229

Source: US Census Bureau, 2010-2014 American Community Survey

Is it cold or raining? Weather plays a role in determining how trips are made. Lebanon experiences cool, rainy winters, with mild and generally dry summers. According to the Oregon Climate Service, average temperatures in the winter months (December to February) are around 40 degrees Fahrenheit, with measurable rainfall occurring about 18 days each winter month. The spring and fall months (March to May, and September to November) are slightly warmer and dryer, with average temperatures around 50 degrees Fahrenheit, and about 14 days of measurable rainfall. The summer months (June to August) are typically very pleasant, with average temperatures around 65 degrees Fahrenheit, and less than 4 days of measurable rainfall each month[2]. Cold, rainy weather can make walking and biking trips less attractive, encouraging users to make a trip by motor vehicle.

How are People Choosing to Travel?

The number of people who choose to walk, bike, ride transit or drive is important for assessing how well existing transportation facilities serve the needs of users. Available data on commuter travel mode choices and peak hour travel demand is used to better understand travel behavior in the community and inform the needs analysis for the existing transportation system.

Commute Mode of Lebanon Residents

Most Lebanon residents commuted to work between the years 2010 and 2014 by single-occupant motor vehicles (about 77 percent)[3]. About five percent of residents walked and biked to work, and approximately one percent used public transportation.

The commute mode choices of Lebanon residents are compared with other cities in the region in Table 4. The single-occupant motor vehicle commute share in Lebanon was lower than that of Millersburg, and comparable to that of Albany and Sweet Home. The walking and biking commute share in Lebanon was similar to that of Albany and Sweet Home, and much lower than that of Corvallis. Commuting to work via public transportation was not common in most of these cities (three percent or less)[4].

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[2] Climate Summary for Corvallis (no data was available for Lebanon), Oregon Climate Service.

[3] 2010-2014 American Community Survey, US Census Bureau

[4] Although the US Census Bureau is a valuable source of information for work-related commute patterns, it does not truly represent the full range of travel within Lebanon. Non-motorized vehicle transportation modes are likely higher in Lebanon for other types of travel including trips to school, recreation, or access to transit.

Table 4: Transportation Modes Used by Employees to Commute to Work

	Percent of Commuters				
Transportation Mode	**Lebanon**	**Albany**	**Millersburg**	**Sweet Home**	**Corvallis**
Workers over 16 years	*6,246*	*20,952*	*799*	*3,037*	*24,654*
Motor Vehicle- Single Occupant	77%	79%	85%	76%	58%
Motor Vehicle- Carpool	10%	10%	11%	12%	7%
Walked	2%	3%	0%	5%	12%
Biked	3%	2%	1%	3%	12%
Public Transportation	1%	1%	0%	0%	3%
Worked at Home	6%	4%	4%	5%	7%
Other	0%	2%	0%	0%	1%

Source: US Census Bureau, 2010-2014 American Community Survey

Commute Mode of Lebanon Employees

The travel choices of those who work in Lebanon, including people who live outside of the City, are important community considerations for economic reasons as well as quality of life. Up to 85 percent of the commuters destined for jobs in northeast, and northwest Lebanon commute to work by single-occupant motor vehicle (see Table 5). This is slightly higher than the shares of single-occupant motor vehicle commuters destined for jobs in southeast, and southwest Lebanon, which are around 76 percent. Walking and biking to work is more common in northeast and southwest Lebanon (5 to 7 percent). The highest usage of public transportation for commuting occurs in northeast Lebanon (2 percent).

Table 5: Transportation Modes Used by Employees to Commute to Work in Lebanon

Transportation Mode	Percent of Commuters: Northwest Lebanon	Northeast Lebanon	Southwest Lebanon	Southeast Lebanon
Motor Vehicle- Single Occupant	85%	80%	76%	76%
Motor Vehicle- Carpool	5%	8%	14%	8%
Walked	0%	4%	1%	3%
Biked	0%	3%	4%	0%
Public Transportation	0%	2%	1%	1%
Worked at Home	9%	3%	3%	11%
Other	0%	0%	0%	0%

Source: US Census Bureau, 2010-2014 American Community Survey

Transportation Demand by Mode

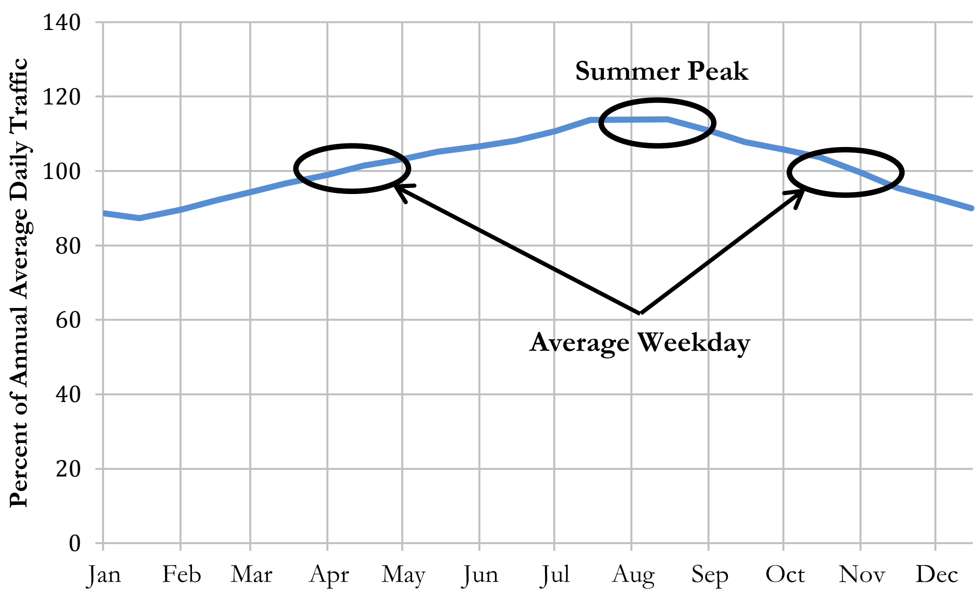
Pedestrian, bicycle, and motor vehicle traffic counts were conducted at key intersections throughout Lebanon on typical weekdays[5]. This information indicates where and when travel demand is highest for each mode of travel. It also provides a basis for assessing how well existing transportation facilities are able to meet the needs of users during peak demand periods.

- **Pedestrian volumes during the PM peak hour** are generally highest near downtown Lebanon, including along US 20 (Main Street), 2nd Street, and Oak Street (shown in Figure A1 in the appendix, along with the traffic count summary). The highest hourly pedestrian activity during the evening peak occurred at the Main Street intersection with Grant Street, with 39 pedestrian crossings in the one-hour period between 4:35 p.m. and 5:35 p.m. Other study intersections with more than 15 pedestrian crossings during the one-hour period included Airport Road at 7th Street, Oak Street at 5th Street, and Rose Street at 5th Street.

[5] Based on counts conducted in January of 2016.

- **Bicycle volumes** indicate limited biking, with the highest volumes along 2nd Street and 5th Street (shown in Figure A1 in the appendix, along with the traffic count summary). During the evening peak hour, nearly half of the study intersections had no observed bicyclists during the one-hour period between 4:35 p.m. and 5:35 p.m. The Reeves Parkway at 5th Street, OR 34 at N 2nd Street, OR 34 at S 2nd Street, Rose Street at 5th Street, and Sherman Street at 2nd Street intersections had the highest observed bicycle volumes, with more than 5 bicyclists counted during the single hour at each of the intersections.
- **Motor vehicle volumes** on the roadways in Lebanon (shown in Figure A2 in the appendix) most commonly peak during weekday evenings between 4:35 p.m. and 5:35 p.m. However, traffic volumes generally vary depending on the time of year. While most roadways in Lebanon have fairly consistent traffic demand throughout the year, traffic volumes on highways in the City may increase as much as 14 percent above average during the summer (see Figure 2). This summer increase is due to warmer weather and longer days enticing residents and visitors of Lebanon to travel throughout the region, including increased traffic to and from the western slopes of the Cascade Mountains and along the South Santiam River.

Figure 2: Typical Seasonal Traffic Profile for Highways in Lebanon



What transportation infrastructure is available?

Existing transportation infrastructure includes a range of facilities for people who drive, walk, ride bikes, or use transit. The following sections summarize the existing infrastructure for the pedestrian, bicycle, transit, and roadway systems.

Pedestrian System

Walking plays a key role in Lebanon's transportation network. Planning for pedestrians not only helps the City provide a complete, multi-modal transportation system, it supports healthy lifestyles and addresses a social equity issue, ensuring that the young, the elderly, and those not financially able to afford motorized transport have access to goods, services, employment, and education. Approximately two percent of commuters in the City walk to work, with another one percent utilizing public transportation to get to work, which generally includes a walking trip at the beginning or end. In addition to the work commute trips, walking trips are made to and from recreational or shopping areas, schools, or other activity generators. Continuous sidewalk connections between all activity generators and arterial/collector roadways are desirable to allow for safe and attractive non-motorized travel options.

Shared-use Path along Reeves Parkway

The walking network in Lebanon, shown in Figure 3, is composed of sidewalks, and shared-use paths, and is fairly well developed. A large part of central Lebanon was developed prior to 1950, a time in which sidewalks were incorporated into the design of neighborhoods and streets. Although most areas incorporated into Lebanon over the following decades have sidewalk coverage, a few areas do not have complete sidewalks on one side of the street, or even on both sides. These gaps are most significant in southwest and southeast Lebanon, and on roadway segments outside the City limits.

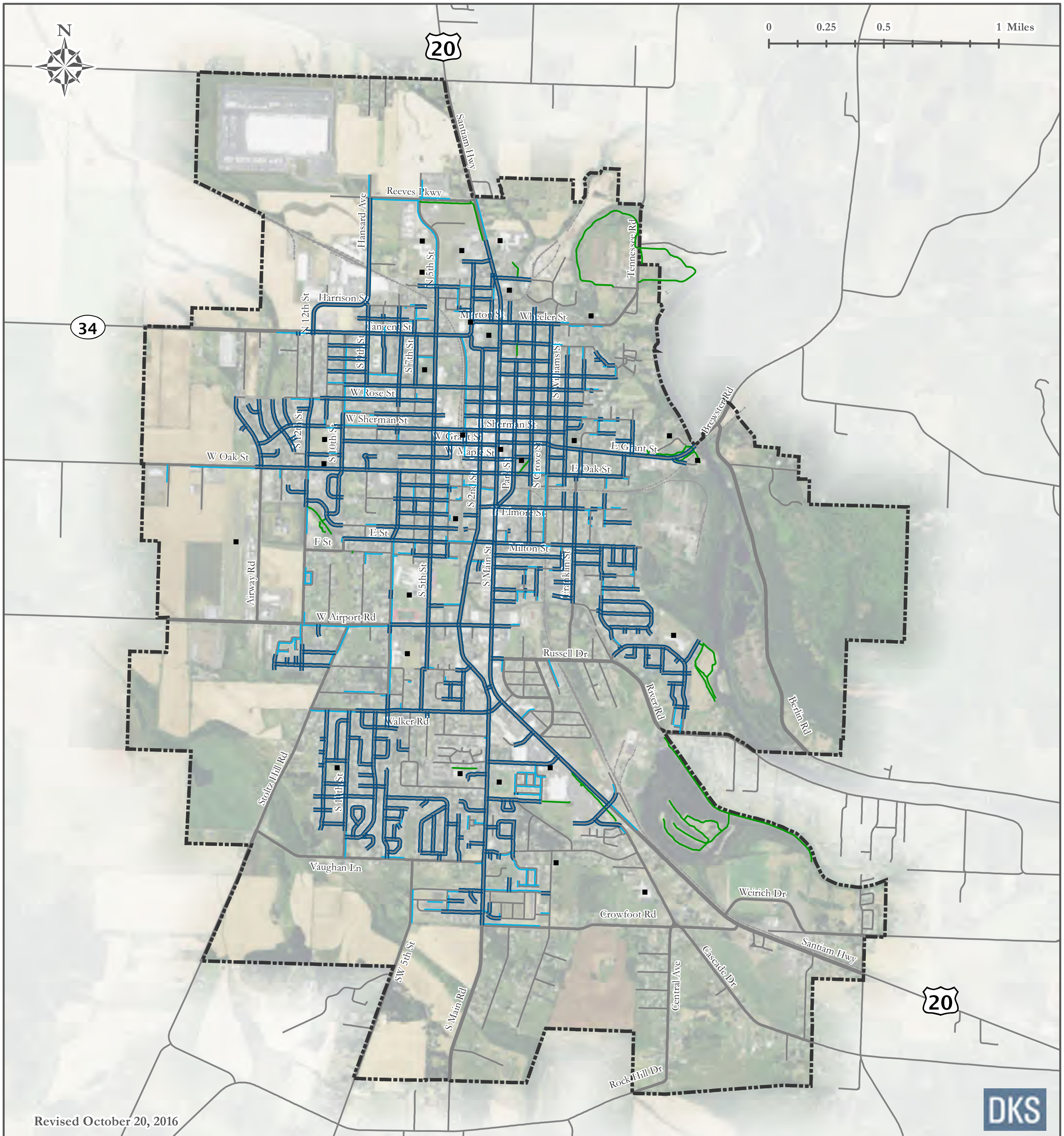
Paved shared-use paths exist along portions of US 20, Reeves Parkway, Hansard Avenue, D Street, 7th Street, Grant Street, Weldwood Drive and Crowfoot Road, and unpaved pedestrian only trails are located throughout the City.

Intersection without Curb Ramps

Many intersections in older parts of the City lack ADA-compliant ramps, which provide important connections between sidewalks, making it easier to cross streets and handle the vertical drop at curbs. However, the presence of curb ramps is fairly consistent along streets in downtown Lebanon, and in the newest neighborhoods on the edges of the City.

3

Existing Pedestrian Facilities



Legend:

Pedestrian Facilities

- Sidewalk on Both Sides
- Sidewalk on One Side
- Trails
- Urban Growth Boundary
- Arterial or Collector Street
- Major Activity Generator

Bicycle System

The bicycle system provides a non-motorized travel option for trips that are longer than a comfortable walking distance. A well-developed bicycle system promotes a healthy and active lifestyle for the residents, and visitors of Lebanon. Approximately three percent of commuters in the City bicycle to work. In addition to the work commute trips, bicycle trips are made to and from recreational or shopping areas, schools, or other activity generators. Continuous bicycle connections between all activity generators and arterial/collector roadways are desirable to allow for safe and attractive non-motorized travel options.

The bicycle network in Lebanon, shown in Figure 4, is composed of bike lanes, roadway shoulders, shared roadways, and shared-use paths.

- **Bike lanes** are portions of the roadway designated specifically for bicycle travel via a striped lane and pavement stencils. Standard width for a bicycle lane is six feet. The minimum width of a bicycle lane against a curb or adjacent to a parking lane is five feet. A bicycle lane may be as narrow as four feet, but only in very constrained situations. Bike lanes are most appropriate on arterials and collectors, where high traffic volumes and speeds warrant greater separation of the travel modes. Significant segments of continuous bicycle lanes exist along OR 34, 5th Street, S 2nd Street and Main Road, and Airport Road.
- **Shoulder bikeways** are paved with striped shoulders wide enough for bicycle travel. A six-foot paved shoulder is desired to adequately provide for bicyclists, with a four-foot minimum width in constrained areas. Roadways with shoulders less than four feet are considered shared roadways. Some shoulder bikeways are signed to alert motorists to expect bicycle travel along the roadway. Shoulder lanes adequate for bicycle travel are available along various short segments of OR 34, US 20, Airport Road, Walker Road, and Main Road in Lebanon.
- **Shared roadways** include those on which bicyclists and motorists share the same travel lane. The most suitable roadways for shared bicycle use are those with low speeds (25 mph or less) and low traffic volumes (3,000 vehicles of fewer per day). Shared roadways, often signed as bicycle routes, serve to provide continuity to other bicycle facilities (e.g., bicycle lanes) or can be designated as a preferred route through the community. Common practice is to sign a route with standard Manual on Uniform Traffic Control Devices (MUTCD) green bicycle route signs with directional arrows and/or pavement markings. Shared roadways can have signs that highlight a special route or provide directional information in bicycling minutes or distance. Most local roadways in the City are considered shared roadways, but do not have signs of pavement markings.
- **Shared-use paths** provide off-street travel for bicyclists, and are wider than an average sidewalk (e.g., 10 – 14 feet). Shared-use paths are typically paved (asphalt or

concrete), but may also consist of an unpaved smooth surface as long as it meets Americans with Disabilities Act (ADA) standards. Paved shared-use paths exist along portions of US 20, Reeves Parkway, Hansard Avenue, D Street, 7th Street, Grant Street, Weldwood Drive, and Crowfoot Road.

Bicycle Parking

End-of-trip bicycle facilities are a fundamental component of a bicycle network. Lack of safe and secure facilities for either short-term or long-term parking can be an obstacle to promoting bicycle riding.

Short-term parking accommodates visitors, customers, and others expecting to depart within two hours. It requires a standard rack, appropriate location and placement, and weather protection.

Long-term parking accommodates employees, students, residents, commuters, and others who park for more than two hours. This parking requires a secure, weather-protected manner and location.

Short-term bicycle parking in downtown Lebanon

4

Existing Bicycle Facilities

LEBANON
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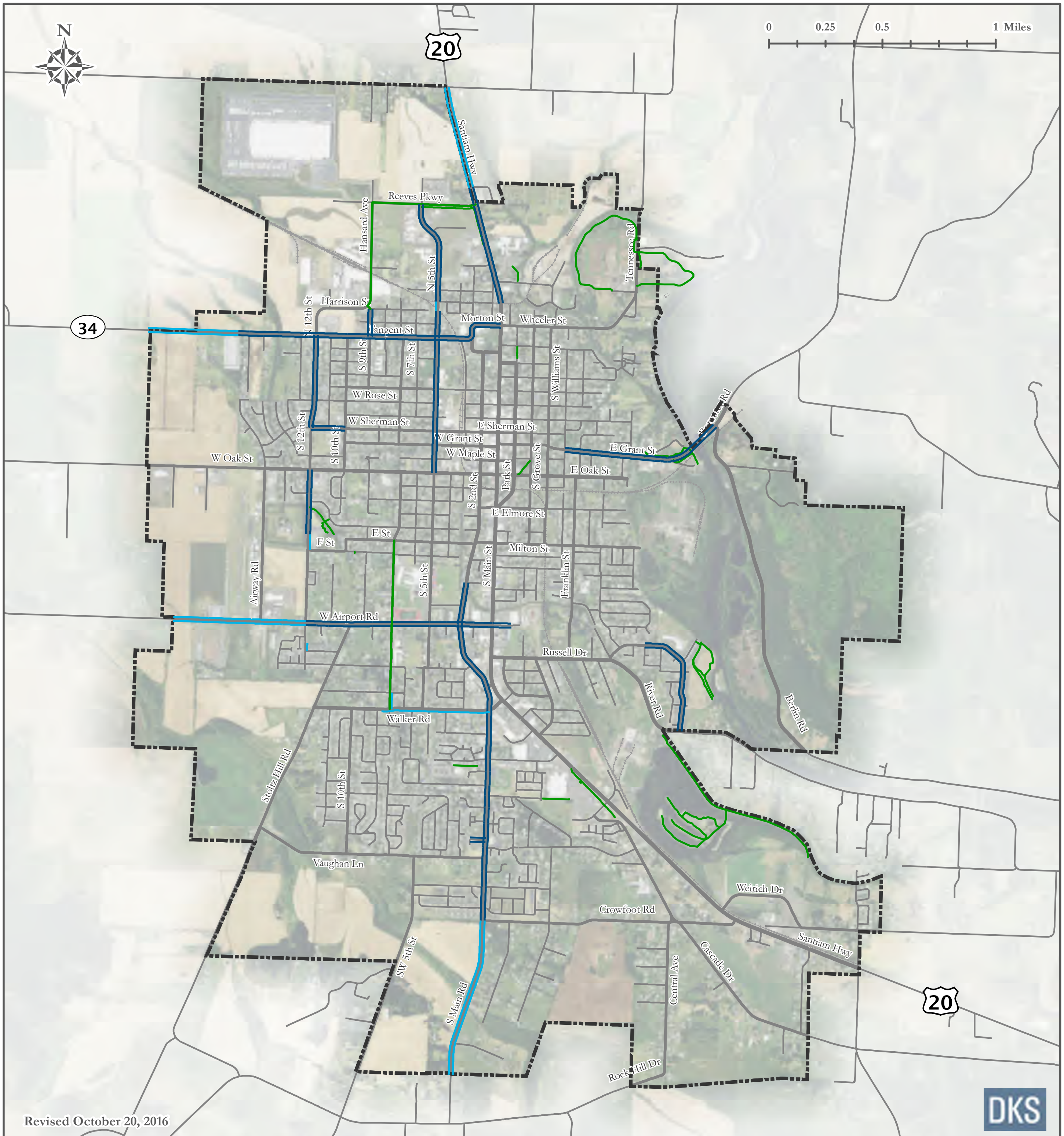


Legend:

Bicycle Facilities

Bike Lane

Shoulder

Trails

Urban Growth Boundary

Arterial or Collector Street

Transit System

The Linn Shuttle, operated out of Sweet Home, provides transit service in Lebanon via one fixed bus route connecting the City with Sweet Home and Albany. Transit riders can transfer to the Albany Transit System and Linn-Benton Loop in Albany. Figure 5 shows the route in Lebanon.

Bus stops in Lebanon are located near US 20 and Weldwood Drive-Burdell Boulevard, Main Street-Park Street (US 20) and Oak Street, and US 20 and Industrial Way. Only the bus stop near US 20 and Industrial Way (in front of Linn-Benton Community College) is signed and provides a bench, shelter, and bus pull-out. All remaining bus stops are unsigned and have no amenities. Most transit users in the City are more than a half-mile from a bus stop.

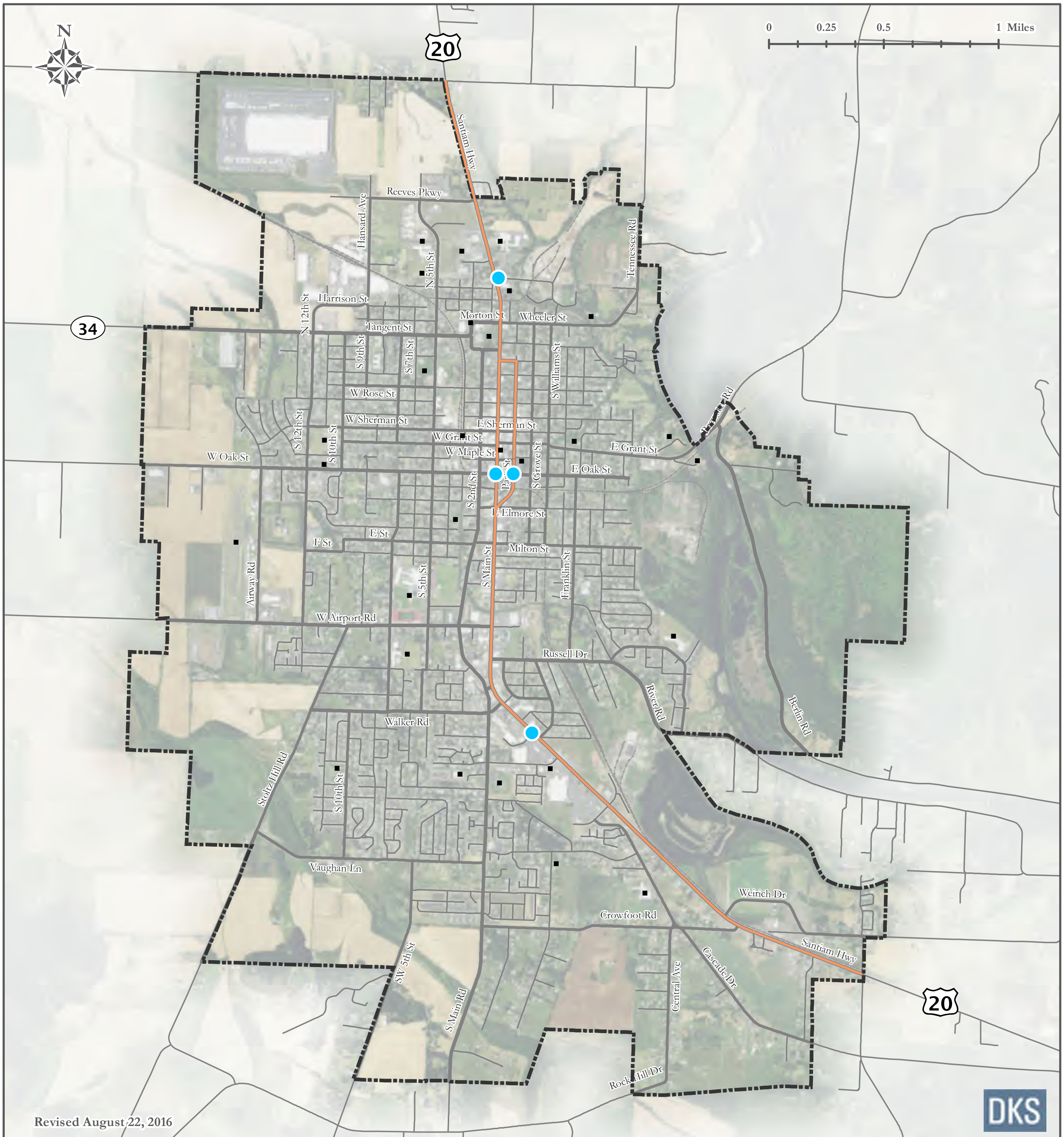
Bus stop along Industrial Way

The Linn Shuttle travels through Lebanon northbound and southbound seven times a day, with additional morning and evening express routes to Linn-Benton Community College Monday through Friday. Transit service is provided from 6:50 a.m. to 7:05 p.m. with headways typically between one to two hours. Key destinations along this route include Walmart, downtown Lebanon, Linn-Benton Community College, Samaritan Lebanon Community Hospital, and Western University of Health Sciences. Linn Shuttle buses are equipped with a lift to allow for wheelchair access and include bicycle racks.

Lebanon's Dial-A-Ride program provides public transportation to seniors, persons with disabilities, and the general public who are unable to use regular fixed route buses. Curb to curb Dial-A-Ride service, in wheelchair lift equipped mini-buses, is available generally between 7:00 a.m. and 4:00 p.m. Monday through Friday.

Public comments indicate a desire for bus service to be extended west of US 20.

5 Existing Transit Facilities



Legend:

Transit Facilities:

- Linn County Shuttle Stop
- Transit Route
- Urban Growth Boundary
- Arterial or Collector Street
- Major Activity Generator

Roadway System

Lebanon streets are well connected and generally follow a grid pattern. The major transportation routes through Lebanon include US 20, OR 34, as well as a few key City roadways. US 20 runs north-south through the City. In the downtown area, US 20 becomes a one-way couplet, with Park Street serving the northbound and Main Street the southbound direction. US 20 connects Lebanon to Albany north of downtown, and Lebanon to Sweet Home south of downtown. OR 34 runs east-west connecting Corvallis and Interstate 5 with US 20.

A few key City roadways that provide north-south access are 2nd Street-Main Road, Williams Street, and 12th Street. 2nd Street-Main Road parallels US 20 from OR 34 to the south side of Lebanon, Williams Street provides a connection on the east side of Lebanon, and 12th Street provides a connection on the west side of Lebanon. Key east-west City roadways include Reeves Parkway, Oak Street, and Airport Road, with Reeves Parkway towards the north end of the City, Oak Street centered in the middle, and Airport Road in the south end of the City.

Functional Classification

To manage the street network, the City classified the streets based on a hierarchy according to the intended purpose of each (as shown in Figure 6). From highest to lowest intended usage, the classifications are principal arterial, arterial, collector, and local streets. Streets with higher intended usage generally limit access to adjacent property in favor of more efficient motor vehicle traffic movement (i.e., mobility). Local roadways with lower intended usage have more driveway access and intersections, and generally accommodate shorter trips to nearby destinations.

- **Principal Arterials** serve as the main travel routes through the City and serve the highest volume of motor vehicle traffic. All state highways in the City, including US 20, and OR 34, are classified as principal arterials. Principal arterials are generally for longer motor vehicle trips with limited local access, although the portion of US 20 through downtown Lebanon also serves as one of the City's main streets. Posted speed limits on the highways range from 25 (in downtown) to 55 miles per hour (in rural areas).
- **Arterials** connect many parts of the City and often serve traffic traveling to and from principal arterials. These roadways provide greater accessibility to neighborhoods, connect to major activity generators, and provide efficient through movement for local traffic. In Lebanon, portions of Wheeler Street, Oak Street, Airport Road, Walker Road, Stoltz Hill Road, 2nd Street, Main Road, Russell Drive, River Drive, Brewster

Road, and Berlin Road are arterials. Posted speeds on arterial streets in Lebanon typically range between 25 (in residential areas) and 55 miles per hour (in rural areas).

- **Collectors** connect neighborhoods to arterials. These streets serve as major neighborhood routes and generally provide more direct property access or driveways than arterial streets. In Lebanon, portions of Reeves Parkway, Grant Street, Milton Street, Crowfoot Road, 12th Street. 5th Street, and Williams Street are examples of collector streets. Posted speeds on collector streets in Lebanon typically range between 25 and 35 miles per hour.
- **Local Streets** provide more direct access to residences without serving through travel in Lebanon. These roadways generally are lined with residences and are designed to serve lower volumes of traffic with a statutory speed limit of 25 miles per hour.

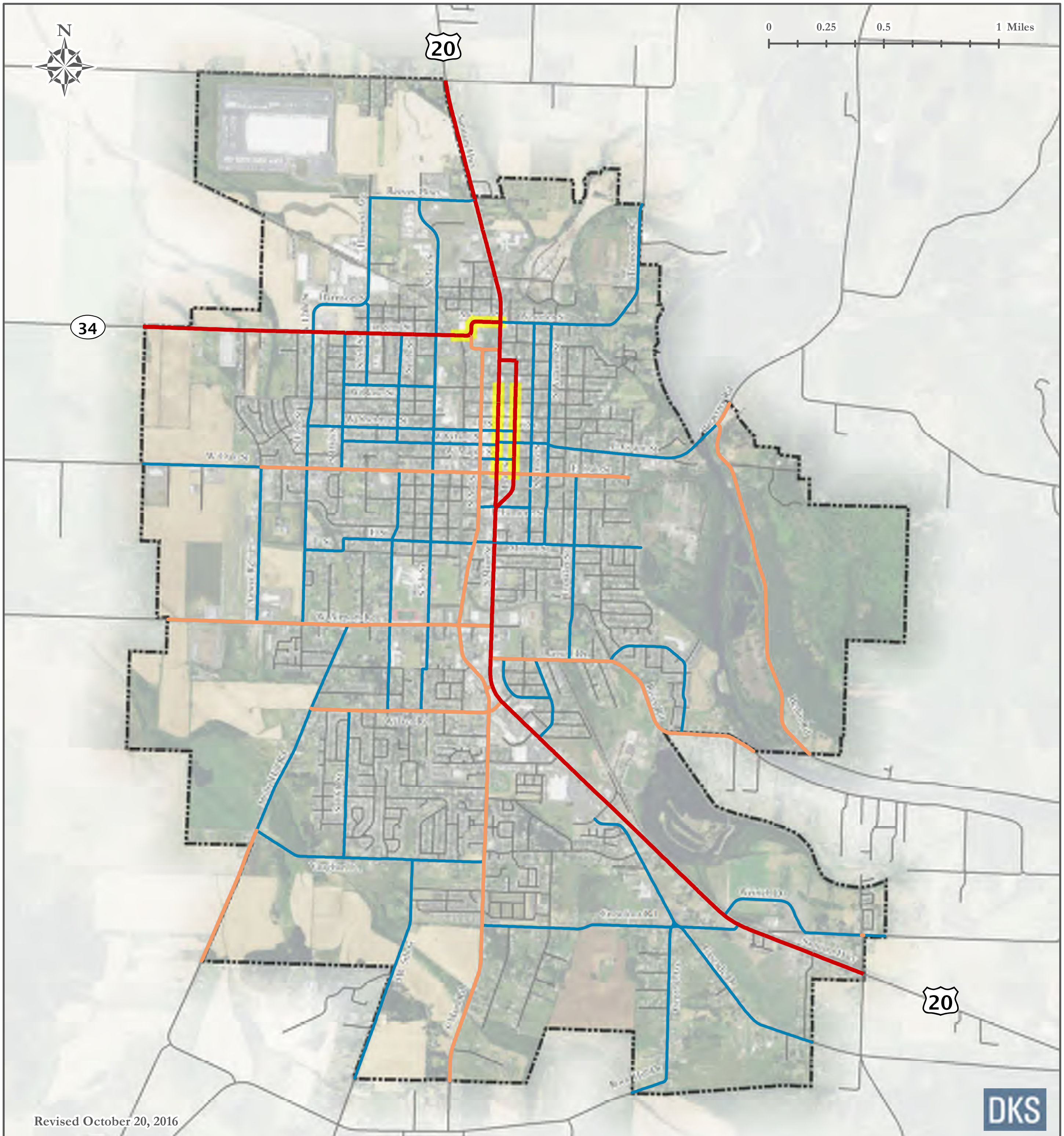
The Oregon Department of Transportation (ODOT) and Linn County classify roadways in Lebanon under their jurisdiction. Within Lebanon, US 20 and OR 34 are under ODOT jurisdiction (see Figure A3 in the appendix) and classified as Regional Highways[6]. US 20 between Rose Street and Oak Street, and OR 34 between the rail crossing just west of South 3rd Street and US 20 are designated as Special Transportation Areas.

Several streets are under County jurisdiction, but within the Lebanon Urban Growth Boundary. The County defers to local agencies for classifying streets inside an Urban Growth Boundary.

The federal government also has a functional classification system that is used to determine federal aid funding eligibility (see the Federal Functional Classification map in the appendix). Roadways federally designated as a major collector, minor arterial, principal arterial, or interstate are eligible for federal aid. US 20 and OR 34 are federally classified as a principal arterials, while most locally designated arterial streets in Lebanon are federally classified as minor arterials, and locally designated collector streets are federally classified as major collectors.

[6] 1999 Oregon Highway Plan, Including amendments November 1999 through May 2015, Oregon Department of Transportation, 2016.

6 Existing Functional Classification



Legend:

Functional Classification:
- Principal Arterial
- Arterial
- Collector
- Local Streets

Special Designation
- Special Transportation Area

- Urban Growth Boundary
- Arterial or Collector Street

Bridges

There are a total of 30 bridges within the Lebanon Urban Growth Boundary, with five along state facilities and 25 along City or County facilities, as shown in Figure A4 in the appendix. Five bridges are flagged as structurally deficient with poor or serious substructure conditions, including:

- The bridge along Wheeler Street over Lebanon Santiam Canal, east of Hiatt Street.
- The bridge along River Drive over Lebanon Santiam Canal, just west of Mountain River Drive.
- The bridge along Stoltz Hill Road over Oak Creek, south of Vaughan Lane.
- The bridge along 5th Street over Oak Creek, south of Shannon Place.
- The bridge along Rock Hill Drive over Oak Creek, west of Central Avenue.

In addition, the bridge along US 20 over Lebanon Santiam Canal, south of Gore Drive is flagged as functionally obsolete.

Freight

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The designation of through truck routes provides for this efficient movement, while maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. Within Lebanon, OR 34, and US 20 south of OR 34 are classified as Oregon Freight Routes and Federal Truck Routes, while US 20 north of OR 34 is only classified as a Federal Truck Route (see Figure A4 in the appendix). Federal Truck Routes generally require 12-foot travel lanes, but allow 11-foot travel lanes within Special Transportation Areas with lower truck volumes.

Local truck routes have also been designated by the City, including around downtown Lebanon (see Figure A4 in the appendix). The local truck routes include portions of Wheeler Street, Williams Street, Milton Street, Grant Street, and Oak Street. Most of the local freight generators are located at the north, and west end of the City.

Heavy vehicles account for approximately four percent of the traffic on US 20, six percent of the traffic on OR 34, four percent of the traffic on Wheeler Street, Williams Street, and Milton Street, five percent of the traffic on Grant Street, and seven percent of the traffic on Oak Street through Lebanon during an average weekday. Traffic count data including heavy vehicle percentages is summarized in the appendix.

Public comments indicate a desire to modify the Wheeler Street, Williams Street, and Milton Street local truck route. The current route directs trucks through residential neighborhoods.

Rail

Freight rail service is provided to Lebanon by the Albany and Eastern Railroad (see Figure A5 in the appendix). The main line enters the City from the northwest between OR 34 and Reeves Parkway, before crossing OR 34 just west of 3rd Street. The line parallels 3rd Street before turning east near Oak Street, crossing US 20 and connecting with the branch lines to Sweet Home and Mill City near Grove Street. The branch line connecting to Sweet Home generally parallels US 20 to the south of Lebanon. The Mill City branch line parallels Grant Street before crossing the South Santiam River and exiting the City to the northeast.

The Albany and Eastern Railroad serves 3,011 carloads per year. Within Lebanon there are a total of 30 at-grade rail crossings (three of the crossings are pedestrian only), with 17 of the crossings gate controlled and 13 stop controlled.

Amtrak passenger service is available in Albany, less than 15 miles away. Connections to the Amtrak depot in Albany can be made via the Linn Shuttle.

Air

The Lebanon State Airport, owned and operated by the Oregon Department of Aviation, is a public use airport located between Oak Street and Airport Drive, to the west of US 20 about one mile from downtown. The airport is a local general aviation facility, which primarily supports single engine, general aviation aircraft, but is capable of accommodating smaller twin-engine general aviation aircraft. It also supports local air transportation needs and special use aviation activities. The airport provides support to 54 based aircraft. Services and facilities available include: hangar storage, tie-downs, fixed base operator services, flight instruction, aircraft rental, aircraft maintenance, and fueling. The airport encompasses approximately 55 acres of land. The airport has one runway, and serves 9,800 annual operations (i.e., take-offs or landings).

Regional and international air service for passengers and freight is provided via Portland International Airport (PDX). The airport is located approximately 92 miles (or under two hours) to the north of Lebanon and is connected via I-5 and I-205. Eugene Airport, located approximately 44 miles (or 50 minutes) to the south of Lebanon also provides regional air service.

The current Airport master plan calls for extending the runway to the north and/or south. Either option would impact key east-to-west City streets for passenger vehicles and freight (Oak Street or Airport Road). The City has indicated its desire to maintain these streets as through routes. An update to the current Airport master plan is currently underway.

Waterway

Lebanon is bordered by the South Santiam River on the east side of the City. This waterway generally only serves recreational needs, and is not navigable.

Pipeline

Northwest Natural Gas operates several feeder lines from the main natural gas pipeline that serve Lebanon. There are no other major regional water or oil pipelines within the City limits.

Transportation System Management and Operations (TSMO)

Transportation System Management and Operations (TSMO) is a set of integrated transportation solutions for improving the performance of existing transportation infrastructure through a combination of system and demand management strategies and programs.

Transportation System Management (TSM): TSM solutions attempt to better manage the flow of traffic to achieve maximum efficiency of the current roadway system, possibly resulting in an increase in facility capacity. The regional roadway system in Lebanon benefits from TSM infrastructure, as described below:

- Communications- Many traffic signals are linked by twisted pair copper interconnect. Fiber optic cable allows for greater bandwidth to take advantage of communication technology improvements.
- Coordinated Traffic Signal Control- Coordinated time of day traffic signal control along US 20.

Transportation Demand Management (TDM): TDM solutions encourage travelers to choose alternatives to driving alone in their car by providing services, incentives, supportive infrastructure and awareness of travel options. These strategies improve the performance of the existing infrastructure and services, and may result in fewer vehicles on the roadway system. TDM measures in use in Lebanon include:

- Cascades West Rideshare provides transportation options outreach including carpool/vanpool matching services for commuters in Benton, Lincoln, and Linn counties. The service supports connections to major cities such as Portland, Salem, and Eugene.
- Investment in pedestrian/bicycle facilities.

What is the Condition of the Existing Transportation System?

The transportation system in Lebanon is managed with a variety of measures designed to ensure that the transportation infrastructure in the City maintains acceptable quality and performance. Performance is evaluated based on the history of crashes and various measures of the pedestrian, bicycle, and motor vehicle transportation system.

Safety Evaluation

A review of available crash data identified patterns of motor vehicle, pedestrian, and bicyclist crashes. ODOT's crash data[7] from January 2010 through December 2014 (the most recent five years of available data) for all roadways within the Urban Growth Boundary of Lebanon showed a total of 796 crashes (an average of 159 crashes a year). A majority of these (about 52 percent) were either rear-end or turning type crashes (see Figure 7). Three percent of the crashes (about four per year) involved pedestrians and four percent (about five per year) involved bicycles. Figure 8 shows the high crash locations within the Urban Growth Boundary.

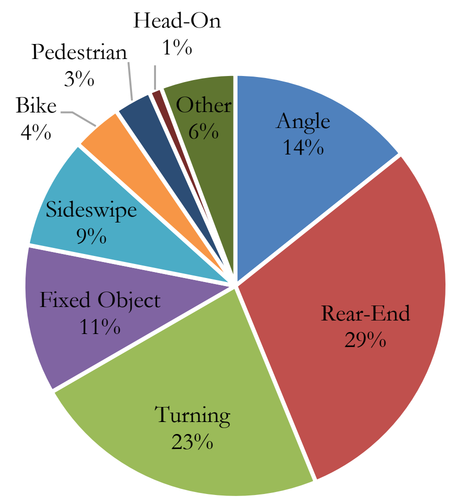


Figure 7: Crash Types (2010-2015)

One crash resulted in death during this period (when a driver collided with a fixed object), and an additional 28 crashes caused serious injuries. The high-severity crashes are a small portion of all crashes, making up only four percent of all reported crashes. However, the overall severity of crashes in Lebanon over the past five years is generally low, with 84 percent involving only property damage (no injuries) or minor injuries.

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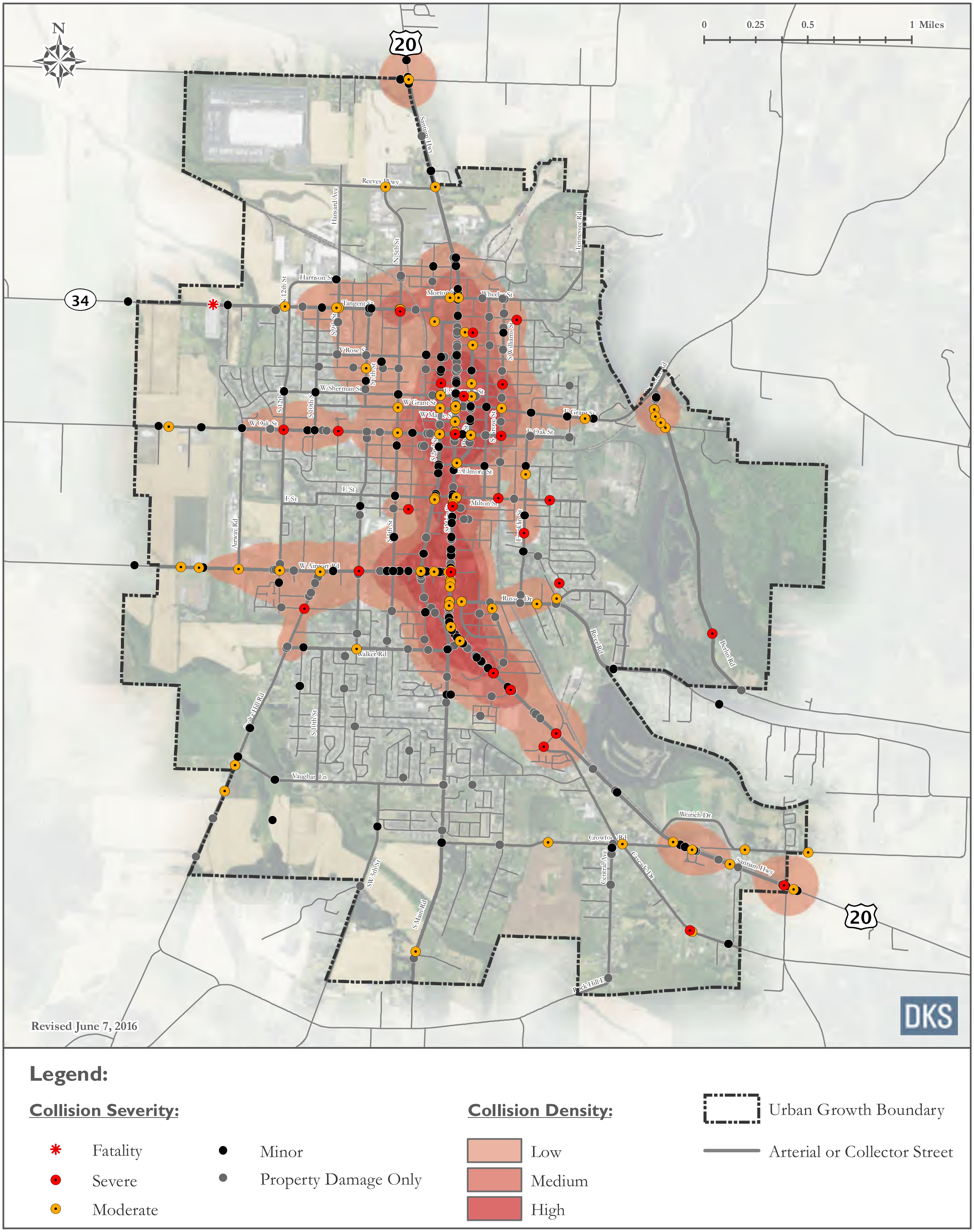
[7] ODOT crash data includes crashes with pedestrians and bicyclists, but only if a motor vehicle was involved. Crash reports are the responsibility of individual drivers, and are only required in the event of death, bodily injury, or damage exceeding $1,500. As such, low-severity crashes are generally underreported.

8 Collision Locations



Causes of Crashes

The City of Lebanon and ODOT strive to provide roads that are engineered to be as safe as possible. However, engineering is only one part of the road safety equation. Education and enforcement are critical elements in promoting safe driver behavior. The five most common driver errors are responsible for nearly 70 percent of all crashes in Lebanon.

- Did Not Yield Right-of-Way (29 percent)
- Followed Too Closely (22 percent)
- Disregarded Traffic Signal (7 percent)
- Made Improper Turn (5 percent)
- Inattention (5 percent)

Risky behavior choices not only contribute to a substantial number of crashes in Lebanon, they generally lead to more severe outcomes for the people involved. Alcohol and/or drug use was involved in 28 crashes, including two high-severity crashes that caused one serious injury and one death. This represents around four percent of all crashes and seven percent of high-severity crashes. Speeding or driving too fast for conditions, was involved in 41 crashes (five percent of all crashes), three of which were high-severity, including one death (10 percent of high-severity crashes).

Pedestrian Safety

There were 21 pedestrian-involved crashes over the past five years. They occurred most frequently downtown (nine crashes involving a pedestrian), along US 20 between Airport Road and Russell Drive (three crashes involving a pedestrian), and at the Airport Road intersection with 2nd Street (two crashes involving a pedestrian).

Pedestrians sustained severe injuries in four crashes; at the US 20 (Park Street)/Carolina Street, US 20 (Park Street)/Sherman Street, US 20 (Main Street)/Oak Street, and US 20/Truman Street intersections. Moderate injuries to pedestrians were sustained in eight of the crashes.

The vast majority of pedestrian-involved crashes (71 percent) were caused by drivers failing to yield the right of way to a pedestrian in a crosswalk or along a sidewalk. About 14 percent of the crashes were caused by pedestrians failing to yield to the motorist on the roadway. Most (86 percent) of pedestrian-involved crashes occurred during the day or at night in a location with street lighting.

The dominant trends observed in the crash data for pedestrian-involved crashes indicate that actions aimed at improving driver yield rates for pedestrians would be valuable in reducing the number of pedestrian-involved crashes. Engineering countermeasures to achieve this include: ensuring adequate signing indicating pedestrian crossing locations and state laws on yielding, providing and enhancing lighting at crossings and locations with high pedestrian traffic, modifying traffic signal phasing to reduce pedestrian conflict opportunities, or improving roadside pedestrian visibility.

The data also indicates that actions focusing on motorist behaviors may be effective, including targeted enforcement and education efforts in the downtown area. These could include actions such as police enforcement of crosswalk laws through staged crossings, or efforts to increase general compliance with red lights and stop signs.

Bicycle Safety

There were 25 bicycle-involved crashes over the past five years. The majority of the bicycle-involved crashes occurred at intersections, split almost equally between traffic signal and stop controlled locations. A cyclist sustained severe injuries in two of the crashes, while moderate injuries were sustained in 11 of the crashes. The bicycle-involved collisions occurred most often at the US 20 intersection with Walker Road-Dewey Street (three collisions involving a bicycle).

Most of the crashes involving a bicyclist were caused by drivers failing to yield the right of way when turning (60 percent). About 12 percent of the crashes were caused by either a bicycle or motorist failing to obey traffic control devices. The vast majority of bicycle crashes occurred during the day.

The dominant trends observed in the crash data for bicycle-involved crashes indicate that actions aimed at improving driver yield rates at intersections, specifically while turning, would be valuable in reducing the number of bicycle-involved crashes. Engineering countermeasures to achieve this include actions to increase the visibility of bicycling and encourage drivers to expect bikes at intersections, such as by providing highly visible space for bicycles and signing. Other engineering approaches include reducing conflict opportunities at intersections, such as through bike boxes or bike-specific signal phasing.

Ensuring a comprehensive bicycle network, including crossing opportunities, can also reduce conflicts between bicycles and motor vehicles. Effective bicycle detection at signals, and an evaluation of stop-controlled intersections along popular biking routes, may promote bicyclist adherence to traffic control devices.

The data also indicates that actions focusing on motorist and bicyclist behaviors may be effective, including targeted enforcement and education efforts in the downtown area and along US 20.

Intersection Safety

Crash rates provide an additional perspective on intersection safety and identify locations where people have a higher risk of being involved in a crash. Crash frequencies (the number of crashes in a period of time) tend to increase with higher vehicle traffic. With more exposure to vehicles, there are more opportunities for crashes to occur. Crash rates consider the amount of crashes relative to the traffic volume at the intersection, and are expressed in units of crashes per million entering vehicles. Study intersections are divided into groups of similar intersections for this analysis, called "Intersection Populations."

Crash rates for the study intersections were calculated and evaluated using two methods: the critical crash rate method from the Highway Safety Manual; and by comparison to statewide 90th percentile crash rates published by ODOT. The critical crash rate method compares an intersection's crash history to that of other similar intersections in Lebanon, adjusting for volume at the intersection. The 90th percentile crash rate compares an intersection's crash history to that of other similar intersections across Oregon. Where an intersection's crash rate is greater than either of these two thresholds, it is an indication that a problem might exist and that further study is warranted.

The Excess Proportion of Specific Crash Types method from the Highway Safety Manual was used as an additional analysis at locations with high crash rates. This method identifies the types of crashes that are over-represented at an intersection, when compared to other similar intersections.

There were nine intersections with high crash rates that exceeded either the critical crash rate or 90th percentile crash rate as shown in Table 6. The crash rates for all study intersections are provided in the appendix.

Table 6: Intersections with High Crash Rates

	Location (jurisdiction)	Total Collisions (2010 to 2015)	Observed Crash Rate (per MEV)	Critical Crash Rate (per MEV)	Over Critical Crash Rate	90th Percentile Rate (per MEV)	Over 90th Percentile Rate	Excess Proportion Crash Types**
1	Reeves Parkway/ 5th Street (City)	2	0.35	0.63	Under	0.29	**Over**	None
7	OR 34/ 5th Street (ODOT)	14	0.90	0.47	**Over**	0.41	**Over**	Angle
13	2nd Street/ Sherman Street (City)	6	0.62	0.54	**Over**	0.41	**Over**	Angle
19	Oak Street/ 2nd Street (City)	15	0.86	0.74	**Over**	0.86	**Over**	Angle
20	US 20-Main Street/ Oak Street (ODOT)	18	0.79	0.70	**Over**	0.86	Under	Angle
24	Airport Road/ Stoltz Hill Road (City)	7	0.31	0.40	Under	0.29	**Over**	None
26	Airport Road/ 5th Street (City)	11	0.52	0.43	**Over**	0.41	**Over**	Rear
28	US 20/ Airport Road (ODOT)	34	0.69	0.62	**Over**	0.86	Under	Rear
29	US 20/ Russell Drive (ODOT)	17	0.41	0.35	**Over**	0.29	**Over**	None

Per MEV = Crashes per million entering vehicles

** Excess Proportion analysis presented for high crash rate locations only. Parameters used: 90% minimum probability, 10% minimum excess proportion. Full results in appendix.

Each intersection with a high crash rate is discussed below.

- **Reeves Parkway/ 5th Street (stop controlled):** This three-leg intersection with stop control on 5th Street, only had two collisions. The crash rate exceeds the 90th percentile statewide rate largely due to the lower traffic volumes at the intersection. Of the two collisions, one involved a fixed-object and the other was an angled crash.

- **OR 34/ 5th Street (stop controlled):** This is a four-leg intersection with stop control on 5th Street. Angle crashes were most prominent here, caused by drivers passing the stop sign or failing to yield. Most of the crashes resulted in injuries (12 of 14).
- **2nd Street/ Sherman Street (stop controlled):** This is four-leg intersection with stop control on Sherman Street. Angle crashes were most prominent here, caused by drivers passing the stop sign or failing to yield. Most of the crashes resulted in injuries (5 of 6).
- **Oak Street/ 2nd Street (signalized):** Angle crashes were the most prominent here. The intersection has permitted left turn lanes on all approaches. Disregarding traffic controls was the most common cause of crashes, possibly related to the permissive turn phasing. Nearly half of the crashes resulted in injuries (7 of 15).
- **US 20-Main Street/ Oak Street (signalized):** Although angle crashes are the most common here, there were two pedestrian and one bike crash caused by a failure to yield or improper turn by a driver. Half of the crashes here resulted in injuries (9 of 18). There are several driveways close to this intersection.
- **Airport Road/ Stoltz Hill Road (stop controlled):** This three-leg intersection has stop control on Stoltz Hill Road. Turning movement crashes were most common here, caused by drivers passing the stop sign or failing to yield. Most of the crashes resulted in injuries (4 of 7).
- **Airport Road/ 5th Street (stop controlled):** This is a four-leg intersection with stop control on 5th Street. Rear-end crashes were the most prominent here, and the majority of the rear-end crashes were on Airport Road traveling eastbound or westbound near the crosswalk. Following too close and driver inattention were the leading causes of crashes at this location. Less than a third of the crashes resulted in injuries (3 of 11).
- **US 20/ Airport Road (signalized):** Rear-end crashes were most prominent here, caused primarily by inattention and following too close between vehicles traveling on the state highway going northbound or southbound. Less than half of the crashes resulted in injuries (14 of 34).
- **US 20/ Russell Drive (stop controlled):** This is a three-leg intersection with stop control on Russell Drive. Turning movement crashes were most common here, specifically while accessing or leaving Russell Drive. Failure to yield was the most common cause of crashes. Less than half of the crashes resulted in injuries (8 of 17).

Roadway Segment Safety

In Lebanon, most crashes (about 60 percent) occur at intersections. Segment crash rates along state highways were calculated to complement the intersection-based analysis and provide a more complete picture of roadway safety. Segment crash rates are determined by dividing the number of crashes everywhere on the segment by the total vehicle traffic along the segment, and are reported in crashes per million vehicle miles traveled (MVMT). The calculated crash rates were compared to the five-year average of state highway crash rates for similar highways[8].

Three state highway segments were identified as having high crash rates, as shown in Table 7. The appendix includes additional details, including analysis results for all segments.

Table 7: Highway Segment with High Crash Rates

Highway (limits)	Distance (miles)	Total Collisions (2010 to 2015)	Observed Crash Rate (per MVMT)	Statewide Collison Rate (per MVMT)	Over Statewide Collison Rate
US 20- Main Street (Carolina Street to Elmore Street) *	0.66	62	6.06	2.78	**Over**
US 20- Park Street (Carolina Street to Elmore Street) *	0.77	49	4.84	2.78	**Over**
US 20 (Elmore Street to Weldwood Drive-Burdell Boulevard)	1.51	186	3.04	2.78	**Over**

Per MVMT = Crashes per million vehicle miles traveled

Note: * Crash rate is reported for a single direction of the highway (within the couplet) and is not a direct comparison to the statewide rate (which includes both directions of the highway).

- **US 20 Downtown Couplet, Main Street (southbound)** is a two-lane one-way segment in downtown Lebanon. Crash causes on this segment reflect the dense urban land uses, and are primarily disregarding traffic controls, following too close, and failure to yield. Most crashes (66 percent) occurred at intersections. This segment includes the US 20-Main Street/Oak Street intersection, which had one of the highest crash rates of all study intersections. There were three pedestrian-involved collisions and four bike-involved collisions along this segment.
- **US 20 Downtown Couplet, Park Street (northbound)** is a two-lane one-way segment in downtown Lebanon. Crash causes on this segment reflect the dense urban land uses, and are primarily disregarding traffic controls, following too close, and

[8] Table II of the 2014 ODOT Crash Rate Book.

failure to yield. Most crashes (82 percent) occurred at intersections. There were five pedestrian-involved collisions and two bike-involved collisions along this segment.

- **US 20, Elmore Street to Weldwood Drive-Burdell Boulevard** is a five-lane two-way segment with a high frequency of accesses. Crash causes on this segment reflect the amount of accesses, and are primarily following too close and failure to yield. Most crashes (75 percent) occurred at intersections or driveways. There were five pedestrian-involved collisions and ten bike-involved collisions along this segment.

Safety Priority Index System (SPIS) Assessment

The Safety Priority Index System (SPIS) is a method developed by ODOT for identifying hazardous locations on and off state highways. The score for each 0.10-mile segment of highway is based on three years of crash data, considering crash frequency, rate, and severity. SPIS then ranks all segments throughout the state by score and identifies the top 5 percent and top 10 percent segments.

According to the ODOT 2014 SPIS ratings (data reported between 2011 and 2013), and 2013 SPIS ratings (data reported between 2010 and 2012), several locations in Lebanon rank among the top most hazardous sections of highways in Oregon. The identified locations are listed and discussed below.

- US 20- Main Street around the Oak Street intersection (top five percent segment; high crash rate intersection, see above).
- US 20 around the Milton Street intersection (top 10 percent segment). Over 15 crashes occurred here, more than half of which were injury crashes including one resulting in serious injury. Rear crashes were most common, and following too close was a prominent cause. There was one pedestrian-involved and one bicycle-involved crash.
- US 20 around the Airport Road intersection (top 10 percent segment; high crash rate intersection, see above).

Walking Network Conditions

This section assesses the quality of the walking facilities in Lebanon.

Qualitative Pedestrian Assessment

The method for assessing pedestrian level of service at a citywide planning level relies on a qualitative analysis of walkways based on the ODOT Multimodal Analysis Methodology[9]. The quality and availability of various characteristics are rated system-wide as "Excellent", "Good", "Fair", or "Poor". For the pedestrian network evaluation, consideration is given to the presence of a sidewalk or path, a buffer zone (i.e., bike lane, shoulder, landscape strip, or on-street parking) and street lighting, and traffic volumes, number of travel lanes and travel speeds along the adjacent roadway. The intent of the analysis is to show the extent to which the pedestrian network provides a level of comfort and safety for users. The analysis will be used to inform, create, and confirm recommendations for pedestrian projects.

In Lebanon, an "Excellent" rating requires sidewalks on both sides of the roadway, along with a desirable buffer zone given the roadway characteristics. A "Good" rating requires sidewalks on both sides of the roadway and a buffer zone, but without the desirable features or widths given the roadway characteristics. A "Fair" rating is given to a roadway with sidewalks on both sides, but without an adequate buffer zone. A "Poor" rating denotes gaps within the sidewalks along that corridor.

Figure 9 summarizes the pedestrian network conditions in Lebanon. Overall, the network rates relatively high near downtown, and poor towards the edges of the City.

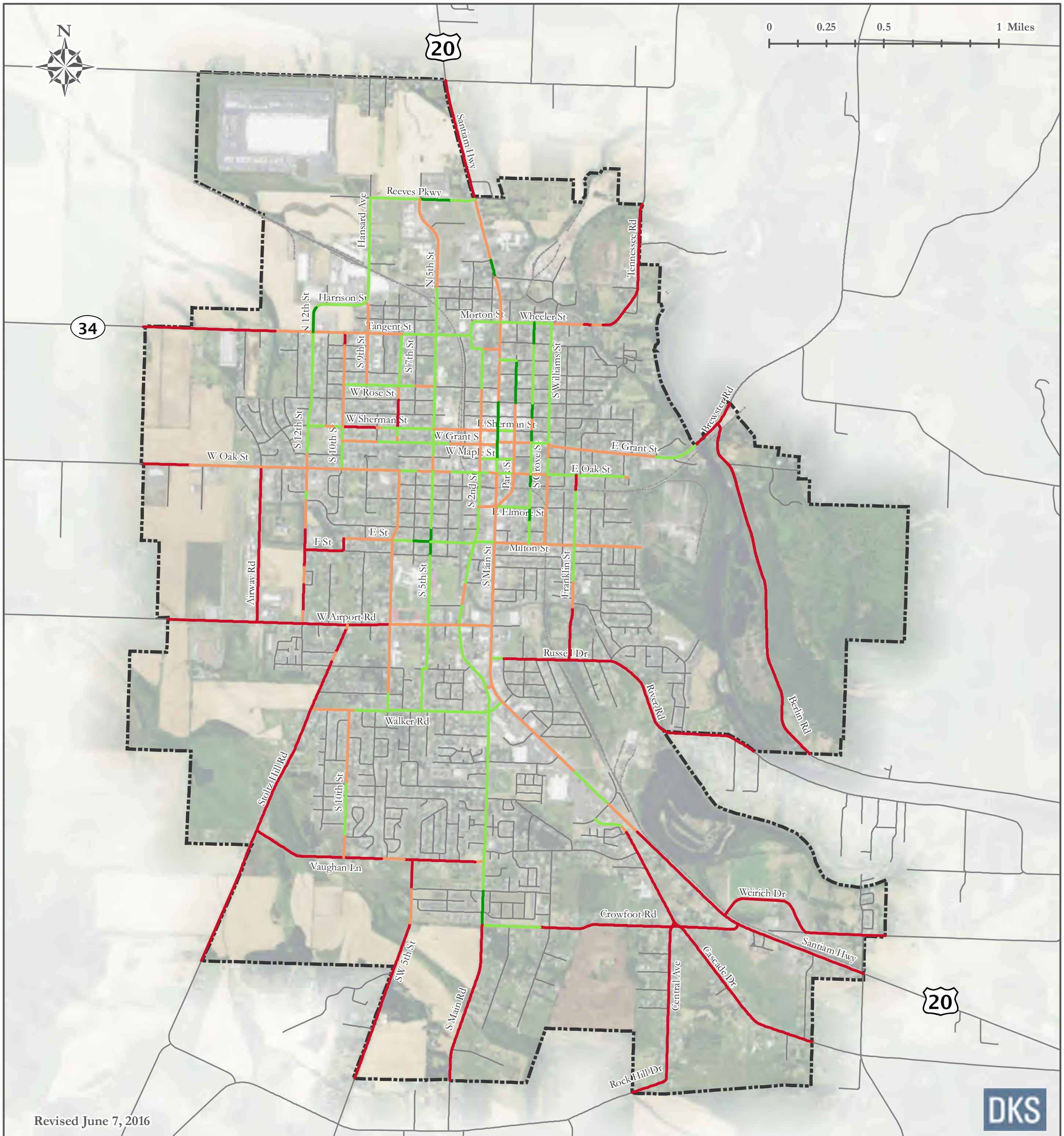
Public Comments on the Walking Network

Key themes from public comments related to the walking network included:

- Sidewalk improvements are needed along streets with heavy pedestrian traffic, including OR 34, and Airport Road.
- Rail crossings need pedestrian safety features.
- Safety concerns for pedestrians was expressed at the US 20- Main Street intersection with Oak Street.
- Pedestrian crossings at off-set intersections should be improved, including at the US-Main Street/ Grant Street, US 20/ Walker Road-Dewey Street, and 2nd Street/ E Street- Milton Street intersections.
- Areas near schools need better sidewalk connectivity.

[9] Analysis Procedures Manual Version 2, Oregon Department of Transportation, March 2016.

9 Qualitative Pedestrian Assessment



Legend:

Qualitative Pedestrian Assessment:

- Excellent
- Good
- Fair
- Poor

Urban Growth Boundary

Note:
Rating is based on a combination of sidewalk presence, speed limit, presence of buffers, roadway volume, number of lanes, shoulder widths and presence of lighting. Rating calculated on Collectors and Arterials.

Bicycle Network Conditions

This section assesses the quality of the biking facilities in Lebanon. People decide whether or not to ride bicycles for many reasons. One of them is the quality of the bikeway facilities. If the network is well connected with streets and intersections that feel safe, more people of all ages and abilities will be supported to make the decision to ride.

Bicycle Level of Traffic Stress

The bicycle network conditions in Lebanon is analyzed using the ODOT Bicycle Level of Traffic Stress methodology[10]. The analysis is based on a combination of traffic speed, presence of bicycle facilities, on-street parking, and other street characteristics, and is rated system-wide as "Extreme Stress", "High Stress", "Moderate Stress", or "Low Stress". The analysis identifies high traffic stress streets, bicycle network gaps, and gaps between "low stress" links. The premise for this analysis is that the overall stress score increases as stress-inducing factors, such as traffic speeds, increase. This analysis can inform the community's understanding of the level of service and form the basis to create and confirm recommendations for bicycle projects.

The Level of Traffic Stress analysis results in four possible street type outcomes:

- **Low Stress:** Most children are comfortable
- **Moderate Stress:** Most of the adult population are comfortable
- **High Stress:** Confident cyclists are comfortable
- **Extreme Stress:** Only the strongest and most experienced cyclists are capable (but not necessarily comfortable)

The bicycle level of traffic stress analysis is shown in Figure 10. This analysis shows that the majority of arterial and collector streets in Lebanon have a low or moderate level of stress. However, the streets with highest stress levels are the streets important for local and regional through travel, where most businesses and services are located. Additionally, the results show streets in downtown Lebanon generate high or extreme levels of stress for people on bicycles.

[10] Analysis Procedures Manual Version 2, Oregon Department of Transportation, March 2016.

Public Comments on the Biking Network

Key themes from public comments related to the biking network included:

- Bike connections to schools are needed.
- Narrower and slower roads are desired to increase safety and encourage more trips by bicycle.

10 Bicycle Level of Stress Analysis

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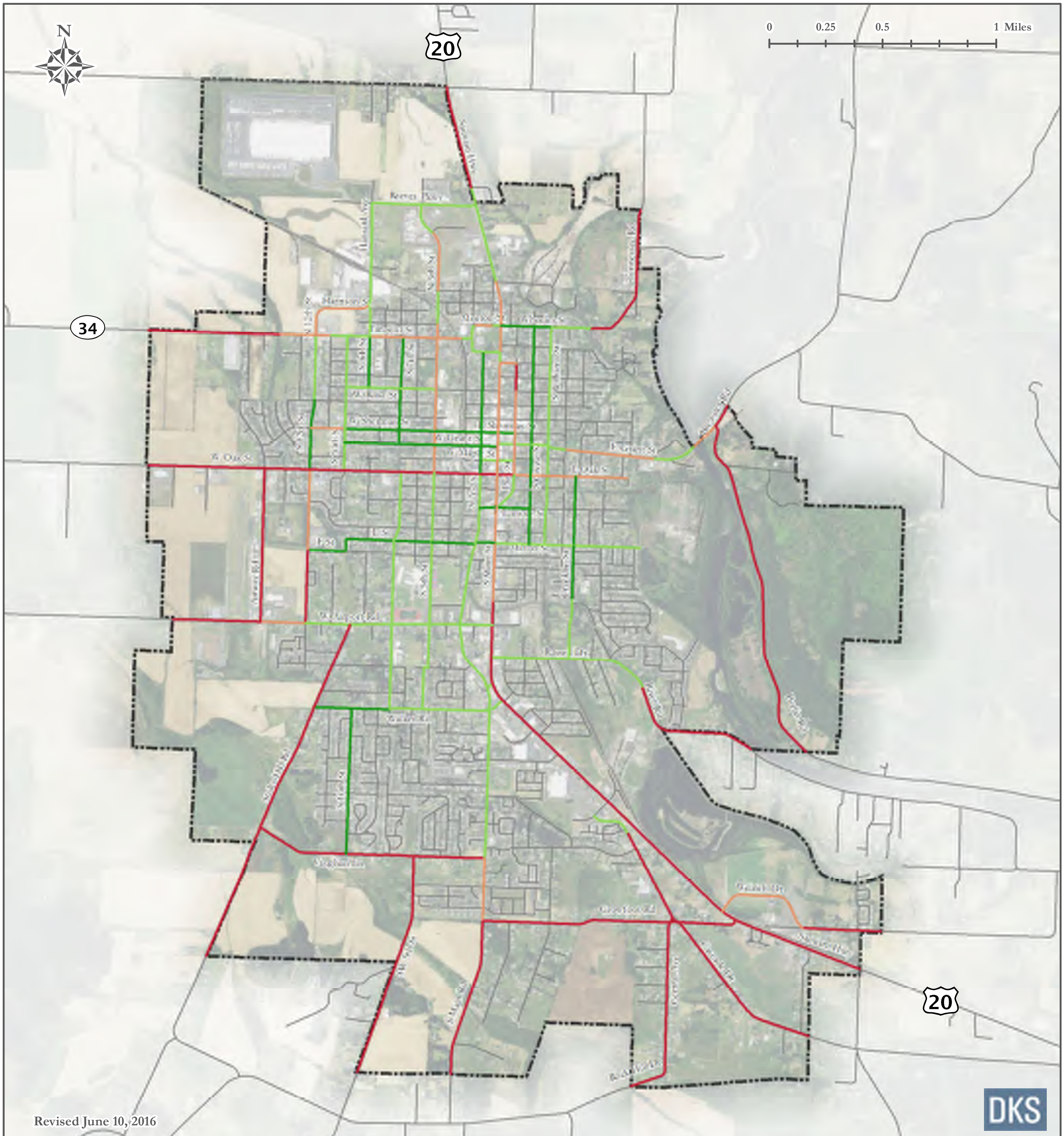

Legend:

Bicycle Level of Stress:

- Low Stress
- Moderate Stress
- High Stress
- Extreme Stress

Urban Growth Boundary

Note:
Rating is based on a combination of speed limit, presence of bicycle facilities, presence of buffers, on-street parking, access and other street characteristics. Rating calculated on Collectors and Arterials.

Driving Conditions

The TSP compares intersections in Lebanon to mobility targets and standards intended to maintain a minimum level of efficiency for motor vehicle travel. Two methods to gauge intersection operations include volume-to-capacity (v/c) ratios and level of service (LOS).

- **Volume-to-capacity (v/c) ratio:** A decimal representation (between 0.00 and 1.00) of the proportion of occupied capacity (capacity defined as the theoretical maximum vehicle throughput in a given time frame) at a turn movement, approach leg, or intersection. It is the peak hour traffic volume divided by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. A ratio approaching 1.00 indicates increased congestion and reduced performance. A ratio greater than 1.00 indicates the turn movement, approach leg, or intersection is oversaturated, which usually results in excessive queues and long delays.
- **Level of service (LOS):** A "report card" rating (A through F) based on the average delay experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and traffic is highly congested.

Intersection mobility targets vary by jurisdiction of the roadways. All intersections under state jurisdiction in Lebanon must comply with the v/c ratios in the Oregon Highway Plan (OHP). The ODOT v/c targets are based on highway classification and posted speeds. A LOS "E" and a v/c ratio of 1.00 as the minimum performance standard during the peak-hour for signalized intersections under City jurisdiction. At un-signalized intersections under City jurisdiction, a v/c ratio of 0.90 is the mobility standard during the peak-hour.

The applicable mobility targets at each study intersection in the City are identified in the appendix (along with existing operating conditions). Study intersections that do not meet the mobility targets shown will require mitigation strategies to be identified in the TSP.

Intersection Operations

The motor vehicle conditions in Lebanon vary based on the time of year. During the summer (typically in August), traffic volumes are higher on major street corridors than during the average weekday (typically in early April or late-October) and, therefore, traffic operations are worse. For this reason, the transportation system plan evaluated the motor vehicle conditions at all 38 study intersections during peak summer (30th highest annual hour volume) conditions. Details of the traffic analysis methodology, including seasonal factors and volume development, are provided in the appendix.

All study intersections meet the mobility targets under existing p.m. peak hour summer conditions. A few intersections are operating just under the applicable mobility targets, including US 20/ Airport Road, US 20/ Walker Road, and Airport Road/ 2nd Street. A listing of operating conditions at all study intersections is provided in the appendix.

Public Comments on the Driving Network

Key themes from public comments related to the driving network included:

- There are peak hour congestion issues at the US 20/ Airport Road intersection.
- Traffic from the US 20/ Walker Road-Dewey Street intersection backs up to Main Road and impacts the Main Road/ Walker Road intersection.
- 12th Street is used as a bypass route for Denny School Road and OR 34.
- Walnut Street and Ash Street are used by drivers to avoid traffic signals along Grant Street.
- Improvements are needed at the Crowfoot Road/ Central Avenue/ Cascade Drive intersection.

Summary of Key Findings

Below is a summary of key findings from the analysis of existing transportation conditions that helps establish a baseline for system performance.

Walking

- Traveling by foot is far more common in the northeast and southwest areas of the City.
- Gaps in the sidewalk system are more common in southwest and southeast Lebanon, and on roadway segments outside the City limits.
- Most crashes involving pedestrians occur downtown, along US 20 between Airport Road and Russell Drive, and at the Airport Road intersection with 2nd Street.
- The vast majority of pedestrian-involved crashes (71 percent) were caused by drivers failing to yield the right of way to a pedestrian in a crosswalk or along a sidewalk.
- Overall, the walking network rates relatively high near downtown, and poor towards the edges of the City.

Key themes from public comments related to the walking network included:

- Sidewalk improvements are needed along streets with heavy pedestrian traffic, including OR 34, and Airport Road.

- Rail crossings need pedestrian safety features.
- Safety concerns for pedestrians was expressed at the US 20- Main Street intersection with Oak Street.
- Pedestrian crossings at off-set intersections should be improved, including at the US-Main Street/ Grant Street, US 20/ Walker Road-Dewey Street, and 2nd Street/ E Street- Milton Street intersections.
- Areas near schools need better sidewalk connectivity.

Biking

- Traveling by bicycle is far more common in the northeast and southwest areas of the City.
- Significant segments of continuous bicycle lanes exist along OR 34, 5th Street, S 2nd Street and Main Road, and Airport Road.
- Most crashes involving bicycles occur at intersections.
- Most of the crashes involving a bicyclist were caused by drivers failing to yield the right of way when turning.
- The majority of arterial and collector streets in Lebanon have a low or moderate level of bicycling stress. However, the streets with highest stress levels are the streets important for local and regional through travel, where most businesses and services are located. Additionally, streets in downtown Lebanon generate high or extreme levels of stress for people on bicycles.

Key themes from public comments related to the biking network included:

- Bike connections to schools are needed.
- Narrower and slower roads are desired to increase safety and encourage more trips by bicycle.

Transit

- Bus stops in Lebanon are located near US 20 and Weldwood Drive-Burdell Boulevard, Main Street-Park Street (US 20) and Oak Street, and US 20 and Industrial Way.
- Only the bus stop near US 20 and Industrial Way (in front of Linn-Benton Community College) is signed and provides a bench, shelter, and bus pull-out.
- All remaining bus stops are unsigned and have no amenities.
- Most transit users in the City are more than a half-mile from a bus stop.
- Public comments indicate a desire for bus service to be extended west of US 20.

Driving

- More than 60 percent of the workers in Lebanon live in another City that is located more than ten miles away, creating many long commute trips and encouraging travel by motor vehicle.
- Motor vehicle volumes on the roadways in Lebanon most commonly peak during weekday evenings between 4:35 p.m. and 5:35 p.m.
- Lebanon experiences an average of around 159 crashes a year, though the severity of most crashes is generally low, with 84 percent involving only property damage or minor injuries.
- Nine intersections in Lebanon were noted as having a high rate of crashes, with three other locations identified through ODOT's Safety Priority Index System as having a high combination of crash frequency and severity.
- The five most common driver errors are responsible for nearly 70 percent of all crashes in Lebanon.
    1. Did Not Yield Right-of-Way (29 percent)
    2. Followed Too Closely (22 percent)
    3. Disregarded Traffic Signal (7 percent)
    4. Made Improper Turn (5 percent)
    5. Inattention (5 percent)
- All study intersections meet the mobility targets under existing p.m. peak hour summer conditions. However, a few intersections are operating just under the applicable mobility targets, including US 20/ Airport Road, US 20/ Walker Road, and Airport Road/ 2nd Street.

Key themes from public comments related to the driving network included:

- There are peak hour congestion issues at the US 20/ Airport Road intersection.
- Traffic from the US 20/ Walker Road-Dewey Street intersection backs up to Main Road and impacts the Main Road/ Walker Road intersection.
- 12th Street is used as a bypass route for Denny School Road and OR 34.
- Walnut Street and Ash Street are used by drivers to avoid traffic signals along Grant Street.
- Improvements are needed at the Crowfoot Road/ Central Avenue/ Cascade Drive intersection.

Other Modes of Travel

- Five bridges are flagged as structurally deficient with poor or serious substructure conditions, and one bridge is flagged as functionally obsolete.
- Within Lebanon, OR 34, and US 20 south of OR 34 are classified as Oregon Freight Routes and Federal Truck Routes, while US 20 north of OR 34 is only classified as a Federal Truck Route
- Local truck routes have also been designated by the City, including portions of Wheeler Street, Williams Street, Milton Street, Grant Street, and Oak Street.
- Public comments indicate a desire to modify the Wheeler Street, Williams Street, and Milton Street local truck route. The current route directs trucks through residential neighborhoods.
- Freight rail service is provided to Lebanon by the Albany and Eastern Railroad.
- The Lebanon State Airport serves 9,800 annual operations (i.e., take-offs or landings).
- Regional and international air service for passengers and freight is provided via Portland International Airport (PDX). Eugene Airport provides regional air service.
- Cascades West RideShare provides transportation options outreach including carpool/vanpool matching services for commuters in Benton, Lincoln, and Linn counties.

Technical Memorandum #5: Existing Conditions Appendix

Section 1: PM Peak Hour Pedestrian & Bicycle Volumes

Section 2: 2016 Existing PM Peak Hour Traffic Volumes

Section 3: Traffic Count Summary

Section 4: Roadway Jurisdiction

Section 5: Federal Functional Classification

Section 6: Freight and Trucking Routes with Bridge Conditions

Section 7: Rail Lines and Crossings

Section 8: Study Intersection Crash Rates

Section 9: Study Intersection Excess Proportion Crash Types

Section 10: Highway Segment Crash Rates

Section 11: Methodology and Assumptions Memorandum

Section 12: Existing Operating Conditions at Study Intersections (2016 PM Peak Hour- 30HV Conditions)

Section 1: PM Peak Hour Pedestrian & Bicycle Volumes

AI PM Peak Hour Pedestrian and Bicycle Volumes

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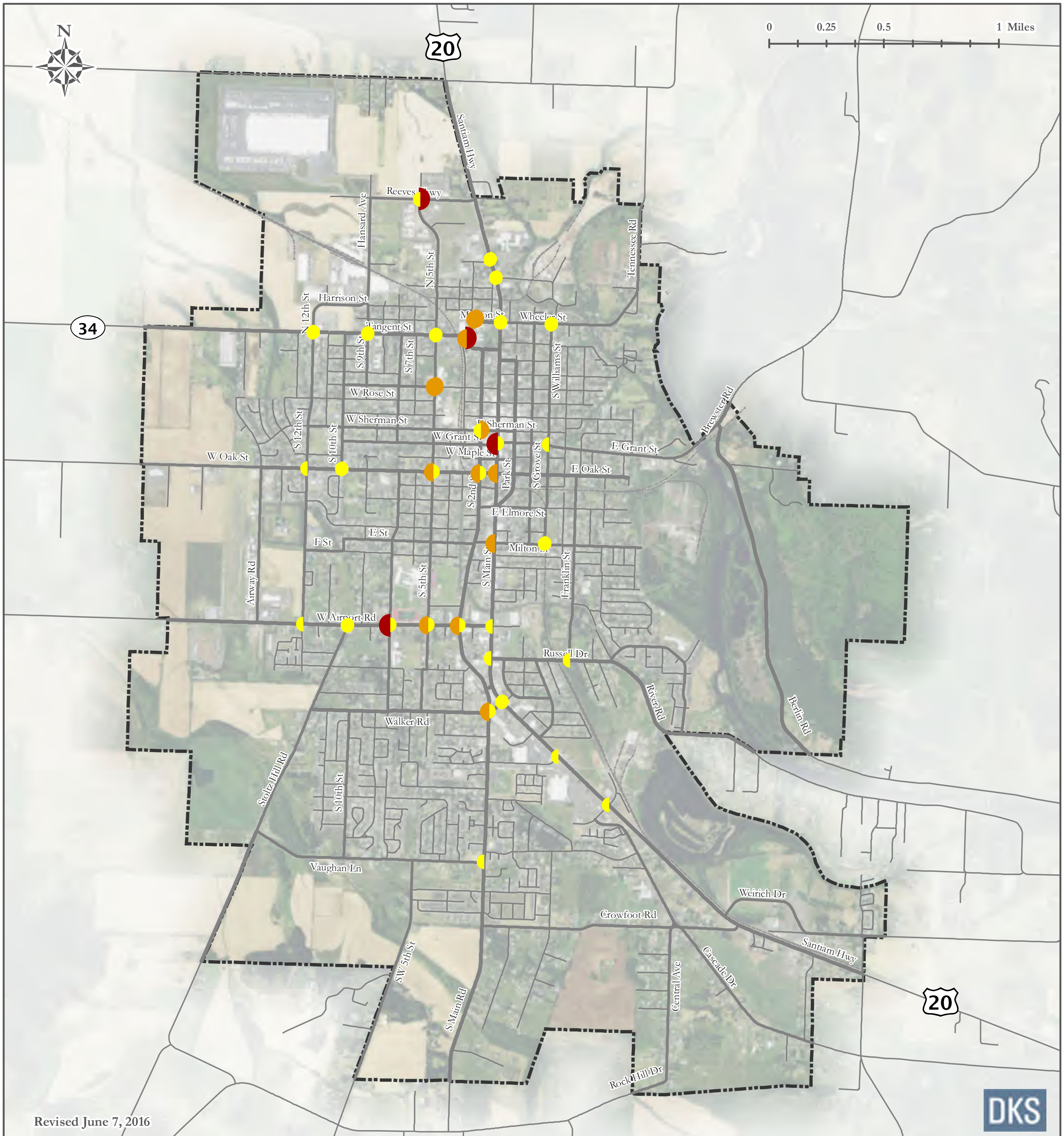

Legend:

Pedestrian Volumes:

- 1 - 10 Pedestrians
- 11 - 20 Pedestrians
- 21 - 40 Pedestrians

Bicycle Volumes:

- 1 - 3 Bicyclists
- 4 - 6 Bicyclists
- 7 - 9 Bicyclists

Urban Growth Boundary

Arterial or Collector Street

Section 2: 2016 Existing PM Peak Hour Traffic Volumes

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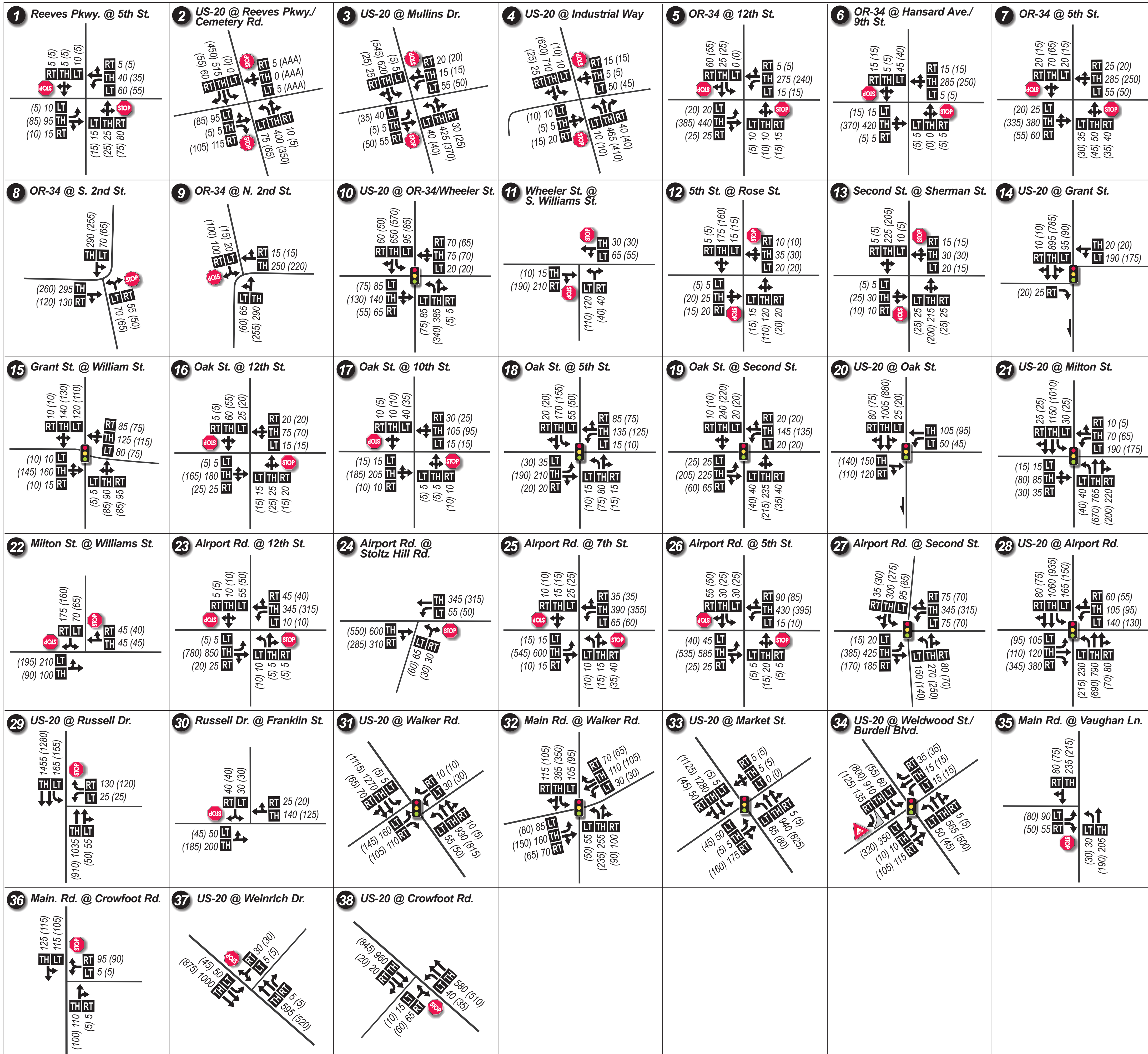
Connecting people and places 2040



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City of Lebanon
Transportation System Plan

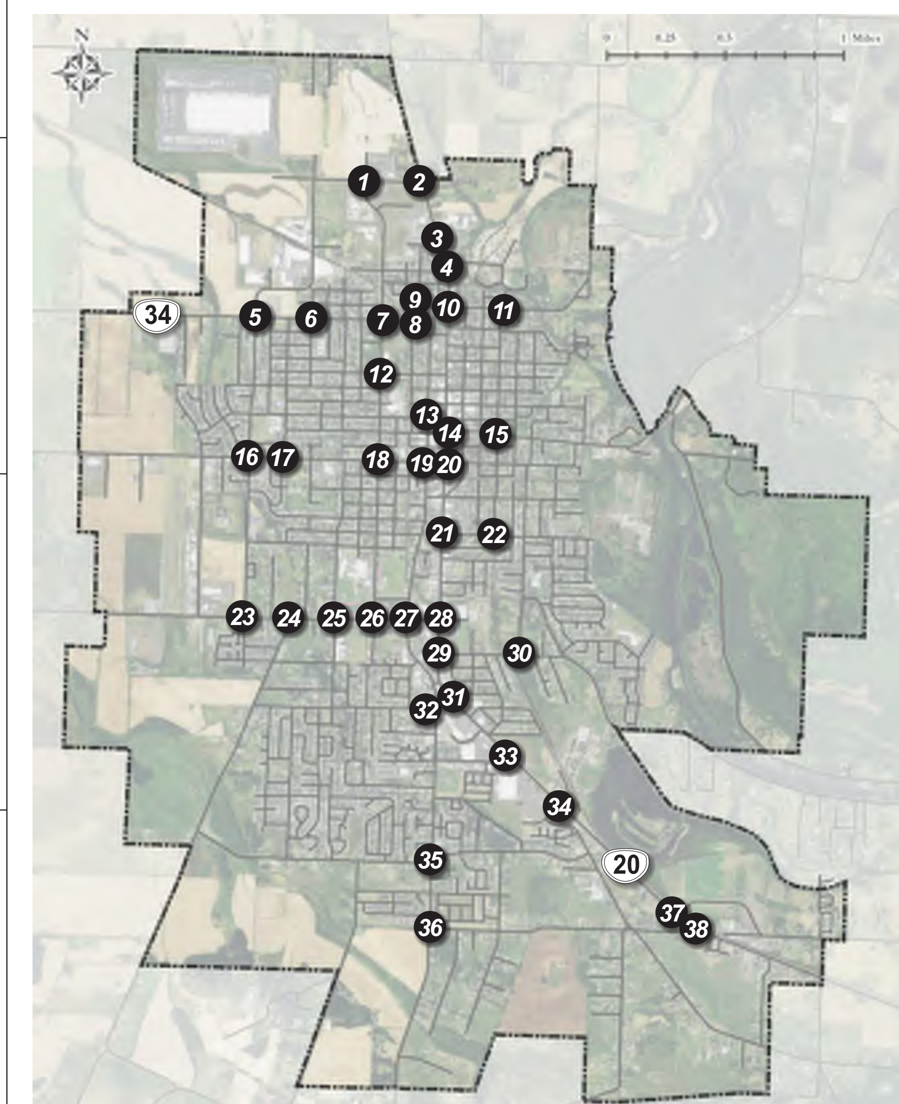
DKS

Figure A-2

2016 Existing PM Peak Hour Traffic Volumes

LEGEND

- # - Study Intersection
- Traffic Signal
- Stop Sign
- Yield Sign
- Lane Configuration
- AAA - 30th Hour Traffic Volumes
- (AAA) - Average Weekday Traffic Volumes
- LT TH RT - Volume Turn Movement (Left • Thru • Right)



Section 3: Traffic Count Summary

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

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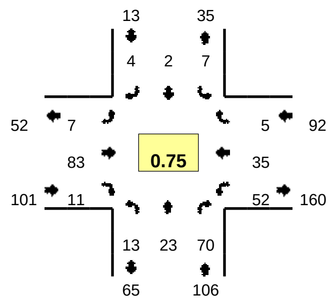
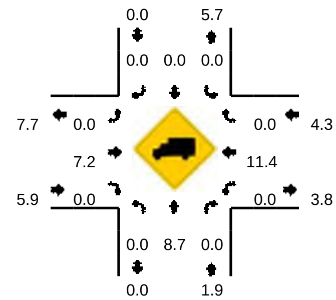
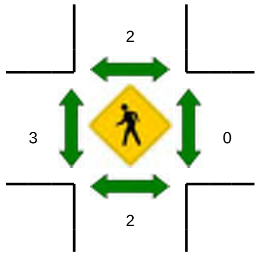
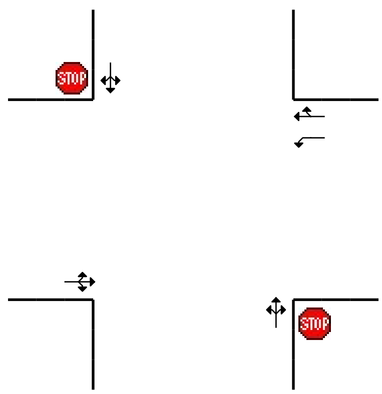
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

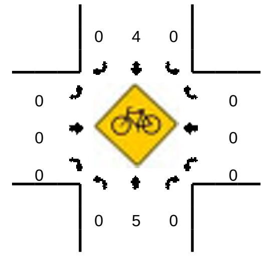


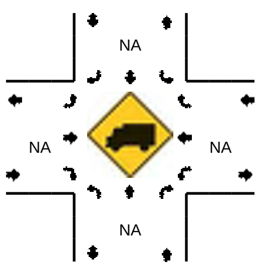
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

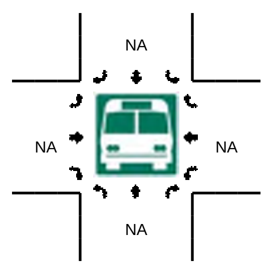












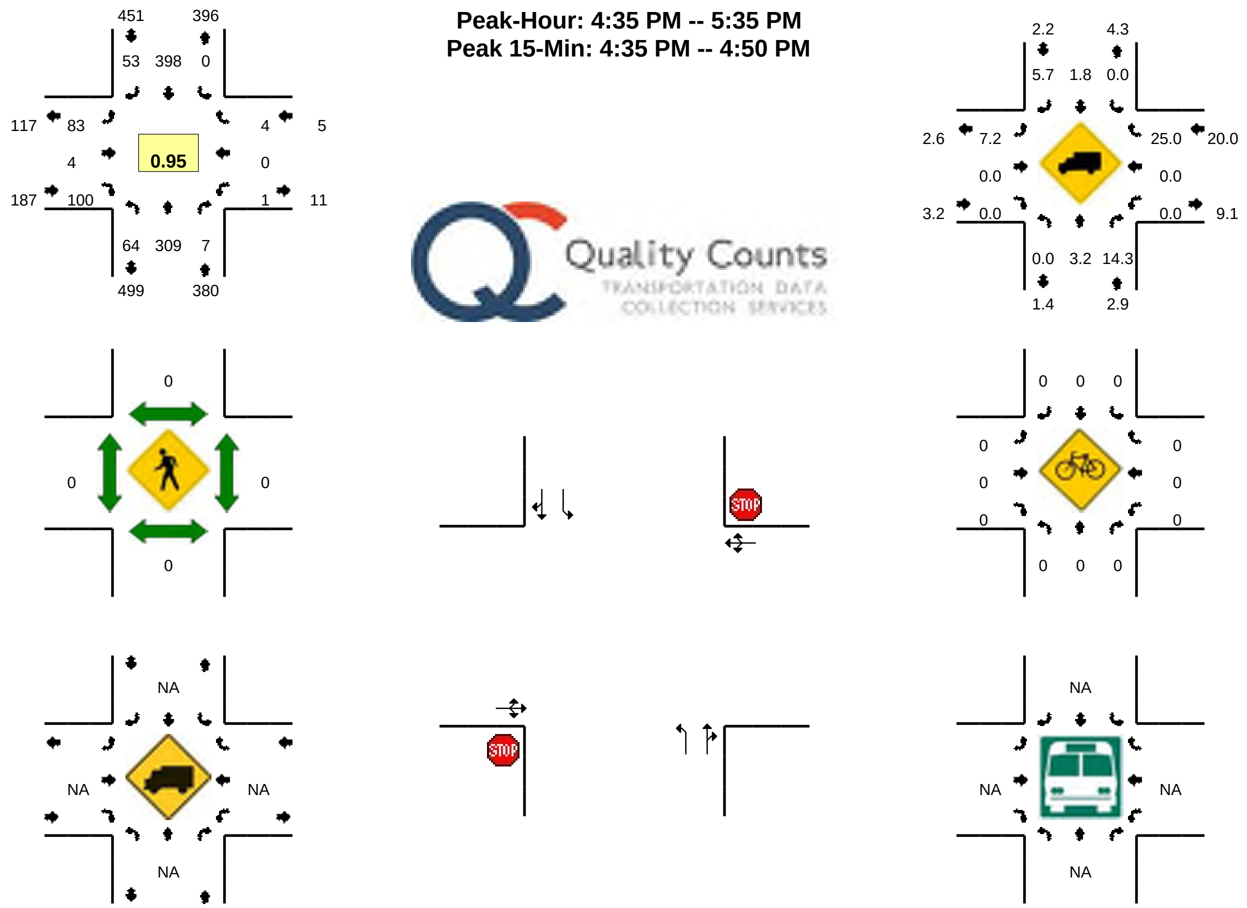
5-Min Count Period Beginning At	N 5th St (Northbound)				N 5th St (Southbound)				Reeves Pkwy (Eastbound)				Reeves Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	0	0	3	0	0	0	0	0	1	5	2	0	3	2	0	0	16	271
4:10 PM	1	1	8	0	0	1	0	0	1	6	1	0	4	0	0	0	23	269
4:15 PM	2	2	8	0	0	0	0	0	0	2	0	0	5	5	0	0	24	272
4:20 PM	1	1	4	0	1	0	0	0	0	2	1	0	5	3	0	0	18	272
4:25 PM	0	0	5	0	0	0	0	0	1	41	1	0	10	4	0	0	62	313
4:30 PM	0	0	8	0	0	0	0	0	1	50	4	0	5	2	0	0	70	355
4:35 PM	2	2	4	0	1	0	0	0	0	24	2	0	3	3	1	0	42	371
4:40 PM	0	1	6	0	0	0	0	0	0	18	3	0	4	3	0	0	35	373
4:45 PM	3	1	5	0	0	0	0	0	2	6	0	0	5	4	1	0	27	379
4:50 PM	1	4	7	0	0	0	1	0	0	6	2	0	2	4	0	0	27	375
4:55 PM	0	4	4	0	2	0	0	0	1	7	2	0	1	5	1	0	27	389
5:00 PM	1	1	3	0	0	0	0	0	1	6	0	0	4	3	0	0	19	390
5:05 PM	1	2	2	0	1	0	0	0	0	5	0	0	5	2	0	0	18	392
5:10 PM	1	1	12	0	0	0	0	0	1	2	2	0	8	5	1	0	33	402
5:15 PM	0	5	8	0	1	0	1	0	1	2	0	0	7	2	0	0	27	405
5:20 PM	2	1	11	0	0	1	1	0	0	2	0	0	6	1	0	0	25	412
5:25 PM	1	0	1	0	2	1	0	0	1	1	0	0	4	1	1	0	13	363
5:30 PM	1	1	7	0	0	0	1	0	0	4	0	0	3	2	0	0	19	312
5:35 PM	0	2	4	0	0	0	0	0	0	1	0	0	3	2	0	0	12	282
5:40 PM	0	2	3	0	0	1	0	0	1	3	0	0	2	9	1	0	22	269
5:45 PM	0	1	0	0	0	0	1	0	2	1	0	0	1	4	1	0	11	253
5:50 PM	0	0	3	0	1	0	1	0	0	3	1	0	1	7	1	0	18	244
5:55 PM	1	1	2	0	2	0	0	0	0	0	0	0	4	1	0	0	11	228
6:00 PM	0	1	2	0	0	0	0	0	0	8	1	0	5	2	0	0	19	228

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	16	60	0	4	0	0	0	8	192	20	0	48	40	8	0	416
Heavy Trucks	0	8	0		0	0	0		0	16	0		0	4	0		28
Pedestrians		4				0				0				0			4
Bicycles	0	4	0		0	0	0		0	0	0		0	0	0		4
Railroad																	
Stopped Buses																	

Comments:

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

LOCATION: US 20 -- Reeves Pkwy/Cemetery Rd **QC JOB #:** 13675114
CITY/STATE: Linn, OR **DATE:** Wed, Jan 20 2016



5-Min Count Period Beginning At	US 20 (Northbound)				US 20 (Southbound)				Reeves Pkwy/Cemetery Rd (Eastbound)				Reeves Pkwy/Cemetery Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	4	28	0	0	0	29	1	0	5	0	3	0	0	0	0	0	70	942
4:10 PM	7	25	0	0	0	26	0	0	9	0	6	0	0	0	0	0	73	936
4:15 PM	6	28	1	0	0	33	5	0	4	0	5	0	0	0	1	0	83	944
4:20 PM	5	29	0	0	0	50	3	0	4	0	6	0	0	0	0	0	97	961
4:25 PM	10	23	0	0	0	35	5	0	15	0	18	0	0	0	0	0	106	991
4:30 PM	6	30	0	0	0	26	4	0	27	0	39	0	0	1	0	0	133	1048
4:35 PM	2	25	1	0	0	32	5	0	11	0	22	0	0	0	0	0	98	1069
4:40 PM	4	24	0	0	0	34	4	0	11	0	12	0	0	0	1	0	90	1066
4:45 PM	8	18	1	0	0	36	3	0	10	0	6	0	0	0	0	0	82	1066
4:50 PM	2	27	0	0	0	32	4	0	6	0	8	0	0	0	0	0	79	1051
4:55 PM	4	22	1	0	0	38	6	0	5	2	8	0	0	0	0	0	86	1066
5:00 PM	3	24	1	0	0	31	7	0	8	0	8	0	0	0	0	0	82	1079
5:05 PM	8	44	0	0	0	29	3	0	5	0	4	0	0	0	1	0	94	1103
5:10 PM	7	28	2	0	0	33	7	0	9	0	6	0	0	0	0	0	92	1122
5:15 PM	8	24	0	0	0	31	7	0	7	0	5	0	1	0	0	0	83	1122
5:20 PM	8	27	1	0	0	37	4	0	4	1	10	0	0	0	1	0	93	1118
5:25 PM	7	29	0	0	0	27	1	0	3	0	5	0	0	0	1	0	73	1085
5:30 PM	3	17	0	0	0	38	2	0	4	1	6	0	0	0	0	0	71	1023
5:35 PM	10	23	0	0	0	34	2	0	3	0	1	0	0	0	0	0	73	998
5:40 PM	3	15	0	0	0	48	7	0	3	0	4	0	0	0	0	0	80	988
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5:50 PM	8	22	1	0	0	29	4	0	5	0	4	0	0	0	0	0	73	966
5:55 PM	1	23	0	0	0	25	4	0	3	0	4	0	1	0	0	0	61	941
6:00 PM	6	24	0	0	0	27	3	0	7	0	5	0	0	0	1	0	73	932

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	56	268	8	0	0	408	48	0	128	0	160	0	0	0	4	0	1080
Heavy Trucks	0	16	0		0	12	4		12	0	0		0	0	0		44
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

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

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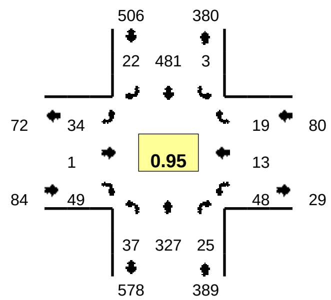
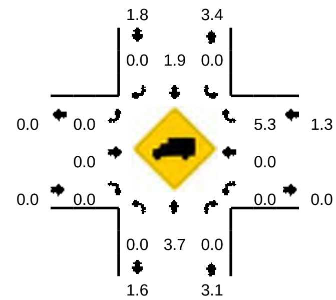
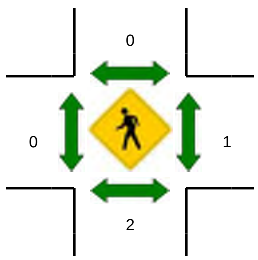
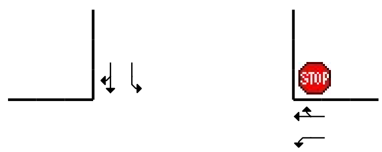
CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016

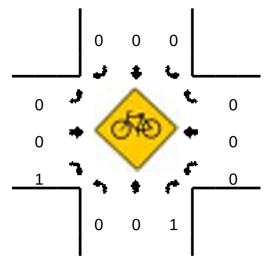


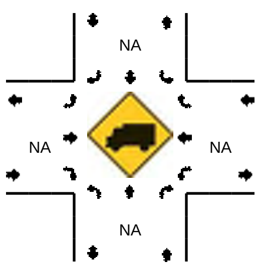
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

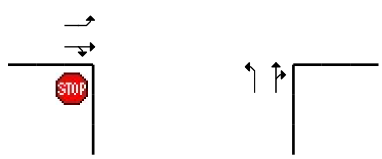


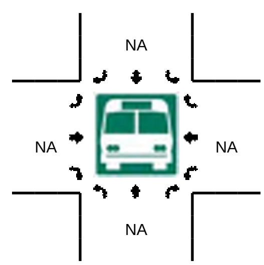












5-Min Count Period Beginning At	US 20 (Northbound)				US 20 (Southbound)				Mullins Dr (Eastbound)				Mullins Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	4	23	6	0	0	36	0	0	2	0	0	0	15	1	3	0	90	1001
4:10 PM	1	21	2	0	0	28	1	0	4	0	2	0	6	0	4	0	69	992
4:15 PM	3	32	6	0	2	34	1	0	3	0	2	0	4	1	2	0	90	1008
4:20 PM	3	33	1	0	0	58	3	0	2	0	2	0	1	0	1	0	104	1025
4:25 PM	4	26	3	0	0	52	1	0	3	0	3	0	6	0	2	0	100	1049
4:30 PM	3	26	1	0	0	59	6	0	4	0	1	0	2	0	5	0	107	1063
4:35 PM	1	25	0	0	0	58	0	0	0	0	1	0	5	1	2	0	93	1093
4:40 PM	1	19	2	0	0	40	3	0	5	0	7	0	4	0	1	0	82	1083
4:45 PM	4	26	1	0	0	45	1	0	1	1	3	0	3	0	0	0	85	1076
4:50 PM	8	27	5	0	0	45	1	0	2	0	6	0	0	1	0	0	95	1075
4:55 PM	3	19	0	0	0	41	2	0	6	0	4	0	3	2	3	0	83	1073
5:00 PM	5	26	3	0	1	35	3	0	3	0	3	0	3	2	3	0	87	1085
5:05 PM	2	39	2	0	0	30	4	0	6	0	5	0	6	1	4	0	99	1094
5:10 PM	0	31	0	0	1	37	1	0	4	0	5	0	7	1	1	0	88	1113
5:15 PM	4	31	3	0	0	34	2	0	0	0	6	0	4	3	1	0	88	1111
5:20 PM	4	37	4	0	1	44	3	0	2	0	4	0	3	1	0	0	103	1110
5:25 PM	3	29	3	0	0	31	2	0	3	0	2	0	7	1	2	0	83	1093
5:30 PM	2	18	2	0	0	41	0	0	2	0	3	0	3	0	2	0	73	1059
5:35 PM	3	25	0	0	0	37	0	0	4	0	7	0	4	1	3	0	84	1050
5:40 PM	2	13	2	0	0	47	3	0	3	0	2	0	1	0	0	0	73	1041
5:45 PM	3	28	1	0	2	29	1	0	2	0	3	0	1	0	0	0	70	1026
5:50 PM	2	28	1	0	0	32	0	0	1	1	2	0	6	0	0	0	73	1004
5:55 PM	2	25	3	0	1	27	1	0	1	0	4	0	3	0	2	0	69	990
6:00 PM	1	24	1	0	0	27	2	0	1	1	4	0	0	1	1	0	63	966

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	32	396	28	0	8	460	24	0	24	0	60	0	56	20	8	0	1116
Heavy Trucks	0	12	0		0	8	0		0	0	0		0	0	0		20
Pedestrians		4				0				0				4			8
Bicycles	0	0	1		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

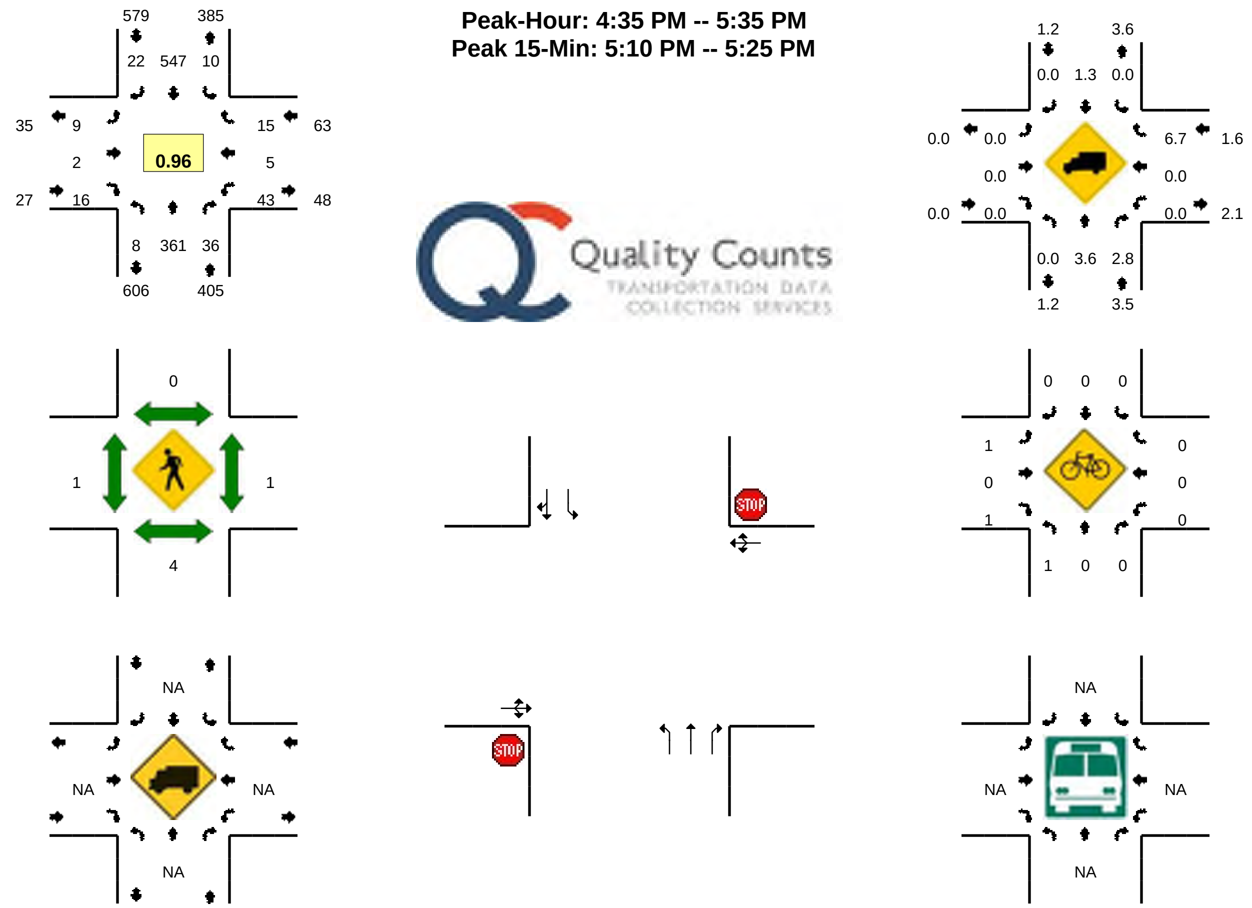
Type of peak hour being reported: User-Defined — Method for determining peak hour: Total Entering Volume

LOCATION: US 20 -- Industral Way — **QC JOB #:** 13675116

CITY/STATE: Linn, OR — **DATE:** Wed, Jan 20 2016

Peak-Hour: 4:35 PM -- 5:35 PM

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



5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Industral Way (Eastbound) Left	Thru	Right	U	Industral Way (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	33	3	0	0	49	3	0	1	0	0	0	2	0	1	0	92	1041
4:10 PM	0	20	5	0	0	32	2	0	1	0	1	0	3	0	1	0	65	1028
4:15 PM	0	38	4	0	0	38	3	0	0	0	2	0	6	0	3	0	94	1038
4:20 PM	0	36	5	0	0	55	3	0	0	0	0	0	8	0	2	0	109	1050
4:25 PM	1	31	6	0	1	61	0	0	0	0	1	0	3	0	1	0	105	1073
4:30 PM	0	22	1	0	3	59	0	0	1	0	0	0	5	0	7	0	98	1077
4:35 PM	3	24	2	0	1	62	1	0	1	0	3	0	1	1	2	0	101	1108
4:40 PM	2	24	3	0	0	48	4	0	0	1	1	0	5	0	0	0	88	1108
4:45 PM	0	26	5	0	1	49	2	0	1	0	2	0	1	0	1	0	88	1107
4:50 PM	0	37	1	0	0	50	0	0	0	0	1	0	7	1	5	0	102	1114
4:55 PM	2	20	3	0	0	49	1	0	0	0	1	0	9	0	0	0	85	1111
5:00 PM	0	34	3	0	1	38	1	0	0	0	1	0	2	1	0	0	81	1108
5:05 PM	0	35	4	0	0	41	0	0	3	0	2	0	7	0	3	0	95	1111
5:10 PM	0	27	2	0	2	47	2	0	1	0	1	0	3	1	2	0	88	1134
5:15 PM	1	38	2	0	1	37	3	0	1	1	1	0	2	0	0	0	87	1127
5:20 PM	0	45	5	0	1	48	3	0	0	0	1	0	2	0	0	0	105	1123
5:25 PM	0	30	5	0	0	37	3	0	1	0	1	0	3	0	2	0	82	1100
5:30 PM	0	21	1	0	3	41	2	0	1	0	1	0	1	1	0	0	72	1074
5:35 PM	0	25	2	0	1	45	3	0	1	0	1	0	3	0	1	0	82	1055
5:40 PM	1	15	3	0	1	49	4	0	0	0	0	0	4	0	0	0	77	1044
5:45 PM	0	31	6	0	2	31	1	0	1	0	0	0	2	0	1	0	75	1031
5:50 PM	0	30	3	0	2	34	3	0	1	0	0	0	4	0	0	0	77	1006
5:55 PM	0	29	3	0	2	32	1	0	0	0	0	0	3	0	0	0	70	991
6:00 PM	0	25	3	0	1	27	1	0	0	0	1	0	3	0	0	0	61	971

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	440	36	0	16	528	32	0	8	4	12	0	28	4	8	0	1120
Heavy Trucks	0	12	0		0	4	0		0	0	0		0	0	0		16
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		1	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

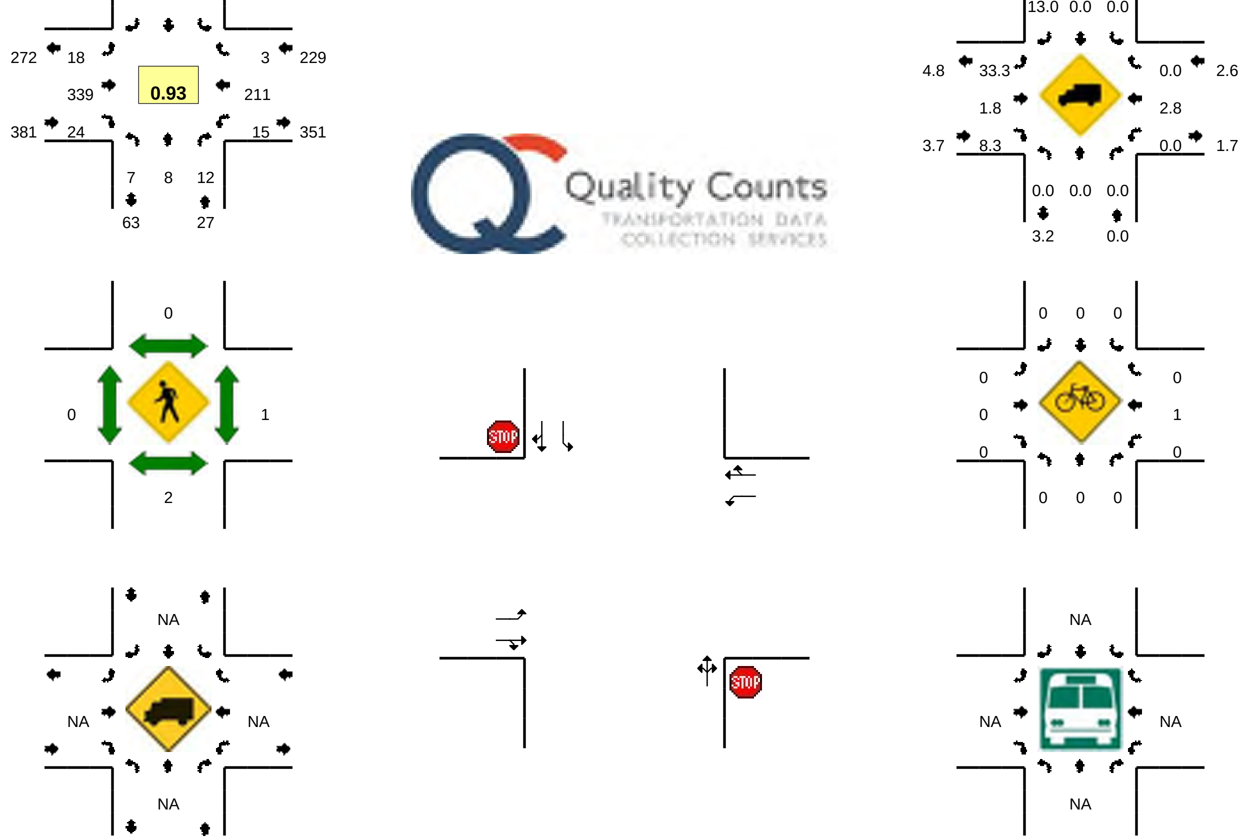
Comments:

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

LOCATION: 12th St -- OR 34 | **QC JOB #:** 13675119

CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016

Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:55 PM -- 5:10 PM



5-Min Count Period Beginning At	12th St (Northbound) Left	Thru	Right	U	12th St (Southbound) Left	Thru	Right	U	OR 34 (Eastbound) Left	Thru	Right	U	OR 34 (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	1	1	2	0	1	4	4	0	2	25	3	0	0	13	0	0	56	648
4:10 PM	1	0	0	0	1	4	4	0	2	23	0	0	2	18	1	0	56	655
4:15 PM	0	1	1	0	0	4	4	0	2	25	2	0	5	9	0	0	53	665
4:20 PM	2	2	1	0	1	0	3	0	0	24	0	0	3	14	0	0	50	657
4:25 PM	1	1	3	0	0	2	11	0	2	20	3	0	3	17	0	0	63	655
4:30 PM	2	2	3	0	1	6	18	0	0	19	3	0	3	18	0	0	75	672
4:35 PM	3	0	0	0	0	5	15	0	0	22	1	0	1	13	1	0	61	676
4:40 PM	1	0	0	0	0	5	8	0	1	30	0	0	1	18	1	0	65	692
4:45 PM	1	0	0	0	0	1	4	0	1	25	3	0	2	26	0	0	63	704
4:50 PM	0	0	0	0	0	1	2	0	1	29	2	0	2	12	0	0	49	697
4:55 PM	1	1	2	0	0	3	3	0	1	35	1	0	1	20	1	0	69	718
5:00 PM	1	1	2	0	0	3	1	0	4	28	1	0	0	19	0	0	60	720
5:05 PM	0	1	1	0	0	1	6	0	1	22	4	0	3	24	0	0	63	727
5:10 PM	0	2	2	0	0	1	4	0	2	18	0	0	3	19	0	0	51	722
5:15 PM	0	0	2	0	0	3	2	0	1	30	2	0	0	18	0	0	58	727
5:20 PM	0	0	2	0	0	1	1	0	2	28	1	0	2	16	0	0	53	730
5:25 PM	0	2	1	0	0	0	5	0	1	37	4	0	0	13	0	0	63	730
5:30 PM	0	1	0	0	0	0	3	0	3	35	5	0	0	13	0	0	60	715
5:35 PM	1	0	1	0	0	1	3	0	4	18	1	0	2	11	0	0	42	696
5:40 PM	3	1	3	0	0	0	2	0	2	25	3	0	2	10	0	0	51	682
5:45 PM	1	2	2	0	0	1	4	0	5	28	1	0	1	15	0	0	60	679
5:50 PM	1	0	3	0	0	1	0	0	0	19	2	0	2	9	0	0	37	667
5:55 PM	1	1	1	0	0	2	1	0	0	17	2	0	1	13	1	0	40	638
6:00 PM	0	3	1	0	0	2	4	0	2	26	1	0	1	8	0	0	48	626

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	12	20	0	0	28	40	0	24	340	24	0	16	252	4	0	768
Heavy Trucks	0	0	0		0	0	4		8	8	0		0	4	0		24
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

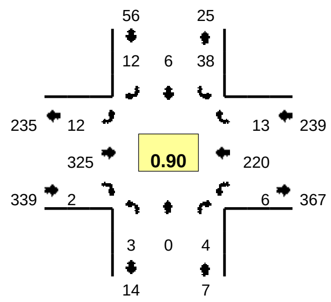
Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

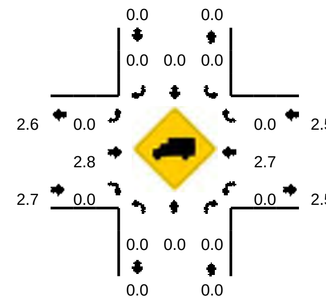
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

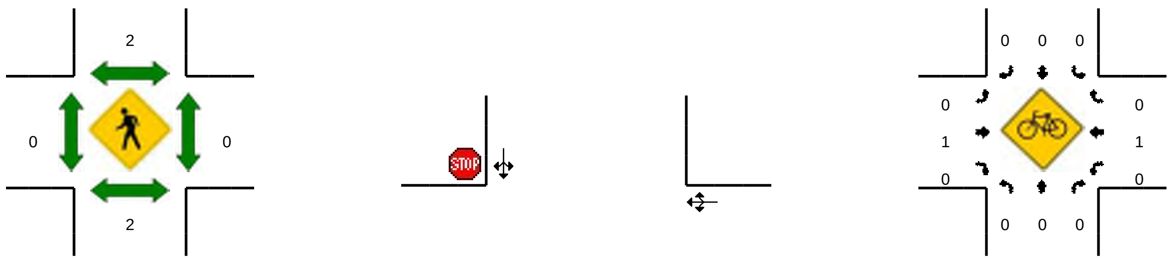
LOCATION: Hansard Ave/S 9th St -- OR 34
CITY/STATE: Linn, OR

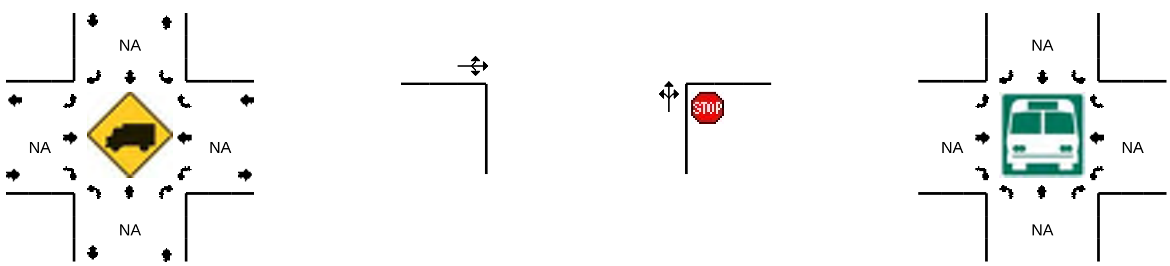
QC JOB #: 13675120
DATE: Wed, Jan 20 2016

Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:50 PM -- 5:05 PM









5-Min Count Period Beginning At	Hansard Ave/S 9th St (Northbound) Left	Thru	Right	U	Hansard Ave/S 9th St (Southbound) Left	Thru	Right	U	OR 34 (Eastbound) Left	Thru	Right	U	OR 34 (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	0	0	0	3	0	3	0	0	33	0	0	0	16	0	0	55	600
4:10 PM	0	0	0	0	3	0	2	0	1	22	0	0	0	22	0	0	50	609
4:15 PM	0	0	2	0	3	0	0	0	0	28	0	0	0	20	2	0	55	621
4:20 PM	0	0	1	0	4	0	0	0	0	22	0	0	1	14	0	0	42	610
4:25 PM	0	0	0	0	6	0	1	0	1	21	0	0	0	23	1	0	53	604
4:30 PM	0	0	0	0	14	1	1	0	0	33	1	0	0	18	3	0	71	620
4:35 PM	1	0	0	0	10	2	1	0	0	21	0	0	0	16	1	0	52	611
4:40 PM	0	0	0	0	6	0	1	0	0	36	0	0	0	17	2	0	62	629
4:45 PM	0	0	0	0	1	0	3	0	1	21	0	0	0	27	3	0	56	628
4:50 PM	0	0	1	0	4	1	2	0	4	22	1	0	0	19	1	0	55	632
4:55 PM	1	0	1	0	5	1	0	0	1	35	0	0	0	17	1	0	62	658
5:00 PM	0	0	1	0	5	1	1	0	1	29	1	0	1	21	0	0	61	674
5:05 PM	0	0	0	0	0	0	0	0	0	27	0	0	1	23	2	0	53	672
5:10 PM	1	0	0	0	2	0	1	0	1	18	0	0	2	20	1	0	46	668
5:15 PM	0	0	1	0	2	0	0	0	1	30	0	0	0	21	0	0	55	668
5:20 PM	0	0	0	0	2	1	2	0	1	28	0	0	0	12	1	0	47	673
5:25 PM	0	0	0	0	0	0	0	0	1	31	0	0	1	16	1	0	50	670
5:30 PM	0	0	0	0	1	0	1	0	1	27	0	0	1	11	0	0	42	641
5:35 PM	0	0	0	0	6	0	0	0	0	18	0	0	0	10	5	0	39	628
5:40 PM	1	0	0	0	1	0	0	0	4	21	1	0	0	11	1	0	40	606
5:45 PM	0	0	0	0	1	0	2	0	1	31	0	0	0	16	2	0	53	603
5:50 PM	0	0	0	0	0	0	0	0	0	22	1	0	0	11	3	0	37	585
5:55 PM	0	0	0	0	4	0	0	0	0	19	0	0	0	14	3	0	40	563
6:00 PM	0	0	0	0	10	1	0	0	0	25	0	0	0	8	1	0	45	547

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	0	12	0	56	12	12	0	24	344	8	0	4	228	8	0	712
Heavy Trucks	0	0	0		0	0	0		0	12	0		0	4	0		16
Pedestrians		0				8				0				0			8
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

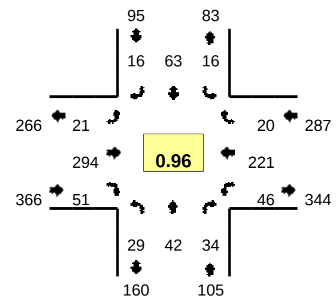
Report generated on 2/16/2016 11:14 AM

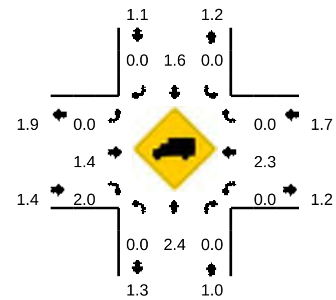
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

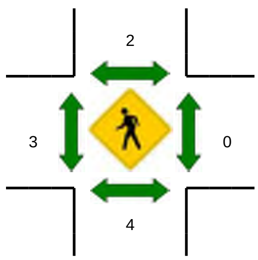
Type of peak hour being reported: User-Defined — Method for determining peak hour: Total Entering Volume

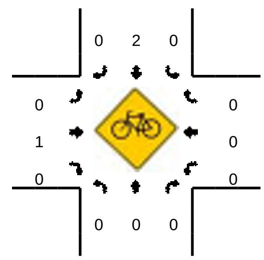
LOCATION: S 5th St -- OR 34 — **QC JOB #:** 13675121
CITY/STATE: Linn, OR — **DATE:** Wed, Jan 20 2016

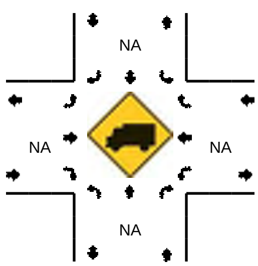
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:55 PM -- 5:10 PM

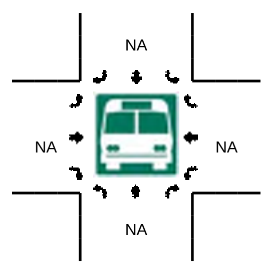












5-Min Count Period Beginning At	S 5th St (Northbound) Left	Thru	Right	U	S 5th St (Southbound) Left	Thru	Right	U	OR 34 (Eastbound) Left	Thru	Right	U	OR 34 (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	3	1	2	0	1	4	1	0	1	35	7	0	2	16	2	0	75	780
4:10 PM	3	2	2	0	1	3	1	0	1	31	3	0	3	18	0	0	68	800
4:15 PM	1	4	1	0	3	2	0	0	0	26	8	0	4	23	2	0	74	818
4:20 PM	4	0	4	0	0	2	0	0	3	25	3	0	0	14	1	0	56	805
4:25 PM	3	1	1	0	3	6	0	0	1	22	5	0	3	19	0	0	64	801
4:30 PM	3	2	1	0	1	3	0	0	1	39	6	0	4	12	1	0	73	805
4:35 PM	2	3	2	0	2	6	0	0	4	24	3	0	2	20	0	0	68	801
4:40 PM	2	5	1	0	0	9	1	0	5	34	9	0	4	16	2	0	88	824
4:45 PM	5	1	5	0	1	10	2	0	0	17	1	0	3	20	1	0	66	824
4:50 PM	3	3	5	0	2	4	0	0	0	23	3	0	1	18	1	0	63	812
4:55 PM	1	3	4	0	1	2	1	0	1	27	7	0	4	18	2	0	71	823
5:00 PM	2	1	5	0	1	0	2	0	2	29	4	0	6	20	1	0	73	839
5:05 PM	4	3	0	0	1	3	3	0	1	26	3	0	11	24	0	0	79	843
5:10 PM	2	5	3	0	1	5	1	0	1	19	1	0	4	19	2	0	63	838
5:15 PM	3	6	4	0	0	5	2	0	1	20	10	0	3	20	5	0	79	843
5:20 PM	4	5	1	0	4	7	0	0	2	28	1	0	4	17	2	0	75	862
5:25 PM	1	3	1	0	0	6	3	0	1	22	6	0	4	13	3	0	63	861
5:30 PM	0	4	3	0	3	6	1	0	3	25	3	0	0	16	1	0	65	853
5:35 PM	2	2	2	0	1	8	0	0	1	20	5	0	4	11	2	0	58	843
5:40 PM	1	3	1	0	0	8	3	0	2	18	2	0	1	10	1	0	50	805
5:45 PM	5	1	2	0	0	2	2	0	1	25	3	0	5	12	1	0	59	798
5:50 PM	1	0	0	0	1	1	2	0	3	18	4	0	1	18	0	0	49	784
5:55 PM	2	1	1	0	0	4	0	0	1	20	5	0	2	15	1	0	52	765
6:00 PM	0	1	5	0	1	1	0	0	2	24	3	0	1	12	0	0	50	742

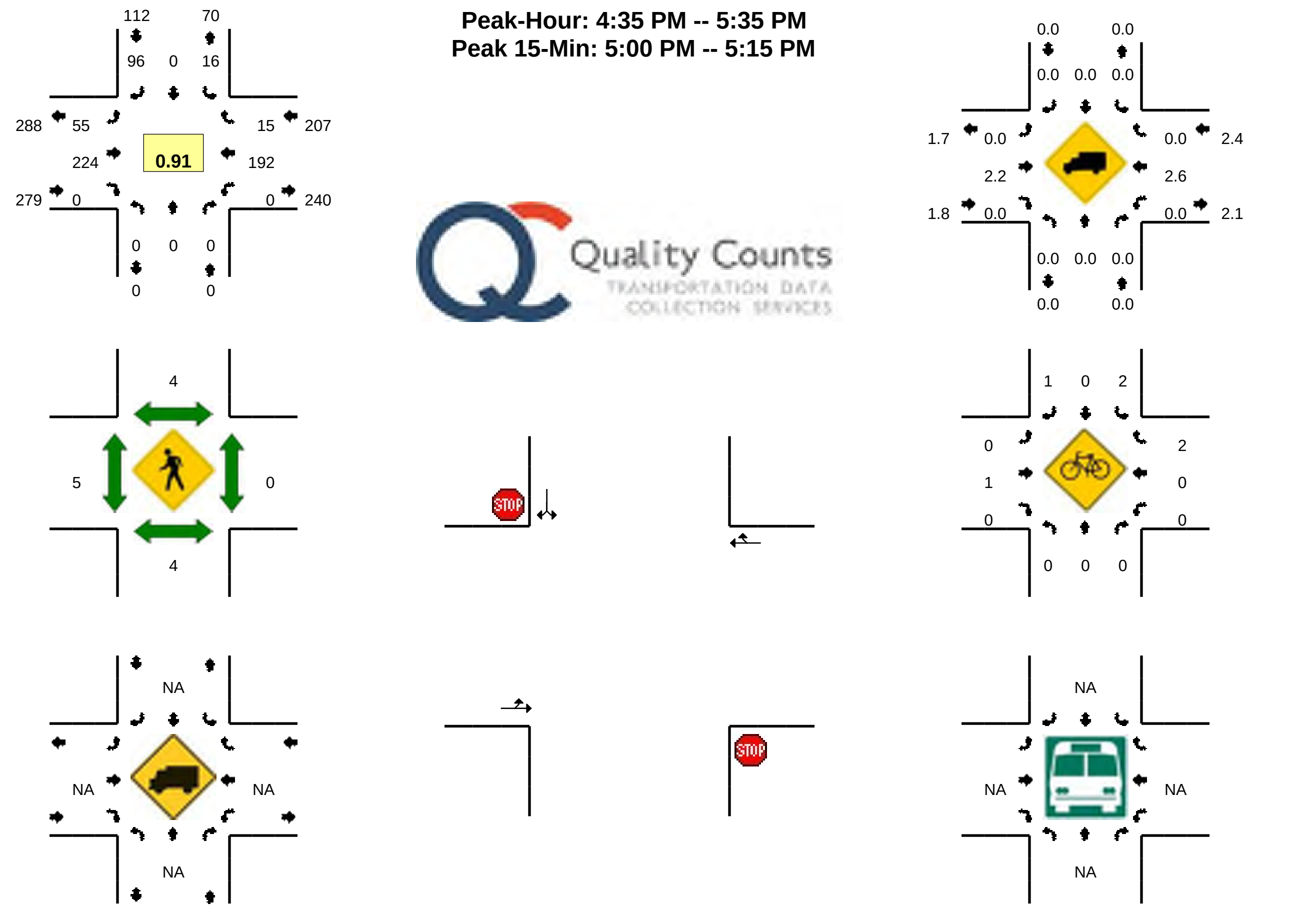
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	28	28	36	0	12	20	24	0	16	328	56	0	84	248	12	0	892
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	8	0		12
Pedestrians		0				8				4				0			12
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

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

LOCATION: 2nd St -- OR 34 | **QC JOB #:** 13675122
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:00 PM -- 5:15 PM



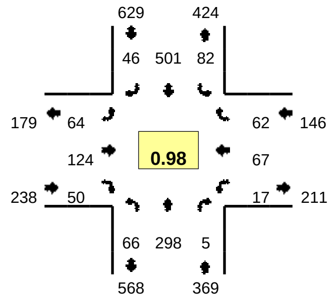
5-Min Count Period Beginning At	2nd St (Northbound) Left	Thru	Right	U	2nd St (Southbound) Left	Thru	Right	U	OR 34 (Eastbound) Left	Thru	Right	U	OR 34 (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	0	0	0	3	0	4	0	2	24	0	0	0	17	2	0	52	519
4:10 PM	0	0	0	0	7	0	6	0	3	19	0	0	0	19	2	0	56	536
4:15 PM	0	0	0	0	2	0	3	0	2	11	0	0	0	18	1	0	37	536
4:20 PM	0	0	0	0	5	0	3	0	2	16	0	0	0	11	1	0	38	536
4:25 PM	0	0	0	0	1	0	5	0	6	22	0	0	0	13	0	0	47	538
4:30 PM	0	0	0	0	2	0	3	0	3	13	0	0	0	13	1	0	35	535
4:35 PM	0	0	0	0	0	0	5	0	3	24	0	0	0	16	1	0	49	547
4:40 PM	0	0	0	0	1	0	12	0	6	13	0	0	0	17	0	0	49	540
4:45 PM	0	0	0	0	1	0	6	0	5	18	0	0	0	19	1	0	50	553
4:50 PM	0	0	0	0	2	0	15	0	6	13	0	0	0	15	0	0	51	545
4:55 PM	0	0	0	0	1	0	5	0	2	23	0	0	0	14	2	0	47	551
5:00 PM	0	0	0	0	2	0	17	0	9	19	0	0	0	17	1	0	65	576
5:05 PM	0	0	0	0	0	0	6	0	3	18	0	0	0	23	0	0	50	574
5:10 PM	0	0	0	0	0	0	7	0	9	15	0	0	0	16	2	0	49	567
5:15 PM	0	0	0	0	4	0	5	0	6	16	0	0	0	17	0	0	48	578
5:20 PM	0	0	0	0	0	0	7	0	1	21	0	0	0	17	3	0	49	589
5:25 PM	0	0	0	0	2	0	6	0	2	19	0	0	0	12	1	0	42	584
5:30 PM	0	0	0	0	3	0	5	0	3	25	0	0	0	9	4	0	49	598
5:35 PM	0	0	0	0	2	0	6	0	3	12	0	0	0	12	1	0	36	585
5:40 PM	0	0	0	0	1	0	4	0	2	16	0	0	0	9	0	0	32	568
5:45 PM	0	0	0	0	2	0	4	0	2	19	0	0	0	13	1	0	41	559
5:50 PM	0	0	0	0	1	0	3	0	5	13	0	0	0	8	0	0	30	538
5:55 PM	0	0	0	0	0	0	2	0	2	13	0	0	0	13	1	0	31	522
6:00 PM	0	0	0	0	0	0	4	0	2	16	0	0	0	8	1	0	31	488

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	8	0	120	0	84	208	0	0	0	224	12	0	656
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	8	0		12
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	1		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

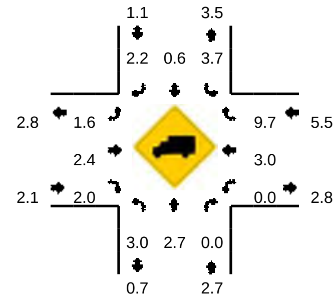
Comments:

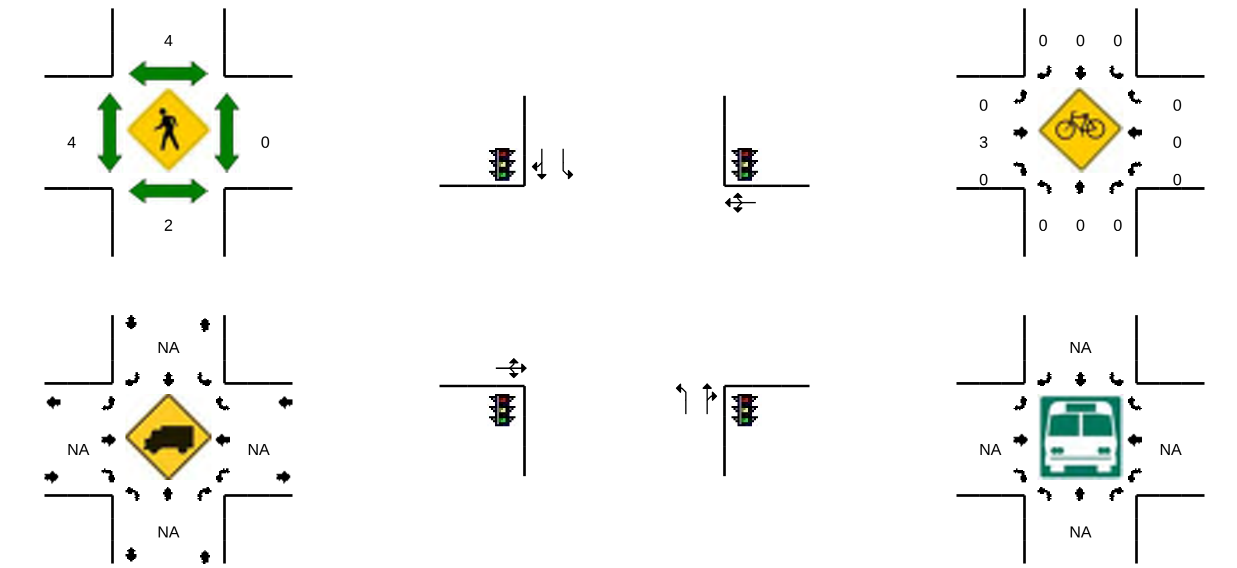
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: US 20 -- OR 34/Wheeler St | **QC JOB #:** 13675101
CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016



Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:55 PM -- 5:10 PM





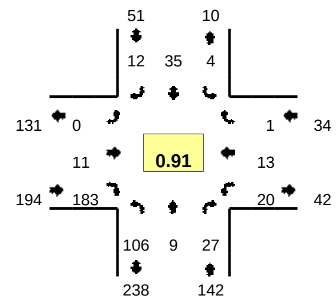
5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	OR 34/Wheeler St (Eastbound) Left	Thru	Right	U	OR 34/Wheeler St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	6	20	4	0	7	33	5	0	7	11	4	0	1	4	5	0	107	1316
4:10 PM	8	18	0	0	4	34	6	0	6	13	7	0	0	5	4	0	105	1323
4:15 PM	2	36	0	0	6	37	7	0	5	4	8	0	1	6	7	0	119	1338
4:20 PM	2	30	0	0	7	50	2	0	5	8	5	0	0	7	6	0	122	1347
4:25 PM	4	25	1	0	8	54	5	0	12	9	3	0	1	3	5	0	130	1370
4:30 PM	5	16	1	0	12	51	2	0	1	13	2	0	0	4	2	0	109	1365
4:35 PM	3	19	0	0	5	53	3	0	6	16	6	0	0	11	9	0	131	1389
4:40 PM	4	19	0	0	9	55	4	0	2	7	2	0	1	4	5	0	112	1397
4:45 PM	10	24	1	0	8	34	1	0	8	10	1	0	0	7	5	0	109	1397
4:50 PM	3	27	0	0	10	45	5	0	2	8	5	0	1	2	4	0	112	1384
4:55 PM	9	21	0	0	5	43	3	0	3	18	3	0	2	5	4	0	116	1381
5:00 PM	3	26	0	0	2	44	9	0	9	7	6	0	2	6	4	0	118	1390
5:05 PM	7	30	1	0	7	37	4	0	6	9	4	0	2	7	6	0	120	1403
5:10 PM	7	26	0	0	7	42	4	0	2	9	3	0	2	6	2	0	110	1408
5:15 PM	5	39	2	0	9	39	5	0	6	6	4	0	0	4	4	0	123	1412
5:20 PM	8	26	1	0	5	33	2	0	11	8	5	0	0	5	6	0	110	1400
5:25 PM	5	23	0	0	10	39	2	0	4	12	5	0	6	5	9	0	120	1390
5:30 PM	2	18	0	0	5	37	4	0	5	14	6	0	1	5	4	0	101	1382
5:35 PM	5	17	1	0	7	36	4	0	4	10	7	0	1	3	4	0	99	1350
5:40 PM	3	15	0	0	4	36	2	0	3	12	1	0	0	2	2	0	80	1318
5:45 PM	1	24	0	0	9	32	3	0	9	10	4	0	1	7	9	0	109	1318
5:50 PM	3	27	1	0	5	29	4	0	2	5	5	0	0	1	1	0	83	1289
5:55 PM	9	25	0	0	5	28	2	0	3	8	3	0	1	0	2	0	86	1259
6:00 PM	2	21	0	0	3	29	4	0	9	6	1	0	0	3	2	0	80	1221

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	308	4	0	56	496	64	0	72	136	52	0	24	72	56	0	1416
Heavy Trucks	4	12	0		0	8	0		4	0	4		0	4	8		44
Pedestrians		0				4				8				0			12
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad																	
Stopped Buses																	

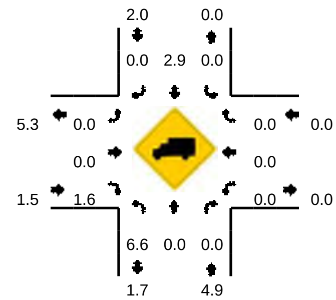
Comments:

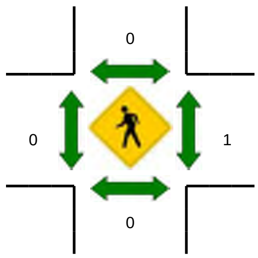
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

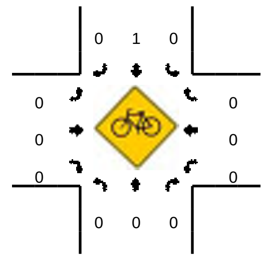
LOCATION: S Williams St -- Wheeler St | **QC JOB #:** 13675129
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

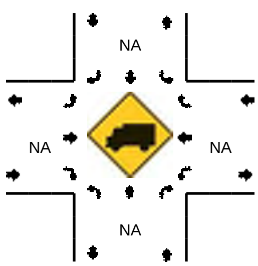


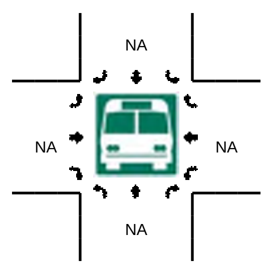
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:55 PM -- 5:10 PM











5-Min Count Period Beginning At	S Williams St (Northbound) Left	Thru	Right	U	S Williams St (Southbound) Left	Thru	Right	U	Wheeler St (Eastbound) Left	Thru	Right	U	Wheeler St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	8	1	1	0	0	3	1	0	1	1	16	0	0	0	0	0	32	351
4:10 PM	9	1	2	0	0	1	2	0	0	1	16	0	1	1	0	0	34	366
4:15 PM	13	0	2	0	0	5	1	0	0	2	10	0	3	0	1	0	37	367
4:20 PM	13	0	1	0	1	1	0	0	1	0	13	0	4	0	0	0	34	379
4:25 PM	3	1	2	0	2	2	1	0	1	0	13	0	4	0	0	0	29	378
4:30 PM	7	1	0	0	1	5	2	0	0	0	24	0	2	0	0	0	42	398
4:35 PM	12	2	2	0	0	5	1	0	0	0	13	0	3	1	0	0	39	399
4:40 PM	9	0	3	0	0	2	2	0	0	0	16	0	2	1	0	0	35	396
4:45 PM	6	0	2	0	0	2	0	0	0	3	13	0	3	1	0	0	30	399
4:50 PM	8	0	1	0	0	2	0	0	0	0	16	0	0	1	0	0	28	398
4:55 PM	9	0	3	0	0	0	0	0	0	1	23	0	1	1	0	0	38	411
5:00 PM	5	1	4	0	0	10	3	0	0	1	7	0	3	0	0	0	34	412
5:05 PM	13	2	3	0	0	4	0	0	0	0	18	0	1	2	1	0	44	424
5:10 PM	4	0	2	0	0	2	1	0	0	0	10	0	2	4	0	0	25	415
5:15 PM	10	2	1	0	1	3	2	0	0	3	17	0	0	0	0	0	39	417
5:20 PM	13	2	0	0	1	2	1	0	0	0	13	0	2	0	0	0	34	417
5:25 PM	10	0	2	0	0	2	1	0	0	2	20	0	1	1	0	0	39	427
5:30 PM	7	0	4	0	2	1	1	0	0	1	17	0	2	1	0	0	36	421
5:35 PM	5	1	2	0	1	2	2	0	0	0	11	0	1	0	1	0	26	408
5:40 PM	5	0	0	0	0	3	0	0	0	0	16	0	2	0	0	0	26	399
5:45 PM	14	3	1	0	0	3	1	0	0	0	22	0	1	1	0	0	46	415
5:50 PM	2	0	4	0	0	0	0	0	0	0	13	0	1	0	1	0	21	408
5:55 PM	3	3	1	0	3	1	0	0	0	0	11	1	1	0	0	0	24	394
6:00 PM	5	0	2	0	1	1	0	0	0	1	10	0	0	0	0	0	20	380

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	108	12	40	0	0	56	12	0	0	8	192	0	20	12	4	0	464
Heavy Trucks	8	0	0		0	4	0		0	0	0		0	0	0		12
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

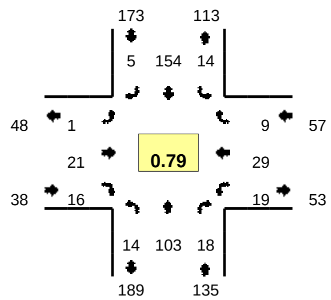
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

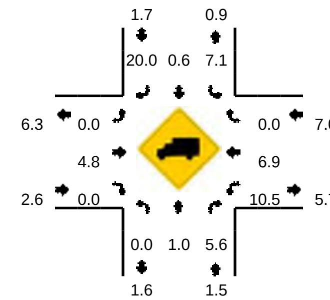
LOCATION: S 5th St -- W Rose St | **QC JOB #:** 13675123

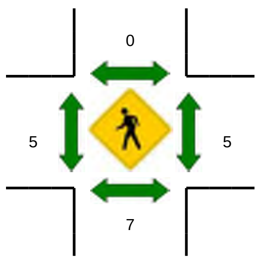
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

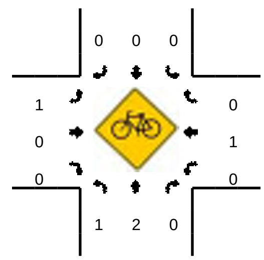
Peak-Hour: 4:35 PM -- 5:35 PM

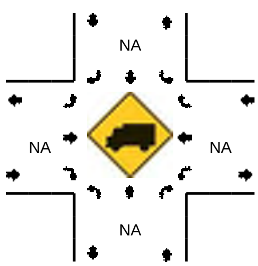
Peak 15-Min: 5:10 PM -- 5:25 PM

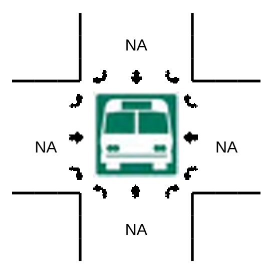












5-Min Count Period Beginning At	S 5th St (Northbound) Left	Thru	Right	U	S 5th St (Southbound) Left	Thru	Right	U	W Rose St (Eastbound) Left	Thru	Right	U	W Rose St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	5	9	1	0	2	13	0	0	0	2	0	0	0	6	0	0	38	332
4:10 PM	1	5	1	0	3	9	0	0	0	1	3	0	1	3	0	0	27	344
4:15 PM	1	7	2	0	3	10	1	0	1	1	0	0	1	4	0	0	31	354
4:20 PM	2	10	2	0	3	9	1	0	1	1	2	0	1	2	2	0	36	376
4:25 PM	1	4	4	0	0	8	0	0	0	1	1	0	0	2	0	0	21	366
4:30 PM	0	7	0	0	2	13	0	0	0	1	0	0	1	1	1	0	26	354
4:35 PM	0	5	1	0	0	11	0	0	0	2	1	0	1	4	1	0	26	359
4:40 PM	2	9	0	0	2	16	1	0	0	1	0	0	1	8	0	0	40	372
4:45 PM	0	11	1	0	4	11	1	0	0	1	1	0	2	1	0	0	33	369
4:50 PM	0	8	2	0	2	10	0	0	0	3	1	0	2	0	2	0	30	363
4:55 PM	2	4	1	0	2	8	1	0	0	4	2	0	2	1	1	0	28	365
5:00 PM	0	10	2	0	1	10	0	0	0	1	2	0	1	1	3	0	31	367
5:05 PM	0	7	0	0	1	17	1	0	0	1	0	0	1	5	1	0	34	363
5:10 PM	3	13	2	0	0	10	0	0	0	0	1	0	3	3	0	0	35	371
5:15 PM	3	14	3	0	1	18	0	0	0	3	1	0	1	3	0	0	47	387
5:20 PM	2	14	2	0	0	15	1	0	1	1	5	0	3	1	0	0	45	396
5:25 PM	0	3	2	0	1	14	0	0	0	2	2	0	1	2	1	0	28	403
5:30 PM	2	5	2	0	0	14	0	0	0	2	0	0	1	0	0	0	26	403
5:35 PM	3	9	0	0	0	14	0	0	0	0	0	0	2	2	0	0	30	407
5:40 PM	0	5	1	0	1	15	0	0	1	0	1	0	0	0	1	0	25	392
5:45 PM	0	11	0	0	1	11	0	0	1	2	0	0	0	3	1	0	30	389
5:50 PM	2	0	1	0	1	5	0	0	0	2	0	0	0	2	0	0	13	372
5:55 PM	1	10	0	0	1	9	0	0	0	1	0	0	1	0	0	0	23	367
6:00 PM	1	4	0	0	0	8	0	0	0	1	0	0	0	1	0	0	15	351

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	164	28	0	4	172	4	0	4	16	28	0	28	28	0	0	508
Heavy Trucks	0	0	0		0	4	0		0	0	0		4	4	0		12
Pedestrians		20				0				12				8			40
Bicycles	0	1	0		0	0	0		1	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

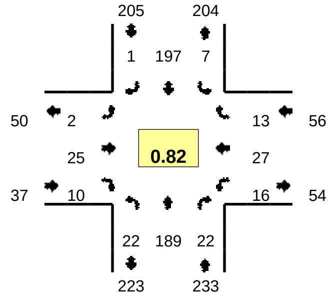
Comments:

Report generated on 2/16/2016 11:14 AM

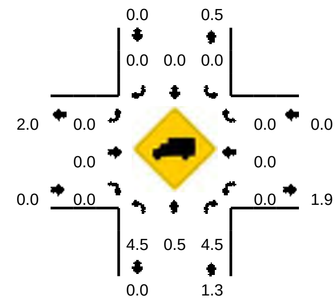
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

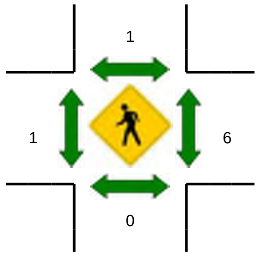
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

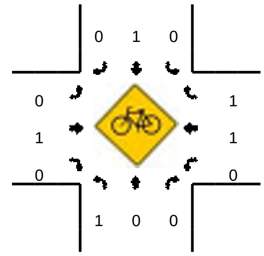
LOCATION: S Second St -- W Sherman St | **QC JOB #:** 13675135
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

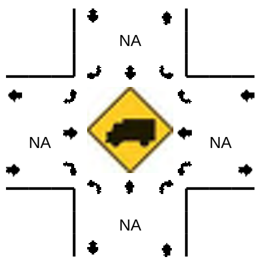


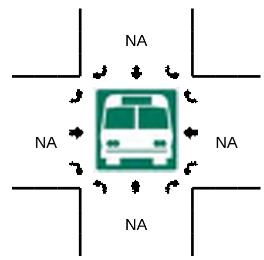
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:35 PM -- 4:50 PM











5-Min Count Period Beginning At	S Second St (Northbound) Left	Thru	Right	U	S Second St (Southbound) Left	Thru	Right	U	W Sherman St (Eastbound) Left	Thru	Right	U	W Sherman St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	3	24	0	0	0	20	0	0	0	1	1	0	1	2	1	0	53	521
4:10 PM	0	9	3	0	1	19	0	0	0	1	1	0	0	2	1	0	37	511
4:15 PM	2	16	0	0	1	19	0	0	0	0	0	0	1	0	1	0	40	511
4:20 PM	1	18	1	0	0	9	0	0	0	1	2	0	2	2	1	0	37	520
4:25 PM	0	16	4	0	1	15	0	0	0	2	0	0	2	1	1	0	42	529
4:30 PM	2	17	2	0	1	19	0	0	2	3	1	0	2	4	3	0	56	531
4:35 PM	1	22	0	0	1	21	0	0	0	5	1	0	4	1	3	0	59	540
4:40 PM	2	21	2	0	1	23	0	0	0	3	0	0	1	0	0	0	53	553
4:45 PM	4	15	4	0	1	17	0	0	0	3	0	0	1	3	1	0	49	559
4:50 PM	1	11	3	0	0	20	1	0	0	1	0	0	1	4	2	0	44	558
4:55 PM	0	10	2	0	1	15	0	0	0	0	0	0	0	2	0	0	30	536
5:00 PM	2	20	4	0	1	23	0	0	0	3	4	0	2	3	3	0	65	565
5:05 PM	1	16	0	0	0	15	0	0	2	1	0	0	2	2	1	0	40	552
5:10 PM	2	23	1	0	1	18	0	0	0	3	2	0	0	4	1	0	55	570
5:15 PM	3	18	2	0	0	10	0	0	0	2	0	0	1	3	1	0	40	570
5:20 PM	3	13	2	0	0	19	0	0	0	1	1	0	1	3	0	0	43	576
5:25 PM	1	12	1	0	0	6	0	0	0	2	1	0	2	1	1	0	27	561
5:30 PM	2	8	1	0	1	10	0	0	0	1	1	0	1	1	0	0	26	531
5:35 PM	0	9	0	0	1	8	0	0	0	1	1	0	1	1	0	0	22	494
5:40 PM	0	14	2	0	0	10	0	0	0	1	0	0	0	0	0	0	27	468
5:45 PM	2	15	0	0	0	9	0	0	0	2	2	0	1	0	2	0	33	452
5:50 PM	2	14	2	0	3	7	1	0	0	1	1	0	1	4	2	0	38	446
5:55 PM	2	7	1	0	1	5	1	0	0	1	0	0	1	1	2	0	22	438
6:00 PM	0	11	1	0	0	9	0	0	1	2	0	0	0	0	1	0	25	398

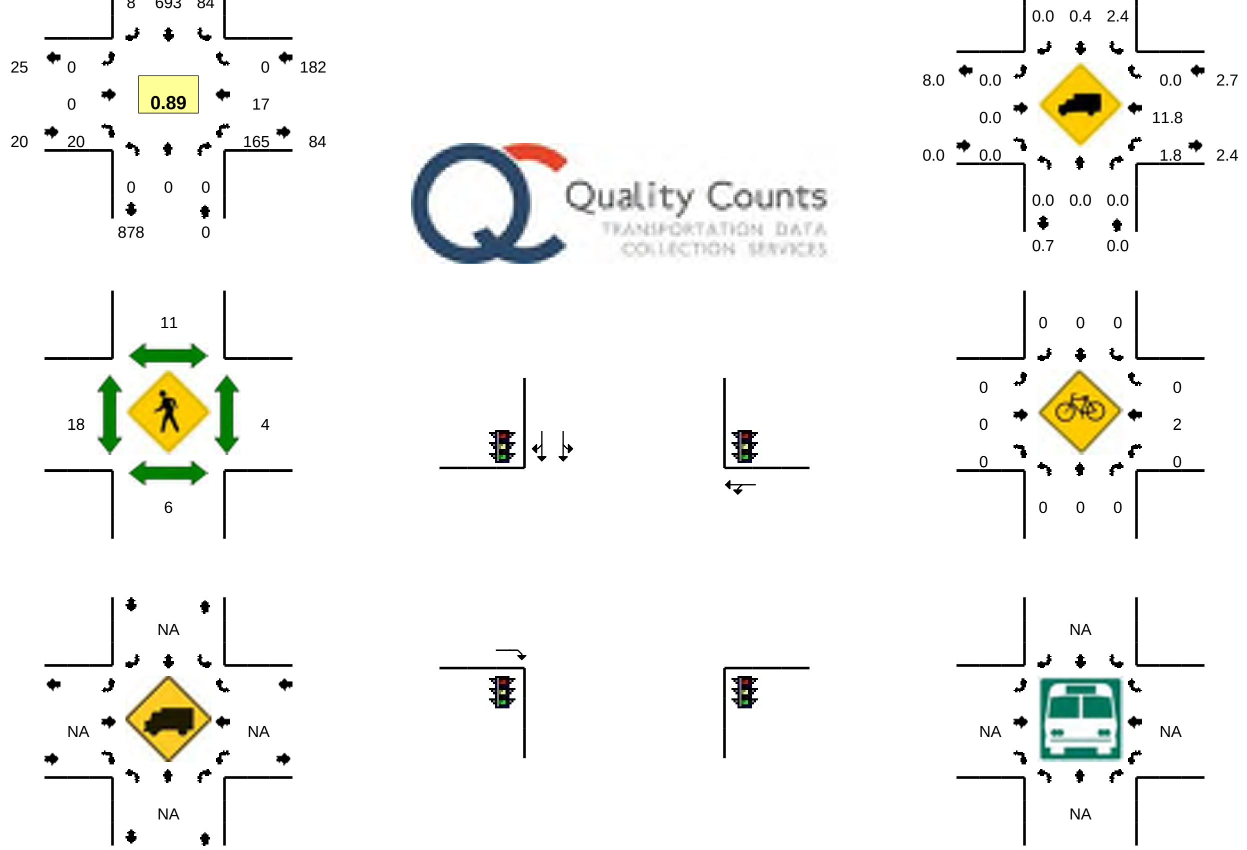
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	28	232	24	0	12	244	0	0	0	44	4	0	24	16	16	0	644
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Pedestrians		0				0				0				0			0
Bicycles	1	0	0		0	0	0		0	1	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

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

LOCATION: US 20 -- Grant St — **QC JOB #:** 13675102
CITY/STATE: Lebanon, OR — **DATE:** Wed, Jan 20 2016

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



5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Grant St (Eastbound) Left	Thru	Right	U	Grant St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	0	0	0	4	57	3	0	0	0	3	0	13	4	0	0	84	946
4:10 PM	0	0	0	0	7	48	1	0	0	0	3	0	10	2	0	0	71	949
4:15 PM	0	0	0	0	9	56	1	0	0	0	2	0	11	5	0	0	84	961
4:20 PM	0	0	0	0	6	57	3	0	0	0	2	0	15	2	0	0	85	974
4:25 PM	0	0	0	0	10	66	0	0	0	0	0	0	9	4	0	0	89	991
4:30 PM	0	0	0	0	8	62	2	0	0	0	3	0	13	4	0	0	92	1002
4:35 PM	0	0	0	0	5	74	2	0	0	0	2	0	16	1	0	0	100	1022
4:40 PM	0	0	0	0	5	69	1	0	0	0	2	0	15	2	0	0	94	1030
4:45 PM	0	0	0	0	10	55	1	0	0	0	1	0	15	1	0	0	83	1043
4:50 PM	0	0	0	0	10	55	1	0	0	0	0	0	17	1	0	0	84	1048
4:55 PM	0	0	0	0	6	58	0	0	0	0	3	0	16	0	0	0	83	1032
5:00 PM	0	0	0	0	8	67	1	0	0	0	4	0	10	2	0	0	92	1041
5:05 PM	0	0	0	0	12	48	0	0	0	0	1	0	15	4	0	0	80	1037
5:10 PM	0	0	0	0	5	61	0	0	0	0	2	0	10	1	0	0	79	1045
5:15 PM	0	0	0	0	8	42	1	0	0	0	3	0	8	4	0	0	66	1027
5:20 PM	0	0	0	0	7	48	0	0	0	0	0	0	19	0	0	0	74	1016
5:25 PM	0	0	0	0	3	54	0	0	0	0	1	0	19	0	0	0	77	1004
5:30 PM	0	0	0	0	5	62	1	0	0	0	1	0	5	1	0	0	75	987
5:35 PM	0	0	0	0	8	46	1	0	0	0	0	0	14	3	0	0	72	959
5:40 PM	0	0	0	0	8	52	0	0	0	0	0	0	11	1	0	0	72	937
5:45 PM	0	0	0	0	2	28	0	0	0	0	3	0	12	2	0	0	47	901
5:50 PM	0	0	0	0	8	40	0	0	0	0	0	0	13	1	0	0	62	879
5:55 PM	0	0	0	0	5	38	0	0	0	0	0	0	6	1	0	0	50	846
6:00 PM	0	0	0	0	3	36	0	0	0	0	1	0	10	3	0	0	53	807

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	80	792	16	0	0	0	20	0	184	16	0	0	1108
Heavy Trucks	0	0	0		0	4	0		0	0	0		0	4	0		8
Pedestrians		0				20				24				4			48
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

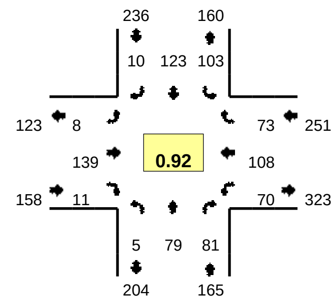
Comments:

Report generated on 2/16/2016 11:14 AM

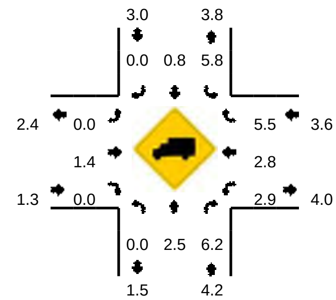
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

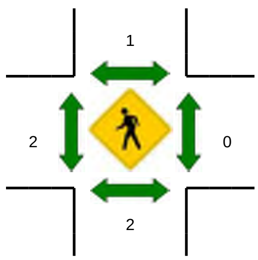
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

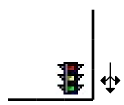
LOCATION: S Williams St -- E Grant St | **QC JOB #:** 13675113
CITY/STATE: Linn, OR | **DATE:** Thu, Jan 21 2016

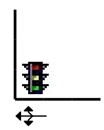


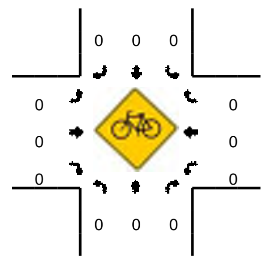
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

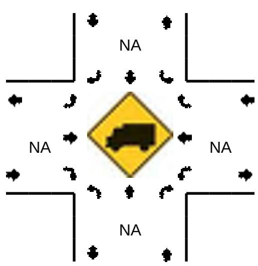


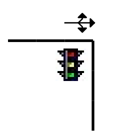


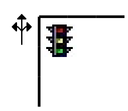


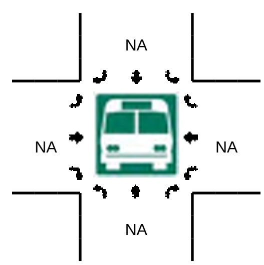












5-Min Count Period Beginning At	S Williams St (Northbound) Left	Thru	Right	U	S Williams St (Southbound) Left	Thru	Right	U	E Grant St (Eastbound) Left	Thru	Right	U	E Grant St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	6	8	0	7	6	0	0	0	13	1	0	6	11	5	0	63	795
4:10 PM	1	9	9	0	10	5	0	0	1	16	2	0	6	5	10	0	74	804
4:15 PM	2	7	4	0	10	9	0	0	3	10	0	0	4	18	6	0	73	807
4:20 PM	0	6	13	0	8	5	0	0	0	7	4	0	6	3	4	0	56	809
4:25 PM	1	10	6	0	6	7	0	0	2	10	2	0	5	11	5	0	65	815
4:30 PM	0	9	4	0	11	8	2	0	0	9	1	0	5	3	2	0	54	804
4:35 PM	0	5	4	0	15	13	0	0	1	6	3	0	5	7	8	0	67	806
4:40 PM	1	6	6	0	4	16	0	0	0	9	1	0	3	12	4	0	62	811
4:45 PM	0	4	5	0	7	12	0	0	0	7	0	0	7	12	7	0	61	793
4:50 PM	0	3	3	0	10	9	0	0	0	13	1	0	5	13	6	0	63	782
4:55 PM	0	7	8	0	6	10	1	0	0	11	1	0	3	10	9	0	66	768
5:00 PM	1	11	8	0	11	6	0	0	1	18	1	0	3	11	9	0	80	784
5:05 PM	0	4	9	0	8	10	2	0	2	17	0	0	2	5	5	0	64	785
5:10 PM	0	10	10	0	10	9	0	0	1	11	2	0	8	6	4	0	71	782
5:15 PM	0	8	7	0	7	15	2	0	1	12	1	0	7	6	5	0	71	780
5:20 PM	2	9	6	0	10	10	2	0	0	14	0	0	8	11	6	0	78	802
5:25 PM	0	10	10	0	8	6	3	0	0	7	1	0	5	5	4	0	59	796
5:30 PM	1	2	5	0	7	7	0	0	2	14	0	0	14	10	6	0	68	810
5:35 PM	2	7	9	0	8	4	0	0	2	16	0	0	6	9	3	0	66	809
5:40 PM	0	11	10	0	13	6	0	0	0	13	0	0	5	7	5	0	70	817
5:45 PM	0	10	7	0	10	11	2	0	0	6	2	0	10	6	6	0	70	826
5:50 PM	1	6	4	0	6	7	0	0	0	14	1	0	4	7	5	0	55	818
5:55 PM	1	7	4	0	5	3	1	0	1	4	0	0	2	9	4	0	41	793
6:00 PM	3	2	2	0	4	6	1	0	0	17	1	0	5	7	4	0	52	765

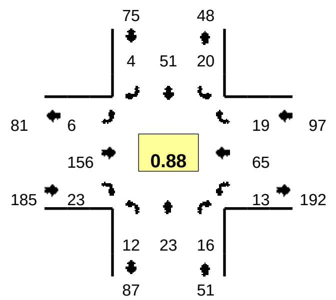
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	8	108	92	0	108	136	16	0	8	148	12	0	92	92	60	0	880
Heavy Trucks	0	0	16		8	0	0		0	4	0		0	0	4		32
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

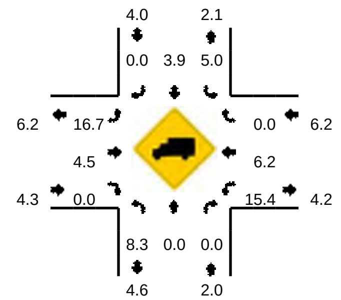
Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

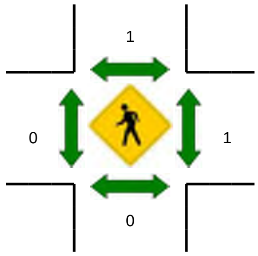
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

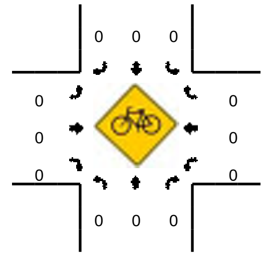
LOCATION: 12th St -- W Oak St | **QC JOB #:** 13675125
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

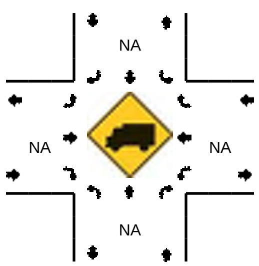


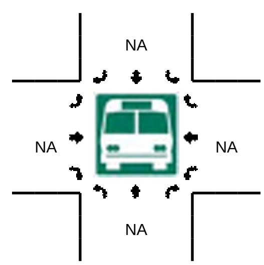
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:10 PM -- 5:25 PM











5-Min Count Period Beginning At	12th St (Northbound) Left	Thru	Right	U	12th St (Southbound) Left	Thru	Right	U	W Oak St (Eastbound) Left	Thru	Right	U	W Oak St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	2	0	0	2	5	0	0	0	12	0	0	1	10	2	0	34	407
4:10 PM	1	4	2	0	0	5	1	0	0	13	1	0	3	7	1	0	38	413
4:15 PM	0	1	1	0	1	4	0	0	1	5	1	0	2	6	2	0	24	416
4:20 PM	0	3	1	0	2	3	0	0	1	16	0	0	0	12	4	0	42	425
4:25 PM	0	2	1	0	3	4	0	0	1	8	0	0	2	8	0	0	29	413
4:30 PM	0	5	1	0	3	7	0	0	1	15	5	0	0	12	7	0	56	433
4:35 PM	0	1	0	0	2	8	1	0	0	14	3	0	0	8	1	0	38	440
4:40 PM	1	3	3	0	1	7	0	0	2	11	0	0	1	3	3	0	35	438
4:45 PM	0	1	2	0	2	4	0	0	0	11	2	0	2	4	1	0	29	429
4:50 PM	4	1	1	0	2	3	0	0	0	9	2	0	3	4	1	0	30	433
4:55 PM	2	3	2	0	1	3	0	0	0	12	0	0	0	4	1	0	28	419
5:00 PM	0	2	0	0	2	2	0	0	0	12	1	0	0	6	1	0	26	409
5:05 PM	0	1	1	0	3	5	0	0	1	14	1	0	3	5	1	0	35	410
5:10 PM	1	1	3	0	1	2	2	0	0	13	3	0	2	9	3	0	40	412
5:15 PM	1	1	0	0	2	5	0	0	2	16	1	0	2	5	2	0	37	425
5:20 PM	0	3	1	0	3	6	1	0	0	10	4	0	0	9	2	0	39	422
5:25 PM	2	5	2	0	1	0	0	0	1	20	0	0	0	4	2	0	37	430
5:30 PM	1	1	1	0	0	6	0	0	0	14	6	0	0	4	1	0	34	408
5:35 PM	0	4	0	0	0	1	1	0	0	16	0	0	3	4	0	0	29	399
5:40 PM	0	7	1	0	3	4	1	0	0	12	5	0	2	8	1	0	44	408
5:45 PM	0	2	1	0	0	0	0	0	2	9	0	0	1	1	3	0	19	398
5:50 PM	0	3	3	0	1	4	0	0	1	11	0	0	0	3	0	0	26	394
5:55 PM	0	1	0	0	1	4	0	0	0	10	3	0	0	6	3	0	28	394
6:00 PM	0	7	0	0	0	5	0	0	0	9	3	0	3	2	2	0	31	399

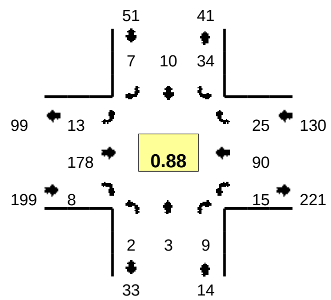
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	8	20	16	0	24	52	12	0	8	156	32	0	16	92	28	0	464
Heavy Trucks	0	0	0		0	0	0		4	4	0		0	4	0		12
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

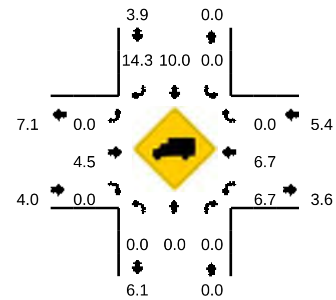
Comments:

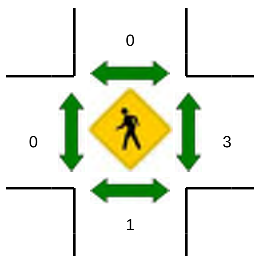
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

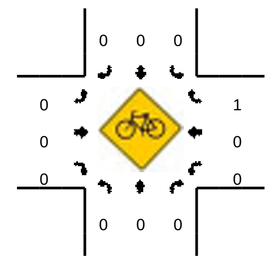
LOCATION: S 10th St -- W Oak St | **QC JOB #:** 13675124
CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016

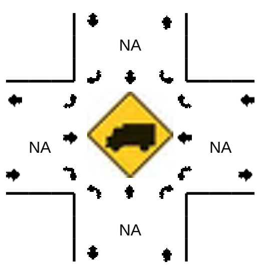
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

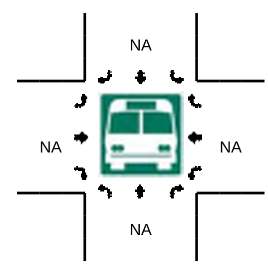












5-Min Count Period Beginning At	S 10th St (Northbound) Left	Thru	Right	U	S 10th St (Southbound) Left	Thru	Right	U	W Oak St (Eastbound) Left	Thru	Right	U	W Oak St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	1	0	0	3	2	0	0	0	10	0	0	0	12	3	0	31	408
4:10 PM	0	0	1	0	1	0	3	0	2	16	1	0	0	10	4	0	38	416
4:15 PM	0	1	0	0	2	0	0	0	0	6	0	0	1	9	2	0	21	413
4:20 PM	0	3	2	0	3	0	1	0	0	18	0	0	0	14	1	0	42	425
4:25 PM	0	0	0	0	3	1	1	0	0	11	1	0	1	13	4	0	35	416
4:30 PM	0	2	0	0	2	0	2	0	0	20	0	0	1	15	2	0	44	426
4:35 PM	0	0	2	0	4	1	0	0	0	16	0	0	2	7	1	0	33	421
4:40 PM	0	0	0	0	0	0	0	0	2	12	1	0	2	6	3	0	26	415
4:45 PM	1	1	1	0	1	0	1	0	3	13	0	0	2	6	0	0	29	402
4:50 PM	0	1	0	0	7	4	0	0	0	11	1	0	0	8	2	0	34	404
4:55 PM	0	0	0	0	2	0	0	0	0	14	1	0	0	4	5	0	26	391
5:00 PM	0	0	2	0	3	1	2	0	0	14	1	0	0	8	2	0	33	392
5:05 PM	0	0	1	0	4	2	1	0	1	18	0	0	3	7	2	0	39	400
5:10 PM	0	0	0	0	0	0	0	0	2	16	1	0	2	13	6	0	40	402
5:15 PM	0	1	1	0	2	0	2	0	1	16	1	0	0	7	1	0	32	413
5:20 PM	1	0	2	0	3	2	0	0	1	13	1	0	1	9	1	0	34	405
5:25 PM	0	0	0	0	3	0	0	0	1	19	1	0	2	10	1	0	37	407
5:30 PM	0	0	0	0	5	0	1	0	2	16	0	0	1	5	1	0	31	394
5:35 PM	0	0	0	0	5	0	0	0	1	15	0	0	1	9	0	0	31	392
5:40 PM	0	0	1	0	2	0	1	0	1	14	0	0	0	9	7	0	35	401
5:45 PM	0	0	0	0	4	1	0	0	1	12	0	0	0	5	3	0	26	398
5:50 PM	0	0	0	0	0	2	0	0	2	12	0	0	1	3	6	0	26	390
5:55 PM	0	1	0	0	1	1	0	0	0	12	0	0	2	9	3	0	29	393
6:00 PM	0	0	1	0	3	1	0	0	0	8	0	0	0	6	3	0	22	382

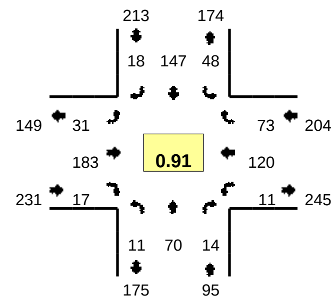
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	0	12	0	28	12	12	0	12	192	8	0	20	112	40	0	448
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	8	0		12
Pedestrians		4				0				0				12			16
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

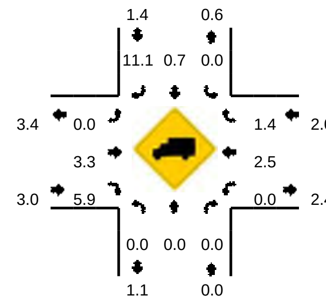
Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

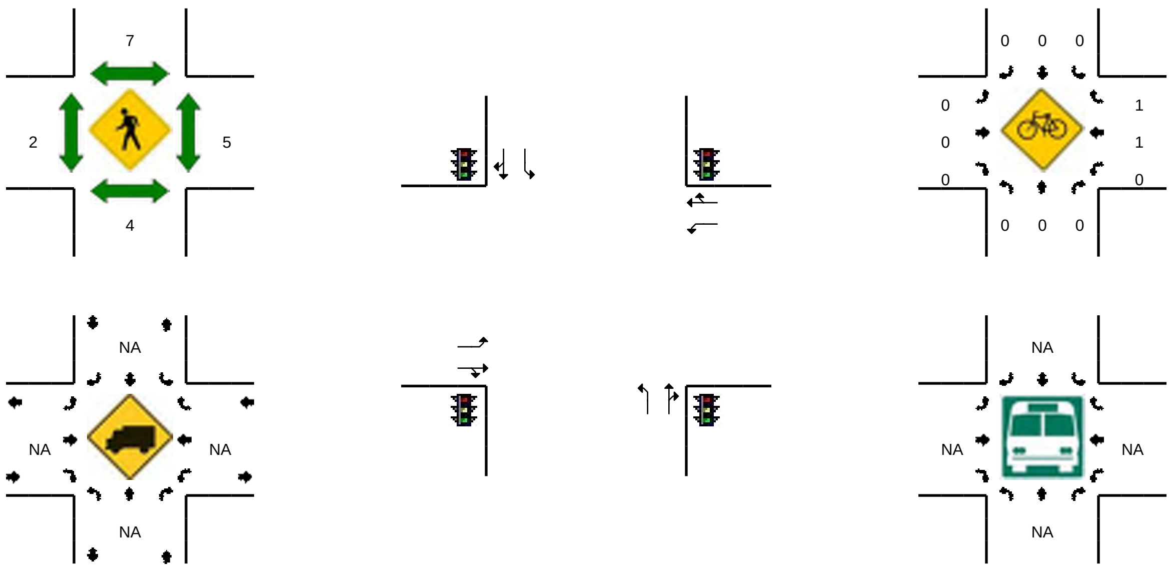
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: S 5th St -- Oak St | **QC JOB #:** 13675109
CITY/STATE: Linn, OR | **DATE:** Thu, Jan 21 2016



Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:50 PM -- 5:05 PM





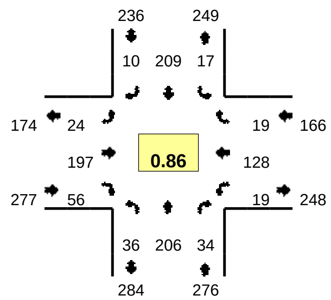
5-Min Count Period Beginning At	S 5th St (Northbound)				S 5th St (Southbound)				Oak St (Eastbound)				Oak St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	0	10	1	0	5	14	3	0	5	17	1	0	1	13	8	0	78	748
4:10 PM	1	6	2	0	5	8	2	0	0	16	0	0	1	6	3	0	50	736
4:15 PM	1	8	1	0	0	5	2	0	0	16	0	0	0	13	7	0	53	725
4:20 PM	1	6	1	0	3	6	0	0	4	15	0	0	1	5	5	0	47	693
4:25 PM	1	3	2	0	3	9	0	0	1	14	2	0	4	10	4	0	53	677
4:30 PM	1	4	0	0	3	10	3	0	2	12	3	0	2	11	6	0	57	694
4:35 PM	1	2	0	0	3	10	1	0	1	19	2	0	0	7	4	0	50	682
4:40 PM	1	4	2	0	2	16	0	0	3	19	1	0	0	10	12	0	70	697
4:45 PM	0	3	0	0	9	6	2	0	2	19	2	0	1	7	5	0	56	694
4:50 PM	1	4	2	0	3	12	3	0	4	25	1	0	1	10	5	0	71	708
4:55 PM	1	7	1	0	2	14	1	0	0	16	1	0	0	9	8	0	60	699
5:00 PM	2	5	1	0	7	11	1	0	3	15	2	0	1	16	10	0	74	719
5:05 PM	0	3	0	0	4	16	3	0	1	12	2	0	0	11	0	0	52	693
5:10 PM	2	7	0	0	5	11	1	0	4	13	2	0	2	8	9	0	64	707
5:15 PM	0	12	1	0	2	21	4	0	6	13	0	0	2	12	2	0	75	729
5:20 PM	0	5	2	0	4	14	1	0	1	15	1	0	2	12	6	0	63	745
5:25 PM	2	11	4	0	1	11	1	0	2	9	1	0	2	8	6	0	58	750
5:30 PM	1	7	1	0	6	5	0	0	4	8	2	0	0	10	6	0	50	743
5:35 PM	0	7	0	0	4	5	2	0	6	20	0	0	0	7	12	0	63	756
5:40 PM	0	10	0	0	4	10	2	0	5	19	0	0	2	17	6	0	75	761
5:45 PM	1	3	0	0	5	11	2	0	1	11	1	0	1	11	6	0	53	758
5:50 PM	1	2	1	0	3	5	2	0	0	8	3	0	0	12	0	0	37	724
5:55 PM	1	4	1	0	4	8	1	0	3	11	1	0	1	15	7	0	57	721
6:00 PM	2	4	1	0	2	10	0	0	1	12	0	0	1	10	5	0	48	695

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	16	64	16	0	48	148	20	0	28	224	16	0	8	140	92	0	820
Heavy Trucks	0	0	0		0	0	0		0	8	4		0	8	0		20
Pedestrians		12				4				4				0			20
Bicycles	0	0	0		0	0	0		0	0	0		0	1	0		1
Railroad																	
Stopped Buses																	

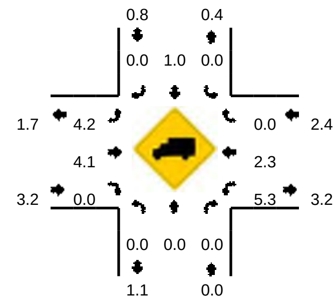
Comments:

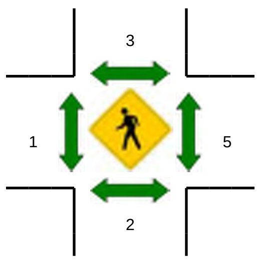
Type of peak hour being reported: User-Defined Method for determining peak hour: Total Entering Volume

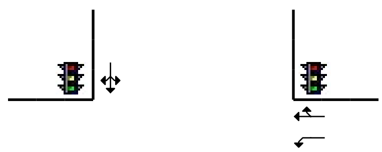
LOCATION: S Second St -- Oak St **QC JOB #:** 13675110
CITY/STATE: Linn, OR **DATE:** Wed, Jan 20 2016

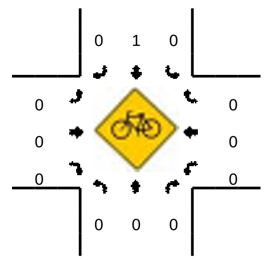


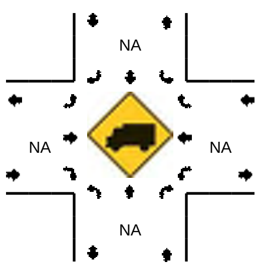
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

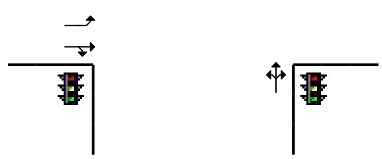


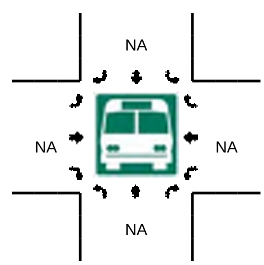












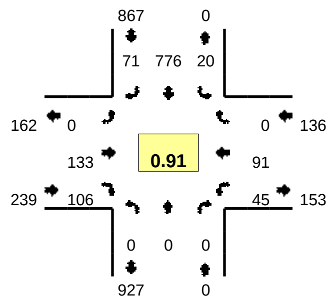
5-Min Count Period Beginning At	S Second St (Northbound)				S Second St (Southbound)				Oak St (Eastbound)				Oak St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	5	23	4	0	0	22	1	0	3	15	3	0	1	15	2	0	94	863
4:10 PM	6	13	3	0	1	12	1	0	1	11	7	0	4	11	0	0	70	863
4:15 PM	4	14	3	0	1	19	3	0	2	10	2	0	1	9	1	0	69	861
4:20 PM	4	22	4	0	0	14	1	0	2	11	4	0	0	8	1	0	71	881
4:25 PM	1	11	1	0	1	9	3	0	1	13	4	0	2	21	2	0	69	890
4:30 PM	1	17	2	0	1	24	1	0	1	10	9	0	2	11	2	0	81	893
4:35 PM	3	17	2	0	3	17	1	0	3	13	6	0	4	12	3	0	84	896
4:40 PM	2	26	5	0	1	25	0	0	2	19	3	0	0	4	2	0	89	918
4:45 PM	3	22	3	0	4	15	1	0	0	15	7	0	2	7	2	0	81	927
4:50 PM	0	15	3	0	4	17	0	0	2	16	5	0	0	5	0	0	67	928
4:55 PM	5	11	4	0	1	20	1	0	2	15	7	0	2	13	1	0	82	930
5:00 PM	3	23	4	0	1	20	1	0	2	17	5	0	1	12	5	0	94	951
5:05 PM	5	23	3	0	1	23	1	0	0	15	2	0	1	15	1	0	90	947
5:10 PM	4	18	3	0	0	22	0	0	3	22	4	0	1	16	0	0	93	970
5:15 PM	6	18	2	0	1	16	2	0	3	17	3	0	2	12	1	0	83	984
5:20 PM	2	12	1	0	0	20	2	0	4	14	7	0	3	7	2	0	74	987
5:25 PM	1	13	3	0	0	6	0	0	2	14	6	0	2	13	1	0	61	979
5:30 PM	2	8	1	0	1	8	1	0	1	20	1	0	1	12	1	0	57	955
5:35 PM	4	10	0	0	1	14	0	0	2	12	1	0	1	12	2	0	59	930
5:40 PM	6	9	0	0	1	10	0	0	3	21	2	0	3	7	0	0	62	903
5:45 PM	3	16	0	0	0	7	2	0	1	7	2	0	0	7	0	0	45	867
5:50 PM	4	17	1	0	0	11	2	0	1	13	5	0	1	6	1	0	62	862
5:55 PM	5	11	4	0	0	4	2	0	1	7	6	0	0	6	0	0	46	826
6:00 PM	4	11	0	0	1	10	0	0	1	4	2	0	0	6	1	0	40	772

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	48	256	40	0	8	260	8	0	20	216	44	0	12	172	24	0	1108
Heavy Trucks	0	0	0		0	0	0		0	4	0		4	8	0		16
Pedestrians		4				0				0				4			8
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

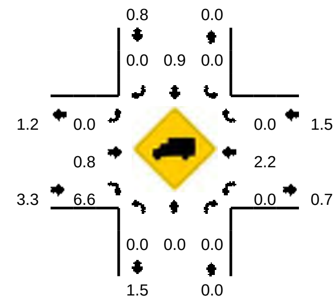
Comments:

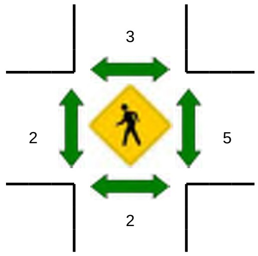
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

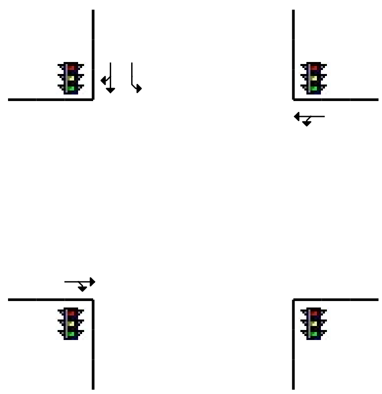
LOCATION: US 20 -- Oak St | **QC JOB #:** 13675103
CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016

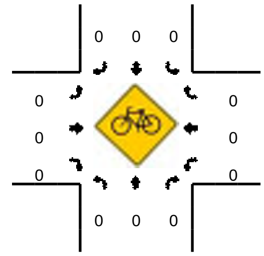


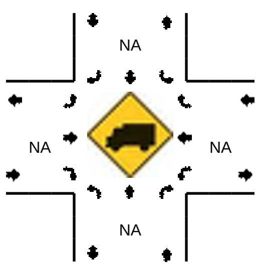
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

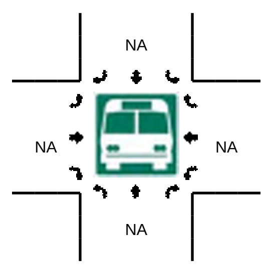












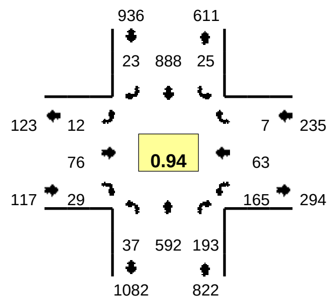
5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Oak St (Eastbound) Left	Thru	Right	U	Oak St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	0	0	0	3	74	2	0	0	8	12	0	1	9	0	0	109	1138
4:10 PM	0	0	0	0	2	57	6	0	0	8	8	0	4	7	0	0	92	1142
4:15 PM	0	0	0	0	4	58	5	0	0	6	6	0	1	3	0	0	83	1140
4:20 PM	0	0	0	0	3	74	3	0	0	10	8	0	2	10	0	0	110	1166
4:25 PM	0	0	0	0	1	63	7	0	0	7	7	0	3	13	0	0	101	1178
4:30 PM	0	0	0	0	4	74	5	0	0	5	7	0	1	10	0	0	106	1194
4:35 PM	0	0	0	0	3	74	6	0	0	5	9	0	3	13	0	0	113	1197
4:40 PM	0	0	0	0	3	93	4	0	0	14	6	0	7	2	0	0	129	1233
4:45 PM	0	0	0	0	2	57	3	0	0	14	12	0	4	7	0	0	99	1231
4:50 PM	0	0	0	0	1	77	2	0	0	10	12	0	3	1	0	0	106	1257
4:55 PM	0	0	0	0	0	58	5	0	0	12	9	0	6	12	0	0	102	1248
5:00 PM	0	0	0	0	2	70	8	0	0	15	5	0	3	8	0	0	111	1261
5:05 PM	0	0	0	0	2	58	8	0	0	13	9	0	4	13	0	0	107	1259
5:10 PM	0	0	0	0	1	68	4	0	0	12	9	0	1	9	0	0	104	1271
5:15 PM	0	0	0	0	2	43	6	0	0	14	11	0	6	9	0	0	91	1279
5:20 PM	0	0	0	0	2	57	8	0	0	4	6	0	0	4	0	0	81	1250
5:25 PM	0	0	0	0	0	64	10	0	0	11	10	0	5	9	0	0	109	1258
5:30 PM	0	0	0	0	2	57	7	0	0	9	8	0	3	4	0	0	90	1242
5:35 PM	0	0	0	0	2	65	3	0	0	6	11	0	1	12	0	0	100	1229
5:40 PM	0	0	0	0	1	54	3	0	0	7	12	0	3	5	0	0	85	1185
5:45 PM	0	0	0	0	0	47	4	0	0	2	5	0	2	4	0	0	64	1150
5:50 PM	0	0	0	0	1	48	2	0	0	11	7	0	3	5	0	0	77	1121
5:55 PM	0	0	0	0	0	44	4	0	0	4	3	0	3	3	0	0	61	1080
6:00 PM	0	0	0	0	1	49	2	0	0	1	6	0	1	6	0	0	66	1035

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	32	896	52	0	0	132	108	0	56	88	0	0	1364
Heavy Trucks	0	0	0		0	4	0		0	4	8		0	0	0		16
Pedestrians		0				4				4				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

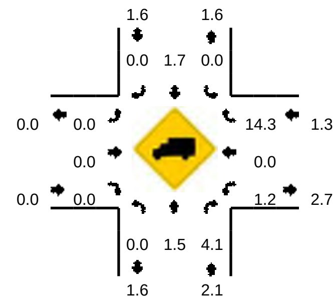
Comments:

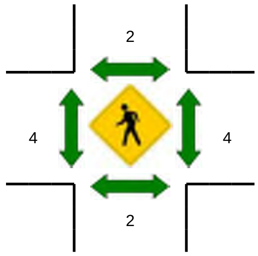
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

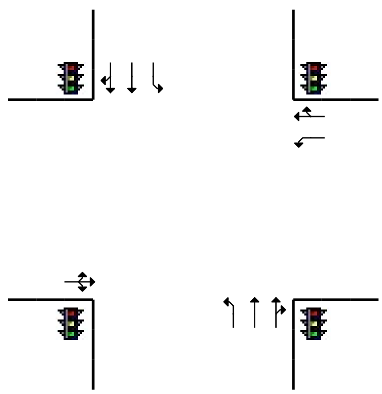
LOCATION: US 20 -- E Milton St | **QC JOB #:** 13675104
CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016

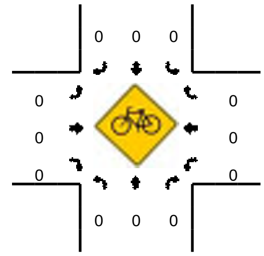


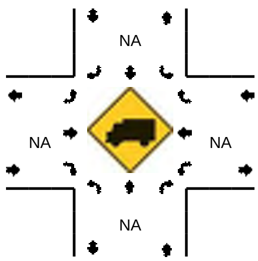
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

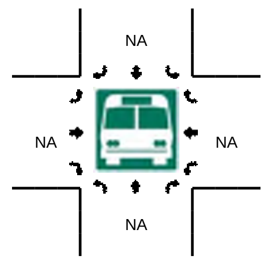












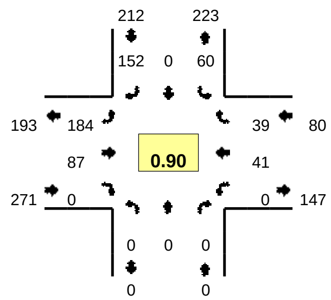
5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	E Milton St (Eastbound) Left	Thru	Right	U	E Milton St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	3	45	11	0	7	65	0	0	0	8	5	0	16	4	1	0	165	1960
4:10 PM	4	43	12	0	3	73	3	0	1	7	3	0	20	3	0	0	172	1967
4:15 PM	4	58	15	0	1	69	1	0	0	1	1	0	8	3	1	0	162	1972
4:20 PM	1	51	7	0	6	81	1	0	2	4	2	0	11	3	0	0	169	1973
4:25 PM	1	32	13	0	7	70	0	0	0	2	3	0	15	2	0	0	145	1958
4:30 PM	2	47	10	0	3	78	3	0	2	3	1	0	7	4	2	0	162	1968
4:35 PM	3	35	12	0	3	85	2	0	0	8	4	0	17	3	1	0	173	1978
4:40 PM	3	50	11	0	2	97	4	0	0	3	6	0	17	12	1	0	206	2007
4:45 PM	2	54	20	0	4	64	0	0	3	8	2	0	16	7	1	0	181	2015
4:50 PM	5	44	5	0	3	83	4	0	0	7	0	0	15	5	0	0	171	2027
4:55 PM	3	52	27	0	1	82	3	0	0	6	1	0	14	1	1	0	191	2060
5:00 PM	2	66	14	0	0	71	0	0	0	5	2	0	12	3	0	0	175	2072
5:05 PM	3	50	17	0	2	74	3	0	0	4	1	0	15	5	0	0	174	2081
5:10 PM	3	48	15	0	2	78	1	0	1	13	2	0	13	4	0	0	180	2089
5:15 PM	7	70	20	0	4	56	2	0	2	2	4	0	10	8	2	0	187	2114
5:20 PM	1	45	17	0	1	62	2	0	1	5	1	0	8	4	1	0	148	2093
5:25 PM	2	33	15	0	0	63	0	0	4	10	2	0	16	7	0	0	152	2100
5:30 PM	3	45	20	0	3	73	2	0	1	5	4	0	12	4	0	0	172	2110
5:35 PM	3	30	9	0	2	72	1	0	0	8	2	0	10	7	1	0	145	2082
5:40 PM	5	47	16	0	2	57	0	0	0	5	6	0	10	4	0	0	152	2028
5:45 PM	3	41	6	0	3	63	2	0	1	6	1	0	7	12	0	0	145	1992
5:50 PM	5	52	10	0	1	54	2	0	3	9	1	0	7	10	1	0	155	1976
5:55 PM	1	33	10	0	1	43	0	0	1	6	1	0	5	7	1	0	109	1894
6:00 PM	5	33	11	0	4	47	4	0	0	4	2	0	4	3	4	0	121	1840

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	556	172	0	36	984	24	0	12	76	48	0	200	88	12	0	2240
Heavy Trucks	0	4	12		0	12	0		0	0	0		0	0	0		28
Pedestrians		4				0				0				4			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

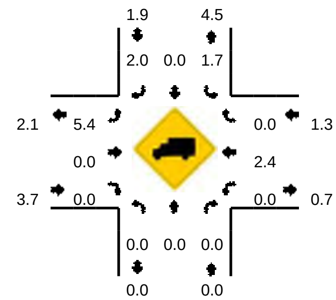
Comments:

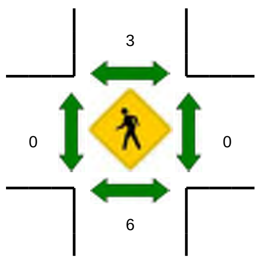
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

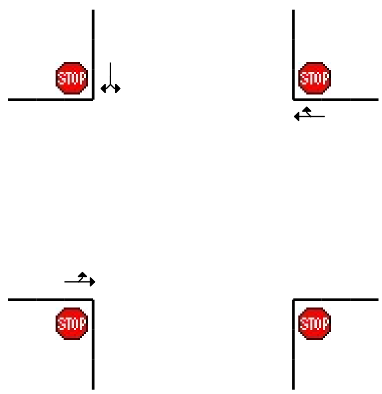
LOCATION: S Williams St -- E Milton St | **QC JOB #:** 13675128
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

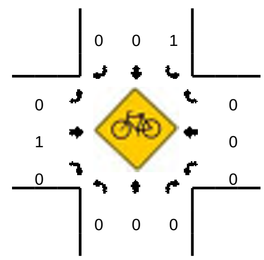


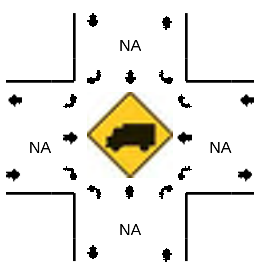
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

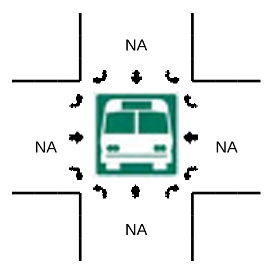












5-Min Count Period Beginning At	S Williams St (Northbound)				S Williams St (Southbound)				E Milton St (Eastbound)				E Milton St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	0	0	0	0	9	0	11	0	12	10	0	0	0	6	2	0	50	472
4:10 PM	0	0	0	0	4	0	18	0	8	10	0	0	0	3	6	0	49	490
4:15 PM	0	0	0	0	1	0	9	0	13	5	0	0	0	2	6	0	36	493
4:20 PM	0	0	0	0	5	0	6	0	10	5	0	0	0	8	3	0	37	477
4:25 PM	0	0	0	0	1	0	10	0	11	6	0	0	0	6	4	0	38	477
4:30 PM	0	0	0	0	4	0	9	0	6	9	0	0	0	3	7	0	38	485
4:35 PM	0	0	0	0	5	0	13	0	14	9	0	0	0	5	3	0	49	495
4:40 PM	0	0	0	0	6	0	21	0	13	3	0	0	0	5	4	0	52	510
4:45 PM	0	0	0	0	6	0	12	0	18	8	0	0	0	2	4	0	50	508
4:50 PM	0	0	0	0	7	0	14	0	9	8	0	0	0	5	2	0	45	513
4:55 PM	0	0	0	0	2	0	6	0	19	6	0	0	0	5	5	0	43	519
5:00 PM	0	0	0	0	5	0	10	0	18	5	0	0	0	2	2	0	42	529
5:05 PM	0	0	0	0	13	0	14	0	14	7	0	0	0	3	3	0	54	533
5:10 PM	0	0	0	0	7	0	12	0	15	14	0	0	0	5	3	0	56	540
5:15 PM	0	0	0	0	2	0	12	0	17	8	0	0	0	4	3	0	46	550
5:20 PM	0	0	0	0	3	0	10	0	15	5	0	0	0	1	6	0	40	553
5:25 PM	0	0	0	0	2	0	18	0	14	6	0	0	0	3	2	0	45	560
5:30 PM	0	0	0	0	2	0	10	0	18	8	0	0	0	1	2	0	41	563
5:35 PM	0	0	0	0	9	0	10	0	11	5	0	0	0	4	1	0	40	554
5:40 PM	0	0	0	0	7	0	11	0	18	7	0	0	0	4	4	0	51	553
5:45 PM	0	0	0	0	6	0	5	0	8	3	0	0	0	8	6	0	36	539
5:50 PM	0	0	0	0	4	0	9	0	11	9	0	0	0	4	0	0	37	531
5:55 PM	0	0	0	0	5	0	8	0	9	4	0	0	0	1	3	0	30	518
6:00 PM	0	0	0	0	4	0	6	0	10	7	0	0	0	3	4	0	34	510

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	0	0	0	0	88	0	152	0	184	116	0	0	0	48	36	0	624
Heavy Trucks	0	0	0		4	0	4		8	0	0		0	0	0		16
Pedestrians		12				12				0				0			24
Bicycles	0	0	0		1	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

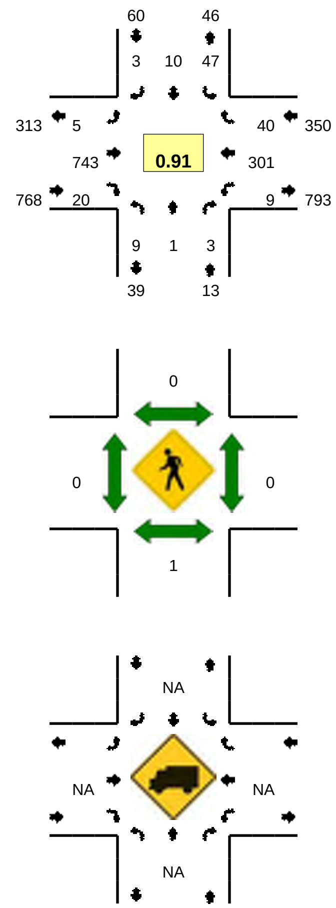
Comments:

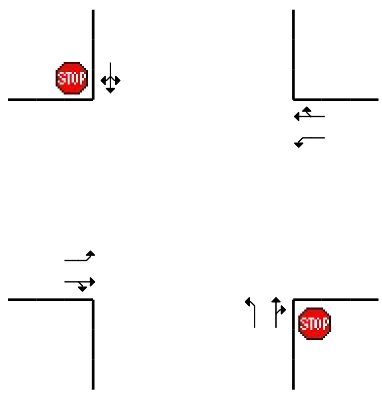
Report generated on 2/16/2016 11:14 AM

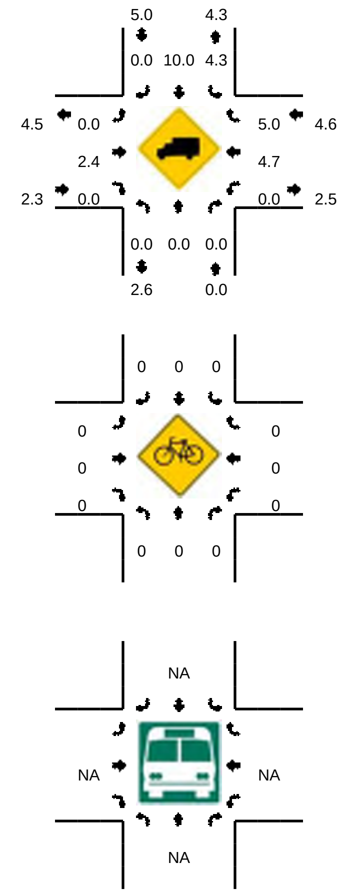
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

LOCATION: 12th St -- S Airport Rd | **QC JOB #:** 13675130
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:40 PM -- 4:55 PM







5-Min Count Period Beginning At	12th St (Northbound) Left	Thru	Right	U	12th St (Southbound) Left	Thru	Right	U	S Airport Rd (Eastbound) Left	Thru	Right	U	S Airport Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	1	0	4	0	3	1	0	0	1	50	1	0	1	17	3	0	82	866
4:10 PM	1	1	0	0	5	0	1	0	1	42	1	0	1	30	4	0	87	901
4:15 PM	1	0	1	0	4	1	1	0	0	45	0	0	1	26	5	0	85	912
4:20 PM	1	0	3	0	3	3	0	0	1	56	3	0	1	20	2	0	93	940
4:25 PM	0	1	0	0	1	0	0	0	0	62	1	0	0	13	3	0	81	949
4:30 PM	0	2	1	0	8	2	1	0	0	61	4	0	0	20	2	0	101	969
4:35 PM	1	0	1	0	9	1	1	0	0	58	1	0	1	27	3	0	103	1013
4:40 PM	1	1	0	0	6	1	0	0	0	51	2	0	1	26	4	0	93	1029
4:45 PM	2	0	0	0	4	0	0	0	0	71	3	0	2	28	4	0	114	1053
4:50 PM	1	0	0	0	3	0	0	0	0	82	4	0	0	28	2	0	120	1111
4:55 PM	1	0	0	0	4	2	0	0	1	63	1	0	1	15	3	0	91	1124
5:00 PM	0	0	0	0	1	0	0	0	0	57	1	0	1	29	5	0	94	1144
5:05 PM	2	0	1	0	4	1	0	0	2	63	0	0	0	20	3	0	96	1158
5:10 PM	0	0	0	0	5	1	1	0	0	51	2	0	0	29	3	0	92	1163
5:15 PM	0	0	0	0	1	2	0	0	0	53	2	0	0	22	1	0	81	1159
5:20 PM	0	0	0	0	4	0	1	0	1	67	2	0	2	33	4	0	114	1180
5:25 PM	1	0	1	0	2	1	0	0	1	56	0	0	1	20	6	0	89	1188
5:30 PM	0	0	0	0	4	1	0	0	0	71	2	0	0	24	2	0	104	1191
5:35 PM	0	1	0	0	5	0	0	0	1	61	0	0	2	20	9	0	99	1187
5:40 PM	1	0	0	0	5	1	0	0	0	49	1	0	0	26	6	0	89	1183
5:45 PM	1	0	0	0	2	1	0	0	1	55	1	0	0	16	3	0	80	1149
5:50 PM	0	2	0	0	3	0	0	0	0	38	1	0	1	14	1	0	60	1089
5:55 PM	0	0	0	0	4	2	0	0	0	45	1	0	0	11	3	0	66	1064
6:00 PM	0	3	0	0	5	2	0	0	0	50	2	0	0	23	4	0	89	1059

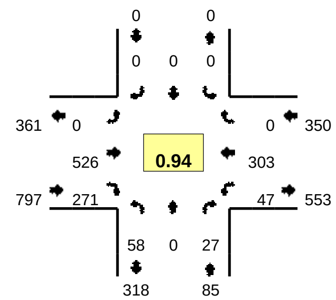
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	16	4	0	0	52	4	0	0	0	816	36	0	12	328	40	0	1308
Heavy Trucks	0	0	0		4	0	0		0	32	0		0	8	4		48
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

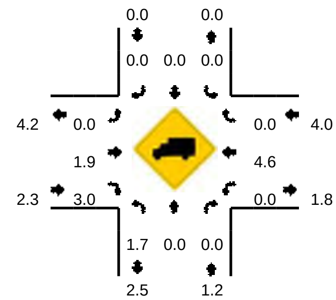
Comments:

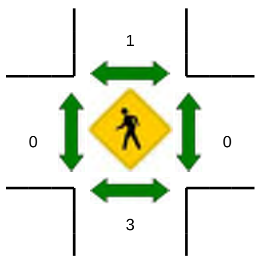
Type of peak hour being reported: User-Defined — Method for determining peak hour: Total Entering Volume

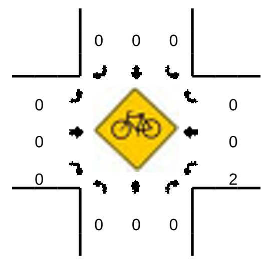
LOCATION: Stoltzhill Rd -- S Airport Rd — **QC JOB #:** 13675131
CITY/STATE: Linn, OR — **DATE:** Wed, Jan 20 2016

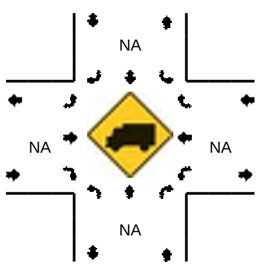
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

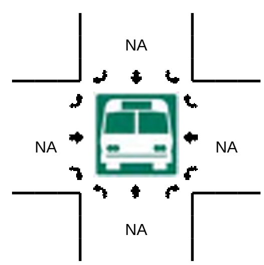












5-Min Count Period Beginning At	Stoltzhill Rd (Northbound) Left	Thru	Right	U	Stoltzhill Rd (Southbound) Left	Thru	Right	U	S Airport Rd (Eastbound) Left	Thru	Right	U	S Airport Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	6	0	1	0	0	0	0	0	0	43	16	0	4	22	0	0	92	931
4:10 PM	8	0	1	0	0	0	0	0	0	35	18	0	2	21	0	0	85	954
4:15 PM	8	0	3	0	0	0	0	0	0	29	16	0	1	25	0	0	82	958
4:20 PM	6	0	1	0	0	0	0	0	0	45	22	0	4	18	0	0	96	987
4:25 PM	6	0	1	0	0	0	0	0	0	31	23	0	2	11	0	0	74	983
4:30 PM	5	0	5	0	0	0	0	0	0	38	28	0	4	20	0	0	100	1003
4:35 PM	7	0	0	0	0	0	0	0	0	49	21	0	5	24	0	0	106	1043
4:40 PM	3	0	3	0	0	0	0	0	0	43	21	0	2	30	0	0	102	1064
4:45 PM	3	0	2	0	0	0	0	0	0	47	25	0	1	30	0	0	108	1071
4:50 PM	8	0	3	0	0	0	0	0	0	50	33	0	2	22	0	0	118	1115
4:55 PM	3	0	5	0	0	0	0	0	0	56	18	0	5	16	0	0	103	1142
5:00 PM	6	0	1	0	0	0	0	0	0	43	19	0	2	28	0	0	99	1165
5:05 PM	5	0	3	0	0	0	0	0	0	38	22	0	4	20	0	0	92	1165
5:10 PM	7	0	5	0	0	0	0	0	0	36	28	0	1	31	0	0	108	1188
5:15 PM	5	0	1	0	0	0	0	0	0	35	20	0	6	22	0	0	89	1195
5:20 PM	6	0	2	0	0	0	0	0	0	42	24	0	2	36	0	0	112	1211
5:25 PM	3	0	0	0	0	0	0	0	0	42	22	0	9	19	0	0	95	1232
5:30 PM	2	0	2	0	0	0	0	0	0	45	18	0	8	25	0	0	100	1232
5:35 PM	9	0	1	0	0	0	0	0	0	45	27	0	6	23	0	0	111	1237
5:40 PM	7	0	3	0	0	0	0	0	0	37	20	0	4	26	0	0	97	1232
5:45 PM	4	0	5	0	0	0	0	0	0	33	23	0	6	17	0	0	88	1212
5:50 PM	7	0	3	0	0	0	0	0	0	29	12	0	3	9	0	0	63	1157
5:55 PM	5	0	2	0	0	0	0	0	0	39	12	0	2	10	0	0	70	1124
6:00 PM	6	0	2	0	0	0	0	0	0	31	21	0	6	18	0	0	84	1109

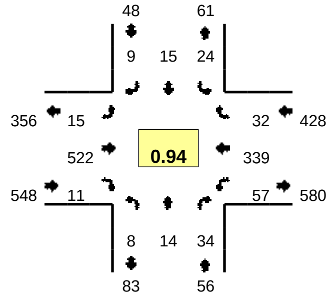
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	56	0	40	0	0	0	0	0	0	612	304	0	32	272	0	0	1316
Heavy Trucks	0	0	0		0	0	0		0	16	8		0	20	0		44
Pedestrians		4				4				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

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

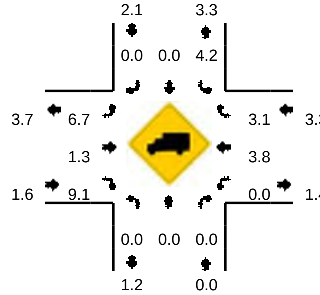
LOCATION: S 7th St -- S Airport Rd | **QC JOB #:** 13675127

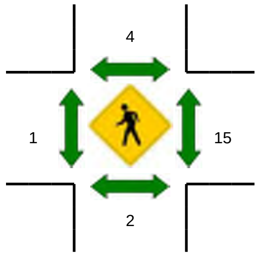
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

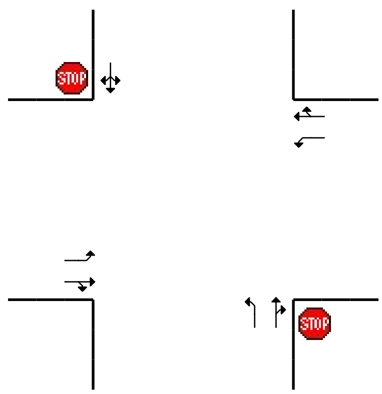


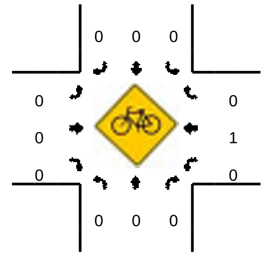
Peak-Hour: 4:35 PM -- 5:35 PM

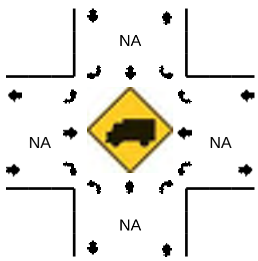
Peak 15-Min: 5:20 PM -- 5:35 PM

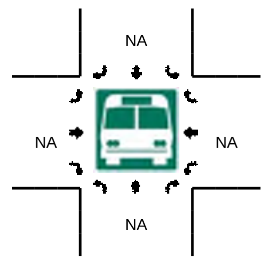












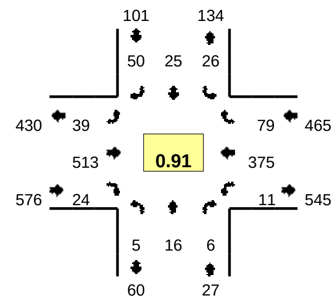
5-Min Count Period Beginning At	S 7th St (Northbound) Left	Thru	Right	U	S 7th St (Southbound) Left	Thru	Right	U	S Airport Rd (Eastbound) Left	Thru	Right	U	S Airport Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	1	2	3	0	1	2	2	0	0	45	0	0	1	20	2	0	79	834
4:10 PM	1	1	2	0	2	1	2	0	0	35	0	0	0	20	3	0	67	838
4:15 PM	1	0	1	0	1	0	1	0	1	35	0	0	2	23	0	0	65	833
4:20 PM	0	1	1	0	3	2	1	0	1	43	2	0	1	22	2	0	79	859
4:25 PM	0	2	1	0	0	1	0	0	0	30	0	0	4	14	1	0	53	844
4:30 PM	0	0	0	0	0	3	1	0	2	43	0	0	1	23	4	0	77	853
4:35 PM	2	2	3	0	1	2	1	0	4	44	0	0	5	30	2	0	96	886
4:40 PM	0	0	2	0	0	2	0	0	0	44	2	0	4	34	3	0	91	896
4:45 PM	1	0	2	0	2	0	2	0	2	44	1	0	6	29	1	0	90	898
4:50 PM	1	1	2	0	3	2	0	0	2	48	0	0	4	18	1	0	82	920
4:55 PM	0	3	3	0	2	0	0	0	2	52	3	0	2	23	3	0	93	937
5:00 PM	0	0	1	0	0	0	1	0	0	46	1	0	2	32	1	0	84	956
5:05 PM	1	0	3	0	3	1	1	0	1	39	1	0	3	23	3	0	79	956
5:10 PM	1	2	4	0	4	2	0	0	2	42	0	0	5	32	2	0	96	985
5:15 PM	0	2	4	0	3	0	0	0	0	35	0	0	9	26	4	0	83	1003
5:20 PM	1	1	4	0	3	1	0	0	1	42	1	0	10	38	2	0	104	1028
5:25 PM	1	2	3	0	3	1	3	0	1	43	0	0	4	23	8	0	92	1067
5:30 PM	0	1	3	0	0	4	1	0	0	43	2	0	3	31	2	0	90	1080
5:35 PM	1	0	3	0	1	2	0	0	1	49	0	0	3	32	1	0	93	1077
5:40 PM	1	0	0	0	0	0	0	0	3	37	1	0	2	25	6	0	75	1061
5:45 PM	0	0	2	0	3	1	3	0	0	32	3	0	4	27	2	0	77	1048
5:50 PM	1	0	3	0	1	1	0	0	2	31	1	0	4	7	3	0	54	1020
5:55 PM	0	1	2	0	1	1	0	0	0	42	0	0	8	13	2	0	70	997
6:00 PM	0	1	5	0	1	0	1	0	0	31	1	0	4	24	8	0	76	989

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	16	40	0	24	24	16	0	8	512	12	0	68	368	48	0	1144
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	16	4		24
Pedestrians		0				0				0				12			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

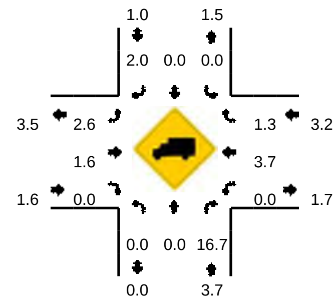
Comments:

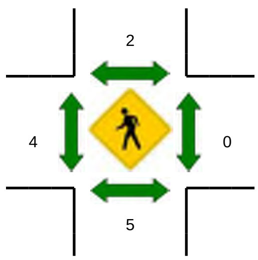
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

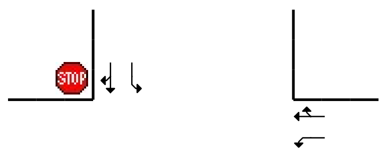
LOCATION: S 5th St -- S Airport Rd | **QC JOB #:** 13675126
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

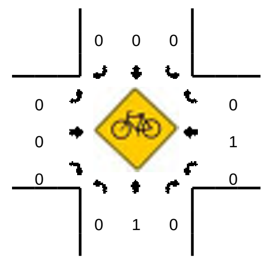


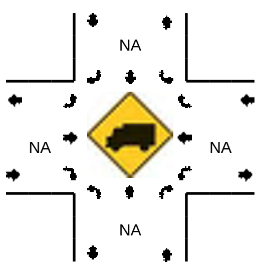
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

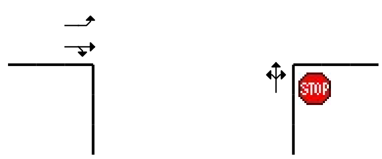


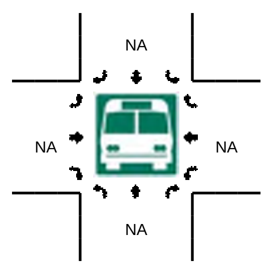












5-Min Count Period Beginning At	S 5th St (Northbound) Left	Thru	Right	U	S 5th St (Southbound) Left	Thru	Right	U	S Airport Rd (Eastbound) Left	Thru	Right	U	S Airport Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	1	1	0	0	4	2	0	3	40	2	0	0	25	4	0	82	859
4:10 PM	1	1	1	0	1	3	0	0	2	40	0	0	0	21	2	0	72	869
4:15 PM	0	0	0	0	2	4	1	0	1	32	3	0	0	30	0	0	73	871
4:20 PM	0	0	0	0	1	1	2	0	1	43	2	0	0	14	4	0	68	881
4:25 PM	0	1	2	0	3	1	3	0	1	29	1	0	1	16	5	0	63	876
4:30 PM	0	0	0	0	3	3	2	0	1	42	1	0	1	27	5	0	85	892
4:35 PM	0	0	1	0	1	2	5	0	3	46	3	0	3	35	6	0	105	935
4:40 PM	0	2	0	0	2	0	3	0	0	44	1	0	1	36	3	0	92	950
4:45 PM	2	2	1	0	2	3	4	0	2	41	0	0	1	30	5	0	93	944
4:50 PM	0	0	1	0	0	4	4	0	3	47	2	0	0	17	4	0	82	962
4:55 PM	1	0	1	0	0	1	0	0	3	52	3	0	0	31	10	0	102	985
5:00 PM	0	1	1	0	3	1	3	0	6	42	3	0	1	28	9	0	98	1015
5:05 PM	0	1	0	0	3	2	5	0	2	40	3	0	0	25	6	0	87	1020
5:10 PM	0	2	0	0	6	2	4	0	5	39	1	0	2	36	3	0	100	1048
5:15 PM	0	2	1	0	2	5	7	0	7	33	1	0	1	36	9	0	104	1079
5:20 PM	1	1	0	0	5	4	7	0	2	44	2	0	0	40	10	0	116	1127
5:25 PM	0	3	0	0	0	1	5	0	5	40	4	0	1	28	6	0	93	1157
5:30 PM	1	2	0	0	2	0	3	0	1	45	1	0	1	33	8	0	97	1169
5:35 PM	1	3	1	0	3	0	7	0	2	54	2	0	0	31	7	0	111	1175
5:40 PM	0	0	1	0	5	1	4	0	2	30	0	0	3	25	3	0	74	1157
5:45 PM	0	0	0	0	7	2	7	0	3	37	0	0	0	25	7	0	88	1152
5:50 PM	0	2	0	0	3	1	2	0	7	26	1	0	2	16	9	0	69	1139
5:55 PM	0	0	1	0	5	2	5	0	6	37	1	0	0	16	10	0	83	1120
6:00 PM	1	0	2	0	3	1	4	0	3	32	3	0	0	32	3	0	84	1106

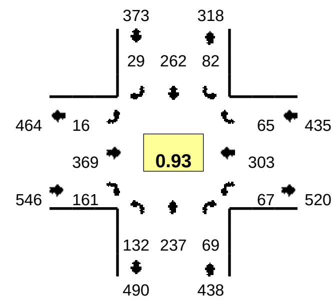
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	4	20	4	0	52	44	72	0	56	464	16	0	12	448	88	0	1280
Heavy Trucks	0	0	0		0	0	0		0	4	0		0	24	0		28
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

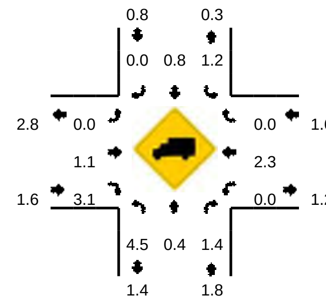
Comments:

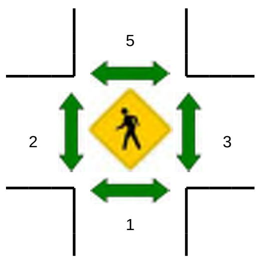
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

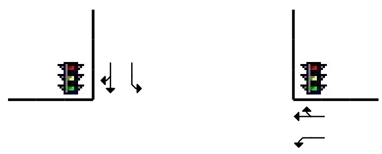
LOCATION: S Second St -- S Airport Rd | **QC JOB #:** 13675111
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

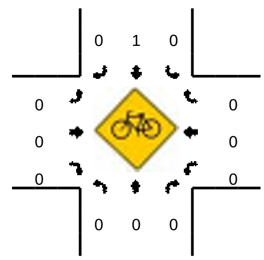
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:55 PM -- 5:10 PM

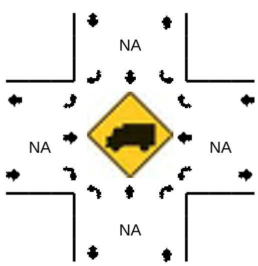


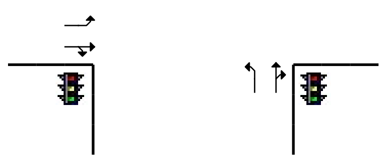


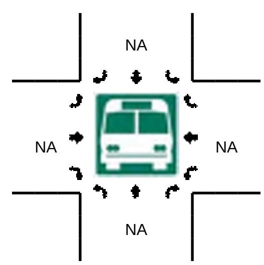












5-Min Count Period Beginning At	S Second St (Northbound)				S Second St (Southbound)				S Airport Rd (Eastbound)				S Airport Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:05 PM	10	21	8	0	3	20	1	0	2	29	9	0	2	16	6	0	127	1443
4:10 PM	5	15	5	0	6	18	1	0	3	31	10	0	7	16	2	0	119	1447
4:15 PM	6	16	5	0	15	28	1	0	3	29	6	0	7	23	3	0	142	1470
4:20 PM	4	26	8	0	4	14	0	0	1	24	11	0	13	17	7	0	129	1489
4:25 PM	8	19	4	0	6	15	1	0	0	26	13	0	6	10	3	0	111	1494
4:30 PM	12	16	5	0	3	20	2	0	0	29	15	0	4	22	6	0	134	1534
4:35 PM	8	14	4	0	12	18	4	0	2	30	15	0	8	27	10	0	152	1561
4:40 PM	12	29	5	0	2	28	4	0	2	23	13	0	2	29	6	0	155	1596
4:45 PM	4	23	5	0	4	24	2	0	2	28	17	0	4	26	2	0	141	1595
4:50 PM	9	15	11	0	7	16	1	0	0	34	17	0	9	13	2	0	134	1600
4:55 PM	12	15	4	0	8	27	1	0	2	30	19	0	10	31	5	0	164	1628
5:00 PM	12	20	9	0	9	19	0	0	2	32	12	0	4	24	8	0	151	1659
5:05 PM	10	25	9	0	12	27	2	0	0	31	12	0	6	24	8	0	166	1698
5:10 PM	12	30	8	0	9	20	3	0	0	32	14	0	3	22	5	0	158	1737
5:15 PM	18	18	4	0	5	21	5	0	1	24	10	0	3	23	7	0	139	1734
5:20 PM	15	18	1	0	3	18	1	0	2	33	14	0	6	34	7	0	152	1757
5:25 PM	10	15	6	0	5	30	2	0	3	33	5	0	7	23	2	0	141	1787
5:30 PM	10	15	3	0	6	14	4	0	0	39	13	0	5	27	3	0	139	1792
5:35 PM	18	9	3	0	5	11	1	0	1	37	10	0	8	24	3	0	130	1770
5:40 PM	5	12	5	0	0	13	1	0	0	36	9	0	4	21	3	0	109	1724
5:45 PM	8	17	2	0	5	11	2	0	0	33	10	0	6	22	2	0	118	1701
5:50 PM	9	27	3	0	3	16	3	0	0	23	8	0	1	15	5	0	113	1680
5:55 PM	11	21	4	0	4	12	0	0	0	27	13	0	5	15	2	0	114	1630
6:00 PM	16	8	7	0	3	12	2	0	2	22	16	0	3	17	5	0	113	1592

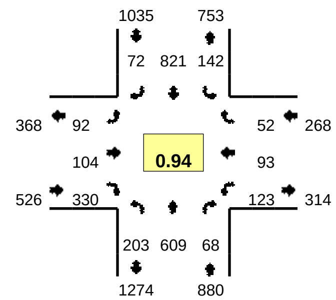
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	136	240	88	0	116	292	12	0	16	372	172	0	80	316	84	0	1924
Heavy Trucks	4	0	4		0	4	0		0	0	16		0	4	0		32
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

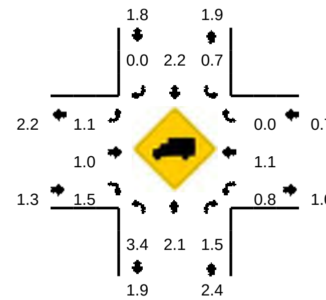
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

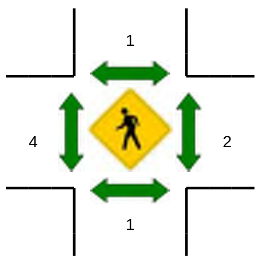
LOCATION: US 20 -- Airport Rd | **QC JOB #:** 13675105

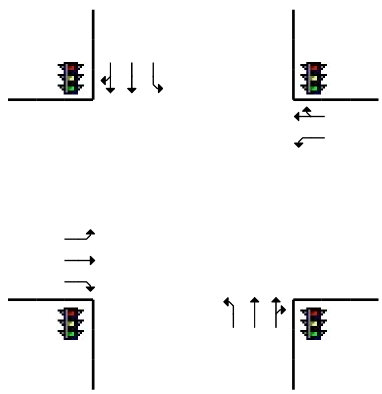
CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016

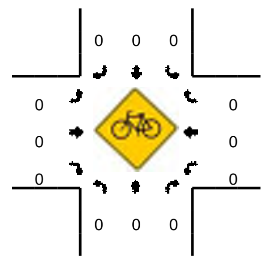


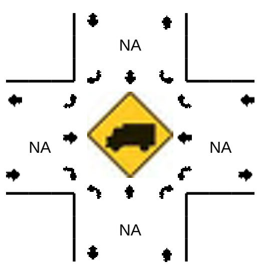
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:55 PM -- 5:10 PM

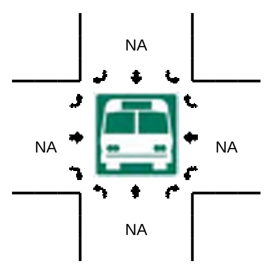












5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Airport Rd (Eastbound) Left	Thru	Right	U	Airport Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	14	38	4	0	10	47	4	0	10	11	32	0	10	5	4	0	189	2416
4:10 PM	14	56	7	0	19	71	3	0	6	4	27	0	10	3	4	0	224	2452
4:15 PM	21	48	3	0	13	59	7	0	4	9	28	0	17	6	6	0	221	2484
4:20 PM	13	55	4	0	10	64	11	0	8	7	24	0	12	5	2	0	215	2488
4:25 PM	16	41	5	0	11	80	3	0	9	8	24	0	8	4	4	0	213	2511
4:30 PM	16	48	3	0	12	55	5	0	4	7	29	0	13	6	6	0	204	2505
4:35 PM	20	40	4	0	9	90	4	0	6	8	23	0	11	7	3	0	225	2534
4:40 PM	21	41	5	0	20	57	5	0	3	6	34	0	13	9	4	0	218	2545
4:45 PM	18	67	3	0	17	90	3	0	8	6	24	0	4	4	3	0	247	2552
4:50 PM	14	43	6	0	11	67	8	0	8	12	24	0	13	5	3	0	214	2582
4:55 PM	20	50	7	0	15	65	14	0	11	5	25	0	9	5	6	0	232	2606
5:00 PM	12	70	12	0	6	66	8	0	13	14	29	0	6	6	2	0	244	2646
5:05 PM	19	53	3	0	12	79	6	0	7	10	28	0	12	6	6	0	241	2698
5:10 PM	10	58	3	0	15	66	3	0	5	10	31	0	11	10	3	0	225	2699
5:15 PM	22	59	4	0	10	57	6	0	9	13	20	0	8	10	3	0	221	2699
5:20 PM	25	42	6	0	10	41	3	0	3	8	28	0	8	12	2	0	188	2672
5:25 PM	8	37	9	0	8	72	7	0	12	5	30	0	16	8	7	0	219	2678
5:30 PM	14	49	6	0	9	71	5	0	7	7	34	0	12	11	10	0	235	2709
5:35 PM	16	20	1	0	11	65	5	0	4	2	24	0	9	5	4	0	166	2650
5:40 PM	21	41	5	0	15	55	4	0	9	11	34	0	8	6	3	0	212	2644
5:45 PM	8	41	2	0	3	70	5	0	10	3	24	0	12	4	5	0	187	2584
5:50 PM	15	44	6	0	5	35	4	0	5	12	23	0	11	2	6	0	168	2538
5:55 PM	11	38	2	0	4	50	1	0	6	5	19	0	6	8	4	0	154	2460
6:00 PM	14	39	6	0	10	49	1	0	5	4	24	0	5	3	3	0	163	2379

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	204	692	88	0	132	840	112	0	124	116	328	0	108	68	56	0	2868
Heavy Trucks	4	8	4		0	16	0		4	0	4		0	0	0		40
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

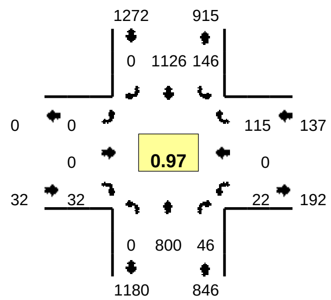
Report generated on 2/16/2016 11:14 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

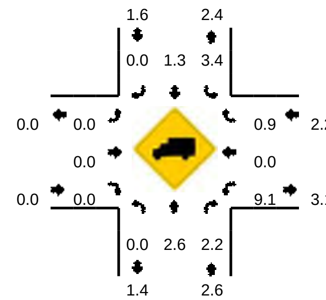
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

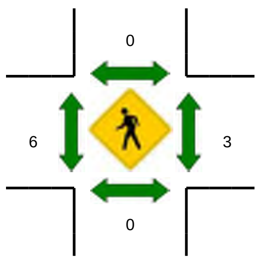
LOCATION: US 20 -- Russell Dr | **QC JOB #:** 13675137

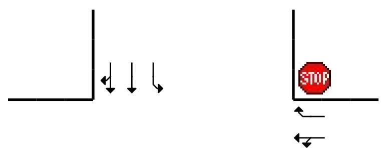
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

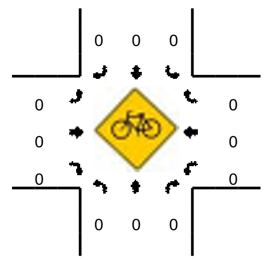


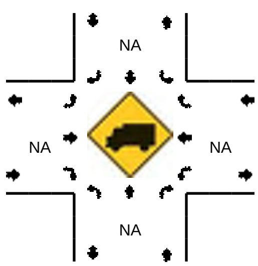
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:55 PM -- 5:10 PM

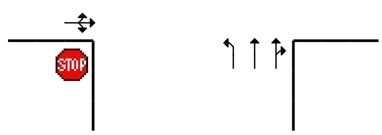


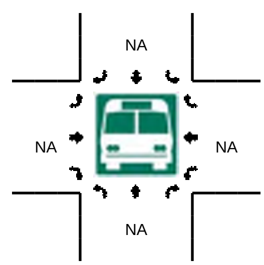












5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Russell Dr (Eastbound) Left	Thru	Right	U	Russell Dr (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	54	3	0	9	76	0	0	0	0	0	0	3	0	9	0	154	2024
4:10 PM	1	61	2	0	11	91	0	0	0	0	1	0	0	0	14	0	181	2058
4:15 PM	0	56	3	0	9	85	0	0	0	1	4	0	2	0	20	0	180	2074
4:20 PM	0	52	3	0	6	102	0	0	0	0	4	0	1	0	14	0	182	2094
4:25 PM	0	53	3	0	21	75	0	0	0	0	4	0	3	0	6	0	165	2081
4:30 PM	0	64	4	0	14	90	0	0	0	0	2	0	1	0	8	0	183	2111
4:35 PM	0	55	3	0	14	102	0	0	0	0	2	0	3	0	9	0	188	2135
4:40 PM	0	78	4	0	9	100	0	0	0	0	2	0	2	0	7	0	202	2135
4:45 PM	0	58	5	0	9	108	0	0	0	0	0	0	0	0	11	0	191	2136
4:50 PM	0	68	5	0	5	92	0	0	0	0	2	0	3	0	8	0	183	2153
4:55 PM	0	100	4	0	13	87	0	0	0	0	3	0	1	0	4	0	212	2197
5:00 PM	0	61	8	0	21	87	0	0	0	0	4	0	2	0	9	0	192	2213
5:05 PM	0	60	1	0	17	89	0	0	0	0	6	0	2	0	13	0	188	2247
5:10 PM	0	73	2	0	13	108	0	0	0	0	4	0	0	0	11	0	211	2277
5:15 PM	0	65	2	0	9	75	0	0	0	0	1	0	1	0	13	0	166	2263
5:20 PM	0	63	6	0	10	76	0	0	0	0	4	0	2	0	11	0	172	2253
5:25 PM	0	59	5	0	11	102	0	0	0	0	2	0	2	0	8	0	189	2277
5:30 PM	0	60	1	0	15	100	0	0	0	0	2	0	4	0	11	0	193	2287
5:35 PM	0	42	2	0	14	91	0	0	0	0	1	0	3	0	6	0	159	2258
5:40 PM	0	52	2	0	14	88	0	0	0	0	3	0	3	0	9	0	171	2227
5:45 PM	0	55	6	0	17	81	0	0	0	0	1	0	3	0	7	0	170	2206
5:50 PM	0	56	3	0	7	62	0	0	0	0	2	0	5	0	8	0	143	2166
5:55 PM	0	43	3	0	13	61	0	0	0	0	2	0	3	0	3	0	128	2082
6:00 PM	0	56	5	0	8	73	0	0	0	0	1	0	3	0	13	0	159	2049

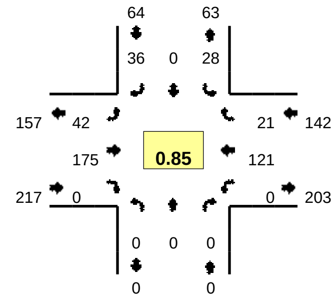
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	884	52	0	204	1052	0	0	0	0	52	0	20	0	104	0	2368
Heavy Trucks	0	12	0		0	12	0		0	0	0		4	0	4		32
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

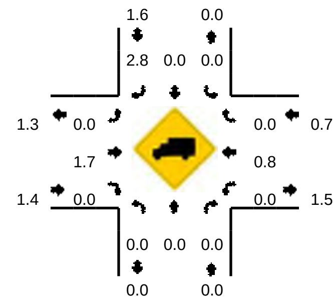
Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

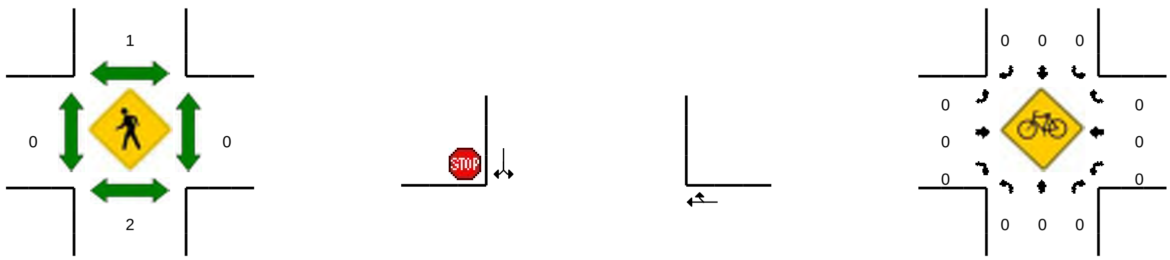
Type of peak hour being reported: User-Defined　　Method for determining peak hour: Total Entering Volume

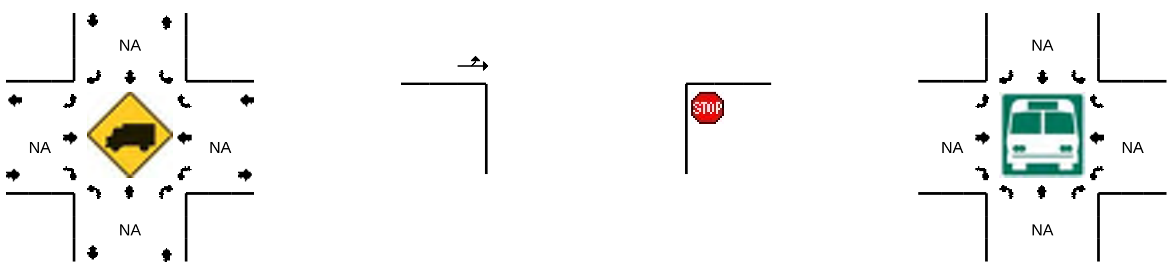
LOCATION: Franklin St -- Russell Dr　　**QC JOB #:** 13675134
CITY/STATE: Linn, OR　　**DATE:** Wed, Jan 20 2016



Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 5:00 PM -- 5:15 PM







5-Min Count Period Beginning At	Franklin St (Northbound) Left	Thru	Right	U	Franklin St (Southbound) Left	Thru	Right	U	Russell Dr (Eastbound) Left	Thru	Right	U	Russell Dr (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	0	0	0	1	0	2	0	0	9	0	0	0	10	3	0	25	342
4:10 PM	0	0	0	0	1	0	3	0	4	13	0	0	0	18	6	0	45	364
4:15 PM	0	0	0	0	2	0	4	0	6	8	0	0	0	16	0	0	36	370
4:20 PM	0	0	0	0	1	0	6	0	3	13	0	0	0	12	5	0	40	384
4:25 PM	0	0	0	0	1	0	6	0	4	20	0	0	0	8	6	0	45	399
4:30 PM	0	0	0	0	2	0	2	0	3	12	0	0	0	10	5	0	34	405
4:35 PM	0	0	0	0	3	0	1	0	4	20	0	0	0	11	3	0	42	424
4:40 PM	0	0	0	0	4	0	4	0	4	13	0	0	0	10	0	0	35	427
4:45 PM	0	0	0	0	2	0	2	0	3	14	0	0	0	7	3	0	31	428
4:50 PM	0	0	0	0	0	0	1	0	7	12	0	0	0	9	2	0	31	422
4:55 PM	0	0	0	0	1	0	5	0	6	10	0	0	0	14	1	0	37	433
5:00 PM	0	0	0	0	2	0	2	0	2	26	0	0	0	10	4	0	46	447
5:05 PM	0	0	0	0	5	0	4	0	0	18	0	0	0	8	3	0	38	460
5:10 PM	0	0	0	0	4	0	4	0	5	13	0	0	0	15	0	0	41	456
5:15 PM	0	0	0	0	2	0	4	0	3	11	0	0	0	8	1	0	29	449
5:20 PM	0	0	0	0	3	0	3	0	2	12	0	0	0	12	1	0	33	442
5:25 PM	0	0	0	0	2	0	5	0	3	16	0	0	0	8	0	0	34	431
5:30 PM	0	0	0	0	0	0	1	0	3	10	0	0	0	9	3	0	26	423
5:35 PM	0	0	0	0	1	0	3	0	2	16	0	0	0	6	0	0	28	409
5:40 PM	0	0	0	0	0	0	5	0	1	11	0	0	0	11	2	0	30	404
5:45 PM	0	0	0	0	3	0	1	0	4	18	0	0	0	5	0	0	31	404
5:50 PM	0	0	0	0	1	0	1	0	2	11	0	0	0	11	4	0	30	403
5:55 PM	0	0	0	0	1	0	4	0	5	11	0	0	0	11	0	0	32	398
6:00 PM	0	0	0	0	3	0	1	0	7	13	0	0	0	12	1	0	37	389

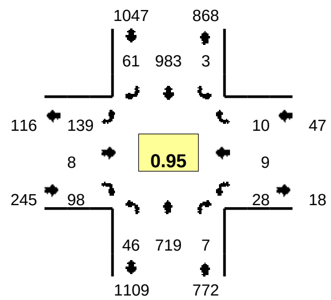
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	0	0	0	44	0	40	0	28	228	0	0	0	132	28	0	500
Heavy Trucks	0	0	0		0	0	4		0	4	0		0	4	0		12
Pedestrians		4				4				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

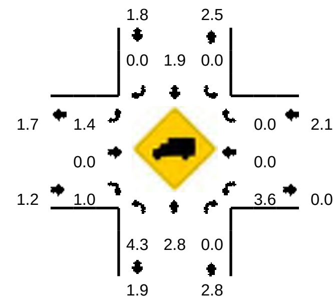
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

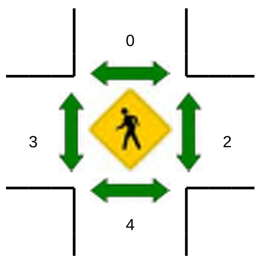
LOCATION: US 20 -- Walker Rd | **QC JOB #:** 13675106

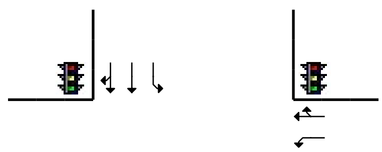
CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016

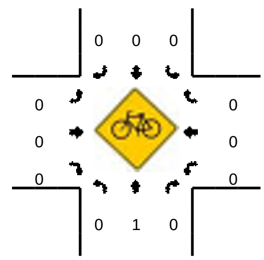


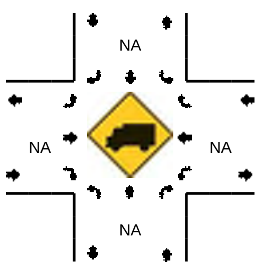
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:50 PM -- 5:05 PM

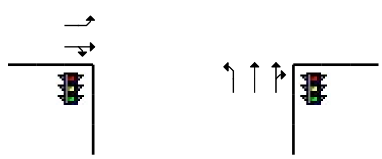


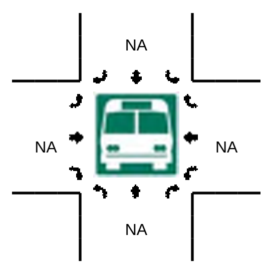












5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Walker Rd (Eastbound) Left	Thru	Right	U	Walker Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	1	44	0	0	0	77	5	0	7	0	4	0	2	0	0	0	140	1867
4:10 PM	2	52	1	0	0	75	5	0	15	0	8	0	1	2	2	0	163	1893
4:15 PM	3	52	0	0	0	69	6	0	10	0	7	0	1	0	0	0	148	1886
4:20 PM	9	47	1	0	0	86	3	0	10	3	9	0	4	0	0	0	172	1905
4:25 PM	9	53	1	0	0	76	6	0	10	0	7	0	2	3	0	0	167	1917
4:30 PM	5	51	0	0	2	75	5	0	10	0	6	0	1	4	0	0	159	1927
4:35 PM	3	64	2	0	0	87	8	0	11	1	6	0	0	0	0	0	182	1940
4:40 PM	5	63	0	0	0	87	5	0	13	0	11	0	4	4	0	0	192	1959
4:45 PM	4	64	1	0	1	72	6	0	14	0	11	0	1	1	1	0	176	1961
4:50 PM	3	55	0	0	0	102	4	0	12	2	5	0	0	0	2	0	185	1986
4:55 PM	4	76	1	0	0	76	3	0	15	1	10	0	2	2	0	0	190	2034
5:00 PM	6	65	0	0	0	87	1	0	11	1	8	0	3	0	1	0	183	2057
5:05 PM	3	54	1	0	0	77	10	0	6	0	10	0	6	1	1	0	169	2086
5:10 PM	6	57	0	0	2	68	2	0	14	0	11	0	2	0	1	0	163	2086
5:15 PM	4	62	0	0	0	69	7	0	16	0	5	0	4	0	1	0	168	2106
5:20 PM	2	56	1	0	0	71	6	0	7	2	7	0	1	0	2	0	155	2089
5:25 PM	2	55	0	0	0	94	7	0	12	1	8	0	1	0	1	0	181	2103
5:30 PM	4	48	1	0	0	93	2	0	8	0	6	0	4	1	0	0	167	2111
5:35 PM	6	49	0	0	0	95	5	0	7	0	9	0	0	0	0	0	171	2100
5:40 PM	2	46	0	0	0	84	3	0	12	0	4	0	2	0	2	0	155	2063
5:45 PM	3	49	0	0	0	68	6	0	13	1	2	0	1	1	0	0	144	2031
5:50 PM	4	51	0	0	0	52	5	0	5	0	5	0	1	2	0	0	125	1971
5:55 PM	3	40	1	0	0	61	3	0	12	1	2	0	1	1	1	0	126	1907
6:00 PM	3	43	2	0	0	61	6	0	8	0	3	0	1	0	2	0	129	1853

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	52	784	4	0	0	1060	32	0	152	16	92	0	20	8	12	0	2232
Heavy Trucks	4	28	0		0	28	0		4	0	0		4	0	0		68
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

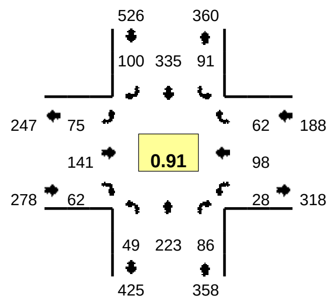
LOCATION: S Main Rd -- Walker Rd

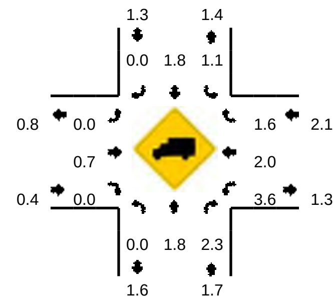
CITY/STATE: Linn, OR

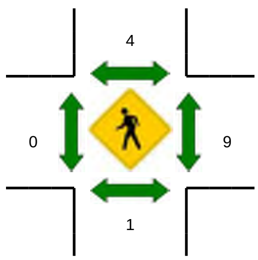
QC JOB #: 13675112

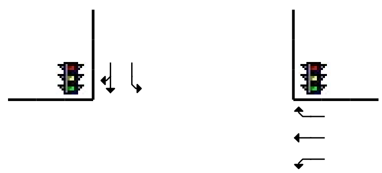
DATE: Wed, Jan 20 2016

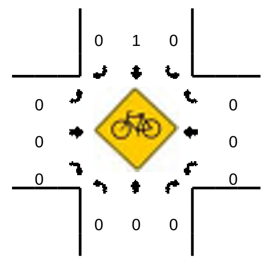
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

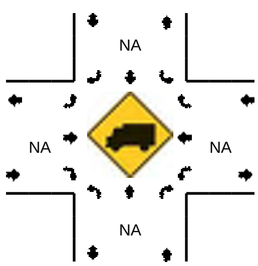


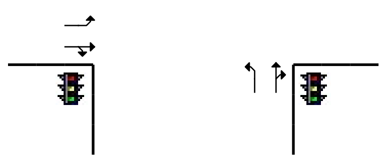


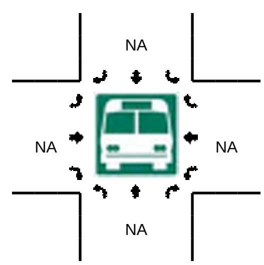












5-Min Count Period Beginning At	S Main Rd (Northbound) Left	Thru	Right	U	S Main Rd (Southbound) Left	Thru	Right	U	Walker Rd (Eastbound) Left	Thru	Right	U	Walker Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	2	9	8	0	4	22	6	0	6	13	6	0	3	7	6	0	92	1204
4:10 PM	7	15	4	0	7	24	8	0	5	16	3	0	1	9	4	0	103	1196
4:15 PM	6	19	7	0	9	31	11	0	1	11	5	0	1	8	6	0	115	1221
4:20 PM	5	15	4	0	5	20	8	0	8	11	4	0	2	11	5	0	98	1215
4:25 PM	1	24	6	0	6	28	8	0	2	5	1	0	1	15	7	0	104	1216
4:30 PM	5	18	5	0	5	37	12	0	4	9	4	0	2	10	5	0	116	1260
4:35 PM	3	15	4	0	5	28	7	0	7	14	5	0	4	7	3	0	102	1255
4:40 PM	5	17	4	0	4	31	12	0	6	15	5	0	2	8	6	0	115	1270
4:45 PM	5	20	9	0	9	25	11	0	3	16	8	0	3	8	7	0	124	1290
4:50 PM	4	22	11	0	8	23	11	0	8	10	13	0	1	7	8	0	126	1313
4:55 PM	2	16	8	0	10	31	8	0	13	11	9	0	0	8	5	0	121	1324
5:00 PM	7	18	7	0	11	30	9	0	10	14	3	0	0	5	3	0	117	1333
5:05 PM	3	18	3	0	10	25	5	0	7	14	2	0	4	14	8	0	113	1354
5:10 PM	5	19	15	0	3	35	11	0	5	9	4	0	2	5	5	0	118	1369
5:15 PM	5	20	8	0	5	26	7	0	3	11	5	0	2	17	0	0	109	1363
5:20 PM	3	21	8	0	10	21	7	0	3	8	4	0	2	4	6	0	97	1362
5:25 PM	4	17	5	0	9	30	7	0	9	13	2	0	5	10	6	0	117	1375
5:30 PM	3	20	4	0	7	30	5	0	1	6	2	0	3	5	5	0	91	1350
5:35 PM	3	10	3	0	3	18	5	0	9	10	3	0	3	6	8	0	81	1329
5:40 PM	2	18	7	0	3	18	5	0	4	8	4	0	1	11	4	0	85	1299
5:45 PM	4	19	8	0	3	25	5	0	4	14	2	0	0	9	5	0	98	1273
5:50 PM	2	22	4	0	4	19	5	0	1	5	1	0	0	6	7	0	76	1223
5:55 PM	2	26	6	0	7	26	5	0	4	6	1	0	1	9	4	0	97	1199
6:00 PM	2	19	2	0	8	26	5	0	2	7	4	0	2	3	2	0	82	1164

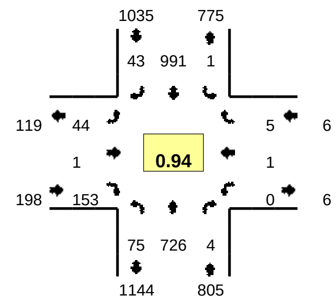
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	44	232	112	0	108	316	120	0	96	148	120	0	16	92	80	0	1484
Heavy Trucks	0	4	4		4	8	0		0	4	0		0	4	0		28
Pedestrians		0				12				0				12			24
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

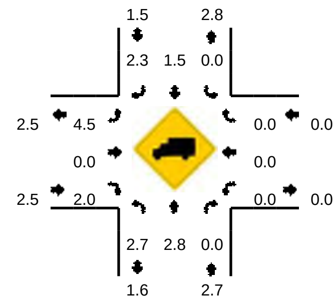
Comments:

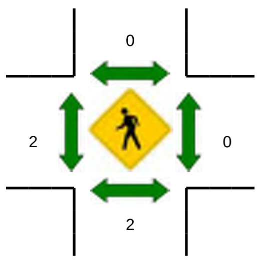
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

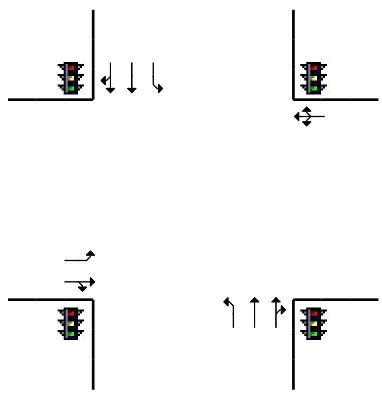
LOCATION: US 20 -- Market St | **QC JOB #:** 13675107
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

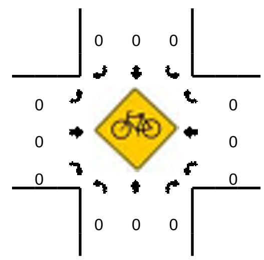
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

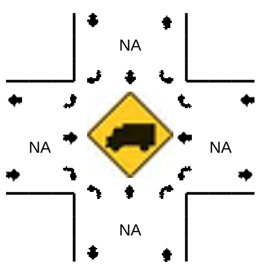


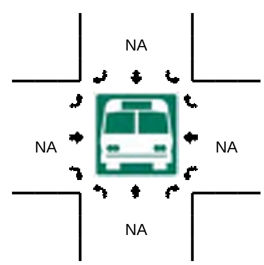












5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Market St (Eastbound) Left	Thru	Right	U	Market St (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	5	51	0	0	0	81	4	0	3	0	12	0	0	0	1	0	157	1889
4:10 PM	4	50	0	0	0	66	3	0	3	0	9	0	0	0	1	0	136	1868
4:15 PM	6	51	0	0	0	71	5	0	7	0	15	0	0	0	0	0	155	1870
4:20 PM	5	60	0	0	0	84	4	0	0	0	14	0	0	0	0	0	167	1890
4:25 PM	3	72	0	0	1	79	8	0	5	1	9	0	0	0	0	0	178	1907
4:30 PM	4	61	0	0	0	69	4	0	4	0	12	0	0	0	0	0	154	1905
4:35 PM	9	63	1	0	0	89	8	0	6	0	18	0	0	0	1	0	195	1927
4:40 PM	5	64	0	0	1	89	5	0	3	0	12	0	0	0	0	0	179	1945
4:45 PM	3	66	1	0	0	74	4	0	5	0	13	0	0	1	0	0	167	1956
4:50 PM	5	57	0	0	0	94	2	0	2	0	9	0	0	0	0	0	169	1970
4:55 PM	8	82	0	0	0	78	2	0	7	0	18	0	0	0	1	0	196	2015
5:00 PM	6	48	0	0	0	68	2	0	3	1	11	0	0	0	0	0	139	1992
5:05 PM	2	59	0	0	0	85	2	0	3	0	19	0	0	0	1	0	171	2006
5:10 PM	9	56	1	0	0	89	2	0	4	0	9	0	0	0	0	0	170	2040
5:15 PM	8	70	0	0	0	76	2	0	3	0	11	0	0	0	0	0	170	2055
5:20 PM	7	56	0	0	0	76	4	0	3	0	16	0	0	0	0	0	162	2050
5:25 PM	6	62	0	0	0	69	3	0	2	0	10	0	0	0	0	0	152	2024
5:30 PM	7	43	1	0	0	104	7	0	3	0	7	0	0	0	2	0	174	2044
5:35 PM	4	55	0	0	0	92	5	0	2	0	8	0	0	0	1	0	167	2016
5:40 PM	6	44	0	0	0	80	1	0	1	0	6	0	0	0	0	0	138	1975
5:45 PM	7	46	0	0	0	68	3	0	1	0	9	0	0	0	0	0	134	1942
5:50 PM	6	53	0	0	0	54	8	0	3	0	6	0	0	0	0	0	130	1903
5:55 PM	10	43	0	0	0	52	3	0	4	0	17	0	0	0	0	0	129	1836
6:00 PM	9	42	0	0	0	59	6	0	7	0	12	0	0	0	0	0	135	1832

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	772	8	0	4	1008	68	0	56	0	172	0	0	4	4	0	2164
Heavy Trucks	0	16	0		0	20	0		4	0	4		0	0	0		44
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

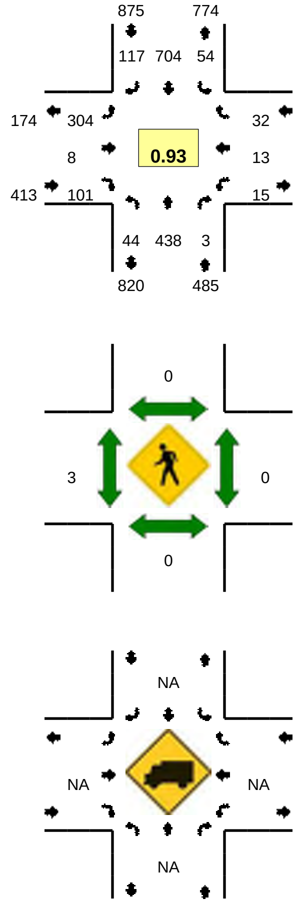
Report generated on 2/16/2016 11:14 AM

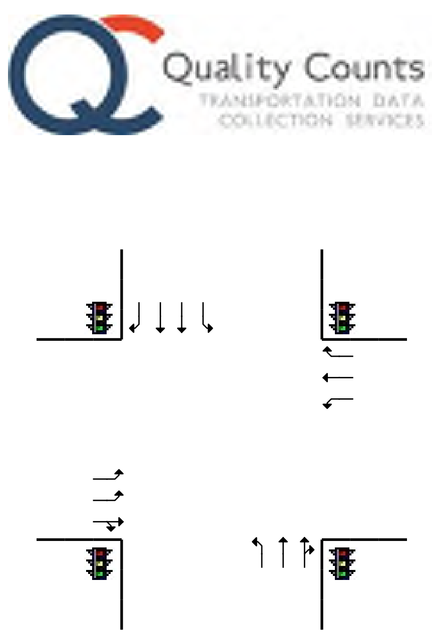
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

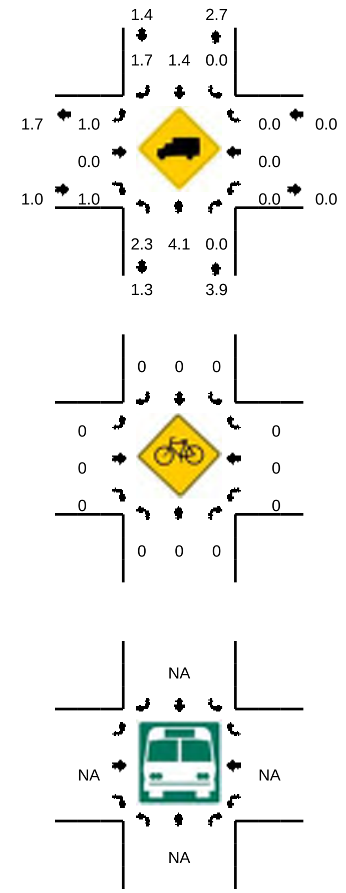
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

LOCATION: US 20 -- Weldwood St/Burdell Blvd | **QC JOB #:** 13675108
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:45 PM -- 5:00 PM







5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Weldwood St/Burdell Blvd (Eastbound) Left	Thru	Right	U	Weldwood St/Burdell Blvd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	33	1	0	7	61	8	0	20	1	9	0	0	2	2	0	144	1714
4:10 PM	3	39	2	0	4	50	8	0	15	1	5	0	1	0	4	0	132	1720
4:15 PM	3	21	1	0	6	38	8	0	23	2	10	0	3	3	8	0	126	1701
4:20 PM	0	43	1	0	6	70	9	0	25	2	9	0	4	0	3	0	172	1742
4:25 PM	8	37	0	0	8	51	9	0	31	1	7	0	1	2	1	0	156	1746
4:30 PM	1	35	1	0	1	54	7	0	22	1	10	0	4	2	2	0	140	1748
4:35 PM	3	38	1	0	6	61	6	0	21	0	9	0	2	1	7	0	155	1780
4:40 PM	4	43	0	0	7	64	7	0	28	0	5	0	1	1	1	0	161	1766
4:45 PM	5	40	0	0	3	53	7	0	24	1	7	0	0	3	2	0	145	1759
4:50 PM	4	29	0	0	6	73	12	0	27	0	7	0	1	1	6	0	166	1772
4:55 PM	6	55	0	0	5	61	13	0	28	1	9	0	2	0	4	0	184	1809
5:00 PM	5	28	0	0	6	51	11	0	26	1	6	0	2	1	2	0	139	1820
5:05 PM	0	36	0	0	2	59	7	0	24	2	11	0	1	2	1	0	145	1821
5:10 PM	2	38	0	0	1	67	16	0	32	0	8	0	0	1	1	0	166	1855
5:15 PM	3	38	1	0	2	57	8	0	21	0	12	0	2	0	0	0	144	1873
5:20 PM	3	34	1	0	5	45	12	0	27	1	6	0	0	1	1	0	136	1837
5:25 PM	6	34	0	0	3	59	11	0	31	1	8	0	1	1	5	0	160	1841
5:30 PM	3	25	0	0	8	54	7	0	15	1	13	0	3	1	2	0	132	1833
5:35 PM	3	31	0	0	5	65	13	0	29	0	5	0	0	2	2	0	155	1833
5:40 PM	6	22	1	0	1	61	6	0	18	3	9	0	2	1	5	0	135	1807
5:45 PM	4	29	2	0	3	56	14	0	19	1	9	0	0	0	3	0	140	1802
5:50 PM	3	24	0	0	3	29	10	0	29	2	4	0	5	0	3	0	112	1748
5:55 PM	3	37	1	0	1	46	10	0	19	4	11	0	0	0	1	0	133	1697
6:00 PM	2	24	0	0	2	48	8	0	17	3	6	0	2	0	2	0	114	1672

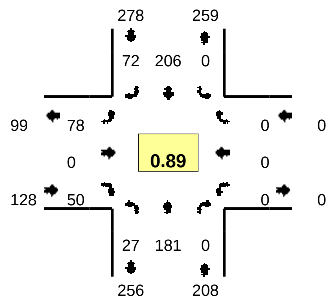
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	60	496	0	0	56	748	128	0	316	8	92	0	12	16	48	0	1980
Heavy Trucks	0	16	0		0	16	0		8	0	0		0	0	0		40
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

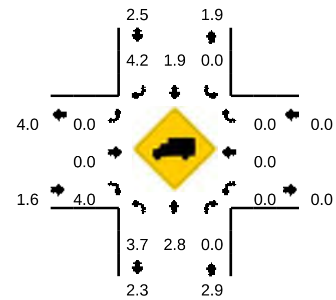
Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

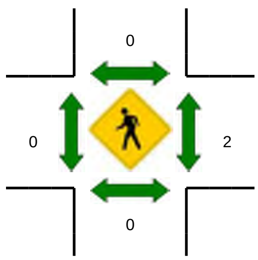
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

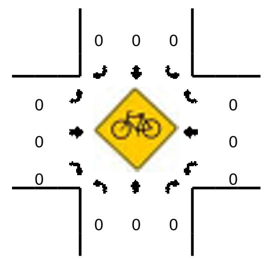
LOCATION: S Main Rd -- Vaughan Ln | **QC JOB #:** 13675132
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

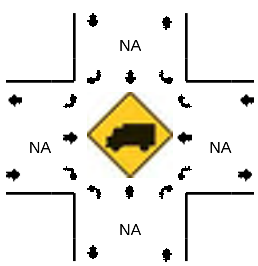


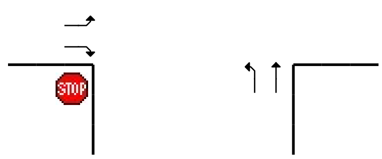
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:55 PM -- 5:10 PM

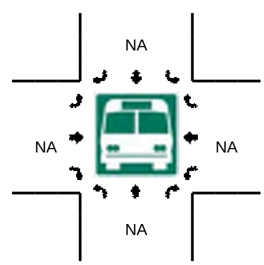












5-Min Count Period Beginning At	S Main Rd (Northbound) Left	Thru	Right	U	S Main Rd (Southbound) Left	Thru	Right	U	Vaughan Ln (Eastbound) Left	Thru	Right	U	Vaughan Ln (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	3	11	0	0	0	9	8	0	9	0	1	0	0	0	0	0	41	517
4:10 PM	3	15	0	0	0	19	8	0	2	0	5	0	0	0	0	0	52	529
4:15 PM	2	12	0	0	0	19	7	0	6	0	7	0	0	0	0	0	53	535
4:20 PM	6	14	0	0	0	15	5	0	8	0	5	0	0	0	0	0	53	550
4:25 PM	3	8	0	0	0	15	5	0	9	0	5	0	0	0	0	0	45	540
4:30 PM	4	15	0	0	0	11	6	0	10	0	7	0	0	0	0	0	53	552
4:35 PM	5	12	0	0	0	15	4	0	4	0	2	0	0	0	0	0	42	564
4:40 PM	1	13	0	0	0	18	5	0	11	0	4	0	0	0	0	0	52	571
4:45 PM	2	16	0	0	0	20	6	0	6	0	4	0	0	0	0	0	54	583
4:50 PM	3	10	0	0	0	12	2	0	8	0	5	0	0	0	0	0	40	577
4:55 PM	3	27	0	0	0	22	10	0	4	0	6	0	0	0	0	0	72	601
5:00 PM	2	12	0	0	0	18	4	0	10	0	2	0	0	0	0	0	48	605
5:05 PM	3	21	0	0	0	14	2	0	7	0	6	0	0	0	0	0	53	617
5:10 PM	1	17	0	0	0	25	7	0	3	0	4	0	0	0	0	0	57	622
5:15 PM	3	13	0	0	0	16	10	0	5	0	3	0	0	0	0	0	50	619
5:20 PM	1	18	0	0	0	10	6	0	6	0	4	0	0	0	0	0	45	611
5:25 PM	1	7	0	0	0	19	11	0	6	0	4	0	0	0	0	0	48	614
5:30 PM	2	15	0	0	0	17	5	0	8	0	6	0	0	0	0	0	53	614
5:35 PM	4	6	0	0	0	16	6	0	4	0	4	0	0	0	0	0	40	612
5:40 PM	3	14	0	0	0	9	7	0	7	0	4	0	0	0	0	0	44	604
5:45 PM	3	14	0	0	0	14	2	0	7	0	7	0	0	0	0	0	47	597
5:50 PM	0	15	0	0	0	11	5	0	4	0	2	0	0	0	0	0	37	594
5:55 PM	2	13	0	0	0	6	2	0	4	0	5	0	0	0	0	0	32	554
6:00 PM	4	11	0	0	0	14	4	0	8	0	0	0	0	0	0	0	41	547

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	240	0	0	0	216	64	0	84	0	56	0	0	0	0	0	692
Heavy Trucks	0	8	0		0	12	0		0	0	4		0	0	0		24
Pedestrians		0				0				0				4			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

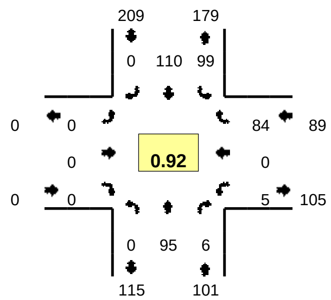
Comments:

Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

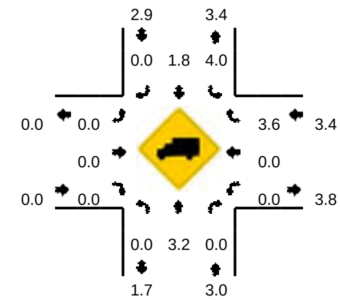
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

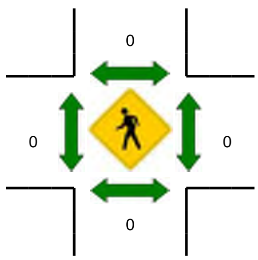
LOCATION: S Main Rd -- Crowfoot Rd | **QC JOB #:** 13675133

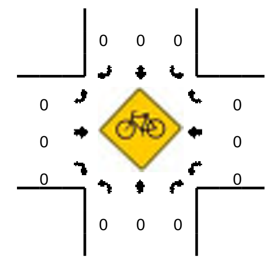
CITY/STATE: Lebanon, OR | **DATE:** Wed, Jan 20 2016

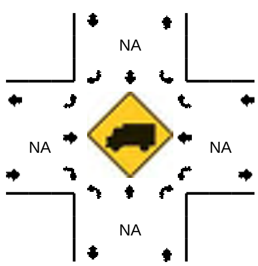


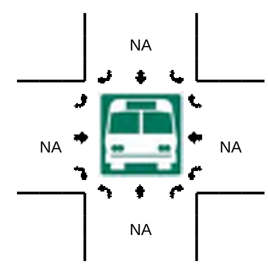
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:45 PM -- 5:00 PM











5-Min Count Period Beginning At	S Main Rd (Northbound) Left	Thru	Right	U	S Main Rd (Southbound) Left	Thru	Right	U	Crowfoot Rd (Eastbound) Left	Thru	Right	U	Crowfoot Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	6	1	0	8	2	0	0	0	0	0	0	0	0	8	0	25	337
4:10 PM	0	8	0	0	8	6	0	0	0	0	0	0	1	0	9	0	32	339
4:15 PM	0	7	1	0	15	13	0	0	0	0	0	0	1	0	4	0	41	355
4:20 PM	0	7	0	0	11	9	0	0	0	0	0	0	1	0	6	0	34	354
4:25 PM	0	6	0	0	6	11	0	0	0	0	0	0	1	0	6	0	30	355
4:30 PM	0	7	0	0	5	7	0	0	0	0	0	0	0	0	4	0	23	344
4:35 PM	0	9	2	0	8	11	0	0	0	0	0	0	0	0	7	0	37	360
4:40 PM	0	8	0	0	6	11	0	0	0	0	0	0	0	0	4	0	29	359
4:45 PM	0	12	1	0	7	12	0	0	0	0	0	0	0	0	7	0	39	365
4:50 PM	0	8	0	0	4	9	0	0	0	0	0	0	2	0	8	0	31	367
4:55 PM	0	12	0	0	11	9	0	0	0	0	0	0	0	0	7	0	39	383
5:00 PM	0	6	0	0	10	9	0	0	0	0	0	0	0	0	9	0	34	394
5:05 PM	0	7	0	0	6	7	0	0	0	0	0	0	0	0	3	0	23	392
5:10 PM	0	10	0	0	11	14	0	0	0	0	0	0	0	0	6	0	41	401
5:15 PM	0	6	2	0	8	6	0	0	0	0	0	0	0	0	9	0	31	391
5:20 PM	0	9	0	0	6	7	0	0	0	0	0	0	3	0	9	0	34	391
5:25 PM	0	2	0	0	8	11	0	0	0	0	0	0	0	0	8	0	29	390
5:30 PM	0	6	1	0	14	4	0	0	0	0	0	0	0	0	7	0	32	399
5:35 PM	0	3	0	0	6	13	0	0	0	0	0	0	0	0	7	0	29	391
5:40 PM	0	7	0	0	5	5	0	0	0	0	0	0	1	0	9	0	27	389
5:45 PM	0	10	1	0	10	6	0	0	0	0	0	0	1	0	8	0	36	386
5:50 PM	0	7	1	0	6	3	0	0	0	0	0	0	0	0	4	0	21	376
5:55 PM	0	11	0	0	7	3	0	0	0	0	0	0	0	0	3	0	24	361
6:00 PM	0	5	0	0	3	6	0	0	0	0	0	0	0	0	5	0	19	346

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	128	4	0	88	120	0	0	0	0	0	0	8	0	88	0	436
Heavy Trucks	0	8	0		4	4	0		0	0	0		0	0	0		16
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

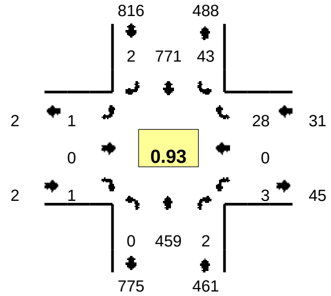
Comments:

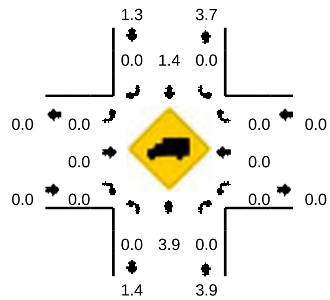
Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

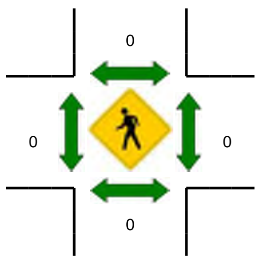
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

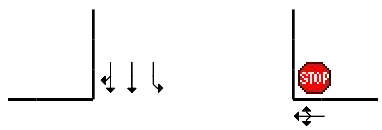
LOCATION: US 20 -- Weirich Dr | **QC JOB #:** 13675117
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

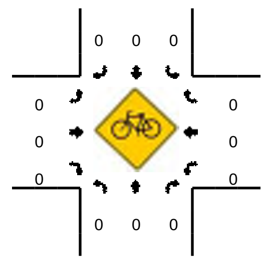
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

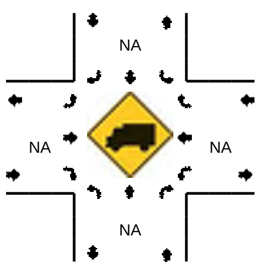


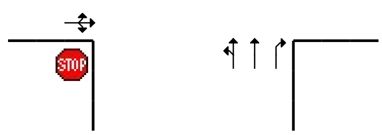


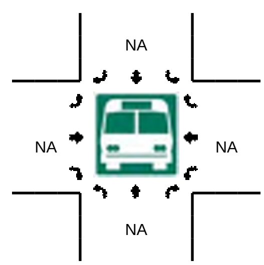












5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Weirich Dr (Eastbound) Left	Thru	Right	U	Weirich Dr (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	0	37	0	0	2	65	0	0	1	0	0	0	0	0	2	0	107	1195
4:10 PM	0	32	0	0	1	44	0	0	0	0	1	0	0	0	5	0	83	1179
4:15 PM	0	30	1	0	1	65	0	0	0	0	0	0	0	0	2	0	99	1192
4:20 PM	0	47	0	0	3	59	0	0	0	0	0	0	0	0	1	0	110	1195
4:25 PM	0	36	0	0	4	59	0	0	0	0	0	0	0	0	2	0	101	1206
4:30 PM	0	33	1	0	3	65	0	0	0	0	0	0	0	0	3	0	105	1227
4:35 PM	0	42	0	0	3	72	0	0	0	0	0	0	0	0	3	0	120	1241
4:40 PM	0	44	0	0	5	69	0	0	0	0	0	0	0	0	0	0	118	1257
4:45 PM	0	41	1	0	1	70	0	0	0	0	0	0	0	0	1	0	114	1266
4:50 PM	0	42	0	0	6	63	0	0	0	0	0	0	1	0	2	0	114	1262
4:55 PM	0	55	1	0	1	63	0	0	0	0	0	0	1	0	3	0	124	1277
5:00 PM	0	21	0	0	4	62	1	0	0	0	1	0	1	0	2	0	92	1287
5:05 PM	0	41	0	0	6	61	0	0	0	0	0	0	0	0	3	0	111	1291
5:10 PM	0	30	0	0	3	74	0	0	0	0	0	0	0	0	5	0	112	1320
5:15 PM	0	43	0	0	5	59	1	0	0	0	0	0	0	0	2	0	110	1331
5:20 PM	0	46	0	0	1	62	0	0	1	0	0	0	0	0	1	0	111	1332
5:25 PM	0	25	0	0	4	48	0	0	0	0	0	0	0	0	4	0	81	1312
5:30 PM	0	29	0	0	4	68	0	0	0	0	0	0	0	0	2	0	103	1310
5:35 PM	0	32	0	0	6	67	0	0	0	0	0	0	0	0	2	0	107	1297
5:40 PM	0	27	0	0	5	62	0	0	0	0	0	0	0	0	0	0	94	1273
5:45 PM	0	38	0	0	3	63	0	0	0	0	0	0	0	0	1	0	105	1264
5:50 PM	0	21	0	0	0	39	0	0	0	0	0	0	0	0	2	0	62	1212
5:55 PM	0	37	0	0	3	52	0	0	0	0	0	0	0	0	3	0	95	1183
6:00 PM	0	23	1	0	5	55	0	0	0	0	0	0	0	0	1	0	85	1176

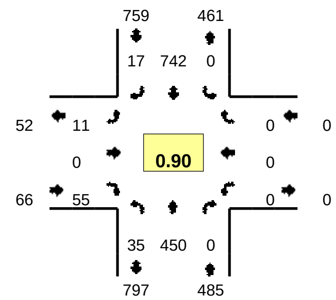
Peak 15-Min Flowrates	Northbound Left	Thru	Right	U	Southbound Left	Thru	Right	U	Eastbound Left	Thru	Right	U	Westbound Left	Thru	Right	U	Total
All Vehicles	0	508	4	0	36	844	0	0	0	0	0	0	0	0	16	0	1408
Heavy Trucks	0	12	0		0	16	0		0	0	0		0	0	0		28
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

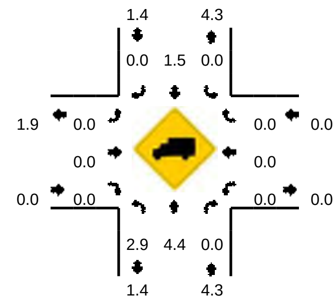
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

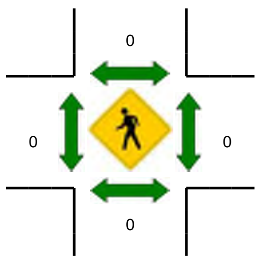
LOCATION: US 20 -- Crowfoot Rd | **QC JOB #:** 13675118

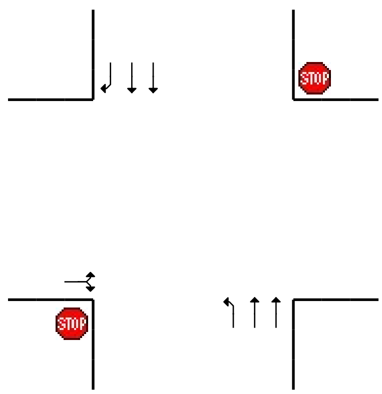
CITY/STATE: Linn, OR | **DATE:** Wed, Jan 20 2016

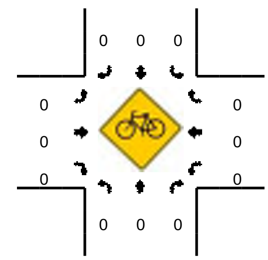


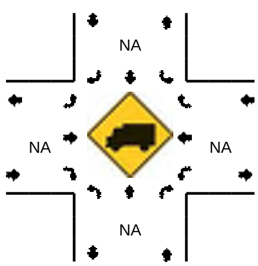
Peak-Hour: 4:35 PM -- 5:35 PM
Peak 15-Min: 4:35 PM -- 4:50 PM

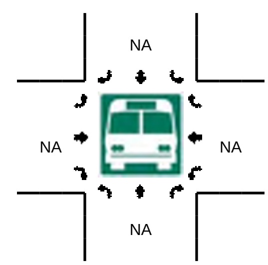












5-Min Count Period Beginning At	US 20 (Northbound) Left	Thru	Right	U	US 20 (Southbound) Left	Thru	Right	U	Crowfoot Rd (Eastbound) Left	Thru	Right	U	Crowfoot Rd (Westbound) Left	Thru	Right	U	Total	Hourly Totals
4:05 PM	3	37	0	0	0	68	0	0	0	0	2	0	0	0	0	0	110	1213
4:10 PM	4	32	0	0	0	40	3	0	0	0	4	0	0	0	0	0	83	1199
4:15 PM	6	28	0	0	0	59	2	0	0	0	6	0	0	0	0	0	101	1206
4:20 PM	1	45	0	0	0	59	3	0	0	0	6	0	0	0	0	0	114	1215
4:25 PM	2	33	0	0	0	54	0	0	3	0	3	0	0	0	0	0	95	1211
4:30 PM	3	33	0	0	0	65	2	0	1	0	3	0	0	0	0	0	107	1233
4:35 PM	2	41	0	0	0	66	3	0	1	0	8	0	0	0	0	0	121	1251
4:40 PM	3	43	0	0	0	66	3	0	0	0	5	0	0	0	0	0	120	1266
4:45 PM	4	42	0	0	0	69	1	0	2	0	3	0	0	0	0	0	121	1281
4:50 PM	2	41	0	0	0	63	1	0	0	0	5	0	0	0	0	0	112	1277
4:55 PM	3	53	0	0	0	60	3	0	3	0	5	0	0	0	0	0	127	1295
5:00 PM	2	21	0	0	0	62	2	0	1	0	4	0	0	0	0	0	92	1303
5:05 PM	1	38	0	0	0	59	0	0	2	0	5	0	0	0	0	0	105	1298
5:10 PM	2	31	0	0	0	71	0	0	0	0	5	0	0	0	0	0	109	1324
5:15 PM	3	42	0	0	0	58	1	0	1	0	6	0	0	0	0	0	111	1334
5:20 PM	6	46	0	0	0	63	0	0	0	0	4	0	0	0	0	0	119	1339
5:25 PM	2	24	0	0	0	43	2	0	0	0	1	0	0	0	0	0	72	1316
5:30 PM	5	28	0	0	0	62	1	0	1	0	4	0	0	0	0	0	101	1310
5:35 PM	4	32	0	0	0	70	1	0	0	0	4	0	0	0	0	0	111	1300
5:40 PM	3	28	0	0	0	57	2	0	0	0	3	0	0	0	0	0	93	1273
5:45 PM	1	37	0	0	0	61	2	0	0	0	4	0	0	0	0	0	105	1257
5:50 PM	0	22	0	0	0	35	1	0	0	0	4	0	0	0	0	0	62	1207
5:55 PM	5	38	0	0	0	49	0	0	1	0	5	0	0	0	0	0	98	1178
6:00 PM	0	23	0	0	0	54	1	0	0	0	2	0	0	0	0	0	80	1166

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	36	504	0	0	0	804	28	0	12	0	64	0	0	0	0	0	1448
Heavy Trucks	0	16	0		0	20	0		0	0	0		0	0	0		36
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

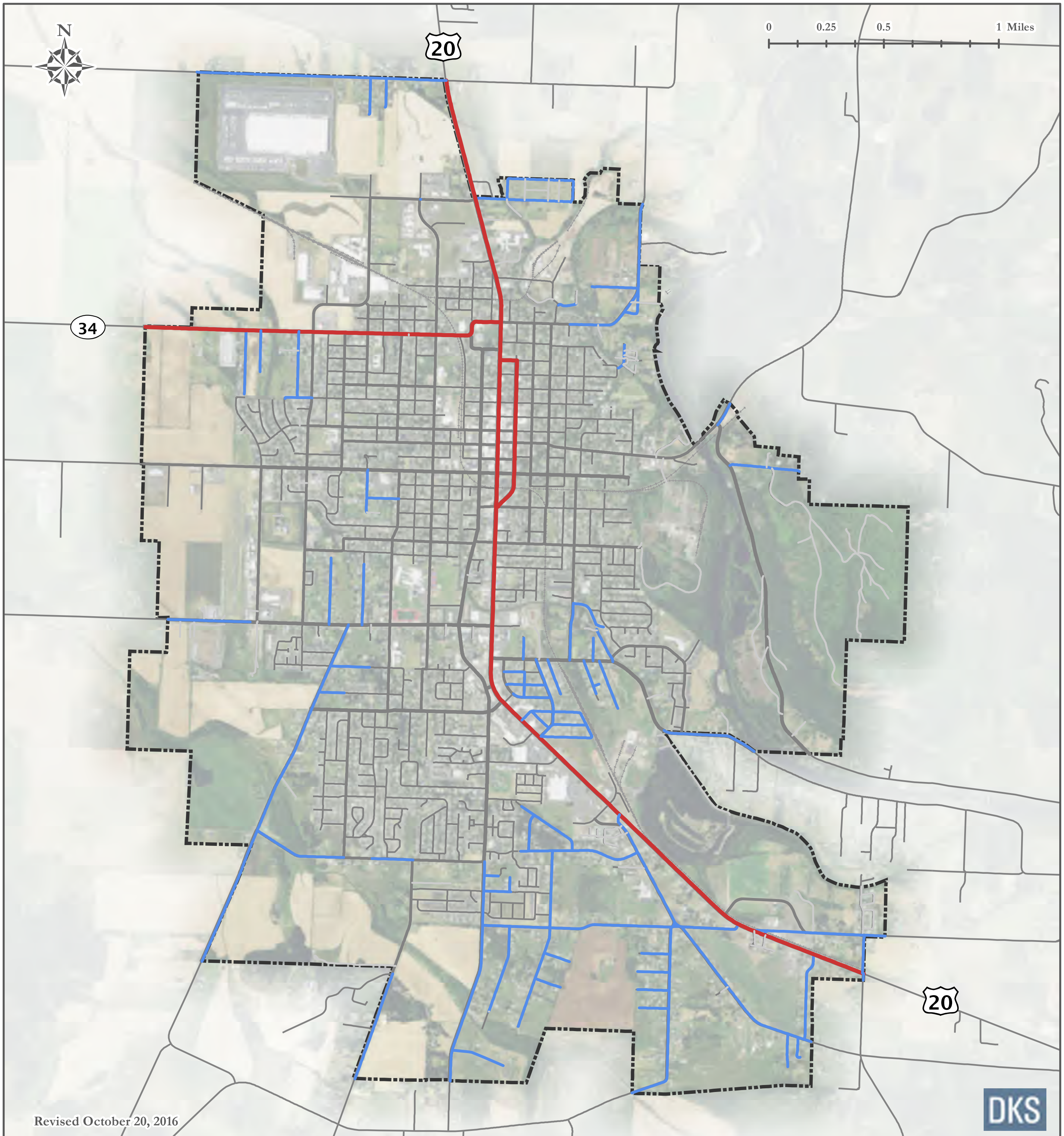
Comments:

Report generated on 2/16/2016 11:14 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Section 4: Roadway Jurisdiction

A3 Roadway Jurisdiction

LEBANON Connecting people and places 2040



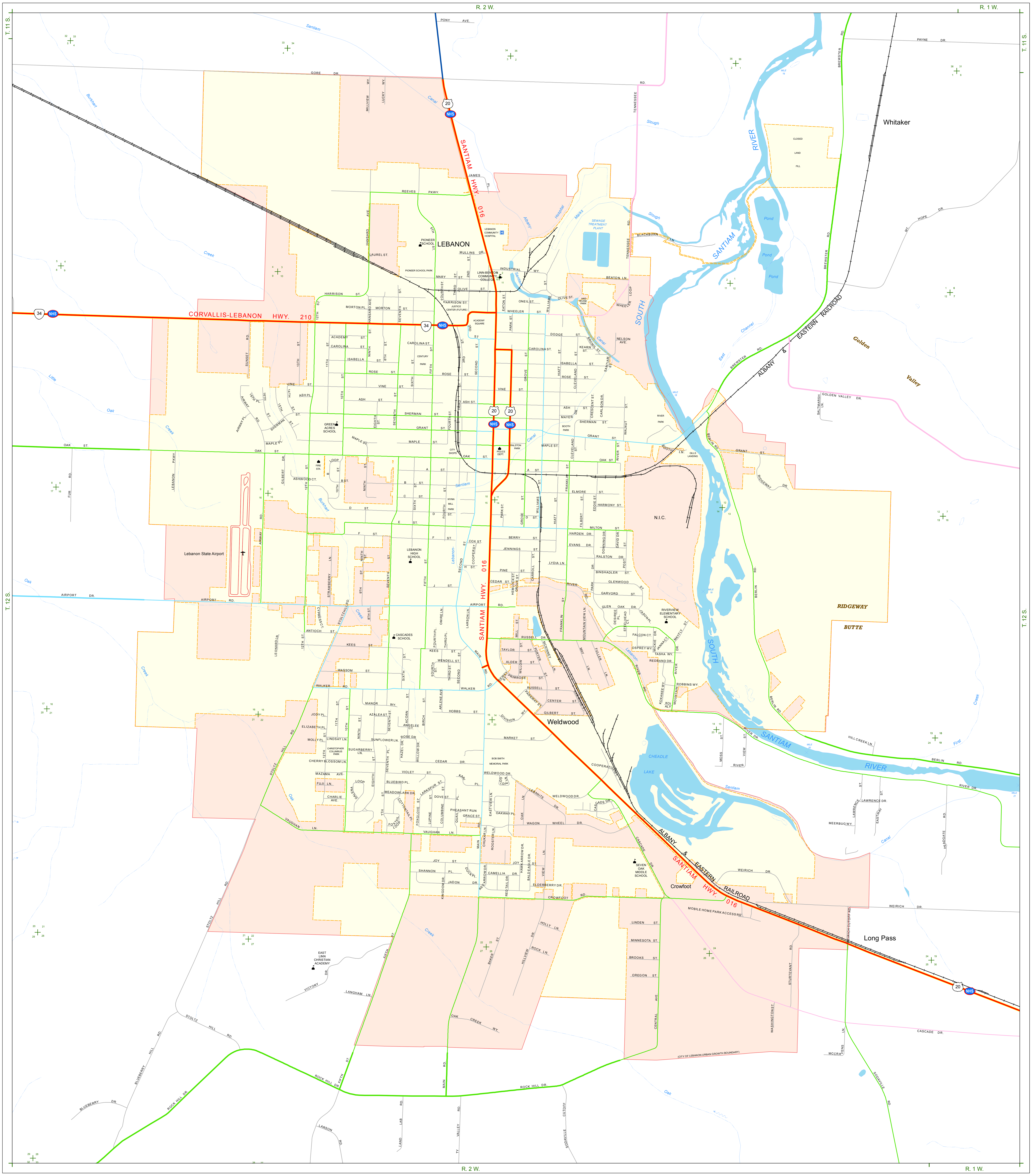
Legend:

Roadway Jurisdiction:

- State of Oregon
- Linn County
- City of Lebanon

- Urban Growth Boundary
- Arterial or Collector Street

Section 5: Federal Functional Classification



LEGEND

FUNCTIONAL CLASSIFICATION

STATE HWY | OTHER JURISDICTION

FOR FURTHER FUNCTIONAL CLASSIFICATION INFORMATION, CONTACT ODOT REGION OFFICE.

- INTERSTATE
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- MINOR COLLECTOR
- LOCAL ROAD
- INTERSTATE - US. ROUTE - ORE. ROUTE
- NATIONAL HIGHWAY SYSTEM ROUTE
- CITY LIMIT
- URBAN GROWTH BOUNDARY
- RAILROAD - AMTRAK PASSENGER STATION
- GRAVEL PIT - QUARRY - ODOT STOCKPILE
- ODOT MAINTENANCE STATION

- PUBLIC BUILDING
- COURTHOUSE
- HOSPITAL
- CITY HALL
- ARMORY
- POST OFFICE
- SCHOOL
- LIBRARY
- SAFETY REST AREA
- WEIGH STATION
- PARK & RIDE LOCATION
- INTERCITY - CITY TRANSIT
- COMMERCIAL - GENERAL AVIATION
- PORT FACILITY

Published by

NORTH

PREPARED DIGITALLY BY THE OREGON DEPARTMENT OF TRANSPORTATION IN COOPERATION WITH THE U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

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SCALE

0 950 1,900 3,800 Feet

0 245 490 980 Meters

LEBANON
POPULATION 15,740

T. 11-12 S. R. 1-2 W. W.M.

OREGON TRANSPORTATION MAP

Showing Federal Functional Classification of Roads
City of

LEBANON

PARK & RIDE | INTERBUS | AMTRAK

AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND

LINN COUNTY
2015 Edition

PORT | AIRPORT | COMM. AIR

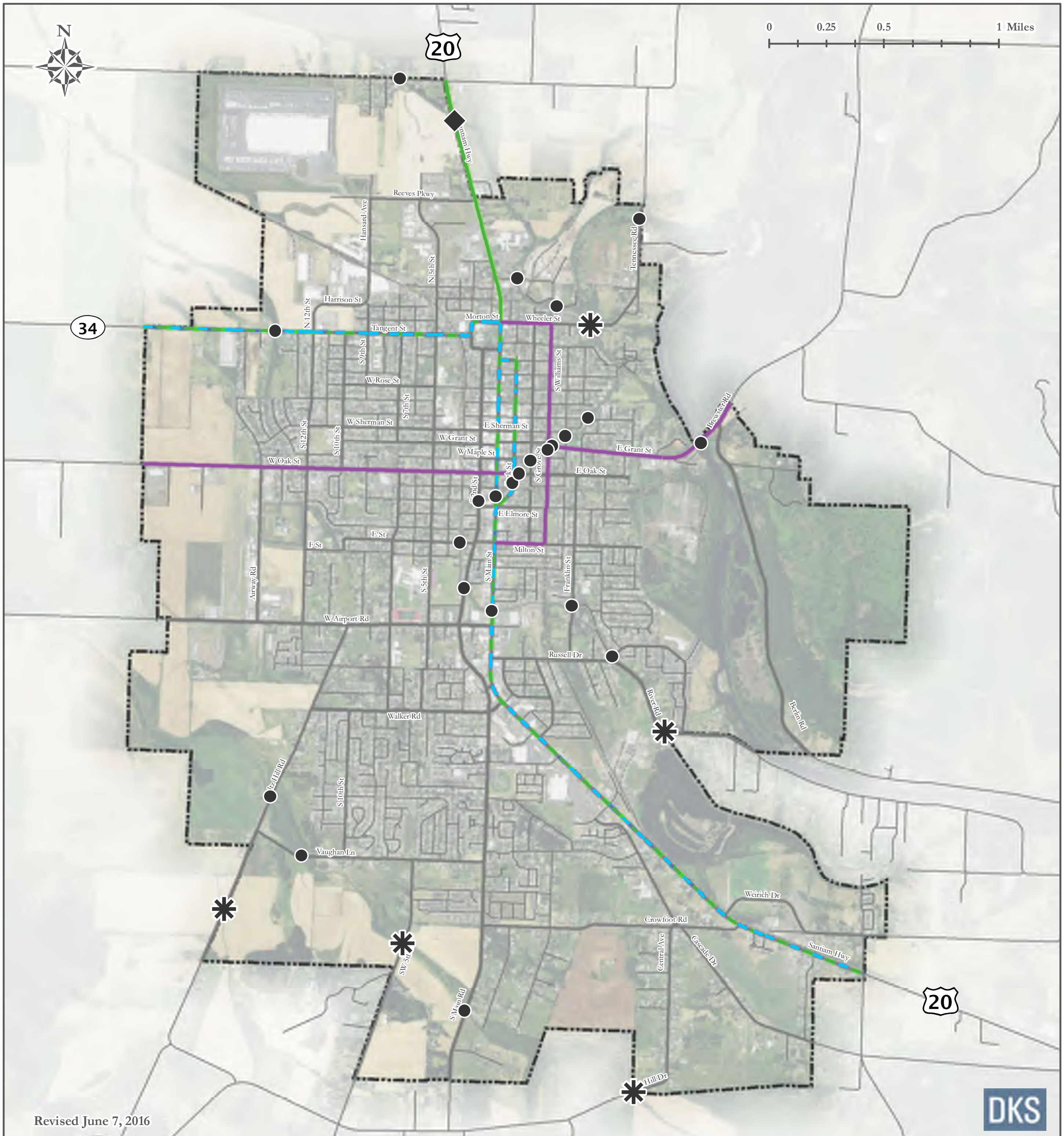
AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND

Copies Available from the Oregon Department of Transportation, Geographic Information Services Unit, Mill Creek Office Building, 555 13th St. NE, Salem, Oregon 97301, (503) 986-3154, http://www.oregon.gov/ODOT/TD/TDATA/Pages/gis/citymaps.aspx
Population numbers are based on current Oregon Population Report, College of Urban and Public Affairs, Portland State University, http://pdx.edu/prc

Section 6: Freight and Trucking Routes with Bridge Conditions

A4 Freight and Trucking Routes With Bridge Condition

LEBANON
Connecting people and places
2040



Legend:

Bridge Condition:

- ● Not Deficient
- ◆ Functionally Obsolete
- ✱ Structurally Deficient

Freight Routes

- Oregon Freight Route and Federal Truck Route
- Federal Truck Route
- Local Truck Route

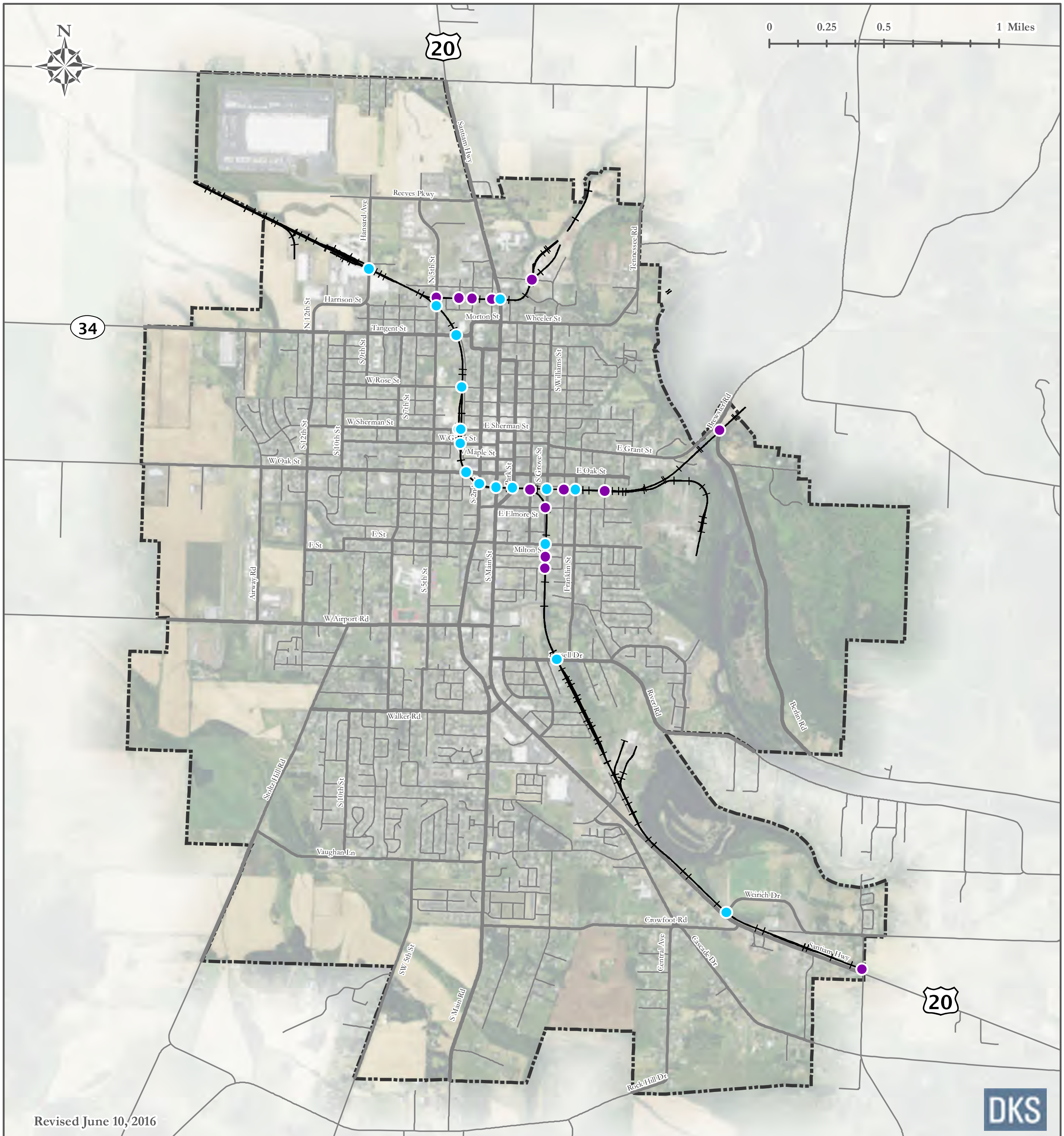
Urban Growth Boundary

Arterial or Collector Street

Section 7: Rail Lines and Crossings

Connecting people and places

A5 Rail Lines and Crossings



Legend:

Rail:

- At-Grade Crossing, gated
- At-Grade Crossing, ungated
- Railroad

Urban Growth Boundary

Arterial or Collector Street

Section 8: Study Intersection Crash Rates

Study Intersection Crash Rates

	Location	Total Collisions (2010 to 2015)	Observed Crash Rate (per MEV)	Critical Crash Rate (per MEV)	Over Critical Crash Rate	90th Percentile Rate (per MEV)	Over 90th Percentile Rate
1	Reeves Parkway/ 5th Street	2	0.35	0.63	Under	0.29	**Over**
2	US 20/ Reeves Parkway - Cemetery Road	2	0.11	0.44	Under	0.41	Under
3	US 20/ Mullins Drive	0	0.00	0.44	Under	0.41	Under
4	US 20/ Industrial Way	1	0.05	0.44	Under	0.41	Under
5	OR 34/ 12th Street	0	0.00	0.49	Under	0.41	Under
6	OR 34/ Hansard Avenue - 9th Street	3	0.26	0.51	Under	0.41	Under
7	OR 34/ 5th Street	14	0.90	0.47	**Over**	0.41	**Over**
8	OR 34/ S 2nd Street	0	0.00	0.47	Under	0.29	Under
9	OR 34/ N 2nd Street	0	0.00	0.50	Under	0.29	Under
10	US 20/ OR 34 - Wheeler Street	11	0.44	0.69	Under	0.86	Under
11	Wheeler Street/ S Williams Street	1	0.13	0.58	Under	0.41	Under
12	5th Street/ Rose Street	0	0.00	0.59	Under	0.41	Under
13	2nd Street/ Sherman Street	6	0.62	0.54	**Over**	0.41	**Over**
14	US 20/ Grant Street	5	0.28	0.74	Under	0.86	Under
15	Grant Street/ Williams Street	6	0.41	0.77	Under	0.86	Under
16	Oak Street/ 12th Street	3	0.40	0.59	Under	0.41	Under
17	Oak Street/ 10th Street	2	0.28	0.60	Under	0.41	Under
18	Oak Street/ 5th Street	6	0.44	0.79	Under	0.86	Under
19	Oak Street/ 2nd Street	15	0.86	0.74	**Over**	0.86	**Over**
20	US 20/ Oak Street	18	0.79	0.70	**Over**	0.86	Under
21	US 20/ Milton Street	13	0.34	0.64	Under	0.86	Under
22	Milton Street/ Williams Street	1	0.10	0.51	Under	0.29	Under
23	Airport Road/ 12th Street	4	0.18	0.43	Under	0.41	Under

Study Intersection Crash Rates

	Location	Total Collisions (2010 to 2015)	Observed Crash Rate (per MEV)	Critical Crash Rate (per MEV)	Over Critical Crash Rate	90th Percentile Rate (per MEV)	Over 90th Percentile Rate
24	Airport Road/ Stoltz Hill Road	7	0.31	0.40	Under	0.29	**Over**
25	Airport Road/ 7th Street	5	0.25	0.44	Under	0.41	Under
26	Airport Road/ 5th Street	11	0.52	0.43	**Over**	0.41	**Over**
27	Airport Road/ 2nd Street	15	0.46	0.66	Under	0.86	Under
28	US 20/ Airport Road	34	0.69	0.62	**Over**	0.86	Under
29	US 20/ Russell Drive	17	0.41	0.35	**Over**	0.29	**Over**
30	Russell Drive/ Franklin Street	2	0.26	0.56	Under	0.29	Under
31	US 20/ Walker Road	17	0.44	0.64	Under	0.86	Under
32	Main Road/ Walker Road	8	0.32	0.69	Under	0.86	Under
33	US 20/ Market Street	9	0.24	0.64	Under	0.86	Under
34	US 20/ Weldwood Drive - Burdell Boulevard	8	0.24	0.66	Under	0.86	Under
35	Main Road/ Vaughan Lane	2	0.18	0.49	Under	0.29	Under
36	Main Road/ Crowfoot Road	1	0.14	0.57	Under	0.29	Under
37	US 20/ Weirich Drive	0	0.00	0.42	Under	0.41	Under
38	US 20/ Crowfoot Road	2	0.08	0.40	Under	0.29	Under

Per MEV = Crashes per million entering vehicles

Intersection Population Type Crash Rates

Intersection Population Type	Sum of Crashes (5-year)	Sum of MEV (5-year)	Average Collision Rate for Reference Population	Intersections in Population
Rural 3SG	0	0	N/A	0
Rural 3ST	0	0	N/A	0
Rural 4SG	0	0	N/A	0
Rural 4ST	0	0	N/A	0
Urban 3SG	0	0	N/A	0
Urban 3ST	34	155	0.22	10
Urban 4SG	165	366	0.45	13
Urban 4ST	52	224	0.23	15

Study Intersection Crash Rate Calculation Resource

	Location	Total Collisions (2010 to 2015)	AADT	MEV (5-year)	Intersection Population Type
1	Reeves Parkway/ 5th Street	2	3,120	5.7	Urban 3ST
2	US 20/ Reeves Parkway - Cemetery Road	2	10,230	18.7	Urban 4ST
3	US 20/ Mullins Drive	0	10,590	19.3	Urban 4ST
4	US 20/ Industrial Way	1	10,740	19.6	Urban 4ST
5	OR 34/ 12th Street	0	7,150	13.0	Urban 4ST
6	OR 34/ Hansard Avenue - 9th Street	3	6,410	11.7	Urban 4ST
7	OR 34/ 5th Street	14	8,530	15.6	Urban 4ST
8	OR 34/ S 2nd Street	0	7,430	13.6	Urban 3ST
9	OR 34/ N 2nd Street	0	5,980	10.9	Urban 3ST
10	US 20/ OR 34 - Wheeler Street	11	13,820	25.2	Urban 4SG
11	Wheeler Street/ S Williams Street	1	4,210	7.7	Urban 4ST
12	5th Street/ Rose Street	0	4,030	7.4	Urban 4ST
13	2nd Street/ Sherman Street	6	5,310	9.7	Urban 4ST
14	US 20/ Grant Street	5	9,870	18.0	Urban 4SG

Study Intersection Crash Rate Calculation Resource

	Location	Total Collisions (2010 to 2015)	AADT	MEV (5-year)	Intersection Population Type
15	Grant Street/ Williams Street	6	8,100	14.8	Urban 4SG
16	Oak Street/ 12th Street	3	4,080	7.4	Urban 4ST
17	Oak Street/ 10th Street	2	3,940	7.2	Urban 4ST
18	Oak Street/ 5th Street	6	7,430	13.6	Urban 4SG
19	Oak Street/ 2nd Street	15	9,550	17.4	Urban 4SG
20	US 20/ Oak Street	18	12,420	22.7	Urban 4SG
21	US 20/ Milton Street	13	21,100	38.5	Urban 4SG
22	Milton Street/ Williams Street	1	5,630	10.3	Urban 3ST
23	Airport Road/ 12th Street	4	11,910	21.7	Urban 4ST
24	Airport Road/ Stoltz Hill Road	7	12,320	22.5	Urban 3ST
25	Airport Road/ 7th Street	5	10,800	19.7	Urban 4ST
26	Airport Road/ 5th Street	11	11,690	21.3	Urban 4ST
27	Airport Road/ 2nd Street	15	17,920	32.7	Urban 4SG
28	US 20/ Airport Road	34	27,090	49.4	Urban 4SG
29	US 20/ Russell Drive	17	22,870	41.7	Urban 3ST
30	Russell Drive/ Franklin Street	2	4,230	7.7	Urban 3ST
31	US 20/ Walker Road	17	21,110	38.5	Urban 4SG
32	Main Road/ Walker Road	8	13,500	24.6	Urban 4SG
33	US 20/ Market Street	9	20,440	37.3	Urban 4SG
34	US 20/ Weldwood Drive - Burdell Boulevard	8	18,330	33.5	Urban 4SG
35	Main Road/ Vaughan Lane	2	6,140	11.2	Urban 3ST
36	Main Road/ Crowfoot Road	1	3,990	7.3	Urban 3ST
37	US 20/ Weirich Drive	0	13,100	23.9	Urban 4ST
38	US 20/ Crowfoot Road	2	13,100	23.9	Urban 3ST

Per MEV = Crashes per million entering vehicles

Section 9: Study Intersection Excess Proportion Crash Types

Study Intersection Crash Type Probability

	Location	Reference Population	Type of Crash Probability				Excess Proportion Crash Types*
			Angle	Pedestrian	Turn	Rear	
1	Reeves Parkway/ 5th Street	3ST					None
2	US 20/ Reeves Parkway - Cemetery Road	4ST			1.00		Turn
3	US 20/ Mullins Drive	4ST					None
4	US 20/ Industrial Way	4ST					None
5	OR 34/ 12th Street	4ST					None
6	OR 34/ Hansard Avenue - 9th Street	4ST			0.99		Turn
7	OR 34/ 5th Street	4ST	1.00				Angle
8	OR 34/ S 2nd Street	3ST					None
9	OR 34/ N 2nd Street	3ST					None
10	US 20/ OR 34 - Wheeler Street	4SG			0.89	0.52	None
11	Wheeler Street/ S Williams Street	4ST					None
12	5th Street/ Rose Street	4ST					None
13	2nd Street/ Sherman Street	4ST	1.00				Angle
14	US 20/ Grant Street	4SG					None
15	Grant Street/ Williams Street	4SG	0.97		0.80		Angle
16	Oak Street/ 12th Street	4ST				1.00	Rear
17	Oak Street/ 10th Street	4ST					None
18	Oak Street/ 5th Street	4SG	0.99				Angle
19	Oak Street/ 2nd Street	4SG	0.97		0.89	0.03	Angle
20	US 20/ Oak Street	4SG	1.00	1.00	0.33	0.00	Angle
21	US 20/ Milton Street	4SG	0.76			0.74	None
22	Milton Street/ Williams Street	3ST					None

Study Intersection Crash Type Probability

	Location	Reference Population	Type of Crash Probability				Excess Proportion Crash Types*
			Angle	Pedestrian	Turn	Rear	
23	Airport Road/ 12th Street	4ST	1.00				Angle
24	Airport Road/ Stoltz Hill Road	3ST			0.83		None
25	Airport Road/ 7th Street	4ST				1.00	Rear
26	Airport Road/ 5th Street	4ST			0.67	1.00	Rear
27	Airport Road/ 2nd Street	4SG	0.68	1.00		0.74	Ped
28	US 20/ Airport Road	4SG			0.34	1.00	Rear
29	US 20/ Russell Drive	3ST			0.60		None
30	Russell Drive/ Franklin Street	3ST					None
31	US 20/ Walker Road	4SG			0.55	0.75	None
32	Main Road/ Walker Road	4SG	0.98		0.72	0.14	Angle
33	US 20/ Market Street	4SG			0.93	0.25	Turn
34	US 20/ Weldwood Drive - Burdell Boulevard	4SG			0.72	0.83	None
35	Main Road/ Vaughan Lane	3ST					None
36	Main Road/ Crowfoot Road	3ST					None
37	US 20/ Weirich Drive	4ST					None
38	US 20/ Crowfoot Road	3ST					None

* Excess proportion analysis parameters used: 90% minimum probability, 10% minimum excess proportion.

Study Intersection Excess Proportion Crash Types

	Location	Reference Population	Excess Proportion Probability				Excess Proportion Crash Types*
			Angle	Pedestrian	Turn	Rear	
1	Reeves Parkway/ 5th Street	3ST					None
2	US 20/ Reeves Parkway - Cemetery Road	4ST			0.85		Turn
3	US 20/ Mullins Drive	4ST					None
4	US 20/ Industrial Way	4ST					None
5	OR 34/ 12th Street	4ST					None
6	OR 34/ Hansard Avenue - 9th Street	4ST			0.51		Turn
7	OR 34/ 5th Street	4ST	0.47				Angle
8	OR 34/ S 2nd Street	3ST					None
9	OR 34/ N 2nd Street	3ST					None
10	US 20/ OR 34 - Wheeler Street	4SG					None
11	Wheeler Street/ S Williams Street	4ST					None
12	5th Street/ Rose Street	4ST					None
13	2nd Street/ Sherman Street	4ST	0.28				Angle
14	US 20/ Grant Street	4SG					None
15	Grant Street/ Williams Street	4SG	0.28				Angle
16	Oak Street/ 12th Street	4ST				0.28	Rear
17	Oak Street/ 10th Street	4ST					None
18	Oak Street/ 5th Street	4SG	0.44				Angle
19	Oak Street/ 2nd Street	4SG	0.18				Angle
20	US 20/ Oak Street	4SG	0.33	0.07			Angle
21	US 20/ Milton Street	4SG					None
22	Milton Street/ Williams Street	3ST					None

Study Intersection Excess Proportion Crash Types

	Location	Reference Population	Excess Proportion Probability				Excess Proportion Crash Types*
			Angle	Pedestrian	Turn	Rear	
23	Airport Road/ 12th Street	4ST	0.37				Angle
24	Airport Road/ Stoltz Hill Road	3ST					None
25	Airport Road/ 7th Street	4ST				0.42	Rear
26	Airport Road/ 5th Street	4ST				0.43	Rear
27	Airport Road/ 2nd Street	4SG		0.10			Ped
28	US 20/ Airport Road	4SG				0.32	Rear
29	US 20/ Russell Drive	3ST					None
30	Russell Drive/ Franklin Street	3ST					None
31	US 20/ Walker Road	4SG					None
32	Main Road/ Walker Road	4SG	0.28				Angle
33	US 20/ Market Street	4SG			0.24		Turn
34	US 20/ Weldwood Drive - Burdell Boulevard	4SG					None
35	Main Road/ Vaughan Lane	3ST					None
36	Main Road/ Crowfoot Road	3ST					None
37	US 20/ Weirich Drive	4ST					None
38	US 20/ Crowfoot Road	3ST					None

* Excess proportion analysis parameters used: 90% minimum probability, 10% minimum excess proportion.

Section 10: Highway Segment Crash Rates

Highway Segment Crash Rates

Highway (limits)	Begin MP	End MP	Distance (miles)	Total Collisions (2010 to 2015)	AADT	MVMT (5-year)	Observed Crash Rate (per MVMT)	Statewide Collison Rate (per MVMT)	Over Statewide Collison Rate
OR 34 (west UGB to 11th Street)	16.58	17.33	0.75	6	5,500	7.53	0.80	2.78	Under
OR 34 (11th Street to US 20)	17.33	18.13	0.80	23	6,100	8.91	2.58	2.78	Under
US 20 (north UGB to OR 34)	11.71	12.80	1.09	20	9,400	18.70	1.07	2.78	Under
US 20 (OR 34 to Carolina Street)	12.80	12.93	0.13	4	9,800	2.33	1.72	2.78	Under
Main Street (Carolina Street to Elmore Street) *	12.93	13.59	0.66	62	8,500	10.24	6.06	2.78	**Over**
Park Street (Carolina Street to Elmore Street) *	12.93	13.70	0.77	49	7,200	10.12	4.84	2.78	**Over**
US 20 (Elmore Street to Weldwood Drive-Burdell Boulevard)	13.59	15.10	1.51	186	22,200	61.18	3.04	2.78	**Over**
US 20 (Weldwood Drive-Burdell Boulevard to south UGB)	15.10	16.46	1.36	22	13,700	34.00	0.65	1.55	Under

Per MVMT = Crashes per million vehicle miles traveled

Note: * Crash rate is reported for a single direction of the highway (within the couplet) and is not a direct comparison to the statewide rate (which includes both directions of the highway).

Statewide Crash Rates

	Statewide Crash Rate	
Year	Principal Arterial (Urban Cities)	Principal Arterial (Suburban Areas)
2010	2.50	1.40
2011	2.84	1.51
2012	2.80	1.71
2013	2.82	1.45
2014	2.93	1.70
Average	2.78	1.55

Section 11: Methodology and Assumptions Memorandum

MEMORANDUM

DATE: May 20th, 2016

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates
Patrick Mahedy, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Task 4.1 Methodology and Assumptions P14180-012

The purpose of this memorandum is to establish the methods and assumptions to be used for the existing and future conditions transportation analysis for the Lebanon Transportation System Plan Update. This memorandum summarizes the study intersections, and describes the proposed methodology to calculate the peak hour, 2016 30th highest annual hour of traffic (30 HV) and average weekday volumes, and forecasted 2040 volumes, and how the traffic, safety, and qualitative multi-modal analyses will be completed.

Study Intersections

The following study intersections will be included, as summarized in Table 1 and Figure 1.

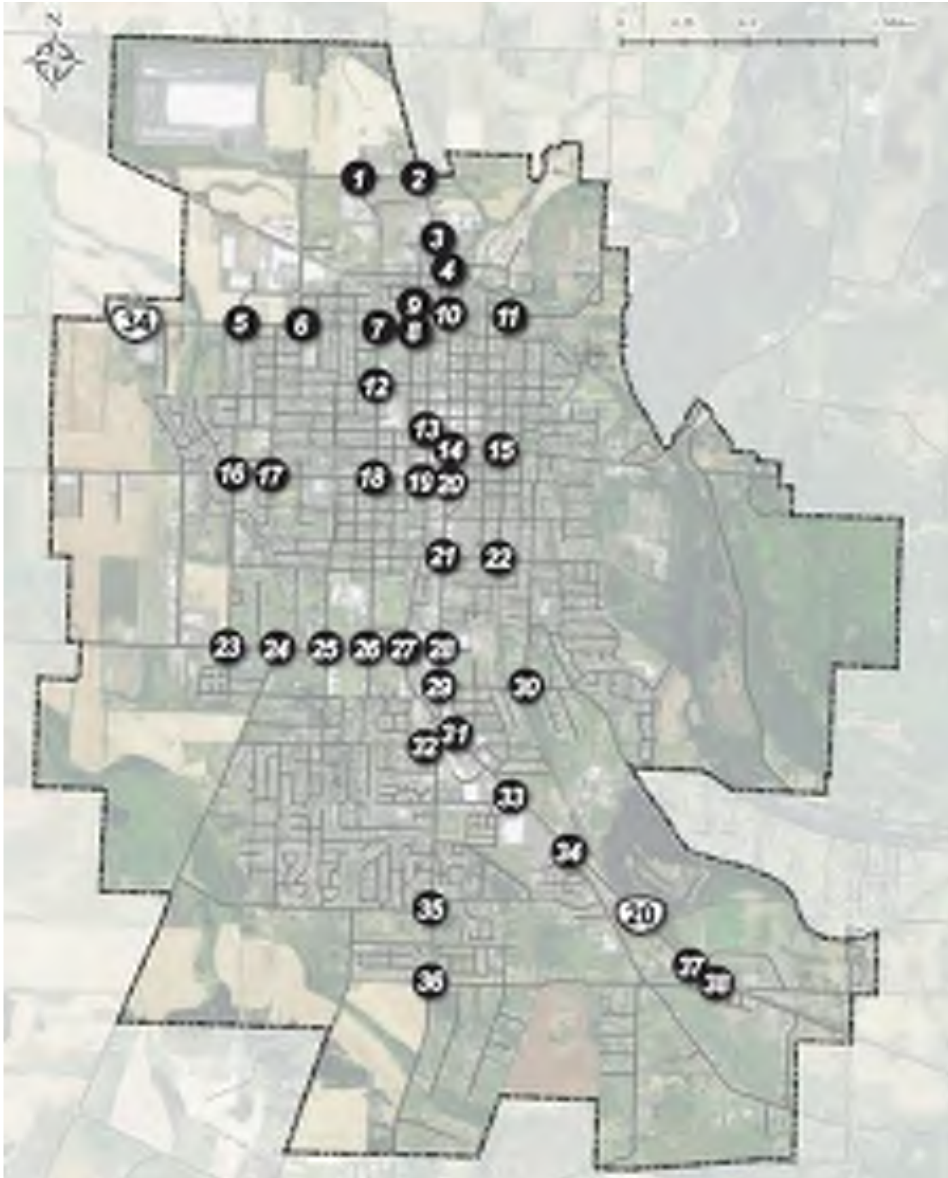
Table 1: Study Intersections

	Location	Count Date	Type	Duration
1	Reeves Parkway/ 5th Street	1/20/2016	Turning Movement Count	4 hour
2	US 20/ Reeves Parkway - Cemetery Road	1/20/2016	Turning Movement Count	4 hour
3	US 20/ Mullins Drive	1/20/2016	Turning Movement Count	4 hour
4	US 20/ Industrial Way	1/20/2016	Turning Movement Count	4 hour
5	OR 34/ 12th Street	1/20/2016	Turning Movement Count	4 hour
6	OR 34/ Hansard Avenue - 9th Street	1/20/2016	Turning Movement Count	4 hour
7	OR 34/ 5th Street	1/20/2016	Turning Movement Count	4 hour
8	OR 34/ S 2nd Street	1/20/2016	Turning Movement Count	4 hour
9	OR 34/ N 2nd Street	1/20/2016	Turning Movement Count	4 hour
10	US 20/ OR 34 - Wheeler Street	1/20/2016	Turning Movement Count	4 hour

Table 1: Study Intersections

	Location	Count Date	Type	Duration
11	Wheeler Street/ S Williams Street	1/20/2016	Turning Movement Count	4 hour
12	5th Street/ Rose Street	1/20/2016	Turning Movement Count	4 hour
13	2nd Street/ Sherman Street	1/20/2016	Turning Movement Count	4 hour
14	US 20/ Grant Street	1/20/2016	Turning Movement Count	4 hour
15	Grant Street/ Williams Street	1/21/2016	Turning Movement Count	4 hour
16	Oak Street/ 12th Street	1/20/2016	Turning Movement Count	4 hour
17	Oak Street/ 10th Street	1/20/2016	Turning Movement Count	4 hour
18	Oak Street/ 5th Street	1/21/2016	Turning Movement Count	4 hour
19	Oak Street/ 2nd Street	1/20/2016	Turning Movement Count	4 hour
20	US 20/ Oak Street	1/20/2016	Turning Movement Count	4 hour
21	US 20/ Milton Street	1/20/2016	Turning Movement Count	4 hour
22	Milton Street/ Williams Street	1/20/2016	Turning Movement Count	4 hour
23	Airport Road/ 12th Street	1/20/2016	Turning Movement Count	4 hour
24	Airport Road/ Stoltz Hill Road	1/20/2016	Turning Movement Count	4 hour
25	Airport Road/ 7th Street	1/20/2016	Turning Movement Count	4 hour
26	Airport Road/ 5th Street	1/20/2016	Turning Movement Count	4 hour
27	Airport Road/ 2nd Street	1/20/2016	Turning Movement Count	4 hour
28	US 20/ Airport Road	1/20/2016	Turning Movement Count	4 hour
29	US 20/ Russell Drive	1/20/2016	Turning Movement Count	4 hour
30	Russell Drive/ Franklin Street	1/20/2016	Turning Movement Count	4 hour
31	US 20/ Walker Road	1/20/2016	Turning Movement Count	4 hour
32	Main Road/ Walker Road	1/20/2016	Turning Movement Count	4 hour
33	US 20/ Market Street	1/20/2016	Turning Movement Count	4 hour
34	US 20/ Weldwood Drive - Burdell Boulevard	1/20/2016	Turning Movement Count	4 hour
35	Main Road/ Vaughan Lane	1/20/2016	Turning Movement Count	4 hour
36	Main Road/ Crowfoot Road	1/20/2016	Turning Movement Count	4 hour
37	US 20/ Weirich Drive	1/20/2016	Turning Movement Count	4 hour
38	US 20/ Crowfoot Road	1/20/2016	Turning Movement Count	4 hour

Figure 1: Study Intersections



Traffic Volume Development

Study intersection traffic operations will be analyzed using estimated 30th highest hour traffic volume (30 HV) conditions. The 30 HV development process for existing conditions includes determination of the system peak, and seasonal adjustments. The future volume development is based on the Corvallis Albany Lebanon Millersburg (CALM) Travel Demand Model.

Peak Hour Selection

The count data obtained suggests that systemwide peak volumes occur at most of the study intersections between 4:35 p.m. and 5:35 p.m. Overall, the individual intersection peak of all study intersections is generally within 10 percent of the systemwide peak. We propose using 4:35 p.m. to 5:35 p.m. as the peak hour of traffic to compare to ODOT mobility targets for current and future conditions.

Development of Seasonal Factors

The traffic count data collected in Lebanon during January represents a period where traffic volumes are slightly lower than the average weekday conditions and much lower than summer conditions. Adjustments are required to reach the desired conditions using methodology from the ODOT Analysis Procedures Manual.

To determine when the summer and average weekday conditions occur, data is first examined from Automatic Traffic Recorder (ATR) stations that record highway traffic volumes year-round. For Lebanon, one nearby ATR exists: ATR #22-013 along US 20, approximately three miles southeast of the City near Waterloo. However, the average annual daily traffic at this site is not within 10 percent of traffic volumes within the Lebanon Urban Growth Boundary, and the traffic characteristics are not comparable (rural at the ATR site versus urban in Lebanon).

Next, the ATR Characteristic Table was reviewed to identify an ATR with similar characteristics. The review produced no matches; therefore, we propose using the seasonal trend method to develop seasonal factors for the study intersections. The seasonal trend method averages seasonal trend groupings from the ATR Characteristics Table. For highway to highway movements at intersections along US 20 and OR 34 in the Urban Growth Boundary, an average of the “commuter” and “summer” trends will be applied. During an average weekday, traffic volumes are generally 12 percent lower than those along these highways during the summer. Average weekday volumes will be adjusted to these periods (100% of AADT). Summer volumes at these locations will be adjusted based on a peak in August (112% of AADT).

Application of Seasonal Factors to Local Streets

Commuting trips occur within Lebanon and between the nearby cities of Albany and Corvallis. As a result, peak seasonal trips traveling along state highways also impact the local roadway system in Lebanon. Therefore, to best represent average weekday and 30 HV volumes for City streets, seasonal factoring will be applied. The "commuter" trend will be applied to local intersections, including non-highway to highway movements at intersections to state highways.

Seasonal Factors

Using the methodologies described above, several seasonal factors were developed for the January traffic counts (see Table 2). These factors will result in a 14 to 29 percent increase to the January counts to adjust for seasonal variations in traffic, replicating summer conditions.

To replicate average weekday traffic conditions, these factors will result in a slight increase to the January counts (5 to 14 percent).

Table 2: Seasonal Factors in Lebanon

Seasonal Factor Method	30-HV Seasonal Factors		Average Weekday Factors		Where Factor Applies
	Jan 20	Jan 21	Jan 20	Jan 21	
Commuter / Summer Average Trend	1.29	1.29	1.14	1.13	Highway to Highway Movements at intersections along US 20 and OR 34
Commuter Trend	1.15	1.14	1.05	1.05	Non-highway to highway movements at intersections along US 20 and OR 34; local intersections

2040 Volume Forecasting

Forecasted traffic volumes will be developed using the latest CALM model for 30th highest annual hour volume conditions in 2040. The CALM travel demand model will be utilized as the primary tool to estimate future travel demand in Lebanon, with refined travel demand forecasts developed for the City by adding local circulation characteristics in the travel demand model (using a mesoscopic windowed-area forecasting tool). Future year 2040 baseline motor vehicle volumes will be developed and post-processed using National

Cooperative Highway Research Program (NCHRP) Report 255 guidelines. The resulting volumes will be used in the future volume traffic operations analysis.

Before beginning the future forecasting process, we will coordinate with city staff to verify the land use assumptions in the CALM model, and verify that it has incorporated future growth assumptions of major generators (e.g., Lebanon Hospital, College of Osteopathic Medicine, Linn Benton Community College Campus).

Traffic Analysis

Traffic operations (LOS and v/c) will be analyzed for all study intersections under existing (2016) and future (2040) conditions. The 2000 Highway Capacity Manual (HCM) methodology will be used for signalized intersection analyses, and 2010 HCM methodology will be used for un-signalized intersection analysis.

Intersection Mobility Targets

All intersections under state jurisdiction must comply with the v/c ratios in the Oregon Highway Plan (OHP). The ODOT v/c targets are based on highway classification and posted speeds (see Table 3).

A LOS "E" and a v/c ratio of 1.00 as the minimum performance standard during the peak-hour for signalized intersections under City jurisdiction. At un-signalized intersections under City jurisdiction, a v/c ratio of 0.90 is the mobility standard during the peak-hour.

Table 3: Study Intersection Mobility Targets

	Location	Jurisdiction	Intersection Control	Highway Category	Mobility Target
1	Reeves Parkway/ 5th Street	City	Un-signalized	N/A	0.90 v/c
2	US 20/ Reeves Parkway - Cemetery Road	ODOT	Un-signalized	Regional; 40 mph	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c
3	US 20/ Mullins Drive	ODOT	Un-signalized	Regional; 30 mph	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c
4	US 20/ Industrial Way	ODOT	Un-signalized	Regional; 30 mph	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c
5	OR 34/ 12th Street	ODOT	Un-signalized	Regional; 25-35 mph; Freight Route	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c

Table 3: Study Intersection Mobility Targets

	Location	Jurisdiction	Intersection Control	Highway Category	Mobility Target
6	OR 34/ Hansard Avenue - 9th Street	ODOT	Un-signalized	Regional; 25-35 mph; Freight Route	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c
7	OR 34/ 5th Street	ODOT	Un-signalized	Regional; 25-35 mph; Freight Route	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c
8	OR 34/ S 2nd Street	ODOT	Un-signalized	Regional; 25 mph; Freight Route; STA	Highway Approaches 0.95 v/c; Side Street Approaches 1.00 v/c
9	OR 34/ N 2nd Street	ODOT	Un-signalized	Regional; 25 mph; Freight Route; STA	Highway Approaches 0.95 v/c; Side Street Approaches 1.00 v/c
10	US 20/ OR 34 - Wheeler Street	ODOT	Signalized	Regional; 30 mph	0.90 v/c*
11	Wheeler Street/ S Williams Street	City	Un-signalized	N/A	0.90 v/c
12	5th Street/ Rose Street	City	Un-signalized	N/A	0.90 v/c
13	2nd Street/ Sherman Street	City	Un-signalized	N/A	0.90 v/c
14	US 20/ Grant Street	ODOT	Signalized	Regional; 25-30 mph; Freight Route; STA	0.95 v/c
15	Grant Street/ Williams Street	City	Signalized	N/A	LOS E; 1.00 v/c
16	Oak Street/ 12th Street	City	Un-signalized	N/A	0.90 v/c
17	Oak Street/ 10th Street	City	Un-signalized	N/A	0.90 v/c
18	Oak Street/ 5th Street	City	Signalized	N/A	LOS E; 1.00 v/c
19	Oak Street/ 2nd Street	City	Signalized	N/A	LOS E; 1.00 v/c

Table 3: Study Intersection Mobility Targets

	Location	Jurisdiction	Intersection Control	Highway Category	Mobility Target
20	US 20/ Oak Street	ODOT	Signalized	Regional; 25-30 mph; Freight Route; STA	0.95 v/c
21	US 20/ Milton Street	ODOT	Signalized	Regional; 30-35 mph; Freight Route	0.90 v/c
22	Milton Street/ Williams Street	City	Un-signalized	N/A	0.90 v/c
23	Airport Road/ 12th Street	City	Un-signalized	N/A	0.90 v/c
24	Airport Road/ Stoltz Hill Road	City	Un-signalized	N/A	0.90 v/c
25	Airport Road/ 7th Street	City	Un-signalized	N/A	0.90 v/c
26	Airport Road/ 5th Street	City	Un-signalized	N/A	0.90 v/c
27	Airport Road/ 2nd Street	City	Signalized	N/A	LOS E; 1.00 v/c
28	US 20/ Airport Road	ODOT	Signalized	Regional; 30-35 mph; Freight Route	0.90 v/c
29	US 20/ Russell Drive	ODOT	Un-signalized	Regional; 30-35 mph; Freight Route	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c
30	Russell Drive/ Franklin Street	City	Un-signalized	N/A	0.90 v/c
31	US 20/ Walker Road	ODOT	Signalized	Regional; 30-35 mph; Freight Route	0.90 v/c
32	Main Road/ Walker Road	City	Signalized	N/A	LOS E; 1.00 v/c
33	US 20/ Market Street	ODOT	Signalized	Regional; 30-35 mph; Freight Route	0.90 v/c
34	US 20/ Weldwood Drive - Burdell Boulevard	ODOT	Signalized	Regional; 45-55 mph; Freight Route	0.85 v/c

Table 3: Study Intersection Mobility Targets

	Location	Jurisdiction	Intersection Control	Highway Category	Mobility Target
35	Main Road/ Vaughan Lane	City	Un-signalized	N/A	0.90 v/c
36	Main Road/ Crowfoot Road	City	Un-signalized	N/A	0.90 v/c
37	US 20/ Weirich Drive	ODOT	Un-signalized	Regional; 45-55 mph; Freight Route	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c
38	US 20/ Crowfoot Road	ODOT	Un-signalized	Regional; 45-55 mph; Freight Route	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c

*The OR 34 approach to US 30 has an STA designation, with a 0.95 v/c mobility target for signalized intersections; however, the more restrictive of the two highway approaches (the US 20 approach) was assumed.

Analysis Parameters

Parameters for traffic analysis will be gathered using varying sources and methodologies. Data needed will be gathered via field work, collected traffic volume data, aerial photos, GIS, ODOT inventory and collision reports, and the 2007 Lebanon TSP. Table 4 lists some of the possible sources that will be used on specific parameters.

Table 4: Analysis Parameters

Parameter	Description	Source
Intersection/ Roadway Geometry	# of lanes, lane configuration, cross-sectional information	Field work, Highway inventory report, Digital video log, aerial photos, TSP, ODOT TransGIS
Operational Data	Posted speeds, intersection control	Field work, Digital video log, aerial photos, TSP
Peak Hour Factor	Peak Hour Factor	Calculated
Traffic Volumes	AADT, 30 HV, DHV	ODOT Transportation Volume Tables; Calculated from new counts; CALM model
Traffic Operations	v/c, LOS	Calculated using 2000 HCM methodology for signalized intersections, and 2010 HCM methodology for un-signalized intersections

Table 4: Analysis Parameters

Parameter	Description	Source
Collision Data	Intersection collisions, roadway segment collisions, SPIS	ODOT Crash Data System, ODOT TransGIS, ODOT Crash Rate Table, ODOT Crash Rate Book

Safety Analysis

Collision trends will be identified by analyzing the most recent five years of available crash data for all roadways within the Lebanon Urban Growth Boundary. Analysis will include calculation of critical crash rates and excess proportion of specific crash types at all study intersections, as outlined in Chapter 4 of ODOT's Analysis Procedures Manual V2. For reference populations with less than 5 intersections, intersection crash rates will be compared to the published 90^{th} percentile crash rates in Table 4-1 of the APM V2. Any intersection with a collision rate that exceeds its critical rate or the 90^{th} percentile crash rate will be flagged for further review. Special consideration will be given to potential causes of collisions at locations with high bicycle/pedestrian crash frequencies.

ODOT's State Highway Crash Rate Tables will be reviewed and used to identify highway segments experiencing crash rates greater than the statewide average for similar facilities. Top 10% ODOT Safety Priority Index System (SPIS) sites will also be identified.

The collision analysis shall be used to identify crash patterns and suggest potential countermeasures at locations that exceed the published intersection or segment crash rates, or the calculated critical crash rate, and identify low cost systemic safety measures that could be considered later in Task 5 to reduce fatal and serious injuries.

Multi-Modal Analysis

The pedestrian network conditions will be analyzed within the study area, using the high-level qualitative evaluation based on the ODOT Multimodal Analysis Methodology[1]. The quality and availability of various characteristics, including a combination of sidewalk presence, speed limit, presence of buffers, roadway volume, number of lanes, shoulder

[1] Analysis Procedures Manual Version 2, Oregon Department of Transportation, March 2016.

widths, and presence of lighting, will be rated system-wide as “Excellent”, “Good”, “Fair”, or “Poor”.

The bicycle network conditions will be analyzed within the study area, using the ODOT Bicycle Level of Traffic Stress methodology in the APM V2- Addendum G. The analysis will be based on a combination of traffic speed, presence of bicycle facilities, on-street parking, and other street characteristics, and will be rated system-wide as “Extreme Stress”, “High Stress”, “Moderate Stress”, or “Low Stress”.

The intent of the analysis is to show the extent to which the pedestrian and bicycle network provides a level of comfort and safety for users. Roadway characteristics will be gathered from field work, aerial photos, GIS, ODOT inventory reports, and the TSP. Figures for the project area will be provided with a summary of the ratings.

Section 12: Existing Operating Conditions at Study Intersections (2016 PM Peak Hour- 30HV Conditions)

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Existing Operating Conditions at Study Intersections (2016 PM Peak Hour- 30HV Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
1	Reeves Parkway/ 5th Street	0.90 v/c	0.22	A/B
2	US 20/ Reeves Parkway - Cemetery Road	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	0.22	A/F
3	US 20/ Mullins Drive	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.49	A/F
4	US 20/ Industrial Way	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.47	A/E
5	OR 34/ 12th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.19	A/C
6	OR 34/ Hansard Avenue - 9th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.22	A/C
7	OR 34/ 5th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.50	A/D
8	OR 34/ S 2nd Street	Highway Approaches 0.95 v/c; Side Street Approaches 1.00 v/c	0.36	A/C
9	OR 34/ N 2nd Street	Highway Approaches 0.95 v/c; Side Street Approaches 1.00 v/c	0.22	A/B
10	US 20/ OR 34 - Wheeler Street	0.90 v/c	0.79	C
11	Wheeler Street/ S Williams Street	0.90 v/c	0.16	A/B
12	5th Street/ Rose Street	0.90 v/c	0.17	A/B
13	2nd Street/ Sherman Street	0.90 v/c	0.20	A/C
14	US 20/ Grant Street	0.95 v/c	0.61	B
15	Grant Street/ Williams Street	LOS E; 1.00 v/c	0.50	B
16	Oak Street/ 12th Street	0.90 v/c	0.19	A/B
17	Oak Street/ 10th Street	0.90 v/c	0.13	A/B
18	Oak Street/ 5th Street	LOS E; 1.00 v/c	0.46	B
19	Oak Street/ 2nd Street	LOS E; 1.00 v/c	0.49	B
20	US 20/ Oak Street	0.95 v/c	0.63	A
21	US 20/ Milton Street	0.90 v/c	0.70	B

Existing Operating Conditions at Study Intersections (2016 PM Peak Hour- 30HV Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
22	Milton Street/ Williams Street	0.90 v/c	0.19	A/B
23	Airport Road/ 12th Street	0.90 v/c	0.63	B/F
24	Airport Road/ Stoltz Hill Road	0.90 v/c	0.31	B/C
25	Airport Road/ 7th Street	0.90 v/c	0.39	A/E
26	Airport Road/ 5th Street	0.90 v/c	0.34	A/F
27	Airport Road/ 2nd Street	LOS E; 1.00 v/c	0.88	D
28	US 20/ Airport Road	0.90 v/c	0.82	D
29	US 20/ Russell Drive	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.29	B/E
30	Russell Drive/ Franklin Street	0.90 v/c	0.13	A/B
31	US 20/ Walker Road	0.90 v/c	0.80	D
32	Main Road/ Walker Road	LOS E; 1.00 v/c	0.59	A
33	US 20/ Market Street	0.90 v/c	0.60	B
34	US 20/ Weldwood Drive - Burdell Boulevard	0.85 v/c	0.65	C
35	Main Road/ Vaughan Lane	0.90 v/c	0.19	A/B
36	Main Road/ Crowfoot Road	0.90 v/c	0.12	A/A
37	US 20/ Weirich Drive	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	0.07	A/B
38	US 20/ Crowfoot Road	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	0.22	B/C

Signalized intersections:
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection

Stop Controlled intersections:
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	95	15	60	40	5	15	25	80	10	5	5
Future Vol, veh/h	10	95	15	60	40	5	15	25	80	10	5	5
Conflicting Peds, #/hr	2	0	2	2	0	2	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	0	7	0	0	11	0	0	9	0	0	0	0
Mvmt Flow	13	127	20	80	53	7	20	33	107	13	7	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	62	0	0	149	0	0	391	387	139	452	394	62
Stage 1	-	-	-	-	-	-	165	165	-	219	219	-
Stage 2	-	-	-	-	-	-	226	222	-	233	175	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.59	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.59	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.59	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.081	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1554	-	-	1445	-	-	572	537	915	521	546	1009
Stage 1	-	-	-	-	-	-	842	749	-	788	726	-
Stage 2	-	-	-	-	-	-	781	707	-	775	758	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1550	-	-	1445	-	-	533	501	913	415	510	1005
Mov Cap-2 Maneuver	-	-	-	-	-	-	533	501	-	415	510	-
Stage 1	-	-	-	-	-	-	834	741	-	780	685	-
Stage 2	-	-	-	-	-	-	724	667	-	648	750	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	4.4	11.4	12.4
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	724	1550	-	-	1445	-	-	514
HCM Lane V/C Ratio	0.221	0.009	-	-	0.055	-	-	0.052
HCM Control Delay (s)	11.4	7.3	-	-	7.6	-	-	12.4
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.8	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	95	5	115	5	0	5	75	400	10	0	515	60
Future Vol, veh/h	95	5	115	5	0	5	75	400	10	0	515	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	100	-	-	100	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	7	0	0	0	0	25	0	3	14	0	2	6
Mvmt Flow	100	5	121	5	0	5	79	421	11	0	542	63

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1129	1131	542	1129	1126	426	542	0	0	432	0	0
Stage 1	542	542	-	584	584	-	-	-	-	-	-	-
Stage 2	587	589	-	545	542	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.5	6.2	7.1	6.5	6.45	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4	3.3	3.5	4	3.525	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	177	205	544	183	207	582	1037	-	-	1138	-	-
Stage 1	516	523	-	501	501	-	-	-	-	-	-	-
Stage 2	487	499	-	526	523	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	165	189	544	131	191	582	1037	-	-	1138	-	-
Mov Cap-2 Maneuver	165	189	-	131	191	-	-	-	-	-	-	-
Stage 1	477	523	-	463	463	-	-	-	-	-	-	-
Stage 2	446	461	-	405	523	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	34.3	22.7	1.4	0
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1037	-	-	166	544	214	1138	-	-
HCM Lane V/C Ratio	0.076	-	-	0.634	0.223	0.049	-	-	-
HCM Control Delay (s)	8.8	-	-	58.2	13.5	22.7	0	-	-
HCM Lane LOS	A	-	-	F	B	C	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	3.5	0.8	0.2	0	-	-

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	40	5	55	55	15	20	40	425	30	5	635	25
Future Vol, veh/h	40	5	55	55	15	20	40	425	30	5	635	25
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	1	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	5	0	4	0	0	2	0
Mvmt Flow	42	5	58	58	16	21	42	447	32	5	668	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1258	1256	684	1274	1253	464	695	0	0	480	0	0
Stage 1	692	692	-	548	548	-	-	-	-	-	-	-
Stage 2	566	564	-	726	705	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.25	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.345	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	149	173	452	145	174	592	910	-	-	1093	-	-
Stage 1	437	448	-	524	520	-	-	-	-	-	-	-
Stage 2	513	512	-	419	442	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	128	164	451	118	165	592	908	-	-	1093	-	-
Mov Cap-2 Maneuver	128	164	-	118	165	-	-	-	-	-	-	-
Stage 1	417	446	-	499	496	-	-	-	-	-	-	-
Stage 2	457	488	-	359	440	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	28.1	45.5	0.7	0.1
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	908	-	-	128	394	118	281	1093	-	-
HCM Lane V/C Ratio	0.046	-	-	0.329	0.16	0.491	0.131	0.005	-	-
HCM Control Delay (s)	9.2	-	-	46.3	15.9	61.9	19.7	8.3	-	-
HCM Lane LOS	A	-	-	E	C	F	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	0.6	2.2	0.4	0	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	5	20	50	5	15	10	470	40	10	710	25
Future Vol, veh/h	10	5	20	50	5	15	10	470	40	10	710	25
Conflicting Peds, #/hr	0	0	4	4	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	100	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	7	0	4	3	0	1	0
Mvmt Flow	10	5	21	52	5	16	10	490	42	10	740	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1295	1285	758	1301	1298	491	767	0	0	491	0	0
Stage 1	774	774	-	511	511	-	-	-	-	-	-	-
Stage 2	521	511	-	790	787	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.27	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.363	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	141	166	410	139	163	568	856	-	-	1083	-	-
Stage 1	394	411	-	549	540	-	-	-	-	-	-	-
Stage 2	542	540	-	386	406	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	131	162	408	126	159	568	853	-	-	1083	-	-
Mov Cap-2 Maneuver	131	162	-	126	159	-	-	-	-	-	-	-
Stage 1	389	407	-	542	533	-	-	-	-	-	-	-
Stage 2	516	533	-	357	402	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24.2	47.8	0.2	0.1
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	853	-	-	224	154	1083	-	-
HCM Lane V/C Ratio	0.012	-	-	0.163	0.473	0.01	-	-
HCM Control Delay (s)	9.3	-	-	24.2	47.8	8.4	-	-
HCM Lane LOS	A	-	-	C	E	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.6	2.2	0	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	20	440	25	15	275	5	10	10	15	0	25	60
Future Vol, veh/h	20	440	25	15	275	5	10	10	15	0	25	60
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	1	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	100	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	33	2	8	0	3	0	0	0	0	0	0	13
Mvmt Flow	22	473	27	16	296	5	11	11	16	0	27	65

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	301	0	0	502	0	0	908	865	490	875	876	298
Stage 1	-	-	-	-	-	-	532	532	-	331	331	-
Stage 2	-	-	-	-	-	-	376	333	-	544	545	-
Critical Hdwy	4.43	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.497	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	1103	-	-	1073	-	-	258	294	582	272	290	716
Stage 1	-	-	-	-	-	-	535	529	-	687	649	-
Stage 2	-	-	-	-	-	-	649	647	-	527	522	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1103	-	-	1072	-	-	211	283	581	250	280	716
Mov Cap-2 Maneuver	-	-	-	-	-	-	211	283	-	250	280	-
Stage 1	-	-	-	-	-	-	523	518	-	673	639	-
Stage 2	-	-	-	-	-	-	557	637	-	491	511	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.4	17.7	14
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	322	1103	-	-	1072	-	-	-	491
HCM Lane V/C Ratio	0.117	0.019	-	-	0.015	-	-	-	0.186
HCM Control Delay (s)	17.7	8.3	-	-	8.4	-	-	0	14
HCM Lane LOS	C	A	-	-	A	-	-	A	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0	-	-	-	0.7

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	15	420	5	5	285	15	5	0	5	45	5	15
Future Vol, veh/h	15	420	5	5	285	15	5	0	5	45	5	15
Conflicting Peds, #/hr	2	0	2	2	0	2	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	17	467	6	6	317	17	6	0	6	50	6	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	335	0	0	474	0	0	852	851	471	844	846	327
Stage 1	-	-	-	-	-	-	505	505	-	338	338	-
Stage 2	-	-	-	-	-	-	347	346	-	506	508	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1236	-	-	1099	-	-	282	299	597	285	301	719
Stage 1	-	-	-	-	-	-	553	544	-	681	644	-
Stage 2	-	-	-	-	-	-	673	639	-	552	542	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1236	-	-	1099	-	-	266	290	596	276	292	718
Mov Cap-2 Maneuver	-	-	-	-	-	-	266	290	-	276	292	-
Stage 1	-	-	-	-	-	-	542	533	-	667	638	-
Stage 2	-	-	-	-	-	-	647	633	-	536	531	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	15.1	19.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	368	1236	-	-	1099	-	-	323
HCM Lane V/C Ratio	0.03	0.013	-	-	0.005	-	-	0.224
HCM Control Delay (s)	15.1	8	0	-	8.3	0	-	19.3
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	7.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	25	380	60	55	285	25	35	50	40	20	70	20
Future Vol, veh/h	25	380	60	55	285	25	35	50	40	20	70	20
Conflicting Peds, #/hr	2	0	4	4	0	2	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	2	0	2	0	0	2	0	0	2	0
Mvmt Flow	26	396	63	57	297	26	36	52	42	21	73	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	325	0	0	462	0	0	957	923	431	952	940	315
Stage 1	-	-	-	-	-	-	483	483	-	426	426	-
Stage 2	-	-	-	-	-	-	474	440	-	526	514	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.52	6.2	7.1	6.52	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.52	-	6.1	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.52	-	6.1	5.52	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.018	3.3	3.5	4.018	3.3
Pot Cap-1 Maneuver	1246	-	-	1110	-	-	239	270	629	241	264	730
Stage 1	-	-	-	-	-	-	569	553	-	610	586	-
Stage 2	-	-	-	-	-	-	575	578	-	539	535	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1243	-	-	1110	-	-	165	245	627	175	239	727
Mov Cap-2 Maneuver	-	-	-	-	-	-	165	245	-	175	239	-
Stage 1	-	-	-	-	-	-	551	536	-	592	548	-
Stage 2	-	-	-	-	-	-	453	541	-	442	518	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	1.3	32	30.5
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	260	1243	-	-	1110	-	-	253
HCM Lane V/C Ratio	0.501	0.021	-	-	0.052	-	-	0.453
HCM Control Delay (s)	32	8	0	-	8.4	0	-	30.5
HCM Lane LOS	D	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	2.6	0.1	-	-	0.2	-	-	2.2

Intersection	
Int Delay, s/veh	3.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	295	130	70	290	70	55
Future Vol, veh/h	295	130	70	290	70	55
Conflicting Peds, #/hr	0	4	4	0	5	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	324	143	77	319	77	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	471	0	878	400
Stage 1	-	-	-	-	400	-
Stage 2	-	-	-	-	478	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1101	-	321	654
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	628	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1101	-	292	652
Mov Cap-2 Maneuver	-	-	-	-	292	-
Stage 1	-	-	-	-	679	-
Stage 2	-	-	-	-	572	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.7	19.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	386	-	-	1101	-
HCM Lane V/C Ratio	0.356	-	-	0.07	-
HCM Control Delay (s)	19.4	-	-	8.5	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.6	-	-	0.2	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	65	285	250	15	20	110
Future Vol, veh/h	65	285	250	15	20	110
Conflicting Peds, #/hr	4	0	0	4	0	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	2	3	0	0	0
Mvmt Flow	71	313	275	16	22	121

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	295	0	-	0	743	292
Stage 1	-	-	-	-	287	-
Stage 2	-	-	-	-	456	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1278	-	-	-	386	752
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	643	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1273	-	-	-	357	746
Mov Cap-2 Maneuver	-	-	-	-	357	-
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	597	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1273	-	-	-	639
HCM Lane V/C Ratio	0.056	-	-	-	0.224
HCM Control Delay (s)	8	0	-	-	12.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	140	65	20	75	70	85	385	5	95	650	60
Future Volume (vph)	85	140	65	20	75	70	85	385	5	95	650	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	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.94		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1627			1535		1614	1696		1599	1705	
Flt Permitted		0.81			0.94		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1342			1457		1614	1696		1599	1705	
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)	87	143	66	20	77	71	87	393	5	97	663	61
RTOR Reduction (vph)	0	9	0	0	24	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	287	0	0	144	0	87	398	0	97	722	0
Confl. Peds. (#/hr)	4		2	2		4	4					4
Confl. Bikes (#/hr)			3									
Heavy Vehicles (%)	2%	2%	2%	0%	3%	10%	3%	3%	0%	4%	1%	2%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)		24.6			24.6		8.7	50.6		9.3	51.2	
Effective Green, g (s)		25.6			25.6		8.7	51.6		9.3	52.2	
Actuated g/C Ratio		0.26			0.26		0.09	0.52		0.09	0.53	
Clearance Time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)		2.5			2.5		2.5	6.1		2.5	6.1	
Lane Grp Cap (vph)		348			378		142	888		150	903	
v/s Ratio Prot							0.05	0.23		c0.06	c0.42	
v/s Ratio Perm		c0.21			0.10							
v/c Ratio		0.83			0.38		0.61	0.45		0.65	0.80	
Uniform Delay, d1		34.3			29.9		43.3	14.6		43.0	18.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		14.4			0.5		6.5	1.6		8.2	7.3	
Delay (s)		48.7			30.4		49.8	16.2		51.2	26.2	
Level of Service		D			C		D	B		D	C	
Approach Delay (s)		48.7			30.4			22.2			29.2	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	98.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	15	210	65	30	120	40
Future Vol, veh/h	15	210	65	30	120	40
Conflicting Peds, #/hr	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	2	0	0	7	0
Mvmt Flow	16	231	71	33	132	44

Major/Minor	Minor2		Minor1		Major1	
Conflicting Flow All	309	-	9	287	0	0
Stage 1	0	-	1	287	-	-
Stage 2	309	-	8	0	-	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	0	-	-	-	-
Stage 1	-	0	-	-	-	-
Stage 2	-	0	-	-	-	-
Platoon blocked, %						-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s			
HCM LOS	-	-	

Minor Lane/Major Mvmt	NBL	NBR	EBLn1	WBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	-
HCM Lane LOS	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	25	20	20	35	10	15	120	20	15	175	5
Future Vol, veh/h	5	25	20	20	35	10	15	120	20	15	175	5
Conflicting Peds, #/hr	0	0	7	7	0	0	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	5	0	10	7	0	0	1	6	7	1	20
Mvmt Flow	6	32	25	25	44	13	19	152	25	19	222	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	499	488	237	506	479	170	233	0	0	182	0	0
Stage 1	268	268	-	208	208	-	-	-	-	-	-	-
Stage 2	231	220	-	298	271	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.2	6.57	6.2	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.2	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.2	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.59	4.063	3.3	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	485	476	807	464	479	879	1346	-	-	1364	-	-
Stage 1	742	682	-	776	721	-	-	-	-	-	-	-
Stage 2	776	716	-	694	676	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	430	457	799	411	460	875	1338	-	-	1364	-	-
Mov Cap-2 Maneuver	430	457	-	411	460	-	-	-	-	-	-	-
Stage 1	727	668	-	760	707	-	-	-	-	-	-	-
Stage 2	705	702	-	626	662	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.4	14.1	0.7	0.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1338	-	-	547	477	1364	-	-
HCM Lane V/C Ratio	0.014	-	-	0.116	0.172	0.014	-	-
HCM Control Delay (s)	7.7	0	-	12.4	14.1	7.7	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.6	0	-	-

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	30	10	20	30	15	25	215	25	10	225	5
Future Vol, veh/h	5	30	10	20	30	15	25	215	25	10	225	5
Conflicting Peds, #/hr	1	0	0	0	0	1	1	0	6	6	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	4	0	4	0	0	0
Mvmt Flow	6	37	12	24	37	18	30	262	30	12	274	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	670	663	278	670	650	284	281	0	0	299	0	0
Stage 1	303	303	-	344	344	-	-	-	-	-	-	-
Stage 2	367	360	-	326	306	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.14	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.236	-	-	2.2	-	-
Pot Cap-1 Maneuver	373	384	766	373	391	760	1270	-	-	1274	-	-
Stage 1	711	667	-	676	640	-	-	-	-	-	-	-
Stage 2	657	630	-	691	665	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	326	367	765	328	374	756	1270	-	-	1273	-	-
Mov Cap-2 Maneuver	326	367	-	328	374	-	-	-	-	-	-	-
Stage 1	691	659	-	654	619	-	-	-	-	-	-	-
Stage 2	586	609	-	635	657	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.2	16.1	0.7	0.3
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1270	-	-	409	404	1273	-	-
HCM Lane V/C Ratio	0.024	-	-	0.134	0.196	0.01	-	-
HCM Control Delay (s)	7.9	0	-	15.2	16.1	7.9	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0.7	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	25	190	20	0	0	0	0	95	895	10
Future Volume (vph)	0	0	25	190	20	0	0	0	0	95	895	10
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)			4.0		4.0						7.0	
Lane Util. Factor			1.00		1.00						0.95	
Frpb, ped/bikes			0.98		1.00						1.00	
Flpb, ped/bikes			1.00		1.00						1.00	
Frt			0.86		1.00						1.00	
Flt Protected			1.00		0.96						1.00	
Satd. Flow (prot)			1488		1619						3295	
Flt Permitted			1.00		0.96						1.00	
Satd. Flow (perm)			1488		1619						3295	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	0	28	213	22	0	0	0	0	107	1006	11
RTOR Reduction (vph)	0	0	22	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	6	0	235	0	0	0	0	0	1123	0
Confl. Peds. (#/hr)	11		6	6		11	18		4	4		18
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	0%	0%	2%	12%	0%	0%	0%	0%	2%	0%	0%
Turn Type			Perm	Perm	NA					Perm	NA	
Protected Phases					8						2	
Permitted Phases			4	8						2		
Actuated Green, G (s)			11.4		11.4						32.1	
Effective Green, g (s)			11.9		11.9						32.1	
Actuated g/C Ratio			0.22		0.22						0.58	
Clearance Time (s)			4.5		4.5						7.0	
Vehicle Extension (s)			0.2		0.2						0.2	
Lane Grp Cap (vph)			321		350						1923	
v/s Ratio Prot												
v/s Ratio Perm			0.00		0.15						0.34	
v/c Ratio			0.02		0.67						0.58	
Uniform Delay, d1			17.0		19.8						7.2	
Progression Factor			1.00		1.00						1.00	
Incremental Delay, d2			0.0		4.0						1.3	
Delay (s)			17.0		23.7						8.5	
Level of Service			B		C						A	
Approach Delay (s)		17.0			23.7			0.0			8.5	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	160	15	80	125	85	5	90	95	120	140	10
Future Volume (vph)	10	160	15	80	125	85	5	90	95	120	140	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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			0.93			0.99	
Flt Protected		1.00			0.99			1.00			0.98	
Satd. Flow (prot)		1709			1586			1568			1649	
Flt Permitted		0.98			0.87			0.99			0.78	
Satd. Flow (perm)		1682			1401			1558			1311	
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)	11	174	16	87	136	92	5	98	103	130	152	11
RTOR Reduction (vph)	0	3	0	0	17	0	0	55	0	0	2	0
Lane Group Flow (vph)	0	198	0	0	298	0	0	151	0	0	291	0
Confl. Peds. (#/hr)	1		2	2		1	2					2
Heavy Vehicles (%)	0%	1%	0%	3%	3%	6%	0%	2%	6%	6%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			8			6			6	
Permitted Phases	8			8			6			6		
Actuated Green, G (s)		33.0			33.0			21.5			21.5	
Effective Green, g (s)		33.0			33.0			21.5			21.5	
Actuated g/C Ratio		0.53			0.53			0.34			0.34	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		0.2			0.2			0.2			0.2	
Lane Grp Cap (vph)		888			739			535			450	
v/s Ratio Prot												
v/s Ratio Perm		0.12			c0.21			0.10			c0.22	
v/c Ratio		0.22			0.40			0.28			0.65	
Uniform Delay, d1		7.9			8.8			14.9			17.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.0			0.1			0.1			2.4	
Delay (s)		7.9			9.0			15.0			19.7	
Level of Service		A			A			B			B	
Approach Delay (s)		7.9			9.0			15.0			19.7	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	180	25	15	75	20	15	25	20	25	60	5
Future Vol, veh/h	5	180	25	15	75	20	15	25	20	25	60	5
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	1	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	17	4	0	15	6	0	8	0	0	5	4	0
Mvmt Flow	6	205	28	17	85	23	17	28	23	28	68	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	109	0	0	233	0	0	398	373	220	389	376	98
Stage 1	-	-	-	-	-	-	230	230	-	132	132	-
Stage 2	-	-	-	-	-	-	168	143	-	257	244	-
Critical Hdwy	4.27	-	-	4.25	-	-	7.18	6.5	6.2	7.15	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.5	-	6.15	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.5	-	6.15	5.54	-
Follow-up Hdwy	2.353	-	-	2.335	-	-	3.572	4	3.3	3.545	4.036	3.3
Pot Cap-1 Maneuver	1393	-	-	1262	-	-	552	561	825	565	552	963
Stage 1	-	-	-	-	-	-	760	718	-	864	783	-
Stage 2	-	-	-	-	-	-	820	782	-	741	700	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1393	-	-	1261	-	-	489	550	824	519	541	962
Mov Cap-2 Maneuver	-	-	-	-	-	-	489	550	-	519	541	-
Stage 1	-	-	-	-	-	-	756	714	-	859	771	-
Stage 2	-	-	-	-	-	-	733	770	-	688	697	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.1	11.8	13.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	598	1393	-	-	1261	-	-	548
HCM Lane V/C Ratio	0.114	0.004	-	-	0.014	-	-	0.187
HCM Control Delay (s)	11.8	7.6	0	-	7.9	0	-	13.1
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0.7

Intersection												
Int Delay, s/veh	2.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	15	205	10	15	105	30	5	5	10	40	10	10
Future Vol, veh/h	15	205	10	15	105	30	5	5	10	40	10	10
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	4	0	7	7	0	0	0	0	0	10	14
Mvmt Flow	17	233	11	17	119	34	6	6	11	45	11	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	153	0	0	245	0	0	456	462	243	454	449	136
Stage 1	-	-	-	-	-	-	274	274	-	170	170	-
Stage 2	-	-	-	-	-	-	182	188	-	284	279	-
Critical Hdwy	4.1	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.6	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.6	-
Follow-up Hdwy	2.2	-	-	2.263	-	-	3.5	4	3.3	3.5	4.09	3.426
Pot Cap-1 Maneuver	1440	-	-	1292	-	-	518	500	801	520	493	882
Stage 1	-	-	-	-	-	-	736	687	-	837	743	-
Stage 2	-	-	-	-	-	-	824	748	-	727	665	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1440	-	-	1289	-	-	491	486	798	496	479	882
Mov Cap-2 Maneuver	-	-	-	-	-	-	491	486	-	496	479	-
Stage 1	-	-	-	-	-	-	725	677	-	825	733	-
Stage 2	-	-	-	-	-	-	790	738	-	699	655	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.8	11.2	12.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	606	1440	-	-	1289	-	-	532
HCM Lane V/C Ratio	0.038	0.012	-	-	0.013	-	-	0.128
HCM Control Delay (s)	11.2	7.5	0	-	7.8	0	-	12.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	210	20	15	135	85	15	80	15	55	170	20
Future Volume (vph)	35	210	20	15	135	85	15	80	15	55	170	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	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		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	0.94		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	1669		1657	1603		1660	1703		1662	1684	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	1669		1657	1603		1660	1703		1662	1684	
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)	38	231	22	16	148	93	16	88	16	60	187	22
RTOR Reduction (vph)	0	3	0	0	17	0	0	5	0	0	3	0
Lane Group Flow (vph)	38	250	0	16	224	0	16	99	0	60	206	0
Confl. Peds. (#/hr)	7		4	4		7	2		5	5		2
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	3%	6%	0%	2%	1%	0%	0%	0%	0%	1%	11%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	2.2	17.1		0.9	15.8		0.9	12.0		4.2	15.3	
Effective Green, g (s)	2.2	17.1		0.9	15.8		0.9	12.0		4.2	15.3	
Actuated g/C Ratio	0.04	0.34		0.02	0.31		0.02	0.24		0.08	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	72	568		29	504		29	407		139	513	
v/s Ratio Prot	c0.02	c0.15		0.01	0.14		0.01	0.06		c0.04	c0.12	
v/s Ratio Perm												
v/c Ratio	0.53	0.44		0.55	0.44		0.55	0.24		0.43	0.40	
Uniform Delay, d1	23.5	12.8		24.4	13.7		24.4	15.4		21.9	13.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	0.5		16.9	0.6		16.9	0.2		1.6	0.4	
Delay (s)	28.7	13.4		41.4	14.3		41.4	15.7		23.4	14.2	
Level of Service	C	B		D	B		D	B		C	B	
Approach Delay (s)		15.4			16.0			19.1			16.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	42.4%	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												
Traffic Volume (vph)	25	225	65	20	145	20	40	235	40	20	240	10
Future Volume (vph)	25	225	65	20	145	20	40	235	40	20	240	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	
Lane Util. Factor	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	0.98			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1592	1632		1580	1684			1702			1717	
Flt Permitted	0.64	1.00		0.53	1.00			0.92			0.97	
Satd. Flow (perm)	1067	1632		883	1684			1584			1664	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	29	262	76	23	169	23	47	273	47	23	279	12
RTOR Reduction (vph)	0	13	0	0	6	0	0	13	0	0	4	0
Lane Group Flow (vph)	29	325	0	23	186	0	0	354	0	0	310	0
Confl. Peds. (#/hr)	3		2	2		3	1		5	5		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	4%	0%	5%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	31.3	31.3		31.3	31.3			15.7			15.7	
Effective Green, g (s)	31.3	31.3		31.3	31.3			15.7			15.7	
Actuated g/C Ratio	0.57	0.57		0.57	0.57			0.29			0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		0.2	0.2			0.2			0.2	
Lane Grp Cap (vph)	607	928		502	958			452			474	
v/s Ratio Prot		c0.20			0.11							
v/s Ratio Perm	0.03			0.03				c0.22			0.19	
v/c Ratio	0.05	0.35		0.05	0.19			0.78			0.65	
Uniform Delay, d1	5.2	6.4		5.2	5.7			18.1			17.3	
Progression Factor	1.00	1.00		1.06	1.01			1.00			1.00	
Incremental Delay, d2	0.1	1.0		0.2	0.4			8.0			2.5	
Delay (s)	5.4	7.4		5.7	6.3			26.1			19.8	
Level of Service	A	A		A	A			C			B	
Approach Delay (s)		7.3			6.2			26.1			19.8	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	150	120	50	105	0	0	0	0	25	1005	80
Future Volume (vph)	0	150	120	50	105	0	0	0	0	25	1005	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	
Lane Util. Factor		1.00		1.00	1.00						0.95	
Frpb, ped/bikes		0.99		1.00	1.00						1.00	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.94		1.00	1.00						0.99	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1577		1661	1716						3250	
Flt Permitted		1.00		0.37	1.00						1.00	
Satd. Flow (perm)		1577		647	1716						3250	
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)	0	165	132	55	115	0	0	0	0	27	1104	88
RTOR Reduction (vph)	0	41	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	256	0	55	115	0	0	0	0	0	1212	0
Confl. Peds. (#/hr)	3		2	2		3	2		5	5		2
Heavy Vehicles (%)	0%	1%	7%	0%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						2	
Permitted Phases				8						2		
Actuated Green, G (s)		11.8		11.8	11.8						34.2	
Effective Green, g (s)		12.3		12.3	12.3						34.7	
Actuated g/C Ratio		0.22		0.22	0.22						0.63	
Clearance Time (s)		4.5		4.5	4.5						4.5	
Vehicle Extension (s)		0.2		0.2	0.2						0.2	
Lane Grp Cap (vph)		352		144	383						2050	
v/s Ratio Prot		c0.16			0.07							
v/s Ratio Perm				0.09							0.37	
v/c Ratio		0.73		0.38	0.30						0.59	
Uniform Delay, d1		19.8		18.1	17.8						6.0	
Progression Factor		1.17		1.00	1.00						0.55	
Incremental Delay, d2		5.9		0.6	0.2						1.1	
Delay (s)		29.0		18.7	17.9						4.4	
Level of Service		C		B	B						A	
Approach Delay (s)		29.0			18.2			0.0			4.4	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.0%	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												
Traffic Volume (vph)	15	85	35	190	70	10	40	765	220	30	1150	25
Future Volume (vph)	15	85	35	190	70	10	40	765	220	30	1150	25
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	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		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	
Frt		0.97		1.00	0.98		1.00	0.97		1.00	1.00	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1673		1644	1682		1662	3118		1662	3248	
Flt Permitted		0.97		0.64	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1634		1101	1682		1662	3118		1662	3248	
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)	16	90	37	202	74	11	43	814	234	32	1223	27
RTOR Reduction (vph)	0	11	0	0	5	0	0	23	0	0	1	0
Lane Group Flow (vph)	0	132	0	202	80	0	43	1025	0	32	1249	0
Confl. Peds. (#/hr)	2		2	2		2	4		4	4		4
Heavy Vehicles (%)	0%	0%	0%	1%	0%	14%	0%	2%	4%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		21.7		21.7	21.7		4.2	38.5		3.8	38.1	
Effective Green, g (s)		21.7		21.7	21.7		4.7	39.0		4.3	38.6	
Actuated g/C Ratio		0.28		0.28	0.28		0.06	0.51		0.06	0.50	
Clearance Time (s)		4.0		4.0	4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		2.5		2.5	2.5		2.5	5.5		2.5	5.5	
Lane Grp Cap (vph)		460		310	474		101	1579		92	1628	
v/s Ratio Prot					0.05		c0.03	0.33		0.02	c0.38	
v/s Ratio Perm		0.08		c0.18								
v/c Ratio		0.29		0.65	0.17		0.43	0.65		0.35	0.77	
Uniform Delay, d1		21.6		24.3	20.8		34.8	14.0		35.0	15.6	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3		4.3	0.1		2.1	1.4		1.7	2.8	
Delay (s)		21.8		28.7	21.0		36.9	15.4		36.7	18.3	
Level of Service		C		C	C		D	B		D	B	
Approach Delay (s)		21.8			26.4			16.2			18.8	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	210	100	45	45	70	175
Future Vol, veh/h	210	100	45	45	70	175
Conflicting Peds, #/hr	3	0	0	3	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	Free
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	0	2	0	2	2
Mvmt Flow	233	111	50	50	78	194

Major/Minor	Major1		Minor2	
Conflicting Flow All	3	0	581	-
Stage 1	-	-	3	-
Stage 2	-	-	578	-
Critical Hdwy	4.15	-	7.12	-
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	6.12	-
Follow-up Hdwy	2.245	-	3.518	-
Pot Cap-1 Maneuver	1600	-	425	0
Stage 1	-	-	-	0
Stage 2	-	-	501	0
Platoon blocked, %		-		
Mov Cap-1 Maneuver	1600	-	374	-
Mov Cap-2 Maneuver	-	-	374	-
Stage 1	-	-	-	-
Stage 2	-	-	423	-

Approach	EB	SB
HCM Control Delay, s	5.2	17.1
HCM LOS		C

Minor Lane/Major Mvmt	EBL	EBT	SBLn1
Capacity (veh/h)	1600	-	374
HCM Lane V/C Ratio	0.146	-	0.208
HCM Control Delay (s)	7.6	0	17.1
HCM Lane LOS	A	A	C
HCM 95th %tile Q(veh)	0.5	-	0.8

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	850	25	10	345	45	10	5	5	55	10	5
Future Vol, veh/h	5	850	25	10	345	45	10	5	5	55	10	5
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	25	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	2	0	0	5	5	0	0	0	4	10	0
Mvmt Flow	5	934	27	11	379	49	11	5	5	60	11	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	429	0	0	963	0	0	1394	1411	949	1390	1400	404
Stage 1	-	-	-	-	-	-	960	960	-	426	426	-
Stage 2	-	-	-	-	-	-	434	451	-	964	974	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.14	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.14	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.14	5.6	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.536	4.09	3.3
Pot Cap-1 Maneuver	1141	-	-	723	-	-	120	140	319	119	135	651
Stage 1	-	-	-	-	-	-	311	338	-	602	572	-
Stage 2	-	-	-	-	-	-	604	574	-	304	320	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1141	-	-	723	-	-	110	137	319	112	132	651
Mov Cap-2 Maneuver	-	-	-	-	-	-	110	137	-	112	132	-
Stage 1	-	-	-	-	-	-	309	336	-	599	563	-
Stage 2	-	-	-	-	-	-	578	565	-	293	318	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	33.1	75
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	110	192	1141	-	-	723	-	-	122
HCM Lane V/C Ratio	0.1	0.057	0.005	-	-	0.015	-	-	0.631
HCM Control Delay (s)	41.3	24.9	8.2	-	-	10.1	-	-	75
HCM Lane LOS	E	C	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.3	0.2	0	-	-	0	-	-	3.2

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	600	310	55	345	65	30
Future Vol, veh/h	600	310	55	345	65	30
Conflicting Peds, #/hr	0	3	3	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	3	0	5	2	0
Mvmt Flow	638	330	59	367	69	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	971	0	1290	806
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	484	-
Critical Hdwy	-	-	4.1	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.2	-	3.518	3.3
Pot Cap-1 Maneuver	-	-	718	-	180	385
Stage 1	-	-	-	-	439	-
Stage 2	-	-	-	-	620	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	718	-	165	384
Mov Cap-2 Maneuver	-	-	-	-	299	-
Stage 1	-	-	-	-	438	-
Stage 2	-	-	-	-	569	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.4	21.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	321	-	-	718	-
HCM Lane V/C Ratio	0.315	-	-	0.081	-
HCM Control Delay (s)	21.3	-	-	10.5	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	1.3	-	-	0.3	-

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	15	600	15	65	390	35	10	15	40	25	15	10
Future Vol, veh/h	15	600	15	65	390	35	10	15	40	25	15	10
Conflicting Peds, #/hr	4	0	2	2	0	4	1	0	15	15	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	7	1	9	0	4	3	0	0	0	4	0	0
Mvmt Flow	16	638	16	69	415	37	11	16	43	27	16	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	456	0	0	656	0	0	1266	1274	663	1298	1264	439
Stage 1	-	-	-	-	-	-	680	680	-	576	576	-
Stage 2	-	-	-	-	-	-	586	594	-	722	688	-
Critical Hdwy	4.17	-	-	4.1	-	-	7.1	6.5	6.2	7.14	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.14	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.14	5.5	-
Follow-up Hdwy	2.263	-	-	2.2	-	-	3.5	4	3.3	3.536	4	3.3
Pot Cap-1 Maneuver	1079	-	-	941	-	-	147	169	465	137	171	622
Stage 1	-	-	-	-	-	-	444	454	-	499	505	-
Stage 2	-	-	-	-	-	-	500	496	-	415	450	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1078	-	-	929	-	-	124	153	458	105	155	619
Mov Cap-2 Maneuver	-	-	-	-	-	-	124	153	-	105	155	-
Stage 1	-	-	-	-	-	-	437	447	-	490	466	-
Stage 2	-	-	-	-	-	-	439	458	-	353	443	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.2	22.7	44.8
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	124	297	1078	-	-	929	-	-	142
HCM Lane V/C Ratio	0.086	0.197	0.015	-	-	0.074	-	-	0.375
HCM Control Delay (s)	36.7	20.1	8.4	-	-	9.2	-	-	44.8
HCM Lane LOS	E	C	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.3	0.7	0	-	-	0.2	-	-	1.6

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	45	585	25	15	430	90	5	20	5	30	30	55
Future Vol, veh/h	45	585	25	15	430	90	5	20	5	30	30	55
Conflicting Peds, #/hr	2	0	5	5	0	2	4	0	0	0	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	10	-	-	-	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	2	0	0	4	1	0	0	17	0	0	2
Mvmt Flow	49	643	27	16	473	99	5	22	5	33	33	60

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	573	0	0	675	0	0	1366	1366	662	1326	1331	528
Stage 1	-	-	-	-	-	-	760	760	-	557	557	-
Stage 2	-	-	-	-	-	-	606	606	-	769	774	-
Critical Hdwy	4.13	-	-	4.1	-	-	7.1	6.5	6.37	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4	3.453	3.5	4	3.318
Pot Cap-1 Maneuver	995	-	-	926	-	-	126	149	437	134	156	550
Stage 1	-	-	-	-	-	-	401	417	-	518	515	-
Stage 2	-	-	-	-	-	-	487	490	-	397	411	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	992	-	-	926	-	-	87	138	435	110	145	547
Mov Cap-2 Maneuver	-	-	-	-	-	-	87	138	-	110	145	-
Stage 1	-	-	-	-	-	-	380	395	-	492	505	-
Stage 2	-	-	-	-	-	-	397	481	-	352	389	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.3	38.5	31.5
HCM LOS			E	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	140	992	-	-	926	-	-	110	276
HCM Lane V/C Ratio	0.235	0.05	-	-	0.018	-	-	0.3	0.338
HCM Control Delay (s)	38.5	8.8	-	-	9	-	-	51.2	24.6
HCM Lane LOS	E	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	0.9	0.2	-	-	0.1	-	-	1.1	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	425	185	75	345	75	150	270	80	95	300	35
Future Volume (vph)	20	425	185	75	345	75	150	270	80	95	300	35
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	0.99		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	0.95		1.00	0.97		1.00	0.97		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	1633		1662	1665		1599	1675		1646	1702	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	1633		1662	1665		1599	1675		1646	1702	
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)	22	457	199	81	371	81	161	290	86	102	323	38
RTOR Reduction (vph)	0	11	0	0	5	0	0	8	0	0	3	0
Lane Group Flow (vph)	22	645	0	81	447	0	161	368	0	102	358	0
Confl. Peds. (#/hr)	5		1	1		5	2		3	3		2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	3%	0%	2%	0%	4%	0%	1%	1%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	2.9	42.6		8.6	48.3		15.1	29.9		11.6	26.4	
Effective Green, g (s)	2.9	42.6		8.6	48.3		15.1	29.9		11.6	26.4	
Actuated g/C Ratio	0.03	0.39		0.08	0.44		0.14	0.28		0.11	0.24	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	44	639		131	739		222	460		175	413	
v/s Ratio Prot	0.01	c0.40		c0.05	0.27		c0.10	c0.22		0.06	0.21	
v/s Ratio Perm												
v/c Ratio	0.50	1.01		0.62	0.60		0.73	0.80		0.58	0.87	
Uniform Delay, d1	52.2	33.0		48.5	22.9		44.8	36.6		46.2	39.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.4	38.0		7.2	1.2		10.5	9.4		4.1	17.0	
Delay (s)	58.6	71.0		55.7	24.1		55.3	46.0		50.3	56.4	
Level of Service	E	E		E	C		E	D		D	E	
Approach Delay (s)		70.6			28.9			48.8			55.1	
Approach LOS		E			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	52.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	108.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.9%	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												
Traffic Volume (vph)	105	120	380	140	105	60	230	790	80	165	1060	80
Future Volume (vph)	105	120	380	140	105	60	230	790	80	165	1060	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	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	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	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1646	1733	1439	1646	1636		1614	3207		1646	3223	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	1733	1439	1646	1636		1614	3207		1646	3223	
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)	112	128	404	149	112	64	245	840	85	176	1128	85
RTOR Reduction (vph)	0	0	309	0	15	0	0	5	0	0	3	0
Lane Group Flow (vph)	112	128	95	149	161	0	245	920	0	176	1210	0
Confl. Peds. (#/hr)	1		1	1		1	4		2	2		4
Heavy Vehicles (%)	1%	1%	2%	1%	1%	0%	3%	2%	2%	1%	2%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)	13.1	15.8	15.8	15.0	17.7		21.6	55.0		17.4	50.8	
Effective Green, g (s)	13.1	15.8	15.8	15.0	17.7		22.1	55.5		17.9	51.3	
Actuated g/C Ratio	0.11	0.13	0.13	0.12	0.15		0.18	0.46		0.15	0.43	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	4.1		2.5	4.1	
Lane Grp Cap (vph)	179	227	189	205	240		296	1480		245	1375	
v/s Ratio Prot	0.07	0.07		c0.09	c0.10		c0.15	0.29		0.11	c0.38	
v/s Ratio Perm			0.07									
v/c Ratio	0.63	0.56	0.50	0.73	0.67		0.83	0.62		0.72	0.88	
Uniform Delay, d1	51.2	49.0	48.5	50.6	48.5		47.2	24.4		48.7	31.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	2.6	1.5	11.4	6.2		16.7	1.0		9.0	7.0	
Delay (s)	57.0	51.6	50.1	62.0	54.7		63.9	25.4		57.8	38.6	
Level of Service	E	D	D	E	D		E	C		E	D	
Approach Delay (s)		51.6			58.1			33.5			41.0	
Approach LOS		D			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	120.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	25	130	1035	55	165	1455
Future Vol, veh/h	25	130	1035	55	165	1455
Conflicting Peds, #/hr	0	0	0	3	3	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	9	1	3	2	3	1
Mvmt Flow	26	134	1067	57	170	1500

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2188	565	0	0	1127	0
Stage 1	1098	-	-	-	-	-
Stage 2	1090	-	-	-	-	-
Critical Hdwy	6.98	6.92	-	-	4.16	-
Critical Hdwy Stg 1	5.98	-	-	-	-	-
Critical Hdwy Stg 2	5.98	-	-	-	-	-
Follow-up Hdwy	3.59	3.31	-	-	2.23	-
Pot Cap-1 Maneuver	35	471	-	-	610	-
Stage 1	266	-	-	-	-	-
Stage 2	269	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 25	470	-	-	610	-
Mov Cap-2 Maneuver	113	-	-	-	-	-
Stage 1	265	-	-	-	-	-
Stage 2	194	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.6	0	1.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	113	470	610	-
HCM Lane V/C Ratio	-	-	0.228	0.285	0.279	-
HCM Control Delay (s)	-	-	46	15.7	13.2	-
HCM Lane LOS	-	-	E	C	B	-
HCM 95th %tile Q(veh)	-	-	0.8	1.2	1.1	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	50	200	140	25	30	40
Future Vol, veh/h	50	200	140	25	30	40
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	2	1	0	0	3
Mvmt Flow	59	235	165	29	35	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	195	0	-	0	533	180
Stage 1	-	-	-	-	180	-
Stage 2	-	-	-	-	353	-
Critical Hdwy	4.1	-	-	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.327
Pot Cap-1 Maneuver	1390	-	-	-	511	860
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	716	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1390	-	-	-	485	859
Mov Cap-2 Maneuver	-	-	-	-	485	-
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	680	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1390	-	-	-	646
HCM Lane V/C Ratio	0.042	-	-	-	0.127
HCM Control Delay (s)	7.7	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	1270	70	55	930	10	160	10	110	30	10	10
Future Volume (vph)	5	1270	70	55	930	10	160	10	110	30	10	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	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	1.00		1.00	0.86		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3233		1599	3223		1646	1471		1591	1619	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.34	1.00	
Satd. Flow (perm)	1662	3233		1599	3223		1287	1471		563	1619	
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)	5	1337	74	58	979	11	168	11	116	32	11	11
RTOR Reduction (vph)	0	2	0	0	0	0	0	96	0	0	10	0
Lane Group Flow (vph)	5	1409	0	58	990	0	168	31	0	32	12	0
Confl. Peds. (#/hr)	2		3	3		2			4	4		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	0%	1%	0%	1%	4%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			3	
Permitted Phases							4			3		
Actuated Green, G (s)	0.9	52.0		7.5	58.6		18.7	18.7		10.9	10.9	
Effective Green, g (s)	1.9	53.0		8.5	59.6		19.7	19.7		11.9	11.9	
Actuated g/C Ratio	0.02	0.45		0.07	0.51		0.17	0.17		0.10	0.10	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.2		2.5	4.2		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	27	1470		116	1648		217	248		57	165	
v/s Ratio Prot	0.00	c0.44		c0.04	0.31			0.02			0.01	
v/s Ratio Perm							c0.13			c0.06		
v/c Ratio	0.19	0.96		0.50	0.60		0.77	0.12		0.56	0.07	
Uniform Delay, d1	56.5	30.7		52.0	20.1		46.3	41.1		49.8	47.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	14.8		2.5	0.8		15.1	0.2		9.9	0.1	
Delay (s)	58.9	45.5		54.4	20.8		61.4	41.2		59.7	47.5	
Level of Service	E	D		D	C		E	D		E	D	
Approach Delay (s)		45.5			22.7			52.7			54.7	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	116.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	70.2%	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												
Traffic Volume (vph)	85	160	70	30	110	70	55	255	100	105	385	115
Future Volume (vph)	85	160	70	30	110	70	55	255	100	105	385	115
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	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	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	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1657	1648		1597	1716	1423	1662	1630		1638	1656	
Flt Permitted	0.68	1.00		0.60	1.00	1.00	0.32	1.00		0.48	1.00	
Satd. Flow (perm)	1185	1648		1005	1716	1423	564	1630		824	1656	
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)	93	176	77	33	121	77	60	280	110	115	423	126
RTOR Reduction (vph)	0	25	0	0	0	51	0	18	0	0	14	0
Lane Group Flow (vph)	93	228	0	33	121	26	60	372	0	115	535	0
Confl. Peds. (#/hr)	4		1	1		4			9	9		
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	4%	2%	2%	0%	2%	2%	1%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2		2	4			8		
Actuated Green, G (s)	12.7	12.7		12.7	12.7	12.7	17.1	17.1		17.1	17.1	
Effective Green, g (s)	12.7	12.7		12.7	12.7	12.7	17.1	17.1		17.1	17.1	
Actuated g/C Ratio	0.34	0.34		0.34	0.34	0.34	0.45	0.45		0.45	0.45	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	398	553		337	576	478	255	737		372	749	
v/s Ratio Prot		c0.14			0.07			0.23			c0.32	
v/s Ratio Perm	0.08			0.03		0.02	0.11			0.14		
v/c Ratio	0.23	0.41		0.10	0.21	0.05	0.24	0.50		0.31	0.71	
Uniform Delay, d1	9.0	9.7		8.6	9.0	8.5	6.3	7.3		6.6	8.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.4		0.1	0.1	0.0	0.3	0.4		0.3	3.0	
Delay (s)	9.3	10.0		8.7	9.1	8.5	6.7	7.7		6.9	11.4	
Level of Service	A	B		A	A	A	A	A		A	B	
Approach Delay (s)		9.8			8.9			7.6			10.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	37.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	1280	50	85	940	5	50	5	175	0	5	5
Future Volume (vph)	5	1280	50	85	940	5	50	5	175	0	5	5
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	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85			0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1662	3239		1614	3226		1599	1446			1632	
Flt Permitted	0.28	1.00		0.12	1.00		0.75	1.00			1.00	
Satd. Flow (perm)	484	3239		196	3226		1264	1446			1632	
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)	5	1362	53	90	1000	5	53	5	186	0	5	5
RTOR Reduction (vph)	0	2	0	0	0	0	0	161	0	0	4	0
Lane Group Flow (vph)	5	1413	0	90	1005	0	53	30	0	0	6	0
Confl. Peds. (#/hr)			2	2					2	2		
Heavy Vehicles (%)	0%	2%	2%	3%	3%	0%	4%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA			NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	46.9	46.0		55.0	49.8		9.9	9.9			9.9	
Effective Green, g (s)	47.9	46.0		55.7	50.3		9.9	9.9			9.9	
Actuated g/C Ratio	0.65	0.63		0.76	0.68		0.13	0.13			0.13	
Clearance Time (s)	4.5	4.0		4.5	4.5		4.0	4.0			4.0	
Vehicle Extension (s)	2.5	4.1		2.5	4.1		2.5	2.5			2.5	
Lane Grp Cap (vph)	337	2024		258	2204		170	194			219	
v/s Ratio Prot	0.00	c0.44		c0.03	0.31			0.02			0.00	
v/s Ratio Perm	0.01			0.24			c0.04					
v/c Ratio	0.01	0.70		0.35	0.46		0.31	0.15			0.03	
Uniform Delay, d1	4.5	9.2		5.9	5.4		28.8	28.2			27.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	1.2		0.6	0.2		0.8	0.3			0.0	
Delay (s)	4.5	10.4		6.5	5.6		29.5	28.4			27.7	
Level of Service	A	B		A	A		C	C			C	
Approach Delay (s)		10.3			5.6			28.7			27.7	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	60	910	135	50	565	5	350	10	115	15	15	35
Future Volume (vph)	60	910	135	50	565	5	350	10	115	15	15	35
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
Frpb, ped/bikes	1.00	1.00	0.99	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	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.86		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1662	3292	1438	1630	3194		3193	1495		1662	1750	1488
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1662	3292	1438	1630	3194		3193	1495		1662	1750	1488
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)	65	978	145	54	608	5	376	11	124	16	16	38
RTOR Reduction (vph)	0	0	59	0	1	0	0	108	0	0	0	34
Lane Group Flow (vph)	65	978	86	54	612	0	376	27	0	16	16	4
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	1%	2%	2%	4%	0%	1%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases			2									4
Actuated Green, G (s)	3.9	27.0	27.0	2.6	25.7		6.3	6.9		1.0	1.6	5.5
Effective Green, g (s)	4.4	28.5	28.5	3.1	27.2		6.8	7.4		1.5	2.1	6.5
Actuated g/C Ratio	0.08	0.50	0.50	0.05	0.48		0.12	0.13		0.03	0.04	0.12
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.8	4.8	2.5	4.8		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	129	1660	725	89	1537		384	195		44	65	276
v/s Ratio Prot	c0.04	c0.30		0.03	0.19		c0.12	c0.02		0.01	0.01	0.00
v/s Ratio Perm			0.06									0.00
v/c Ratio	0.50	0.59	0.12	0.61	0.40		0.98	0.14		0.36	0.25	0.02
Uniform Delay, d1	25.0	9.9	7.4	26.1	9.4		24.8	21.7		27.0	26.4	22.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.2	0.8	0.1	9.5	0.3		39.9	0.2		3.7	1.4	0.0
Delay (s)	27.2	10.7	7.5	35.6	9.7		64.7	22.0		30.7	27.9	22.2
Level of Service	C	B	A	D	A		E	C		C	C	C
Approach Delay (s)		11.2			11.8			53.4			25.4	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	56.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection						
Int Delay, s/veh	2.9					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	90	55	30	205	235	80
Future Vol, veh/h	90	55	30	205	235	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	4	4	3	2	4
Mvmt Flow	101	62	34	230	264	90

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	607	309	354	0	-	0
Stage 1	309	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	463	726	1194	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	758	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	450	726	1194	-	-	-
Mov Cap-2 Maneuver	544	-	-	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	736	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.1	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1194	-	544	726	-	-
HCM Lane V/C Ratio	0.028	-	0.186	0.085	-	-
HCM Control Delay (s)	8.1	-	13.1	10.4	-	-
HCM Lane LOS	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.7	0.3	-	-

Intersection							
Int Delay, s/veh	4.1						

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	5	95	110	5	115	125
Future Vol, veh/h	5	95	110	5	115	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	4	3	0	4	2
Mvmt Flow	5	103	120	5	125	136

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	508	122	0	0	125	0
Stage 1	122	-	-	-	-	-
Stage 2	386	-	-	-	-	-
Critical Hdwy	6.4	6.24	-	-	4.14	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	-	-	2.236	-
Pot Cap-1 Maneuver	528	924	-	-	1449	-
Stage 1	908	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	479	924	-	-	1449	-
Mov Cap-2 Maneuver	479	-	-	-	-	-
Stage 1	908	-	-	-	-	-
Stage 2	627	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	3.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	883	1449	-
HCM Lane V/C Ratio	-	-	0.123	0.086	-
HCM Control Delay (s)	-	-	9.6	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.4	0.3	-

Intersection						
Int Delay, s/veh	0.5					

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Traffic Vol, veh/h	50	1000	595	5	5	30
Future Vol, veh/h	50	1000	595	5	5	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	150	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	1	4	0	0	0
Mvmt Flow	54	1075	640	5	5	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	640	0	-	0	1285	320
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	645	-
Critical Hdwy	4.1	-	-	-	7.5	6.9
Critical Hdwy Stg 1	-	-	-	-	6.5	-
Critical Hdwy Stg 2	-	-	-	-	6.5	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	954	-	-	-	124	682
Stage 1	-	-	-	-	435	-
Stage 2	-	-	-	-	432	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	954	-	-	-	119	682
Mov Cap-2 Maneuver	-	-	-	-	241	-
Stage 1	-	-	-	-	410	-
Stage 2	-	-	-	-	408	-

Approach	EB	WB	SW
HCM Control Delay, s	0.4	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	954	-	-	-	541
HCM Lane V/C Ratio	0.056	-	-	-	0.07
HCM Control Delay (s)	9	-	-	-	12.2
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	960	20	40	580	15	65
Future Vol, veh/h	960	20	40	580	15	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	50	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	3	4	0	0
Mvmt Flow	1067	22	44	644	17	72

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1067	0	1478	533
Stage 1	-	-	-	-	1067	-
Stage 2	-	-	-	-	411	-
Critical Hdwy	-	-	4.16	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.23	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	643	-	119	496
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	643	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	643	-	111	496
Mov Cap-2 Maneuver	-	-	-	-	224	-
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	599	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	16.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	404	-	-	643	-
HCM Lane V/C Ratio	0.22	-	-	0.069	-
HCM Control Delay (s)	16.4	-	-	11	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-

Memo #6 Future Traffic Forecast

MEMORANDUM

DATE: April 18, 2017

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates
Julie Sosnovske, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #6: Future Traffic Forecast P14180-012

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 travel demand model developed by ODOT for the Corvallis/Albany/Lebanon area (CALM model). The CALM model was used to develop study intersection turn movement volumes for the 2040 TSP horizon year.

Introduction

Forecasted traffic volumes were developed using the latest CALM model for 30th highest hour volume conditions in 2040. The CALM travel demand model was utilized as the primary tool to estimate future travel demand in Lebanon, with refined travel demand forecasts developed for the City by incorporating local circulation characteristics in the travel demand model. Future year 2040 baseline motor vehicle volumes were developed and post-processed using National Cooperative Highway Research Program (NCHRP) Report 255 guidelines. The resulting volumes will be used in the future traffic operations analysis.

Before beginning the future forecasting process, a high level review indicated that the land use assumptions in the CALM model incorporated future growth assumptions of major generators (e.g., Lebanon Hospital, College of Osteopathic Medicine, Linn Benton Community College Campus), in accordance with input provided by City staff when the model was developed[1].

A summary of the CALM Travel Demand Model is provided, including a discussion of the roadway network and land use assumptions included in the model. In addition, the model "post-processing" is described and the future traffic volumes are presented.

[1] Coordination with Lebanon staff via email in March, 2014.

CALM Travel Demand Model

The Oregon Department of Transportation (ODOT) has recently developed and will maintain a travel demand model that estimates daily and p.m. peak hour demand for the existing year (2010) and future year (2040) transportation system. The travel demand model includes AAMPO (Albany Area Metropolitan Planning Organization) and the surrounding communities of Corvallis, Lebanon, and portions of unincorporated Linn and Benton Counties (refer to Figure 1[2]). Previously, some of these areas were incorporated into three separate travel demand models. Combining these areas allows the CALM model to better capture regional influences in the surrounding communities.

These models include two key structures that help estimate future traffic:

- **Transportation Analysis Zones (TAZs)**

  The model area is split into 930 internal regional TAZs and 23 external zones. Each internal TAZ represents a small subarea of the model with unique land use attributes that represent the number of households and the number and type of employees within the zone. These land use attributes determine the intensity and directionality of trips generated by the zone. The TAZ structure for CALM is shown in Figure 1. Approximately 87 TAZ's represent the Lebanon area (including the Lebanon UGB).

- **Transportation Network**

  The model includes a network of links that generally represents the major transportation system (typically collector roads and above) in the model area. Each link is coded with attributes (e.g., speed and capacity) that approximate the function of existing roadways (for the base year and future year) and programmed roadway improvements (committed funding identified) for the future year. Each TAZ is connected to links in the model at points representing where travelers access the roadway network.

[2] Taken Directly from *Memorandum: CALM Input Data Development – Task 3.1 Process and Technical Procedures*, prepared by DKS Associates, June 19, 2014.

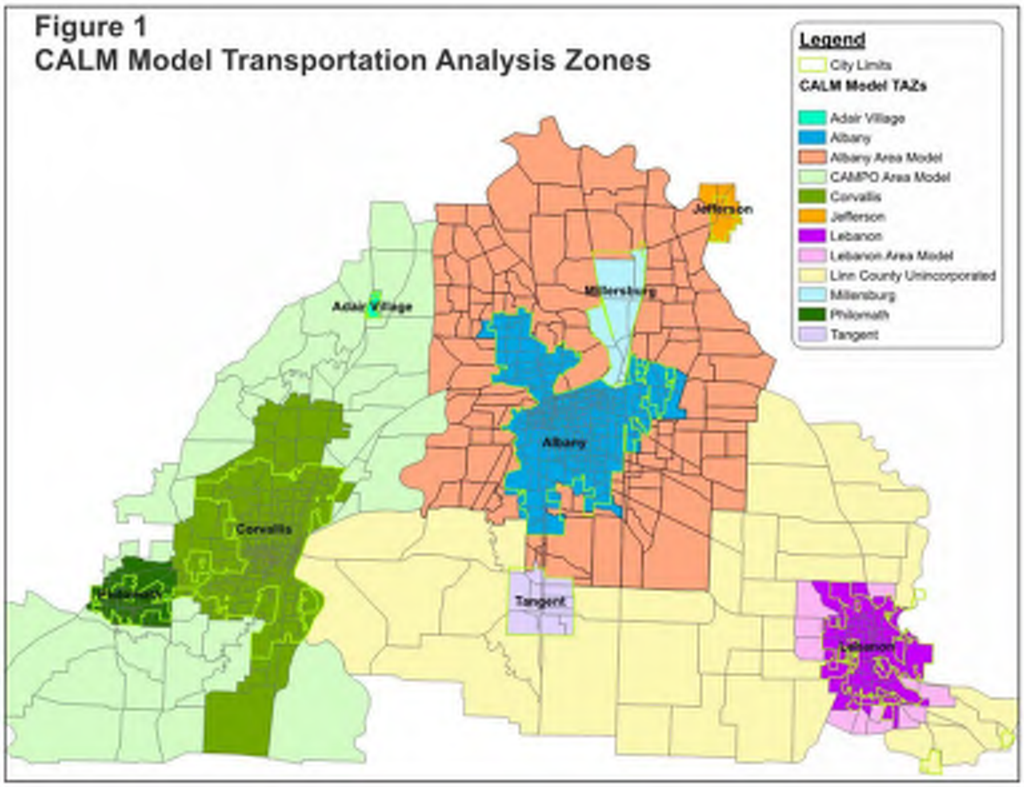

Figure 1
CALM Model Transportation Analysis Zones

Future Transportation Network

There are no regionally significant transportation improvements included in the 2040 travel demand model in the overall AAMPO area. Also, the future transit system is consistent with the existing system. The purpose of this model is to create a "committed" system that represents the conditions and needs of the future system without including any unfunded improvements. There is one planned improvement with committed funding in Lebanon that is scheduled for construction between now and 2040.

- Russell Drive realignment from just east of Porter Street, northwest to align with Airport Road[3]. The existing Russell Drive connection to US 20 will remain.

[3] Source: Email from Rob Emmons, Engineering Services Supervisor, Lebanon Engineering Services, dated August 11, 2016.

Projected Land Use Changes

Land use is a crucial factor in forecasting future transportation demand. The amount of land that is to be developed, the type and scale (housing units or number of employees) of the land uses, and how the land uses are arranged within the model area has a direct impact on the future system.

Projected land uses were developed for the model area with the general development patterns based on the Comprehensive Plan designations for the Cities within the CALM area, including Lebanon. The overall growth in land use was applied to individual TAZs with detailed input and review from staff at agencies within the region[4]. These population and employment assumptions form the basis for the two travel demand models used in forecasting:

- **Base Year (2010):** The base year model represents calibrated conditions for year 2010.
- **Future Year (2040):** The anticipated 2040 land uses and growth within and outside the model area.

The next section summarizes the anticipated changes and growth within the Lebanon UGB. The assumptions about the overall future land use control totals were documented previously[5] during the CALM model development. As summarized in the prior model documentation:

> *"The primary purpose of the control totals is to identify the approximate magnitude of growth anticipated to occur by 2040...*
>
> *These control totals served as the basis for developing land use forecasts for the individual TAZs. The control totals were maintained in developing the TAZ forecasts within each jurisdiction. The 2010 land use totals…may not precisely match the population, household, and employment estimates from other sources for these jurisdictions (e.g., Census data, PSU Population Research Center). This is because the boundaries used for the estimates…are similar to, but do not match, the actual jurisdictional boundaries. The jurisdictional totals [reported in the following section may] also include areas outside of the city limits where growth is expected as cities expand to urban growth boundaries."*

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[4] *Memorandum: CALM Input Data Development – Task 3.1 Process and Technical Procedures*, prepared by DKS Associates, June 19, 2014.

[5] Ibid.

Growth within Lebanon

The CALM model generally uses household and employment information as a basis for estimating future transportation activity. Various types of employment are associated with different types of origin-destination intensities and patterns in the p.m. peak hour. For example, TAZs with large employment numbers may generate a heavy outbound travel movement, sending trips toward TAZs with more households. Conversely, TAZs with numerous retail employees may attract trips in the p.m. peak hour. Table 1 summarizes how households and employment are assumed to change between the 2010 base year and 2040.

As listed in Table 1, the population and number of households within the Lebanon area is projected to increase by approximately 55 percent and 70 percent, respectively, from 2010 to 2040[6].

Overall, employment in the CALM area is projected to increase by approximately 55 percent. Employment in Lebanon is expected to increase over 105 percent, significantly faster than average for the area.

Table 1: CALM Model Land Use Changes (2010-2040)

Lebanon Area*	2010	2040	Percent Increase
Population	18,348	28,365	55%
Households	7,238	12,373	71%
Total Employment	5,711	11,783	106%

Source: CALM Travel Demand Model
Note: * These locations are not limited to the city limits and is based on boundaries approximated by the TAZ boundaries (Figure 1) and may not match current and future city limits.

[6] The households increase at a higher rate in population due to an overall decrease in average household size.

The following maps summarize the change in land use in Lebanon between 2010 and 2040. Figure 2 shows the increase in total households for each zone. Significant residential growth areas in the City are primarily on the west and east edges of town.

Figure 3 shows the increase in total employment for each zone within Lebanon. Significant employment growth areas are primarily in the north end of town.

Trip Generation

The model's trip generation process calculates the total number of productions (person trips) per TAZ using household attributes such as size, income, and number of workers. The trips are separated into different types (home-to-work, home-to-school, etc.). The ODOT trip generation process includes detailed trip characteristics for various types of housing, employment, and special activities. The model's process is tailored to variations in travel characteristics and activities in the region, including estimation of the likelihood for trip potential to be achieved for a particular land area.

The increase in the number of households and employees in the model area increases the overall number of trips generated. Table 2 summarizes the total p.m. peak hour motor vehicle trip ends for the Lebanon area for year 2010 and year 2040. The number of vehicle trips is expected to grow by approximately 63 percent between 2010 and 2040 if the land develops according to the modeled land use assumptions. This is generally consistent with the projected population and land use increases.

Table 2: Vehicle Trip Generation (PM Peak Hour)

	2010 Trips	2040 Trips	% Increase
Lebanon Area*	4,818	7,876	63%
CALM Model Total	50,023	69,624	39%

Source: CALM Travel Demand Model

Note: * These locations are not limited to the city limits and include surrounding unincorporated areas within the MPO to provide location context and consistency with the regional trip information.

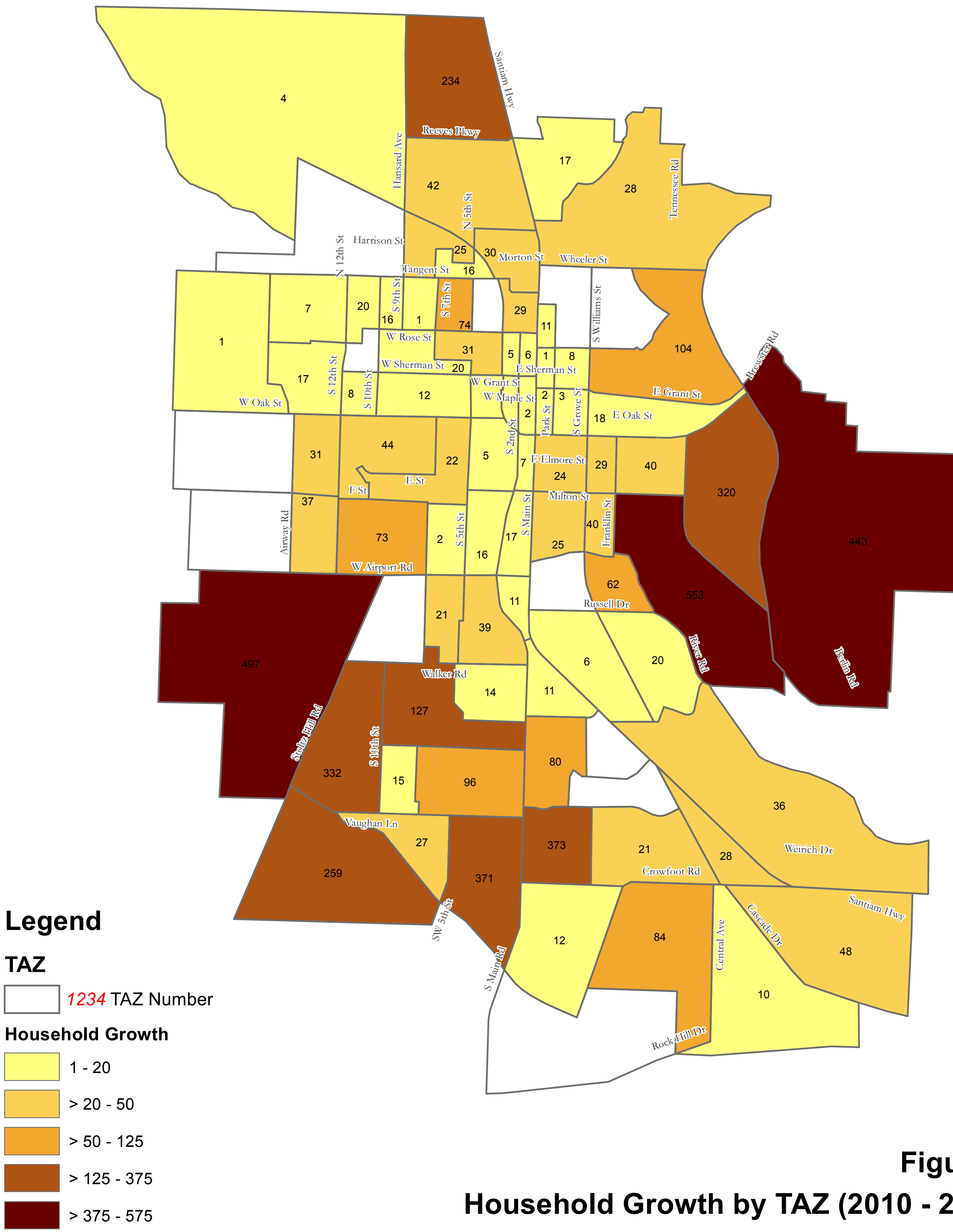


Figure 2

Household Growth by TAZ (2010 - 2040)

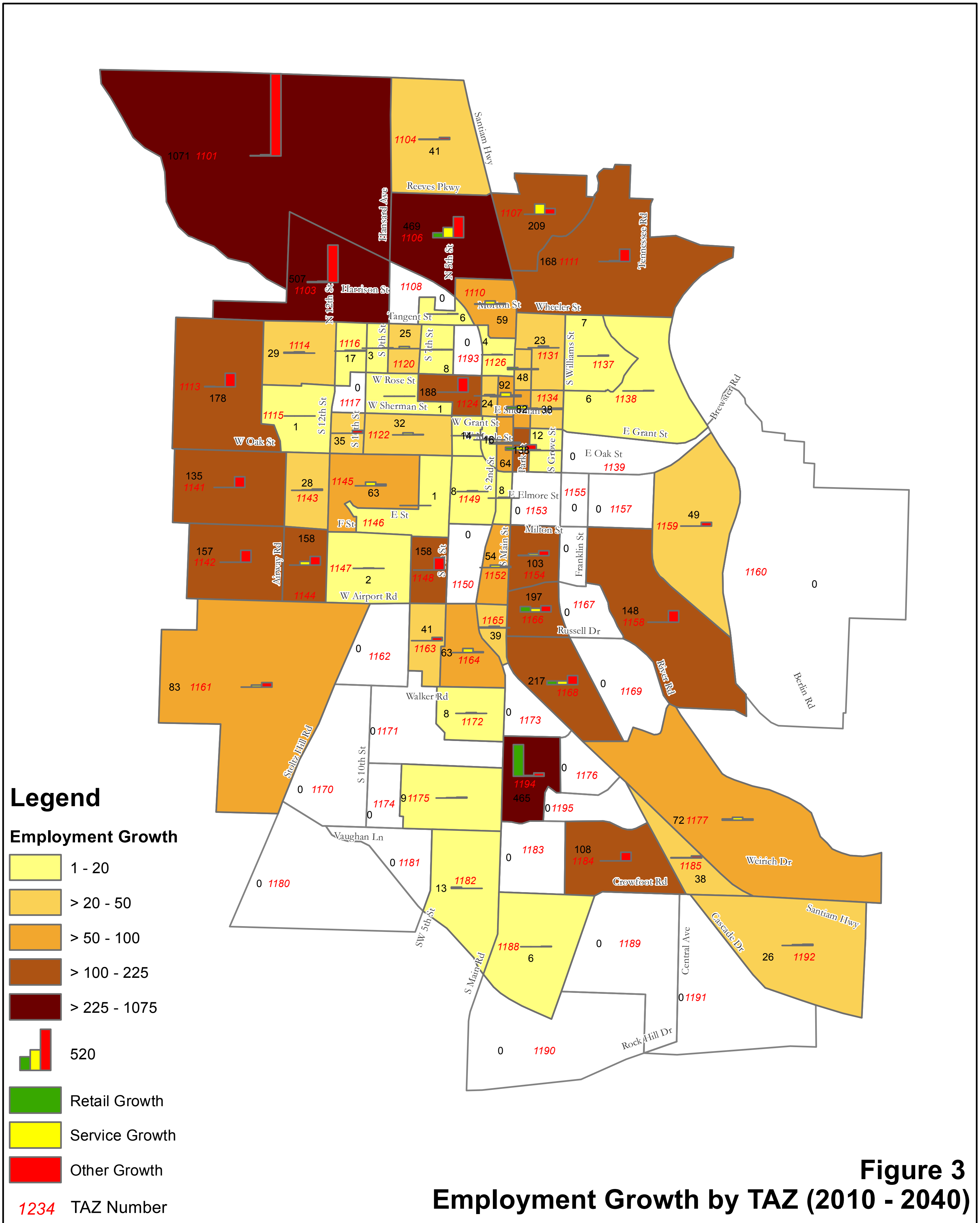


Figure 3
Employment Growth by TAZ (2010 - 2040)

Trip Distribution

The trip distribution step estimates trips between origins and destinations. TAZ zone pairs based on a wide variety of trip choice factors including travel time, travel cost, and trip purpose. The model uses these factors to decide on the destination for each trip produced (started) in the TAZ. For example, home-based shopping trips produced near a downtown shopping area will choose the downtown shopping area destination over a similar shopping area in a different town due to shorter travel times and lower travel cost. The trip distribution step creates tables organized by trip type (home-to-work, home-to-school, etc.) that show the travel patterns between the TAZs in the region.

Although the model distributes all person trips, vehicle trip distribution, in particular, is the most relevant for future traffic forecasting. The following section (titled "Mode Choice") describes how the model converts person trips into vehicle trips.

Mode Choice

The potential modes of travel in the CALM model include driving alone, driving with a passenger, using a park-and-ride, using walk-access transit, biking, and walking. The attractiveness of each mode for each trip is calculated based on the following factors:

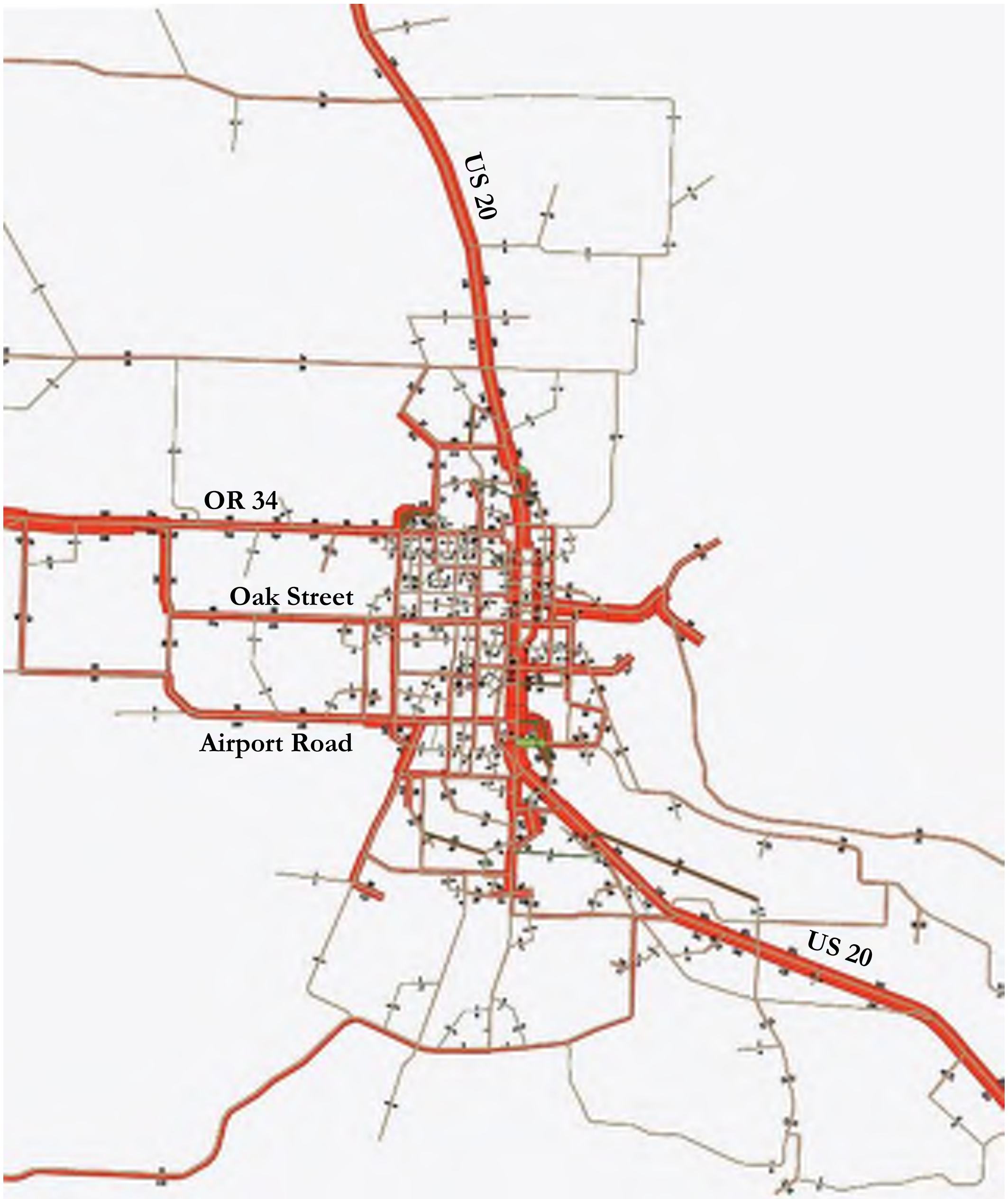
- Travel Time (in-vehicle, wait, transit access, etc.)
- Cost (parking, fare, auto operating, etc.)
- Other travel mode characteristics (reliability, safety, comfort, etc.)
- Person/Household characteristics (income, auto ownership, age, etc.)
- Trip purpose characteristics (shopping, number of stops, etc.)

These mode choice factors are assigned various levels of attraction based on feedback from local surveys and other sources of data applicable to the region. The trips between zones developed in Trip Distribution are split between the different travel modes based on the calculated attractiveness of each mode for each trip pair. The mode choice model creates mode specific trip tables showing travel between the TAZ zone pairs.

Motor Vehicle Traffic Assignment

In this modeling process, motor vehicle trips from one zone to another are assigned to specific travel routes in the network. The resulting trip volumes are accumulated on links of the network until all trips are assigned. The route on which a trip is assigned generally depends on whether it offers the shortest travel time among all possible routes, given all the other trips on the network. Figure 4 shows the p.m. peak hour growth in trips along regional corridors between 2010 and 2040 (thicker lines correlate to higher p.m. peak hour trip growth). The most significant increases are along the primary regional state facilities: US 20 and OR 34. Other routes with significant growth include Grant Street, Oak Street, Airport Road and 12th Street.

Figure 4: PM Peak Hour Trip Growth (2010 – 2040)



Post Processing and Model Application to Lebanon

The year 2010 and year 2040 model and assignments were prepared and provided by ODOT. Limited additional minor network refinements were applied during the forecasting process to add detail to account for local connectivity and circulation patterns, particularly in the vicinity of study intersections. Adding the new network detail helps refine local circulation within the AAMPO area without affecting routing in the overall regional model. Modifications include:

- Added a connector from TAZ 1104 south to connect with the Reeves Parkway/5th Street intersection
- Added a node on 12th Street between OR 34 and Hansard Avenue, and shifted the connector from TAZ 1103 from the 12th Street/OR 34 intersection to the new node, north of the intersection.
- Added a west leg to the US 20/Mullins Drive intersection and added a connector from TAZ 1106 to that intersection.
- Added a connector from TAZ 1156 to US 20 to represent connectivity not provided by the model street network.
- Added a connector from TAZ 1175 to S. 10th Street to represent connectivity not provided by the model street network.
- Added a connector from TAZ 1195 to S. Main Road to represent connectivity not provided by the model street network.
- Added an east leg to the US 20/Weldwood Street/Burdell Boulevard intersection, added a connector from TAZ 1177.

PM peak hour model volumes were extracted from the model for both the base year (2010) and forecast year (2040) scenarios. A "post processing" technique following NCHRP 255 Methodology[7] was utilized to refine model travel forecasts to the volume forecasts presented in Table 3. Post processing is the application of manual adjustments to existing count data and model projections[8] to minimize potential model error and bias.

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7 *Highway Traffic Data for Urbanized Area Project Planning and Design* - National Cooperative Highway Research Program Report 255, Transportation Research Board, Washington D.C., 1982.

8 See the Existing Conditions project memo for more information on existing year (2015) traffic counts and the seasonal adjustment made to create a peak seasonal (30HV) volume set.

Table 3: 2040 Traffic Volumes (30 HV)

			2040 Future 30 HV Volumes (Rounded)											
			Northbound			Southbound			Eastbound			Westbound		
N/S	E/W	#	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Study Intersections														
N 5th St	Reeves Pkwy	1	20	25	90	15	5	10	15	180	25	70	75	10
US 20	Reeves Pkwy/Cemetery Rd	2	105	565	15	0	685	75	135	10	180	10	0	5
US 20	Mullins Dr	3	60	590	35	10	830	30	55	5	70	55	20	25
US 20	Industrial Way	4	10	635	50	15	925	25	10	5	20	60	5	20
12th St	OR 34	5	20	30	25	0	85	150	50	530	45	25	285	15
Hansard Ave/S 9th St	OR 34	6	20	0	20	60	30	20	25	480	30	25	300	20
S 5th St	OR 34	7	35	70	50	45	130	35	40	435	65	70	320	45
2nd St	OR 34	8	95	0	65	0	0	0	0	320	195	95	330	0
OR 34	N 2nd St	9	0	0	0	25	0	130	85	305	0	0	290	25
US 20	OR 34/Wheeler St	10	115	540	10	155	820	75	85	175	65	30	95	95
S Williams St	Wheeler St	11	130	0	45	0	0	0	0	20	295	75	30	0
S 5th St	W Rose St	12	25	140	35	35	220	10	10	60	35	25	55	15
S Second St	W Sherman St	13	35	245	40	25	245	10	10	75	15	20	50	25
US 20	Grant St	14	0	0	0	175	1225	15	0	0	30	190	20	0
S Williams St	E Grant St	15	10	100	175	180	185	10	15	280	25	135	170	110
12th St	W Oak St	16	35	50	35	30	135	10	10	255	70	35	105	30
S 10th St	W Oak St	17	10	5	15	60	15	15	20	285	10	15	150	45
S 5th St	Oak St	18	25	100	20	75	230	35	50	290	30	20	190	95
S Second St	Oak St	19	55	275	55	20	270	10	30	275	115	40	195	25
US 20	Oak St	20	0	0	0	55	1280	120	0	235	120	60	140	0
US 20	E Milton St	21	40	965	275	45	1410	30	25	115	40	250	100	20
S Williams St	E Milton St	22	0	0	0	90	0	235	225	210	0	0	110	55
12th St	S Airport Rd	23	35	20	15	105	50	15	10	955	90	35	430	75
Stoltzhill Rd	S Airport Rd	24	115	0	60	0	0	0	0	675	420	90	430	0
S 7th St	S Airport Rd	25	20	25	40	45	50	35	30	665	35	90	480	40
S 5th St	S Airport Rd	26	10	30	10	65	65	75	45	685	35	35	530	125
S Second St	S Airport Rd	27	195	285	85	100	325	50	25	495	235	80	440	80
US 20	Airport Rd	28	255	980	135	275	1245	90	110	175	385	235	165	105
US 20	Russell Dr	29	0	1380	35	90	1820	0	0	0	40	10	0	50
Franklin St	Russell Dr	30	0	0	0	40	0	40	60	305	0	0	190	40
US 20	Walker Rd	31	110	1130	10	5	1505	155	260	15	155	30	20	10
S Main Rd	Walker Rd	32	75	300	185	120	475	115	85	205	100	75	175	100
US 20	Market St	33	120	1165	10	5	1540	70	65	10	220	0	10	5
US 20	Weldwood St/Burdell Blvd	34	65	720	10	80	1115	170	405	15	125	25	25	60
S Main Rd	Vaughan Ln	35	55	280	0	0	365	130	115	0	85	0	0	0
S Main Rd	Crowfoot Rd	36	0	125	10	135	130	0	0	0	0	10	0	135
US 20	Weirich Dr	37	0	0	0	5	0	35	65	1190	0	0	745	10
US 20	Crowfoot Rd	38	30	0	125	0	0	0	0	1150	35	75	730	0

Memo #7 Finance Program

MEMORANDUM

DATE: March 8, 2018

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates

**SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #7: Finance Program** P14180-012

This memorandum details the transportation funding that can reasonably be expected to be available through 2040. The funding assumptions will help prioritize the investments the City can make in the transportation system, and will be utilized to develop reasonable budgeting assumptions when selecting a set of transportation improvements to meet identified needs over the next 20 years.

Current Funding Sources

The City uses three general funding sources for transportation, including funds from:

- **The Surface Transportation Block Grant Program (STBG)**

  The STBG includes Federal Highway Trust Funds that are received from federal motor vehicle fuel tax and truck-related weight-mile charges. Federal Highway Trust Funds from the STBG flow to the states that use them primarily for safety, highway, and bridge projects. Lebanon receives a portion of these funds based partially upon population.

- **The State Highway Trust Fund**

  The State Highway Trust Fund makes distributions from the state motor vehicle fuel tax, vehicle registration and title fees, driver license fees and truck weight-mile taxes. Cities and counties receive a share of State Highway Trust Fund monies, and by statute may use the money for any road-related purpose, including walking, biking, bridge, street, signal, and safety improvements.

  HB 2017, Keep Oregon Moving, passed by the Oregon Legislature will provide additional revenues. It increases transportation-related fees including the state gas tax, vehicle registration and title fees and implements a new bicycle tax, public transportation payroll tax and new light vehicle dealer privilege tax. Lebanon will see increased revenues of approximately $380,000 annually from HB 2017.

- **A System Development Charge (SDC)**

  The City also collects SDC's from new development, which are a funding source for all capacity adding projects for the transportation system. In Lebanon, these projects include roadway improvements, bikeways and pedestrian facilities. The funds collected can pay for constructing or improving portions of roadways impacted by applicable development. The SDC is a one-time fee. The street SDC rate within the City is currently $1,755 per p.m. peak hour trip end.

Revenues and Expenditures

Revenues

Current annual revenues include $180,000 from the Surface Transportation Block Grant Program, and $875,000 from the State Highway Trust Fund (see Table 1). Lebanon will also see increased revenues of approximately $380,000 annually from HB 2017. State law requires that the City must set aside a minimum of one percent of the State gas tax and vehicle registration funds received for construction and maintenance of walking and bicycling facilities. In Lebanon, this represents approximately $10,000 per year. The City also currently receives approximately $35,000 in other revenues annually (e.g., miscellaneous fees). Current annual SDC revenue is $116,000, with estimated annual revenue expected to increase to $600,000 based on forecasted yearly population and employment growth through 2040.

Assuming, as a conservative estimate,[1] the same levels of funding occur in the future, Lebanon can expect to receive $35.5 million in Surface Transportation Block Grant Program, State Highway Trust Fund and miscellaneous fee revenue through 2040. SDC's likely will provide an additional $14.4 million in revenue through 2040 (based on forecasted yearly population and employment growth through 2040).

[1] This assumes the population growth rate in Lebanon will be roughly the same as the cost inflation rate, therefore, maintaining existing revenues through 2040.

ODOT has also indicated that around $8.5 million in discretionary state and/or federal funds may be available to invest in Lebanon over the next 20 years[2] for system modernization and enhancement.

Expenditures

Expenditures include more than just patching streets. It also includes personnel services, roadway striping, traffic control, vegetation trimming, street sweeping, sign maintenance, and roadway engineering.

The City estimates that it needs approximately $950,000 per year (or $22.8 million through 2040) to maintain and operate the 70 miles of streets at status quo, more than half that of the current revenue ($40.8 million through 2040). This includes an escalation rate of 4.5 percent[3] on the current expenditures to account for rising costs and ensure that needed roadway maintenance and repair work will not be deferred through 2040.

Deferring necessary repair and preservation means spending much more to fix the same streets later, and repair costs rise exponentially as streets are left unmaintained. Every $1 spent to keep a street in good condition avoids $6 to $14 needed later to rebuild the same street once it has deteriorated significantly[4].

Heavy truck traffic and wet weather comprise two of the most critical factors in pavement deterioration[5]. Heavy trucks (particularly those hauling gravel, logs, construction materials, overseas containers, agricultural products, garbage) flex the pavement and create spaces

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[2] The State has not committed any future funding for projects in Lebanon. This assumption is for long-range planning purposes only. This estimate is based on assuming that Lebanon will receive a reasonable share of the state/federal funding projected to be available over the 20-year planning horizon in Region 2 and based on ODOT sustaining their current revenue structure. It is used to illustrate the degree of financial constraints faced by ODOT as of the writing of this document. Actual funding through state and federal sources may be higher or lower than the range of this estimate. This estimate does not include projects that might be funded through the federal Highway Safety Improvement Program (HSIP).

[3] Escalation rate of 4.5 percent, based on the Construction Cost Index during August 2016.

[4] Smart Growth America, Repair Priorities 2014, American Association of State Highway Officials (AASHTO)

[5] Long-Term Pavement Performance, U.S. Department of Transportation, Federal Highway Administration

underneath. Wet weather, with cracked pavement or poor drainage, can lead to water undermining pavement.

Funding Summary

Maintaining and operating City streets requires nearly half that of current revenue ($22.8 million of the $49.9 million in revenue through 2040). These costs will continue to increase over time, leaving $27 million for City street improvement needs (e.g., construction of new facilities) over the next 20 years. The City may also have up to $8.5 million from state and/or federal funding sources to cover investments along state highways over the next 20 years.

The City may wish to consider expanding its funding options in order to fund more of the desired transportation improvements in a timely manner.

Table 1: Lebanon Revenue and Expenditures (2016 Dollars)

City Revenue Source	Average Annual Amount	Estimated Amount Through 2040
Surface Transportation Block Grant Program (STBG)*	$180,000	$4,320,000
State Highway Trust Fund (with HB 2017)*	$1,255,000	$30,120,000
Bikeway/Walkway (1% of State* Highway Trust Fund Revenue)	$10,000	$240,000
System Development Charges	$600,000	$14,400,000
Miscellaneous Fees*	$35,000	$840,000
Total Revenue	**$2,080,000**	**$49,920,000**
City Expenditures*	**Average Annual Amount**	**Estimated Amount Through 2040**
Personnel Services	$300,000	$7,200,000
Materials and Services	$365,000	$8,760,000
Capital Outlay/Maintenance	$285,000	$6,840,000
Total Expenditures	**$950,000**	**$22,800,000**
Funding Summary	**Average Annual Amount**	**Estimated Amount Through 2040**
Funding Summary for City Streets (City Revenue – City Expenditures)	**$1,130,000**	**$27,120,000**

*Source: Email from Rob Emmons, Engineering Services Supervisor, Lebanon Engineering Services, dated June 29, 2016.

Potential Additional Funding Sources

New transportation funding options include local taxes, assessments and charges, and state and federal appropriations, grants, and loans. Factors that constrain these resources, include the willingness of local leadership and the electorate to burden citizens and businesses with taxes and fees; the portion of available local funds dedicated or diverted to transportation issues from other competing City programs; and the availability of state and federal funds. The City should consider all opportunities for providing or enhancing funding for the transportation improvements included in the TSP.

Counties and Cities have used the following sources to fund the capital and maintenance aspects of their transportation programs. As described below and summarized in Table 2, they may help to address existing or new needs identified in Lebanon's TSP.

Table 2: Lebanon Potential Funding Options

Funding Option	Allowed Use of Funds	Existing or New Funding Source	Action Required to Implement	Example Charge	Potential Additional Annual Revenue
System Development Charge Update	Capital improvements	Existing	City Council action	+$245 per peak hour trip for new development	$80,000
Transportation Utility Fee	Capital improvements or maintenance	New	City Council action	$1 per month for residential units and $.01 per month per square foot for non-residential uses	$400,000
Local Fuel Tax	Capital improvements or maintenance	New	Voter Approval	One cent per gallon	$72,000
County Vehicle Registration Fee	Capital improvements or maintenance	New	Voter Approval (County- wide)	$18 for passengers cars, and $8 for motorcycles per year	$400,000
Property Tax Levy	Capital improvements or maintenance	New	Voter Approval	$0.20 per $1,000 in assessed value (per year, for 5 years)	$200,000 (per year, for 5 years)
Local Improvement Districts	Capital improvements	New	Affected Property Owners	n/a	n/a
Debt Financing	Capital improvements	New	Varies	n/a	n/a

Transportation System Development Charge Update

System development charges (SDC) are fees collected from new development and used as a funding source for all capacity adding projects for the transportation system. The fee is based on the proposed land use and size, and is proportional to each land use's potential PM peak hour vehicle trip generation.

The City currently collects an SDC of $1,755 per p.m. peak hour trip end for transportation facilities. The City may wish to update the current SDC rate for transportation facilities based on the transportation needs established in the TSP. As an example, an SDC rate of $2,000 per peak hour trip (and assuming similar growth as the previous years) would provide the City with an additional $80,000 annually. If an SDC update is desired, a rate study would be required to determine appropriate fees based on capacity projects costs, growth potential, and local preferences.

Transportation Utility Fee

A transportation utility fee is a recurring monthly charge that could be paid by all residences and businesses within the City. The City can base the fee on the estimated number of trips a particular land use generates or as a flat fee per residence or business. This fee is typically collected through regular utility billing, however, it could be collected as a separate stand-alone bill. Existing law places no express restrictions on the use of transportation utility fee funds, other than the restrictions that normally apply to the use of government funds[6]. Some local agencies utilize the revenue for any transportation related project, including construction, improvements and repairs; however, many choose self-imposed restrictions or parameters on the use of the funds.

For every $1.00 per month in charged rates for residential units and $0.01 per month per 1,000 square feet of non-residential uses in the City, the City could expect to collect about $400,000 annually. Philomath, for example, charges a fee of $4 per month for single family residential units, $3.20 per month for multi-family units, and between $13.60 and $45.50 (based on type and size of the land use) per month for non-residential uses.

Local Fuel Tax

Sixteen cities and two counties in Oregon have adopted local fuel taxes ranging from one to five cents per gallon. The fuel distributers pay collected taxes to the jurisdictions monthly.

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[6] Implementing Transportation Utility Fees, League of Oregon Cities.

The process for presenting such a tax to voters will need to be consistent with Oregon State law as well as the laws of the City. Nearby locations with a fuel tax include Coburg (three cents per gallon), Eugene (five cents per gallon), and Springfield (three cents per gallon).

To estimate the potential revenue generated from a local fuel tax in Lebanon, the monthly gallons of fuel utilized per resident was assessed in Oregon, and each of the seventeen jurisdictions where ODOT administers the local fuel taxes[7]. Based on this analysis, Oregon residents utilized on average around 35.89 gallons per month. Assuming the Oregon rate (35.89 gallons per resident, per month), Lebanon residents were estimated to utilize around 560,000 gallons of fuel per month. A local fuel tax of one cent per gallon could generate an additional $6,000 monthly, $72,000 annually or $1.7 million through 2040.

County Vehicle Registration Fee

The State of Oregon currently requires vehicle owners to register their vehicles and then review their registration on a biennial basis. The State's biennial registration fee is $86 for passenger cars and light trucks and $48 for motorcycles. In addition to the State fee, Multnomah County is the only County that also has a vehicle registration fee. It adopted a $38 biennial vehicle registration fee to help fund the Sellwood Bridge replacement. Washington County also recently proposed an annual vehicle registration fee of $30 for most vehicles and $17 for motorcycles and mopeds. Vehicle registration fees for Counties in Oregon can be enacted by ordinance, but if a County has a population less than 350,000 residents (like Linn County), then the ordinance requires voter approval. Under State law, 40 percent of the collected fee must go to the Cities within a County, unless they agree to a different percentage.

Linn County has 109,869 registered passenger cars, and 4,552 registered motorcycles[8]. As an example, with a biennial registration fee of $18 for passenger cars, and $8 for motorcycles, the County could expect to collect over $1 million annually, with $600,000 going to the County, and $400,000 distributed to Cities, including Lebanon.

Property Tax Levy

Property tax levies are another funding option available to Cities. Voter approval is required to enact a local option tax, and the tax may be imposed for up to five years at a time, at

[7] Based on 2015 population reports compiled by the Population Research Center, Portland State University, and Taxable Fuel Distribution Reports published by ODOT, June 2016.

[8] Oregon Motor Vehicle Registrations by County, as of December 31, 2015.

which time a City will need voter approval if it desires to renew the levy. The only exception is that a levy for a specific capital project may be imposed for the expected useful life of the capital project up to a maximum of 10 years. Assuming a rate of $0.20 per $1,000 in assessed value as a five year levy for the City, the City could expect to collect around $1 million over five years.[9]

Local Improvement Districts

Local Improvement Districts (LIDs) can fund capital transportation projects that benefit a specific group of property owners. LIDs require owner/voter approval and a specific project definition. Assessments against benefiting properties pay for improvements. LIDs can supply match for other funds where a project has system wide benefit beyond benefiting the adjacent properties. LIDs are often used for sidewalks and pedestrian amenities that provide local benefit to residents along the subject street. Property owners pay fees through property tax bills over a specified number of years.

Debt Financing

While not a direct funding source, debt financing is another funding method. Through debt financing, available funds can be leveraged and the cost can be spread over the projects useful life. Though interest costs are incurred, the use of debt financing can serve not only as a practical means of funding major improvements, but it is also viewed as an equitable funding source for larger projects because it spreads the burden of repayment over existing and future customers who will benefit from the projects. One caution in relying on debt service is that a funding source must still be identified to fulfill annual repayment obligations. Three methods of debt financing are listed below:

- General Obligation (GO) Bonds – Subject to voter approval, a City can issue GO bonds to debt finance capital improvement projects. GO bonds are backed by the increased taxing authority of the City, and the annual principal and interest repayment is funded through a new, voter-approved assessment on property throughout the City (i.e., a property tax increase). Depending on the critical nature of projects identified in the TSP and the willingness of the electorate to accept increased taxation for transportation improvements, voter-approved GO bonds may be a feasible funding option for specific projects. Proceeds may not be used for ongoing maintenance.

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[9] Based on total assessed value of property in Lebanon for FY 2015-16 ($1,058,790,662); Linn County Tax Summary 2015-16.

- Limited Tax General Obligation (LTGO) Bonds – Limited Tax General Obligation (LTGO) Bonds are similar to General Obligation (GO) bonds; however, they do not have to be voted on by constituents. A City pledges its general revenues to bondholders along with the utility revenues. The advantages to this option are that it does not require reserves or coverage (such as Revenue bonds) and does not require a vote.
- Revenue Bonds – Revenue bonds are debt instruments secured by rate revenue. For a City to issue revenue bonds for transportation projects, it would need to identify a stable source of ongoing rate funding. Interest costs for revenue bonds are slightly higher than for general obligation bonds due to the perceived stability offered by the "full faith and credit" of a jurisdiction.

ODOT Statewide Transportation Improvement Program (STIP) Enhance Funding

ODOT has modified the process for selecting projects that receive STIP funding to allow local agencies to receive funding for projects off the state system. Projects that enhance system connectivity and improve multi-modal travel options are the focus. The updated TSP prepares the City to apply for STIP funding.

ODOT Highway Safety Improvement Program (HSIP) Funding

With significantly more funding under the HSIP and direction from the Federal Highway Administration to address safety challenges on all public roads, ODOT will increase the amount of funding available for safety projects on local roads. ODOT will distribute safety funding to each ODOT region, which will collaborate with local governments to select projects that can reduce fatalities and serious injuries, regardless of whether they lie on a local road or a state highway.

ODOT expects to start its jurisdictionally blind safety approach in 2017 for the 2019-2021 STIP. Meanwhile, ODOT intends to implement a transition plan for 2013-2016 to bridge the gap by allocating funding for local roads primarily focused on a few systemic low cost fixes implemented in the shorter timeframe[10].

[10] ODOT Jurisdictionally Blind Safety Program

Memo #8 Future Transportation Conditions and Needs

MEMORANDUM

DATE: April 18, 2017

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #8: Future Transportation Conditions and Needs P14180-012

The condition of Lebanon's future transportation system depends on the growth in population and employment, future travel patterns (e.g., choice of modes, routes, and frequency of trips), and community investment decisions. Growth in population and the number of jobs is forecast based on trends and knowledge of the city and region. Future travel patterns are more difficult to predict as the community's investment decisions and the economy can have significant effect on choice of modes and routes. The objective of the transportation planning process is to generate information necessary for making decisions that will result in safe and efficient travel options through 2040.

Methodology for Estimating Future Travel

The 2040 transportation conditions in Lebanon were forecasted based on trips that new growth will generate, assuming no new investments in infrastructure beyond what already is funded for construction. It describes where the transportation system will perform satisfactorily and areas of the network likely to be congested or in need of investments to function adequately in the future. Subsequent memos will explore solutions for addressing future transportation system needs. For more detail on the travel forecasting process, refer to Technical Memorandum #6.

Future Estimates of Walking, Biking, and Transit

Methodology for determining future needs for walking, biking, and transit in Lebanon begins with an assessment of who is walking, biking, and taking transit now and where they are traveling. Technical Memorandum #6 (Existing Transportation Conditions) answers these questions for pedestrians, bicyclists and transit riders and details existing conditions of the infrastructure.

The existing facilities were then compared to major growth areas of the City, and in proximity to key destinations, such as schools, parks, transit stops, shopping and employment. A review of the City shows that the walking and biking infrastructure is inadequate in anticipated major growth areas and near key destinations, which have the potential to attract significant walking and biking trips. The inadequate walking and biking infrastructure further hinders transit riders, as these users typically utilize these facilities at the beginning and end of their trip.

Baseline Street Network Performance

The baseline condition reflects the street network performance for motor vehicles, assuming only transportation projects with secured funding will be built. Only one project has funding identified in the Lebanon TSP study area:

- Russell Drive realignment from just east of Porter Street, northwest to align with Airport Road. The existing Russell Drive connection to US 20 will remain.

Snapshot of Lebanon in 2040

Rising Population and Employment

Today, Lebanon is home to over 7,200 households and accounts for over 5,700 jobs. Between now and 2040, projected employment growth will increase over 105 percent, outpacing the rate of household growth over the same period, which will increase about 70 percent. Lebanon will have about 12,350 households and about 11,750 jobs[1] by 2040. With more people and more jobs in Lebanon, the transportation network will face increasing demand through 2040.

As discussed in Technical Memorandum #6, the highest household growth is expected on the western and eastern edges of the City, with lesser growth on the north and south ends. Residential infill growth is expected throughout the City. The most significant employment growth is expected at the north end of town, both west and east of US 20, with other high growth areas on the west (west of 12th Street) and southeast (east of US 20 and south of Milton Street) edges of town.

More Travel

With more jobs, residents, and through travel, the street network in Lebanon must accommodate an additional 3,000 motor vehicle trips during the weekday evening design

[1] Based on CALM Travel Demand Model data – note that these totals are based on boundaries approximated by the TAZs, which may not match current and future City limits (see Technical Memorandum #6: Future Traffic Forecast).

hour[2]. Today, the Lebanon street network is generally able to handle the evening peak hour trips; however, the evening peak hour motor vehicle trips are likely to increase about 30 percent at intersections along US 20 and OR 34 by the end of 2040.

2040 motor vehicle volumes for design hour conditions were utilized to determine areas on the baseline roadway network that will be congested and may require future investments to accommodate forecasted growth. The 2040 baseline motor vehicle volumes for study intersections in Figure A1 in the appendix show volumes are anticipated to be highest along US 20, which connects the surrounding region to the employment areas in Lebanon. Other roadways expected to experience significant traffic increases include Oak Street and Airport Road. Each of these roadways connects a major residential and/or employment growth area in the City to US 20 and/or OR 34.

Where Transportation Improvements may be Needed

Review of the expected growth throughout the City and existing gaps and deficiencies of the transportation system identified the following locations as possible candidates for improvements. For more information about the existing and future transit system needs, see the Lebanon Transit Development Plan Technical Memorandum #3 (Existing and Future Transit Conditions).

[2] The future "design hour" is equivalent to the 30th highest annual hour analyzed under existing conditions.

Driving Needs

An increase in motor vehicle travel leads to an increase in congestion. Travel activity, as reflected by evening peak hour motor vehicle trips beginning or ending in Lebanon, is expected to increase significantly through 2040, mainly along US 20, OR 34, Oak Street and Airport Road. Through trips (i.e., trips that neither begin nor end in Lebanon) are also expected to increase through 2040 and are generally representative of increased growth in statewide travel and in neighboring cities such as Albany, Corvallis and Sweet Home.

Study intersection operations were analyzed in the same manner as was done for existing conditions[3]. Forecasted intersection capacity and level of service were compared to applicable agency mobility targets/standards to identify where significant congestion is likely to occur. Table 1 shows the study intersections that do not meet mobility targets/standards under the 2040 design hour conditions[4]. A complete listing of operating conditions at study intersections is provided in the appendix.

Of the 38 study intersections, nine would not meet their respective mobility target/standard during the 2040 design hour conditions. All study intersections met the mobility targets under existing p.m. peak hour conditions. Seven of the substandard intersections are on state highways.

Table 1: Study Intersections That Do Not Meet Mobility Targets/ Standards (2040 PM Peak- Design Hour Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
2	US 20/ Reeves Parkway - Cemetery Road (stop controlled)	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	1.50 (side street)	A/F
3	US 20/ Mullins Drive (stop controlled)	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	1.03 (side street)	B/F
4	US 20/ Industrial Way (stop controlled)	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	1.00 (side street)	B/F

[3] Technical Memorandum #6: Existing Conditions, October 3, 2016

[4] The future "design hour" is equivalent to the 30th highest annual hour analyzed under existing conditions. This is a common time period applied for design purposes and corresponds with adopted mobility targets.

Table 1: Study Intersections That Do Not Meet Mobility Targets/ Standards (2040 PM Peak- Design Hour Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
7	OR 34/ 5th Street (stop controlled)	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	1.06 (side street)	A/F
10	US 20/ OR 34 - Wheeler Street (signalized)	0.90 v/c	0.95	D
23	Airport Road/ 12th Street (stop controlled)	0.90 v/c	>2.0	B/F
25	Airport Road/ 7th Street (stop controlled)	0.90 v/c	1.17	A/F
28	US 20/ Airport Road (signalized)	0.90 v/c	0.98	E
31	US 20/ Walker Road (signalized)	0.90 v/c	1.00	F

Signalized intersections:
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection

Stop Controlled intersections:
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement

Considering the amount of congestion forecast for some study intersections, it may be found impractical to mitigate them sufficiently to once again comply with adopted mobility targets/standards. This could be true for a variety of reasons, such as the project costs to reduce congestion or resulting undesirable impacts to the environment or other modes of travel from a project to reduce congestion. In such situations, adoption of "alternative" mobility targets/standards that allow for higher levels of congestion, in balance with other objectives, may be considered.

A common approach to developing alternative mobility targets is to change the standard analysis parameters used or the time period to which the targets/standards apply from the design hour[5] to an average weekday, which better represents traffic volumes experienced throughout the majority of the year. In consideration of the possible need for alternative mobility targets/standards, the analysis of study intersection operations was repeated under an average weekday condition. Study intersections that do not meet mobility

[5] On state highways in Lebanon, the design hour volume generally occurs during the summer season when traffic volumes can be as much as 16 percent higher than typical weekday peaks hours.

targets/standards under average weekday p.m. peak hour conditions in 2040 are summarized in Table 2.

Four intersections that failed to meet mobility targets/standards during the design hour continue to do so during the average weekday, although the degree of congestion experienced is smaller. Five intersections (US 20/ Mullins Drive, US 20/ Industrial Way, OR 34/ 5th Street, US 20/ OR 34 - Wheeler Street and US 20/ Walker Road) that are substandard under 2040 design hour conditions are not under average weekday p.m. peak hour conditions. A complete listing of average weekday operating conditions at all study intersections is provided in the appendix.

Table 2: Study Intersections That Do Not Meet Mobility Targets/ Standards (2040 PM Peak- Average Weekday Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
2	US 20/ Reeves Parkway - Cemetery Road	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	1.11 (side street)	A/F
23	Airport Road/ 12th Street	0.90 v/c	1.80	B/F
25	Airport Road/ 7th Street	0.90 v/c	0.97	A/F
28	US 20/ Airport Road	0.90 v/c	0.91	D

Signalized intersections:
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection

Stop Controlled intersections:
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement

Walking Network Needs

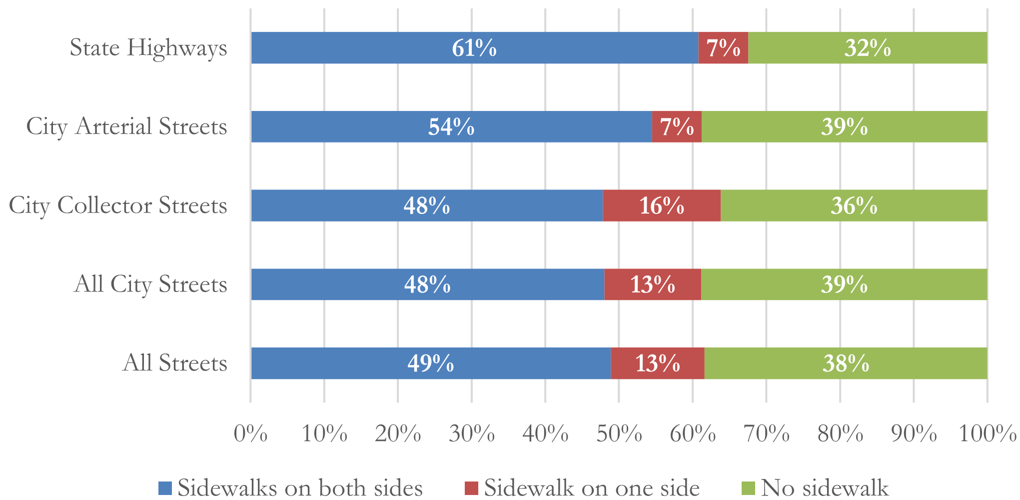
The following section describes the walking network needs identified for the 2040 Baseline street network.

Future Walking Network

The percent of roadways with sidewalks (see Figure 1) will not change noticeably from existing conditions. About 40 percent of State highway miles, and half of City street miles (including City arterial, collector and local streets) lack sidewalk coverage along one or both sides. With only one project currently committed for funding, the 2040 Baseline pedestrian network is very similar to today's conditions. These numbers do not incorporate off-street shared-use paths that may run alongside some roadways.

Any future streets constructed in association with development projects will be required to construct sidewalks as well, increasing the overall sidewalk supply.

Figure 1: Street Miles with Sidewalks within Lebanon



Future Qualitative Pedestrian Assessment

The Qualitative Pedestrian Network Assessment shows the extent to which the walking network on collector and arterial streets provides a level of comfort and safety for users. The assessment method and conditions of the pedestrian network are summarized in a previous memo[6]. Since traffic volume is the only input factor anticipated to change significantly under future conditions, there were no changes made to the street segment quality ratings identified in existing conditions (see Figure 2).

About one-third of the collector and arterial street miles' in Lebanon rate "good" or "excellent" for pedestrians. However, nearly 40 percent of the collector and arterial street miles' rate poorly. Most of the street miles' rated "poor" are located in high growth areas (i.e., household or employment growth). The pedestrian network in these areas is largely unimproved due to the rural nature of the surrounding land use, but will likely be improved as future development occurs. Overall, the pedestrian network continues to rate relatively high near downtown, and poor towards the edges of the City.

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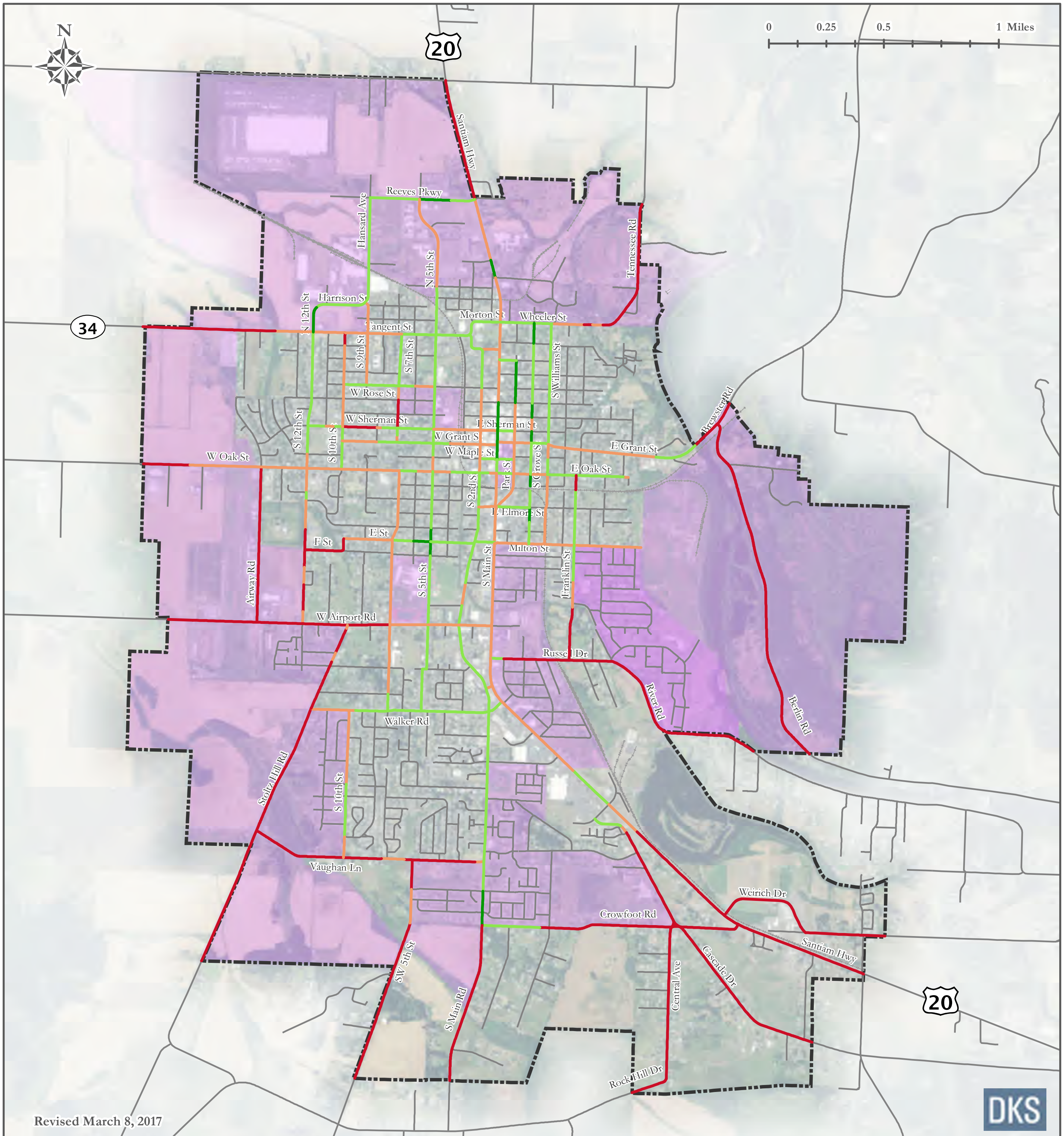
[6] See Technical Memorandum #6: Existing Conditions, October 3, 2016

2 Future Qualitative Pedestrian Assessment



Legend:

Qualitative Pedestrian Assessment:

- Excellent
- Good
- Fair
- Poor

High Growth Area

Urban Growth Boundary

Note:
Rating is based on a combination of sidewalk presence, speed limit, presence of buffers, roadway volume, number of lanes, shoulder widths and presence of lighting. Rating calculated on Collectors and Arterials.

Walking Facility Gaps

Despite the high level of sidewalk coverage towards downtown, parts of the City experience sidewalk gaps. These gaps are predominately concentrated on the edge of the City. However, there are segments along streets near downtown, and other segments that provide important connections that lack sidewalks on one or both sides of the street.

Missing segments in developed areas include:

- 10th Street between OR 34 and Ash Street (City of Lebanon).
- 7th Street between Rose Street and Grant Street (City of Lebanon).
- Sherman Street between 8th Street and 11th Street (City of Lebanon).
- Franklin Street between Oak Street and Elmore Street (City of Lebanon).

Segments in undeveloped areas where future development will require sidewalks include:

- Reeves Parkway between US 20 and Hansard Avenue (City of Lebanon).
- 5th Street between Reeves Parkway and Mary Street (City of Lebanon).
- US 20, north of Reeves Parkway (ODOT).
- OR 34, west of 12th Street (ODOT).
- Wheeler Street, east of Williams Street (City of Lebanon).
- Brewster Road, east of the South Santiam River (City of Lebanon).
- Berlin Road, south of Brewster Road (City of Lebanon).
- Oak Street, west of Airway Road (City of Lebanon).
- Airport Road, west of 7th Street (City of Lebanon).
- Airway Road, between Oak Street and Airport Road (City of Lebanon).
- 12th Street, between Oak Street and Airport Road (City of Lebanon).
- Stoltz Hill Road, south of Airport Road (City of Lebanon).
- Vaughan Lane, between Main Road and Stoltz Hill Road (City of Lebanon).
- 5th Street, south of Vaughan Lane (City of Lebanon).
- Main Road, south of Crowfoot Road (City of Lebanon).
- Crowfoot Road, east of Main Road (City of Lebanon).
- Central Avenue, south of Crowfoot Road (City of Lebanon).
- Cascade Drive, south of Weldwood Drive (City of Lebanon).

- US 20, south of Weldwood Drive (ODOT).
- Weirich Drive, east of US 20 (City of Lebanon).
- Franklin Street, south of Water's Edge Court (City of Lebanon).
- River Road, east of Franklin Street (City of Lebanon).

In addition to the areas where these gaps already exist, future pedestrian infrastructure needs can be identified based on anticipated growth. Higher densities and more people require more pedestrian infrastructure to accommodate demand. Where growth is anticipated, street segments with "poor" or "fair" pedestrian network qualitative assessment scores will need enhancements in order to improve their conditions. These segments include:

- US 20, between Wheeler Street and Reeves Parkway (ODOT).
- US 20, between Elmore Street and Market Street (ODOT).
- OR 34, between 7th Street and 12th Street (ODOT).
- Airport Road, between US 20 and 7th Street (City of Lebanon).
- Oak Street, between 7th Street and Airway Road (City of Lebanon).

Other Pedestrian Needs

Other areas identified by the public as some of the top problematic areas for pedestrians include the US 20/ Oak Street, US 20/ Grant Street, US 20/ Walker Road-Dewey Street, and 2nd Street/ E Street- Milton Street intersections.

As mitigations for motor vehicle travel are considered for intersections and along roadway segments, innovative designs and/or "alternative" vehicular mobility targets that allow for higher levels of congestion may be considered to avoid undesirable impacts on pedestrian safety and connectivity.

Methodology to Address Deficiencies

A list of potential pedestrian network improvement projects will be developed in Technical Memorandum #9 based on streets with pedestrian deficiencies. A street is considered deficient for walking if it meets one or more of the following conditions:

- Arterial or collector street without pedestrian facilities.
- "Poor" qualitative pedestrian assessment rating.
- Qualitative pedestrian assessment rating less than "good" in close proximity to parks, schools, transit stops, or other important destinations.

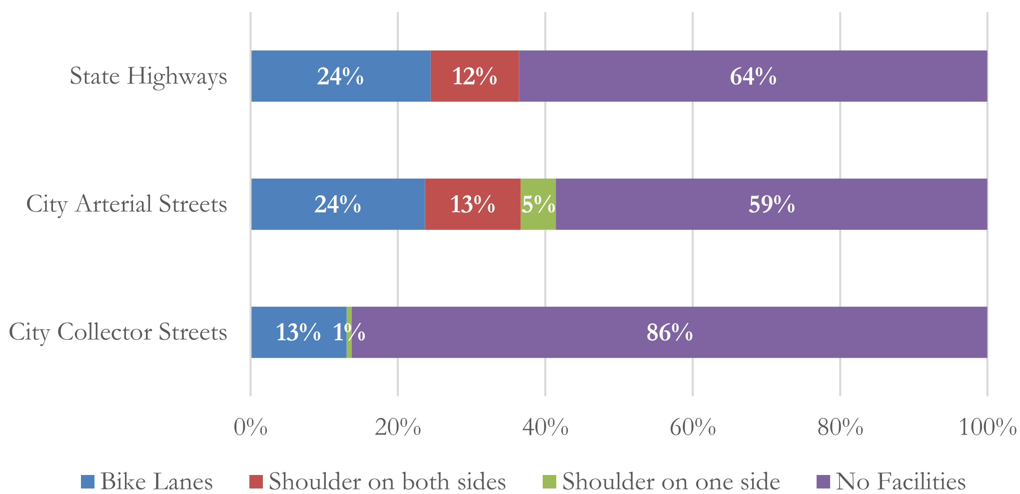
Bicycle Network Needs

The following section describes the bicycle network needs identified for the 2040 Baseline street network.

Future Bicycle Network

Very little is expected to change from the existing bicycle network (see Figure 3). Over 60 percent of State highway and City arterial street miles, and over 80 percent of City collector street miles lack bicycle facilities (bike lanes or shoulder bikeways). With only one project currently committed for funding, the 2040 Baseline bicycle network is very similar to today's conditions. These numbers do not incorporate off-street shared-use paths that may run alongside some roadways.

Figure 3: Street Miles with Bike Facilities within Lebanon

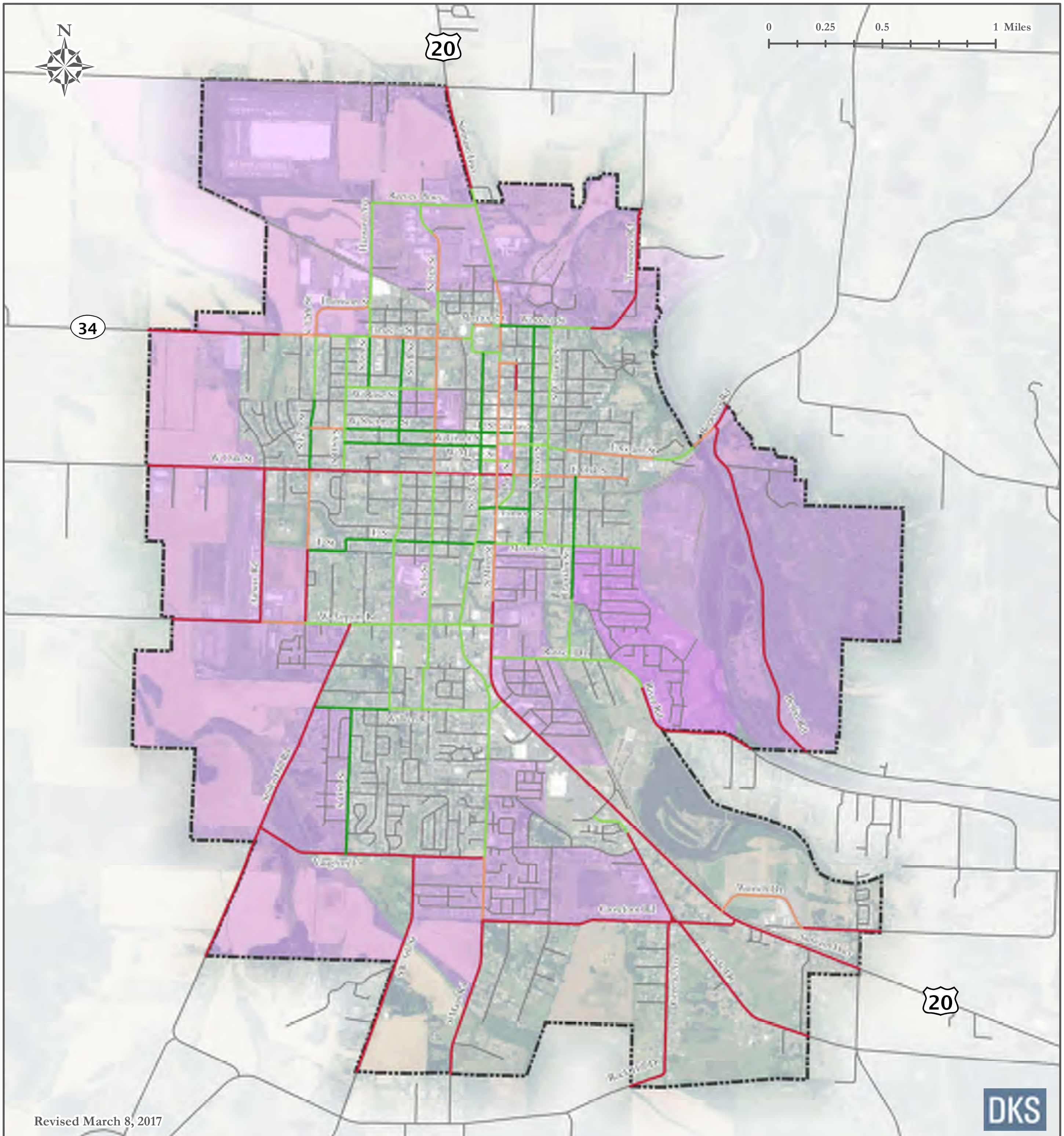


Future Bicycle Level of Traffic Stress

Bicycle Level of Traffic Stress measures the degree that different street characteristics are stressful to people operating a bicycle. The existing conditions analysis (Technical Memorandum #6) rated the bicycle network on collector and arterial streets in Lebanon as "Extreme Stress", "High Stress", "Moderate Stress", or "Low Stress". The future Bicycle Level of Traffic Stress rating did not change from the existing assessment because none of the input criteria are significantly affected by the funded project.

The Bicycle Level of Traffic Stress ratings for collector and arterial streets in the 2040 No Build scenario are shown in Figure 4. About 15 percent of the collector and arterial street miles' in Lebanon have "low stress" for bicyclists. However, about 65 percent of the collector and arterial street miles' have "high stress" or "extreme stress" for bicyclists. The streets with highest stress levels are the streets important for local and regional through travel, where most businesses and services are located. Additionally, the results show streets in downtown Lebanon generate high or extreme levels of stress for people on bicycles.

4 Future Bicycle Level of Stress Analysis



Legend:

Bicycle Level of Stress:

- Low Stress
- Moderate Stress
- High Stress
- Extreme Stress
- High Growth Area
- Urban Growth Boundary

Note:
Rating is based on a combination of speed limit, presence of bicycle facilities, presence of buffers, on-street parking, access and other street characteristics. Rating calculated on Collectors and Arterials.

Bicycle Facility Gaps

Bicycle network gaps are spread throughout the City. These gaps are predominately located on segments of streets in undeveloped areas, or on segments of streets that have no on-street bike facilities that would better connect the bicycle network. Some of these segments include:

- US 20, south of OR 34 (ODOT).
- Oak Street, west of Franklin Street (City of Lebanon).
- Grant Street, between US 20 and Hiatt Street (City of Lebanon).
- Sherman Street, west of Williams Street (City of Lebanon).
- F Street-E Street-Milton Street, between 12th Street and Franklin Street (City of Lebanon).
- Walker Road, between Stoltz Hill Road and US 20 (City of Lebanon).
- 2nd Street, between OR 34 and H Street (City of Lebanon).
- 5th Street, between Oak Street and Airport Road (City of Lebanon).
- 12th Street, between Sherman Street and Oak Street (City of Lebanon).
- 12th Street, between F Street and Airport Road (City of Lebanon).
- Williams Street, between Wheeler Street and Milton Street (City of Lebanon).
- Franklin Street, between Oak Street and Russell Drive (City of Lebanon).

In addition to these missing segments, future bicycle needs can be identified based on where growth is expected to occur. The areas with the greatest increase in employment and population densities are listed below. As most of these areas are undeveloped, future bicycle infrastructure is likely to be provided or enhanced through development of the local street system.

- In north Lebanon, north of OR 34-Wheeler Street.
- In west Lebanon, west of Airway Road.
- In southwest Lebanon, south of Airport Road and west of Stoltz Hill Road, and along Vaughan Lane.
- In east Lebanon, adjacent to the South Santiam River.

Major street segments with high or extreme bicycle stress levels include:

- OR 34, west of 12th Street (ODOT).
- OR 34, between 3rd Street and 9th Street (ODOT).

- Oak Street, west of Franklin Street (City of Lebanon).
- Airport Road, west of 12th Street (City of Lebanon).
- River Road, east of Mountain River Drive (City of Lebanon).
- Crowfoot Road, between Main Road and US 20 (City of Lebanon).
- Weirich Drive, east of US 20 (City of Lebanon).
- 12th Street, between OR 34 and Hansard Avenue (City of Lebanon).
- 12th Street, between Oak Street and Airport Road (City of Lebanon).
- 5th Street, between OR 34 and Oak Street (City of Lebanon).
- Main Road, south of Vaughan Lane (City of Lebanon).
- Cascade Drive, south of Wagon Wheel Drive (City of Lebanon).
- US 20, north of Reeves Parkway (ODOT).
- US 20, south of OR 34 (ODOT).

Generally, improvements are needed if the City prioritizes more bicycle friendly streets for novice riders. Such improvements would focus on improving the density and connectivity of low-stress bike routes, and in some cases identified bicycle deficiencies and gaps can be addressed by providing accommodations on nearby streets.

Other Bicycle Needs

Other bicycle needs identified through public engagement, field observations, and transportation analysis include enhancing bicycle connections to key destinations and expanding low stress bicycle routes. Not all of the roadways lacking bicycle facilities will be able to accommodate bike lanes due to right-of-way constraints, limited funding, and/or fewer constraints on parallel corridors. A network of low stress bikeways will be considered to relieve some of the right-of-way constraints posed on streets where bikeways are high or extreme stress, but space does not permit consideration of bike lanes or buffered bike lanes.

As mitigations for motor vehicle travel are considered for intersections and along roadway segments, innovative designs and/or "alternative" vehicular mobility targets that allow for higher levels of congestion may be considered to avoid undesirable impacts on bicycle safety and connectivity.

Methodology to Address Deficiencies

A list of potential bicycle network improvement projects will be developed in Technical Memorandum #9 based on streets with bicycle deficiencies. A street is considered deficient if it meets one or more of the following conditions:

- Arterial or collector street without bicycle facilities or adjacent corridor with bicycle facilities.
- "Extreme" bicycle stress level.
- Bicycle stress level of "moderate", "high" or "extreme" in close proximity to parks, schools, transit stops, or other important destinations.

Safety Needs

Several locations were identified in Technical Memorandum #5 as high collision locations. With growing traffic volumes, these problematic areas likely will persist, and may even become progressively worse. There are no additional safety needs identified for future conditions other than those previously identified in Technical Memorandum #5.

Freight Needs

With growing traffic volumes from existing conditions, seven intersections along Oregon Freight Routes or Federal Truck Routes would not meet their respective mobility target/standard during the 2040 design hour conditions. Traffic volumes will also increase along local truck routes, including portions of Wheeler Street, Williams Street, Milton Street, Grant Street, and Oak Street. Public comments indicate a desire to modify the Wheeler Street, Williams Street, and Milton Street local truck route. The current route directs trucks through residential neighborhoods.

Other Needs

Technical Memorandum #5 identified existing bridge, rail, air, waterway, pipeline, and Transportation System Management and Operations (TSMO) needs. There are no additional needs identified for future conditions other than those previously identified in Technical Memorandum #5.

DKS

Technical Memorandum #8: Future Transportation Conditions Appendix

Section 1: 2040 PM Peak Hour Traffic Volumes

Section 2: 2040 Operating Conditions at Study Intersections (PM Peak Hour- Design Hour Conditions)

Section 3: 2040 Operating Conditions at Study Intersections (PM Peak Hour- Average Weekday Conditions)

Section 1: 2040 PM Peak Hour Traffic Volumes

Section 2: 2040 Operating Conditions at Study Intersections (PM Peak Hour- Design Hour Conditions)

2040 Operating Conditions at Study Intersections (PM Peak Hour- Design Hour Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
1	Reeves Parkway/ 5th Street	0.90 v/c	0.28	A/B
2	US 20/ Reeves Parkway - Cemetery Road	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	**1.50 (side street)**	A/F
3	US 20/ Mullins Drive	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	**1.03 (side street)**	B/F
4	US 20/ Industrial Way	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	**1.00 (side street)**	B/F
5	OR 34/ 12th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.53 (side street)	A/D
6	OR 34/ Hansard Avenue - 9th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.39 (side street)	A/D
7	OR 34/ 5th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	**1.06 (side street)**	A/F
8	OR 34/ S 2nd Street	Highway Approaches 0.95 v/c; Side Street Approaches 1.00 v/c	0.49 (side street)	A/D
9	OR 34/ N 2nd Street	Highway Approaches 0.95 v/c; Side Street Approaches 1.00 v/c	0.26 (side street)	A/B
10	US 20/ OR 34 - Wheeler Street	0.90 v/c	**0.95**	D
11	Wheeler Street/ S Williams Street	0.90 v/c	0.19	A/B
12	5th Street/ Rose Street	0.90 v/c	0.27	A/C
13	2nd Street/ Sherman Street	0.90 v/c	0.32	A/C
14	US 20/ Grant Street	0.95 v/c	0.75	B
15	Grant Street/ Williams Street	LOS E; 1.00 v/c	0.71	B
16	Oak Street/ 12th Street	0.90 v/c	0.43	A/C
17	Oak Street/ 10th Street	0.90 v/c	0.23	A/C
18	Oak Street/ 5th Street	LOS E; 1.00 v/c	0.54	B
19	Oak Street/ 2nd Street	LOS E; 1.00 v/c	0.58	B

2040 Operating Conditions at Study Intersections (PM Peak Hour- Design Hour Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
20	US 20/ Oak Street	0.95 v/c	0.77	B
21	US 20/ Milton Street	0.90 v/c	0.85	C
22	Milton Street/ Williams Street	0.90 v/c	0.37	A/C
23	Airport Road/ 12th Street	0.90 v/c	**>2.0**	B/F
24	Airport Road/ Stoltz Hill Road	0.90 v/c	0.62	B/E
25	Airport Road/ 7th Street	0.90 v/c	**1.17**	A/F
26	Airport Road/ 5th Street	0.90 v/c	0.76	A/F
27	Airport Road/ 2nd Street	LOS E; 1.00 v/c	0.99	E
28	US 20/ Airport Road	0.90 v/c	**0.98**	E
29	US 20/ Russell Drive	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.23 (highway approach)	B/E
30	Russell Drive/ Franklin Street	0.90 v/c	0.15	A/B
31	US 20/ Walker Road	0.90 v/c	**1.00**	F
32	Main Road/ Walker Road	LOS E; 1.00 v/c	0.65	B
33	US 20/ Market Street	0.90 v/c	0.72	B
34	US 20/ Weldwood Drive - Burdell Boulevard	0.85 v/c	0.67	D
35	Main Road/ Vaughan Lane	0.90 v/c	0.29	A/C
36	Main Road/ Crowfoot Road	0.90 v/c	0.17	A/B
37	US 20/ Weirich Drive	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	0.08 (side street)	A/B
38	US 20/ Crowfoot Road	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	0.39 (side street)	B/C

Signalized intersections:
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection

Stop Controlled intersections:
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement

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Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	170	25	70	65	10	20	25	90	15	5	10
Conflicting Peds, #/hr	2	0	2	2	0	2	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	7	0	0	11	0	0	9	0	0	0	0
Mvmt Flow	19	212	31	88	81	12	25	31	112	19	6	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	97	0	0	247	0	0	544	541	233	607	550	93
Stage 1	-	-	-	-	-	-	269	269	-	266	266	-
Stage 2	-	-	-	-	-	-	275	272	-	341	284	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.59	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.59	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.59	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.081	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1509	-	-	1331	-	-	453	438	811	411	446	970
Stage 1	-	-	-	-	-	-	741	674	-	744	692	-
Stage 2	-	-	-	-	-	-	736	672	-	678	680	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1506	-	-	1329	-	-	414	402	808	312	409	966
Mov Cap-2 Maneuver	-	-	-	-	-	-	414	402	-	312	409	-
Stage 1	-	-	-	-	-	-	730	664	-	733	645	-
Stage 2	-	-	-	-	-	-	671	626	-	548	670	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	3.8	13.2	14.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	608	1506	-	-	1329	-	-	425
HCM Lane V/C Ratio	0.278	0.012	-	-	0.066	-	-	0.088
HCM Control Delay (s)	13.2	7.4	-	-	7.9	-	-	14.3
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1.1	0	-	-	0.2	-	-	0.3

Intersection	
Int Delay, s/veh	30.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	125	10	165	10	0	5	100	530	15	0	650	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	100	-	-	100	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	7	0	0	0	0	25	0	3	14	0	2	6
Mvmt Flow	132	11	174	11	0	5	105	558	16	0	684	74

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1463	1468	684	1465	1460	566	684	0	0	574	0	0
Stage 1	684	684	-	776	776	-	-	-	-	-	-	-
Stage 2	779	784	-	689	684	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.5	6.2	7.1	6.5	6.45	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4	3.3	3.5	4	3.525	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	~ 104	129	452	107	130	483	919	-	-	1009	-	-
Stage 1	431	452	-	393	410	-	-	-	-	-	-	-
Stage 2	381	407	-	439	452	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 94	114	452	56	115	483	919	-	-	1009	-	-
Mov Cap-2 Maneuver	~ 94	114	-	56	115	-	-	-	-	-	-	-
Stage 1	382	452	-	348	363	-	-	-	-	-	-	-
Stage 2	334	360	-	264	452	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	167	61.6	1.5	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	919	-	-	95	452	79	1009	-	-
HCM Lane V/C Ratio	0.115	-	-	1.496	0.384	0.2	-	-	-
HCM Control Delay (s)	9.4	-	-	$ 349.3	17.8	61.6	0	-	-
HCM Lane LOS	A	-	-	F	C	F	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	10.8	1.8	0.7	0	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	16.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	50	5	70	55	20	25	60	555	35	10	805	25
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	1	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	5	0	4	0	0	2	0
Mvmt Flow	53	5	74	58	21	26	63	584	37	11	847	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1639	1633	864	1654	1628	606	876	0	0	623	0	0
Stage 1	884	884	-	731	731	-	-	-	-	-	-	-
Stage 2	755	749	-	923	897	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.25	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.345	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	81	102	357	79	103	492	779	-	-	968	-	-
Stage 1	343	366	-	416	430	-	-	-	-	-	-	-
Stage 2	404	422	-	326	361	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	59	92	356	~ 56	93	491	778	-	-	967	-	-
Mov Cap-2 Maneuver	59	92	-	~ 56	93	-	-	-	-	-	-	-
Stage 1	315	361	-	382	395	-	-	-	-	-	-	-
Stage 2	332	387	-	252	356	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	92.8	153	0.9	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	778	-	-	59	299	56	169	967	-	-
HCM Lane V/C Ratio	0.081	-	-	0.892	0.264	1.034	0.28	0.011	-	-
HCM Control Delay (s)	10	-	-	200.1	21.3	250	34.4	8.8	-	-
HCM Lane LOS	B	-	-	F	C	F	D	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	4.1	1	4.8	1.1	0	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s   +: Computation Not Defined   *: All major volume in platoon

Intersection	
Int Delay, s/veh	10

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	5	20	60	5	20	10	600	45	15	905	25
Conflicting Peds, #/hr	0	0	4	4	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	100	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	7	0	4	3	0	1	0
Mvmt Flow	10	5	21	62	5	21	10	625	47	16	943	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1654	1641	961	1654	1654	630	973	0	0	629	0	0
Stage 1	991	991	-	650	650	-	-	-	-	-	-	-
Stage 2	663	650	-	1004	1004	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.27	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.363	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	79	101	314	79	99	473	717	-	-	963	-	-
Stage 1	299	327	-	461	468	-	-	-	-	-	-	-
Stage 2	454	468	-	294	322	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	70	97	313	69	95	471	716	-	-	962	-	-
Mov Cap-2 Maneuver	70	97	-	69	95	-	-	-	-	-	-	-
Stage 1	294	320	-	453	460	-	-	-	-	-	-	-
Stage 2	423	460	-	265	316	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	40.9	183.4	0.2	0.1
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	716	-	-	136	88	962	-	-
HCM Lane V/C Ratio	0.015	-	-	0.268	1.006	0.016	-	-
HCM Control Delay (s)	10.1	-	-	40.9	183.4	8.8	-	-
HCM Lane LOS	B	-	-	E	F	A	-	-
HCM 95th %tile Q(veh)	0	-	-	1	5.8	0.1	-	-

Intersection	
Int Delay, s/veh	6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	45	510	45	25	280	10	15	25	25	0	70	130
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	1	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	100	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	33	2	8	0	3	0	0	0	0	0	0	13
Mvmt Flow	47	537	47	26	295	11	16	26	26	0	74	137

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	306	0	0	585	0	0	1115	1015	564	1037	1034	303
Stage 1	-	-	-	-	-	-	656	656	-	354	354	-
Stage 2	-	-	-	-	-	-	459	359	-	683	680	-
Critical Hdwy	4.43	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.497	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	1098	-	-	1000	-	-	187	240	529	211	234	712
Stage 1	-	-	-	-	-	-	458	465	-	667	634	-
Stage 2	-	-	-	-	-	-	586	631	-	442	454	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1096	-	-	998	-	-	106	223	528	173	218	710
Mov Cap-2 Maneuver	-	-	-	-	-	-	106	223	-	173	218	-
Stage 1	-	-	-	-	-	-	438	445	-	638	617	-
Stage 2	-	-	-	-	-	-	405	614	-	378	434	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.7	29.2	23.9
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	216	1096	-	-	998	-	-	-	397
HCM Lane V/C Ratio	0.317	0.043	-	-	0.026	-	-	-	0.53
HCM Control Delay (s)	29.2	8.4	-	-	8.7	-	-	0	23.9
HCM Lane LOS	D	A	-	-	A	-	-	A	C
HCM 95th %tile Q(veh)	1.3	0.1	-	-	0.1	-	-	-	3

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	470	25	25	295	20	20	0	20	55	25	20
Conflicting Peds, #/hr	2	0	2	2	0	2	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	3	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	21	495	26	26	311	21	21	0	21	58	26	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	332	0	0	521	0	0	947	934	510	935	937	323
Stage 1	-	-	-	-	-	-	550	550	-	374	374	-
Stage 2	-	-	-	-	-	-	397	384	-	561	563	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1239	-	-	1056	-	-	243	268	567	248	267	723
Stage 1	-	-	-	-	-	-	523	519	-	651	621	-
Stage 2	-	-	-	-	-	-	633	615	-	516	512	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1237	-	-	1054	-	-	208	254	566	229	253	722
Mov Cap-2 Maneuver	-	-	-	-	-	-	208	254	-	229	253	-
Stage 1	-	-	-	-	-	-	510	507	-	635	602	-
Stage 2	-	-	-	-	-	-	569	597	-	484	500	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.6	18.7	26.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	304	1237	-	-	1054	-	-	273
HCM Lane V/C Ratio	0.139	0.017	-	-	0.025	-	-	0.386
HCM Control Delay (s)	18.7	8	0	-	8.5	0	-	26.2
HCM Lane LOS	C	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0.1	-	-	1.7

Intersection	
Int Delay, s/veh	33.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	35	425	65	65	315	40	35	70	45	40	120	35
Conflicting Peds, #/hr	2	0	4	4	0	2	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	2	0	2	0	0	2	0	0	2	0
Mvmt Flow	36	443	68	68	328	42	36	73	47	42	125	36

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	373	0	0	513	0	0	1120	1060	484	1099	1073	356
Stage 1	-	-	-	-	-	-	552	552	-	487	487	-
Stage 2	-	-	-	-	-	-	568	508	-	612	586	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.52	6.2	7.1	6.52	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.52	-	6.1	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.52	-	6.1	5.52	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.018	3.3	3.5	4.018	3.3
Pot Cap-1 Maneuver	1197	-	-	1063	-	-	185	224	587	192	220	693
Stage 1	-	-	-	-	-	-	522	515	-	566	550	-
Stage 2	-	-	-	-	-	-	511	539	-	484	497	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1193	-	-	1059	-	-	77	196	584	114	193	689
Mov Cap-2 Maneuver	-	-	-	-	-	-	77	196	-	114	193	-
Stage 1	-	-	-	-	-	-	498	492	-	540	504	-
Stage 2	-	-	-	-	-	-	333	494	-	362	474	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.3	105	134.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	169	1193	-	-	1059	-	-	191
HCM Lane V/C Ratio	0.925	0.031	-	-	0.064	-	-	1.063
HCM Control Delay (s)	105	8.1	0	-	8.6	0	-	134.2
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	6.9	0.1	-	-	0.2	-	-	9.5

Intersection	
Int Delay, s/veh	4.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	315	180	90	325	90	65
Conflicting Peds, #/hr	0	4	4	0	5	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	332	189	95	342	95	68

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	526	0	963	435
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	532	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1051	-	286	625
Stage 1	-	-	-	-	660	-
Stage 2	-	-	-	-	593	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1047	-	252	620
Mov Cap-2 Maneuver	-	-	-	-	252	-
Stage 1	-	-	-	-	657	-
Stage 2	-	-	-	-	525	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	25.4
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	336	-	-	1047	-
HCM Lane V/C Ratio	0.486	-	-	0.09	-
HCM Control Delay (s)	25.4	-	-	8.8	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	2.5	-	-	0.3	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	80	305	285	20	25	125
Conflicting Peds, #/hr	4	0	0	4	0	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	2	3	0	0	0
Mvmt Flow	84	321	300	21	26	132

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	326	0	-	0	805	320
Stage 1	-	-	-	-	316	-
Stage 2	-	-	-	-	489	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1245	-	-	-	355	725
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	621	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1241	-	-	-	323	720
Mov Cap-2 Maneuver	-	-	-	-	323	-
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	568	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	13.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1241	-	-	-	598
HCM Lane V/C Ratio	0.068	-	-	-	0.264
HCM Control Delay (s)	8.1	0	-	-	13.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	170	65	25	90	90	110	510	10	145	785	70
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	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.94		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1635			1529		1614	1695		1599	1706	
Flt Permitted		0.79			0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1317			1426		1614	1695		1599	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)	87	173	66	26	92	92	112	520	10	148	801	71
RTOR Reduction (vph)	0	8	0	0	24	0	0	1	0	0	3	0
Lane Group Flow (vph)	0	318	0	0	186	0	112	529	0	148	869	0
Confl. Peds. (#/hr)	4		2	2		4	4					4
Confl. Bikes (#/hr)			3									
Heavy Vehicles (%)	2%	2%	2%	0%	3%	10%	3%	3%	0%	4%	1%	2%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)		28.7			28.7		12.2	48.0		14.7	50.5	
Effective Green, g (s)		29.7			29.7		12.2	49.0		14.7	51.5	
Actuated g/C Ratio		0.28			0.28		0.12	0.46		0.14	0.49	
Clearance Time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)		2.5			2.5		2.5	6.1		2.5	6.1	
Lane Grp Cap (vph)		371			401		186	787		223	833	
v/s Ratio Prot							0.07	0.31		c0.09	c0.51	
v/s Ratio Perm		c0.24			0.13							
v/c Ratio		0.86			0.46		0.60	0.67		0.66	1.04	
Uniform Delay, d1		35.8			31.3		44.3	22.0		43.0	27.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		17.2			0.6		4.6	4.6		6.5	43.2	
Delay (s)		53.1			31.9		48.9	26.5		49.5	70.1	
Level of Service		D			C		D	C		D	E	
Approach Delay (s)		53.1			31.9			30.4			67.1	
Approach LOS		D			C			C			E	

Intersection Summary			
HCM 2000 Control Delay	51.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	105.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	2.5

Movement	SEL	SET	NWT	NWR	SWL	SWR
Vol, veh/h	20	275	130	45	75	30
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	2	7	0	0	0
Mvmt Flow	21	289	137	47	79	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	184	0	-	0	493	161
Stage 1	-	-	-	-	161	-
Stage 2	-	-	-	-	332	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1403	-	-	-	539	889
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	731	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1403	-	-	-	529	889
Mov Cap-2 Maneuver	-	-	-	-	529	-
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	718	-

Approach	SE	NW	SW
HCM Control Delay, s	0.5	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1403	-	598
HCM Lane V/C Ratio	-	-	0.015	-	0.185
HCM Control Delay (s)	-	-	7.6	0	12.4
HCM Lane LOS	-	-	A	A	B
HCM 95th %tile Q(veh)	-	-	0	-	0.7

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	55	30	25	50	15	25	135	35	30	210	10
Conflicting Peds, #/hr	0	0	7	7	0	0	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	5	0	10	7	0	0	1	6	7	1	20
Mvmt Flow	12	65	35	29	59	18	29	159	41	35	247	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	614	597	265	626	581	191	266	0	0	207	0	0
Stage 1	331	331	-	245	245	-	-	-	-	-	-	-
Stage 2	283	266	-	381	336	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.2	6.57	6.2	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.2	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.2	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.59	4.063	3.3	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	407	412	779	385	418	856	1310	-	-	1335	-	-
Stage 1	687	640	-	741	694	-	-	-	-	-	-	-
Stage 2	728	683	-	625	633	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	335	385	771	304	390	847	1305	-	-	1329	-	-
Mov Cap-2 Maneuver	335	385	-	304	390	-	-	-	-	-	-	-
Stage 1	666	617	-	718	673	-	-	-	-	-	-	-
Stage 2	632	662	-	515	610	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.7	17.5	1	0.9
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1305	-	-	449	394	1329	-	-
HCM Lane V/C Ratio	0.023	-	-	0.249	0.269	0.027	-	-
HCM Control Delay (s)	7.8	0	-	15.7	17.5	7.8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1	1.1	0.1	-	-

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	65	15	25	45	25	35	240	40	20	240	10
Conflicting Peds, #/hr	1	0	0	0	0	1	1	0	6	6	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	0	0	0	4	0	4	0	0	0
Mvmt Flow	12	76	18	29	53	29	41	282	47	24	282	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	766	749	295	772	731	313	295	0	0	330	0	0
Stage 1	336	336	-	389	389	-	-	-	-	-	-	-
Stage 2	430	413	-	383	342	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.14	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.236	-	-	2.2	-	-
Pot Cap-1 Maneuver	322	343	749	319	351	732	1255	-	-	1241	-	-
Stage 1	682	645	-	639	612	-	-	-	-	-	-	-
Stage 2	607	597	-	644	642	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	257	321	745	241	329	728	1249	-	-	1235	-	-
Mov Cap-2 Maneuver	257	321	-	241	329	-	-	-	-	-	-	-
Stage 1	654	630	-	613	587	-	-	-	-	-	-	-
Stage 2	506	573	-	537	627	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.1	20.3	0.9	0.6
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1249	-	-	344	346	1235	-	-
HCM Lane V/C Ratio	0.033	-	-	0.308	0.323	0.019	-	-
HCM Control Delay (s)	8	0	-	20.1	20.3	8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.3	1.4	0.1	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	30	190	20	0	0	0	0	160	1160	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)			4.0		4.0						7.0	
Lane Util. Factor			1.00		1.00						0.95	
Frpb, ped/bikes			0.98		1.00						1.00	
Flpb, ped/bikes			1.00		1.00						1.00	
Frt			0.86		1.00						1.00	
Flt Protected			1.00		0.96						0.99	
Satd. Flow (prot)			1488		1619						3288	
Flt Permitted			1.00		0.96						0.99	
Satd. Flow (perm)			1488		1619						3288	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	33	211	22	0	0	0	0	178	1289	17
RTOR Reduction (vph)	0	0	26	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	7	0	233	0	0	0	0	0	1483	0
Confl. Peds. (#/hr)	11		6	6		11	18		4	4		18
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	0%	0%	2%	12%	0%	0%	0%	0%	2%	0%	0%
Turn Type			Perm	Perm	NA					Perm	NA	
Protected Phases					8						2	
Permitted Phases			4	8						2		
Actuated Green, G (s)			11.3		11.3						32.2	
Effective Green, g (s)			11.8		11.8						32.2	
Actuated g/C Ratio			0.21		0.21						0.59	
Clearance Time (s)			4.5		4.5						7.0	
Vehicle Extension (s)			0.2		0.2						0.2	
Lane Grp Cap (vph)			319		347						1924	
v/s Ratio Prot												
v/s Ratio Perm			0.00		0.14						0.45	
v/c Ratio			0.02		0.67						0.77	
Uniform Delay, d1			17.0		19.8						8.6	
Progression Factor			1.00		1.00						1.00	
Incremental Delay, d2			0.0		4.0						3.1	
Delay (s)			17.1		23.8						11.7	
Level of Service			B		C						B	
Approach Delay (s)		17.1			23.8			0.0			11.7	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	72.1%	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)	15	255	25	120	165	105	10	100	160	165	180	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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			0.92			1.00	
Flt Protected		1.00			0.98			1.00			0.98	
Satd. Flow (prot)		1708			1590			1541			1648	
Flt Permitted		0.98			0.82			0.98			0.67	
Satd. Flow (perm)		1671			1325			1519			1126	
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)	16	268	26	126	174	111	11	105	168	174	189	11
RTOR Reduction (vph)	0	4	0	0	16	0	0	75	0	0	2	0
Lane Group Flow (vph)	0	306	0	0	396	0	0	209	0	0	372	0
Confl. Peds. (#/hr)	1		2	2		1	2					2
Heavy Vehicles (%)	0%	1%	0%	3%	3%	6%	0%	2%	6%	6%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			8			6			6	
Permitted Phases	8			8			6			6		
Actuated Green, G (s)		33.6			33.6			25.6			25.6	
Effective Green, g (s)		33.6			33.6			25.6			25.6	
Actuated g/C Ratio		0.50			0.50			0.38			0.38	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		0.2			0.2			0.2			0.2	
Lane Grp Cap (vph)		835			662			578			428	
v/s Ratio Prot												
v/s Ratio Perm		0.18			c0.30			0.14			c0.33	
v/c Ratio		0.37			0.60			0.36			0.87	
Uniform Delay, d1		10.3			12.0			14.9			19.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			1.0			0.1			16.4	
Delay (s)		10.4			12.9			15.1			35.6	
Level of Service		B			B			B			D	
Approach Delay (s)		10.4			12.9			15.1			35.6	
Approach LOS		B			B			B			D	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	67.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	106.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	250	60	30	100	25	30	45	35	30	120	10
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	1	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	17	4	0	15	6	0	8	0	0	5	4	0
Mvmt Flow	11	278	67	33	111	28	33	50	39	33	133	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	140	0	0	345	0	0	599	541	313	572	561	127
Stage 1	-	-	-	-	-	-	334	334	-	193	193	-
Stage 2	-	-	-	-	-	-	265	207	-	379	368	-
Critical Hdwy	4.27	-	-	4.25	-	-	7.18	6.5	6.2	7.15	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.5	-	6.15	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.5	-	6.15	5.54	-
Follow-up Hdwy	2.353	-	-	2.335	-	-	3.572	4	3.3	3.545	4.036	3.3
Pot Cap-1 Maneuver	1356	-	-	1145	-	-	405	451	732	426	434	929
Stage 1	-	-	-	-	-	-	667	647	-	802	737	-
Stage 2	-	-	-	-	-	-	727	734	-	637	618	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1355	-	-	1144	-	-	291	432	731	356	416	927
Mov Cap-2 Maneuver	-	-	-	-	-	-	291	432	-	356	416	-
Stage 1	-	-	-	-	-	-	660	640	-	793	714	-
Stage 2	-	-	-	-	-	-	566	711	-	550	611	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	1.6	16.6	19.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	431	1355	-	-	1144	-	-	417
HCM Lane V/C Ratio	0.284	0.008	-	-	0.029	-	-	0.426
HCM Control Delay (s)	16.6	7.7	0	-	8.2	0	-	19.9
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.2	0	-	-	0.1	-	-	2.1

Intersection												
Int Delay, s/veh	3.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	275	10	15	140	40	5	10	15	60	15	15
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	7	7	0	0	0	0	0	10	14
Mvmt Flow	22	306	11	17	156	44	6	11	17	67	17	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	203	0	0	320	0	0	590	595	315	586	578	182
Stage 1	-	-	-	-	-	-	359	359	-	214	214	-
Stage 2	-	-	-	-	-	-	231	236	-	372	364	-
Critical Hdwy	4.1	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.6	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.6	-
Follow-up Hdwy	2.2	-	-	2.263	-	-	3.5	4	3.3	3.5	4.09	3.426
Pot Cap-1 Maneuver	1381	-	-	1212	-	-	422	420	730	425	416	831
Stage 1	-	-	-	-	-	-	663	631	-	793	711	-
Stage 2	-	-	-	-	-	-	776	713	-	653	610	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1380	-	-	1211	-	-	389	403	728	394	400	828
Mov Cap-2 Maneuver	-	-	-	-	-	-	389	403	-	394	400	-
Stage 1	-	-	-	-	-	-	649	617	-	776	698	-
Stage 2	-	-	-	-	-	-	730	700	-	614	597	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.6	12.5	15.8
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	515	1380	-	-	1211	-	-	433
HCM Lane V/C Ratio	0.065	0.016	-	-	0.014	-	-	0.231
HCM Control Delay (s)	12.5	7.7	0	-	8	0	-	15.8
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	275	30	20	180	95	25	95	20	70	220	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	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		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	0.95		1.00	0.97		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	1664		1662	1614		1662	1696		1662	1676	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	1664		1662	1614		1662	1696		1662	1676	
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)	47	289	32	21	189	100	26	100	21	74	232	32
RTOR Reduction (vph)	0	3	0	0	14	0	0	6	0	0	3	0
Lane Group Flow (vph)	47	318	0	21	275	0	26	115	0	74	261	0
Confl. Peds. (#/hr)	7		4	4		7	2		5	5		2
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	3%	6%	0%	2%	1%	0%	0%	0%	0%	1%	11%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	4.1	21.2		2.1	19.2		2.2	14.9		6.8	19.5	
Effective Green, g (s)	4.1	21.2		2.1	19.2		2.2	14.9		6.8	19.5	
Actuated g/C Ratio	0.07	0.35		0.03	0.31		0.04	0.24		0.11	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	111	578		57	508		59	414		185	535	
v/s Ratio Prot	c0.03	c0.19		0.01	0.17		0.02	0.07		c0.04	c0.16	
v/s Ratio Perm												
v/c Ratio	0.42	0.55		0.37	0.54		0.44	0.28		0.40	0.49	
Uniform Delay, d1	27.3	16.1		28.8	17.3		28.8	18.7		25.2	16.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	1.1		2.9	1.2		3.8	0.3		1.0	0.5	
Delay (s)	29.2	17.2		31.7	18.4		32.6	19.0		26.2	17.2	
Level of Service	C	B		C	B		C	B		C	B	
Approach Delay (s)		18.7			19.3			21.4			19.2	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.1%	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												
Volume (vph)	30	265	105	35	185	25	50	265	55	20	265	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	
Lane Util. Factor	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.96		1.00	0.98			0.98			1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1593	1618		1581	1684			1696			1719	
Flt Permitted	0.61	1.00		0.46	1.00			0.92			0.97	
Satd. Flow (perm)	1027	1618		765	1684			1570			1669	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	33	294	117	39	206	28	56	294	61	22	294	11
RTOR Reduction (vph)	0	19	0	0	6	0	0	15	0	0	3	0
Lane Group Flow (vph)	33	392	0	39	228	0	0	396	0	0	324	0
Confl. Peds. (#/hr)	3		2	2		3	1		5	5		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	4%	0%	5%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	29.7	29.7		29.7	29.7			17.3			17.3	
Effective Green, g (s)	29.7	29.7		29.7	29.7			17.3			17.3	
Actuated g/C Ratio	0.54	0.54		0.54	0.54			0.31			0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		0.2	0.2			0.2			0.2	
Lane Grp Cap (vph)	554	873		413	909			493			524	
v/s Ratio Prot		c0.24			0.14							
v/s Ratio Perm	0.03			0.05				c0.25			0.19	
v/c Ratio	0.06	0.45		0.09	0.25			0.80			0.62	
Uniform Delay, d1	6.0	7.7		6.1	6.7			17.3			16.0	
Progression Factor	1.00	1.00		1.11	1.08			1.00			1.00	
Incremental Delay, d2	0.2	1.7		0.4	0.6			8.7			1.5	
Delay (s)	6.2	9.3		7.2	7.9			26.0			17.6	
Level of Service	A	A		A	A			C			B	
Approach Delay (s)		9.1			7.8			26.0			17.6	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.2%	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)	0	220	120	55	135	0	0	0	0	50	1225	115
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	
Lane Util. Factor		1.00		1.00	1.00						0.95	
Frpb, ped/bikes		1.00		1.00	1.00						1.00	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.95		1.00	1.00						0.99	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1609		1661	1716						3243	
Flt Permitted		1.00		0.32	1.00						1.00	
Satd. Flow (perm)		1609		553	1716						3243	
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)	0	232	126	58	142	0	0	0	0	53	1289	121
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	335	0	58	142	0	0	0	0	0	1453	0
Confl. Peds. (#/hr)	3		2	2		3	2		5	5		2
Heavy Vehicles (%)	0%	1%	7%	0%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						2	
Permitted Phases				8						2		
Actuated Green, G (s)		13.9		13.9	13.9						32.1	
Effective Green, g (s)		14.4		14.4	14.4						32.6	
Actuated g/C Ratio		0.26		0.26	0.26						0.59	
Clearance Time (s)		4.5		4.5	4.5						4.5	
Vehicle Extension (s)		0.2		0.2	0.2						0.2	
Lane Grp Cap (vph)		421		144	449						1922	
v/s Ratio Prot		c0.21			0.08							
v/s Ratio Perm				0.10							0.45	
v/c Ratio		0.80		0.40	0.32						0.76	
Uniform Delay, d1		18.9		16.8	16.3						8.3	
Progression Factor		1.12		1.00	1.00						0.49	
Incremental Delay, d2		8.5		0.7	0.1						2.0	
Delay (s)		29.7		17.4	16.5						6.0	
Level of Service		C		B	B						A	
Approach Delay (s)		29.7			16.8			0.0			6.0	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.6%	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												
Volume (vph)	20	110	40	235	90	20	45	925	270	45	1360	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	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		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	
Frt		0.97		1.00	0.97		1.00	0.97		1.00	1.00	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1679		1644	1656		1662	3116		1662	3248	
Flt Permitted		0.96		0.57	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1628		978	1656		1662	3116		1662	3248	
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)	21	116	42	247	95	21	47	974	284	47	1432	32
RTOR Reduction (vph)	0	10	0	0	7	0	0	23	0	0	1	0
Lane Group Flow (vph)	0	169	0	247	109	0	47	1235	0	47	1463	0
Confl. Peds. (#/hr)	2		2	2		2	4		4	4		4
Heavy Vehicles (%)	0%	0%	0%	1%	0%	14%	0%	2%	4%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		25.5		25.5	25.5		5.0	45.3		5.0	45.3	
Effective Green, g (s)		25.5		25.5	25.5		5.5	45.8		5.5	45.8	
Actuated g/C Ratio		0.29		0.29	0.29		0.06	0.52		0.06	0.52	
Clearance Time (s)		4.0		4.0	4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		2.5		2.5	2.5		2.5	5.5		2.5	5.5	
Lane Grp Cap (vph)		467		280	475		102	1607		102	1675	
v/s Ratio Prot					0.07		c0.03	0.40		0.03	c0.45	
v/s Ratio Perm		0.10		c0.25								
v/c Ratio		0.36		0.88	0.23		0.46	0.77		0.46	0.87	
Uniform Delay, d1		25.2		30.2	24.2		40.2	17.2		40.2	18.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3		26.0	0.2		2.4	2.8		2.4	5.9	
Delay (s)		25.5		56.2	24.3		42.6	20.1		42.6	24.9	
Level of Service		C		E	C		D	C		D	C	
Approach Delay (s)		25.5			46.0			20.9			25.4	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	95	55	220	185	85	225
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	0	5	0	2	2
Mvmt Flow	100	58	232	195	89	237

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	748	332	0	0	429	0
Stage 1	332	-	-	-	-	-
Stage 2	416	-	-	-	-	-
Critical Hdwy	6.42	6.2	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.3	-	-	2.218	-
Pot Cap-1 Maneuver	380	714	-	-	1130	-
Stage 1	727	-	-	-	-	-
Stage 2	666	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	345	712	-	-	1130	-
Mov Cap-2 Maneuver	345	-	-	-	-	-
Stage 1	725	-	-	-	-	-
Stage 2	605	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	18.4	0	2.3
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	425	1130	-
HCM Lane V/C Ratio	-	-	0.372	0.079	-
HCM Control Delay (s)	-	-	18.4	8.5	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.7	0.3	-

Intersection	
Int Delay, s/veh	66.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	985	80	30	415	70	30	20	15	100	40	10
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	25	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	0	0	5	5	0	0	0	4	10	0
Mvmt Flow	11	1037	84	32	437	74	32	21	16	105	42	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	511	0	0	1121	0	0	1663	1674	1080	1655	1679	475
Stage 1	-	-	-	-	-	-	1100	1100	-	537	537	-
Stage 2	-	-	-	-	-	-	563	574	-	1118	1142	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.14	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.14	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.14	5.6	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.536	4.09	3.3
Pot Cap-1 Maneuver	1065	-	-	631	-	-	78	97	268	~ 77	91	594
Stage 1	-	-	-	-	-	-	260	290	-	524	510	-
Stage 2	-	-	-	-	-	-	514	506	-	249	266	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1064	-	-	630	-	-	45	91	268	~ 57	85	594
Mov Cap-2 Maneuver	-	-	-	-	-	-	45	91	-	~ 57	85	-
Stage 1	-	-	-	-	-	-	257	287	-	519	484	-
Stage 2	-	-	-	-	-	-	437	480	-	215	263	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	111.8	$ 751.5
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	45	127	1064	-	-	630	-	-	67
HCM Lane V/C Ratio	0.702	0.29	0.01	-	-	0.05	-	-	2.357
HCM Control Delay (s)	190.4	44.5	8.4	-	-	11	-	-	$ 751.5
HCM Lane LOS	F	E	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	2.7	1.1	0	-	-	0.2	-	-	15.2

Notes

~: Volume exceeds capacity $: Delay exceeds 300s   +: Computation Not Defined   *: All major volume in platoon

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	675	410	80	415	105	50
Conflicting Peds, #/hr	0	3	3	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	3	0	5	2	0
Mvmt Flow	711	432	84	437	111	53

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1142	0	1531	929
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	605	-
Critical Hdwy	-	-	4.1	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.2	-	3.518	3.3
Pot Cap-1 Maneuver	-	-	619	-	129	327
Stage 1	-	-	-	-	386	-
Stage 2	-	-	-	-	545	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	617	-	111	326
Mov Cap-2 Maneuver	-	-	-	-	243	-
Stage 1	-	-	-	-	386	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	38.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	265	-	-	617	-
HCM Lane V/C Ratio	0.616	-	-	0.136	-
HCM Control Delay (s)	38.1	-	-	11.8	-
HCM Lane LOS	E	-	-	B	-
HCM 95th %tile Q(veh)	3.7	-	-	0.5	-

Intersection	
Int Delay, s/veh	19.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	25	650	30	90	460	45	15	20	40	45	40	25
Conflicting Peds, #/hr	4	0	2	2	0	4	1	0	15	15	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	7	1	9	0	4	3	0	0	0	4	0	0
Mvmt Flow	26	684	32	95	484	47	16	21	42	47	42	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	547	0	0	731	0	0	1515	1504	719	1511	1495	527
Stage 1	-	-	-	-	-	-	768	768	-	712	712	-
Stage 2	-	-	-	-	-	-	747	736	-	799	783	-
Critical Hdwy	4.17	-	-	4.1	-	-	7.1	6.5	6.2	7.14	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.14	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.14	5.5	-
Follow-up Hdwy	2.263	-	-	2.2	-	-	3.5	4	3.3	3.536	4	3.3
Pot Cap-1 Maneuver	998	-	-	883	-	-	99	123	432	98	124	555
Stage 1	-	-	-	-	-	-	397	414	-	420	439	-
Stage 2	-	-	-	-	-	-	408	428	-	376	407	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	995	-	-	880	-	-	58	104	425	66	105	546
Mov Cap-2 Maneuver	-	-	-	-	-	-	58	104	-	66	105	-
Stage 1	-	-	-	-	-	-	382	398	-	404	387	-
Stage 2	-	-	-	-	-	-	308	377	-	311	391	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.4	41.4	223
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	58	209	995	-	-	880	-	-	99
HCM Lane V/C Ratio	0.272	0.302	0.026	-	-	0.108	-	-	1.17
HCM Control Delay (s)	88.8	29.5	8.7	-	-	9.6	-	-	223
HCM Lane LOS	F	D	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	1	1.2	0.1	-	-	0.4	-	-	7.7

Intersection	
Int Delay, s/veh	12.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	45	650	35	30	510	120	10	25	10	55	60	75
Conflicting Peds, #/hr	2	0	5	5	0	2	4	0	0	0	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	10	-	-	-	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	2	0	0	4	1	0	0	17	0	0	2
Mvmt Flow	47	684	37	32	537	126	11	26	11	58	63	79

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	667	0	0	725	0	0	1539	1531	712	1487	1487	609
Stage 1	-	-	-	-	-	-	801	801	-	667	667	-
Stage 2	-	-	-	-	-	-	738	730	-	820	820	-
Critical Hdwy	4.13	-	-	4.1	-	-	7.1	6.5	6.37	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4	3.453	3.5	4	3.318
Pot Cap-1 Maneuver	918	-	-	887	-	-	95	118	408	104	126	495
Stage 1	-	-	-	-	-	-	381	400	-	451	460	-
Stage 2	-	-	-	-	-	-	413	431	-	372	392	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	914	-	-	883	-	-	42	107	405	76	114	491
Mov Cap-2 Maneuver	-	-	-	-	-	-	42	107	-	76	114	-
Stage 1	-	-	-	-	-	-	360	378	-	426	442	-
Stage 2	-	-	-	-	-	-	285	414	-	318	371	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.4	81.3	81.2
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	91	914	-	-	883	-	-	76	199
HCM Lane V/C Ratio	0.521	0.052	-	-	0.036	-	-	0.762	0.714
HCM Control Delay (s)	81.3	9.2	-	-	9.2	-	-	137	58.5
HCM Lane LOS	F	A	-	-	A	-	-	F	F
HCM 95th %tile Q(veh)	2.3	0.2	-	-	0.1	-	-	3.7	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	485	220	80	420	80	185	285	85	100	320	45
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	0.99		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	0.95		1.00	0.98		1.00	0.97		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	1630		1662	1671		1599	1675		1646	1697	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	1630		1662	1671		1599	1675		1646	1697	
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)	26	511	232	84	442	84	195	300	89	105	337	47
RTOR Reduction (vph)	0	12	0	0	5	0	0	8	0	0	4	0
Lane Group Flow (vph)	26	731	0	84	521	0	195	381	0	105	380	0
Confl. Peds. (#/hr)	5		1	1		5	2		3	3		2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	3%	0%	2%	0%	4%	0%	1%	1%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	4.4	41.6		8.9	46.1		17.2	33.5		12.0	28.3	
Effective Green, g (s)	4.4	41.6		8.9	46.1		17.2	33.5		12.0	28.3	
Actuated g/C Ratio	0.04	0.37		0.08	0.41		0.15	0.30		0.11	0.25	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	65	605		132	687		245	501		176	428	
v/s Ratio Prot	0.02	c0.45		c0.05	0.31		c0.12	0.23		0.06	c0.22	
v/s Ratio Perm												
v/c Ratio	0.40	1.21		0.64	0.76		0.80	0.76		0.60	0.89	
Uniform Delay, d1	52.5	35.2		50.0	28.2		45.7	35.6		47.7	40.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	108.7		8.5	4.6		15.8	6.4		4.5	19.4	
Delay (s)	55.4	143.9		58.5	32.8		61.5	42.1		52.2	59.7	
Level of Service	E	F		E	C		E	D		D	E	
Approach Delay (s)		140.9			36.3			48.5			58.1	
Approach LOS		F			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	76.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	112.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	92.8%	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												
Volume (vph)	110	165	385	215	150	95	255	945	125	250	1210	90
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		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		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	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1646	1733	1439	1646	1630		1614	3193		1646	3224	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	1733	1439	1646	1630		1614	3193		1646	3224	
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)	116	174	405	226	158	100	268	995	132	263	1274	95
RTOR Reduction (vph)	0	0	274	0	16	0	0	7	0	0	4	0
Lane Group Flow (vph)	116	174	131	226	242	0	268	1120	0	263	1365	0
Confl. Peds. (#/hr)	1		1	1		1	4		2	2		4
Heavy Vehicles (%)	1%	1%	2%	1%	1%	0%	3%	2%	2%	1%	2%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)	13.8	19.2	19.2	19.6	25.0		23.6	50.9		23.0	50.3	
Effective Green, g (s)	13.8	19.2	19.2	19.6	25.0		24.1	51.4		23.5	50.8	
Actuated g/C Ratio	0.11	0.15	0.15	0.15	0.19		0.19	0.40		0.18	0.39	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	4.1		2.5	4.1	
Lane Grp Cap (vph)	175	256	213	248	314		299	1265		298	1262	
v/s Ratio Prot	0.07	0.10		c0.14	c0.15		c0.17	0.35		0.16	c0.42	
v/s Ratio Perm			0.09									
v/c Ratio	0.66	0.68	0.61	0.91	0.77		0.90	0.89		0.88	1.08	
Uniform Delay, d1	55.7	52.3	51.8	54.2	49.6		51.6	36.4		51.8	39.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.2	6.4	4.4	34.3	10.7		27.1	8.0		24.8	50.6	
Delay (s)	63.9	58.7	56.2	88.5	60.3		78.7	44.4		76.6	90.0	
Level of Service	E	E	E	F	E		E	D		E	F	
Approach Delay (s)		58.1			73.5			50.9			87.9	
Approach LOS		E			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	69.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	129.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	15	70	1310	40	105	1745
Conflicting Peds, #/hr	0	0	0	3	3	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	9	1	3	2	3	1
Mvmt Flow	15	72	1351	41	108	1799

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2487	699	0	0	1392	0
Stage 1	1371	-	-	-	-	-
Stage 2	1116	-	-	-	-	-
Critical Hdwy	6.98	6.92	-	-	4.16	-
Critical Hdwy Stg 1	5.98	-	-	-	-	-
Critical Hdwy Stg 2	5.98	-	-	-	-	-
Follow-up Hdwy	3.59	3.31	-	-	2.23	-
Pot Cap-1 Maneuver	22	385	-	-	482	-
Stage 1	189	-	-	-	-	-
Stage 2	260	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	17	384	-	-	481	-
Mov Cap-2 Maneuver	97	-	-	-	-	-
Stage 1	189	-	-	-	-	-
Stage 2	201	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.2	0	0.8
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	97	384	481	-
HCM Lane V/C Ratio	-	-	0.159	0.188	0.225	-
HCM Control Delay (s)	-	-	49	16.5	14.6	-
HCM Lane LOS	-	-	E	C	B	-
HCM 95th %tile Q(veh)	-	-	0.5	0.7	0.9	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	60	285	180	35	35	40
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	2	1	0	0	3
Mvmt Flow	67	317	200	39	39	44

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	239	0	-	0	669	220
Stage 1	-	-	-	-	219	-
Stage 2	-	-	-	-	450	-
Critical Hdwy	4.1	-	-	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.327
Pot Cap-1 Maneuver	1340	-	-	-	426	817
Stage 1	-	-	-	-	822	-
Stage 2	-	-	-	-	647	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1339	-	-	-	400	816
Mov Cap-2 Maneuver	-	-	-	-	400	-
Stage 1	-	-	-	-	822	-
Stage 2	-	-	-	-	608	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1339	-	-	-	549
HCM Lane V/C Ratio	0.05	-	-	-	0.152
HCM Control Delay (s)	7.8	0	-	-	12.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	5	1460	135	100	1090	10	240	15	150	30	15	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	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		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.86		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	3216		1599	3224		1646	1475		1590	1643	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.33	1.00	
Satd. Flow (perm)	1662	3216		1599	3224		1282	1475		544	1643	
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)	5	1537	142	105	1147	11	253	16	158	32	16	11
RTOR Reduction (vph)	0	4	0	0	1	0	0	120	0	0	10	0
Lane Group Flow (vph)	5	1675	0	105	1157	0	253	54	0	32	17	0
Confl. Peds. (#/hr)	2		3	3		2			4	4		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	0%	1%	0%	1%	4%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			3	
Permitted Phases							4			3		
Actuated Green, G (s)	1.0	50.4		13.1	62.5		30.7	30.7		11.3	11.3	
Effective Green, g (s)	2.0	51.4		14.1	63.5		31.7	31.7		12.3	12.3	
Actuated g/C Ratio	0.02	0.39		0.11	0.48		0.24	0.24		0.09	0.09	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.2		2.5	4.2		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	24	1240		169	1535		304	350		50	151	
v/s Ratio Prot	0.00	c0.52		c0.07	c0.36			0.04			0.01	
v/s Ratio Perm							c0.20			c0.06		
v/c Ratio	0.21	1.35		0.62	0.75		0.83	0.15		0.64	0.11	
Uniform Delay, d1	64.9	41.0		57.0	28.5		48.3	40.2		58.4	55.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	163.4		6.0	2.3		17.1	0.1		22.1	0.2	
Delay (s)	68.0	204.3		63.1	30.9		65.4	40.3		80.4	55.7	
Level of Service	E	F		E	C		E	D		F	E	
Approach Delay (s)		203.9			33.5			55.2			69.1	
Approach LOS		F			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	120.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	133.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	85.6%	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 (vph)	85	200	95	65	160	95	70	295	165	115	460	115
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	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	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	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1656	1643		1597	1716	1423	1662	1606		1638	1664	
Flt Permitted	0.65	1.00		0.49	1.00	1.00	0.29	1.00		0.39	1.00	
Satd. Flow (perm)	1135	1643		821	1716	1423	499	1606		672	1664	
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)	89	211	100	68	168	100	74	311	174	121	484	121
RTOR Reduction (vph)	0	27	0	0	0	67	0	24	0	0	11	0
Lane Group Flow (vph)	89	284	0	68	168	33	74	461	0	121	594	0
Confl. Peds. (#/hr)	4		1	1		4			9	9		
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	4%	2%	2%	0%	2%	2%	1%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2		2	4			8		
Actuated Green, G (s)	14.3	14.3		14.3	14.3	14.3	21.1	21.1		21.1	21.1	
Effective Green, g (s)	14.3	14.3		14.3	14.3	14.3	21.1	21.1		21.1	21.1	
Actuated g/C Ratio	0.33	0.33		0.33	0.33	0.33	0.49	0.49		0.49	0.49	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	373	541		270	565	468	242	780		326	808	
v/s Ratio Prot		c0.17			0.10			0.29			c0.36	
v/s Ratio Perm	0.08			0.08		0.02	0.15			0.18		
v/c Ratio	0.24	0.53		0.25	0.30	0.07	0.31	0.59		0.37	0.74	
Uniform Delay, d1	10.6	11.8		10.6	10.8	10.0	6.7	8.0		7.0	8.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.7		0.4	0.2	0.0	0.5	1.0		0.5	3.3	
Delay (s)	10.8	12.5		11.0	11.0	10.0	7.3	9.0		7.5	12.2	
Level of Service	B	B		B	B	B	A	A		A	B	
Approach Delay (s)		12.1			10.7			8.8			11.4	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	43.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	5	1490	65	115	1120	10	60	10	210	0	10	5
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	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.86			0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1662	3236		1614	3225		1599	1453			1676	
Flt Permitted	0.22	1.00		0.08	1.00		0.75	1.00			1.00	
Satd. Flow (perm)	380	3236		140	3225		1257	1453			1676	
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)	5	1568	68	121	1179	11	63	11	221	0	11	5
RTOR Reduction (vph)	0	2	0	0	0	0	0	190	0	0	4	0
Lane Group Flow (vph)	5	1634	0	121	1190	0	63	42	0	0	12	0
Confl. Peds. (#/hr)			2	2					2	2		
Heavy Vehicles (%)	0%	2%	2%	3%	3%	0%	4%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA			NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	45.4	44.6		54.2	48.9		10.2	10.2			10.2	
Effective Green, g (s)	46.4	44.6		54.7	49.4		10.2	10.2			10.2	
Actuated g/C Ratio	0.64	0.61		0.75	0.68		0.14	0.14			0.14	
Clearance Time (s)	4.5	4.0		4.5	4.5		4.0	4.0			4.0	
Vehicle Extension (s)	2.5	4.1		2.5	4.1		2.5	2.5			2.5	
Lane Grp Cap (vph)	264	1979		228	2185		175	203			234	
v/s Ratio Prot	0.00	c0.50		c0.04	0.37			0.03			0.01	
v/s Ratio Perm	0.01			0.35			c0.05					
v/c Ratio	0.02	0.83		0.53	0.54		0.36	0.21			0.05	
Uniform Delay, d1	4.9	11.1		10.2	6.0		28.4	27.8			27.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	3.1		1.8	0.4		0.9	0.4			0.1	
Delay (s)	4.9	14.2		12.0	6.4		29.3	28.1			27.2	
Level of Service	A	B		B	A		C	C			C	
Approach Delay (s)		14.2			6.9			28.4			27.2	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	72.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	75	1075	165	60	690	10	395	15	125	25	25	55
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
Frpb, ped/bikes	1.00	1.00	0.99	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	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1662	3292	1438	1630	3192		3193	1502		1662	1750	1488
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1662	3292	1438	1630	3192		3193	1502		1662	1750	1488
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)	79	1132	174	63	726	11	416	16	132	26	26	58
RTOR Reduction (vph)	0	0	57	0	1	0	0	116	0	0	0	49
Lane Group Flow (vph)	79	1132	117	63	736	0	416	32	0	26	26	9
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	1%	2%	2%	4%	0%	1%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases			2									4
Actuated Green, G (s)	5.3	31.6	31.6	3.7	30.0		5.8	7.1		2.4	3.7	9.0
Effective Green, g (s)	5.8	33.1	33.1	4.2	31.5		6.3	7.6		2.9	4.2	10.0
Actuated g/C Ratio	0.09	0.52	0.52	0.07	0.49		0.10	0.12		0.05	0.07	0.16
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.8	4.8	2.5	4.8		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	151	1707	746	107	1575		315	178		75	115	326
v/s Ratio Prot	c0.05	c0.34		0.04	0.23		c0.13	c0.02		0.02	0.01	0.00
v/s Ratio Perm			0.08									0.00
v/c Ratio	0.52	0.66	0.16	0.59	0.47		1.32	0.18		0.35	0.23	0.03
Uniform Delay, d1	27.7	11.3	8.0	29.0	10.6		28.8	25.3		29.5	28.3	22.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.5	1.3	0.2	6.7	0.4		164.9	0.4		2.0	0.7	0.0
Delay (s)	30.2	12.5	8.2	35.7	11.1		193.6	25.6		31.6	29.0	22.8
Level of Service	C	B	A	D	B		F	C		C	C	C
Approach Delay (s)		13.0			13.0			149.5			26.3	
Approach LOS		B			B			F			C	

Intersection Summary			
HCM 2000 Control Delay	40.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	63.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	115	80	50	265	340	120
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	4	4	3	2	4
Mvmt Flow	128	89	56	294	378	133

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	850	444	511	0	-	0
Stage 1	444	-	-	-	-	-
Stage 2	406	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	334	610	1044	-	-	-
Stage 1	651	-	-	-	-	-
Stage 2	677	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	316	610	1044	-	-	-
Mov Cap-2 Maneuver	439	-	-	-	-	-
Stage 1	651	-	-	-	-	-
Stage 2	641	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.6	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1044	-	439	610	-	-
HCM Lane V/C Ratio	0.053	-	0.291	0.146	-	-
HCM Control Delay (s)	8.6	-	16.5	11.9	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.2	0.5	-	-

Intersection	
Int Delay, s/veh	4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	125	125	10	130	135
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	3	0	4	2
Mvmt Flow	11	132	132	11	137	142

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	553	137	0	0	142	0
Stage 1	137	-	-	-	-	-
Stage 2	416	-	-	-	-	-
Critical Hdwy	6.4	6.24	-	-	4.14	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	-	-	2.236	-
Pot Cap-1 Maneuver	498	906	-	-	1429	-
Stage 1	895	-	-	-	-	-
Stage 2	670	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	446	906	-	-	1429	-
Mov Cap-2 Maneuver	446	-	-	-	-	-
Stage 1	895	-	-	-	-	-
Stage 2	600	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	3.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	842	1429	-
HCM Lane V/C Ratio	-	-	0.169	0.096	-
HCM Control Delay (s)	-	-	10.1	7.8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.3	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	65	1150	715	10	5	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	150	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	1	4	0	0	0
Mvmt Flow	68	1211	753	11	5	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	753	0	-	0	1495	376
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	742	-
Critical Hdwy	4.1	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	866	-	-	-	116	627
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	437	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	866	-	-	-	107	627
Mov Cap-2 Maneuver	-	-	-	-	239	-
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	403	-

Approach	EB	WB	SW
HCM Control Delay, s	0.5	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	866	-	-	-	521
HCM Lane V/C Ratio	0.079	-	-	-	0.081
HCM Control Delay (s)	9.5	-	-	-	12.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.3

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1110	30	65	700	25	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	50	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	0	3	4	0	0
Mvmt Flow	1168	32	68	737	26	116

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1168	0	1673	584
Stage 1	-	-	-	-	1168	-
Stage 2	-	-	-	-	505	-
Critical Hdwy	-	-	4.16	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.23	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	588	-	88	460
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	588	-	78	460
Mov Cap-2 Maneuver	-	-	-	-	189	-
Stage 1	-	-	-	-	262	-
Stage 2	-	-	-	-	510	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	21.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	363	-	-	588	-
HCM Lane V/C Ratio	0.391	-	-	0.116	-
HCM Control Delay (s)	21.2	-	-	11.9	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	1.8	-	-	0.4	-

Section 3: 2040 Operating Conditions at Study Intersections (PM Peak Hour- Average Weekday Conditions)

2040 Operating Conditions at Study Intersections (PM Peak Hour- Average Weekday Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
1	Reeves Parkway/ 5th Street	0.90 v/c	0.25	A/B
2	US 20/ Reeves Parkway - Cemetery Road	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	**1.11 (side street)**	A/F
3	US 20/ Mullins Drive	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.69 (side street)	A/F
4	US 20/ Industrial Way	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.71 (side street)	A/F
5	OR 34/ 12th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.50 (side street)	A/C
6	OR 34/ Hansard Avenue - 9th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.32 (side street)	A/C
7	OR 34/ 5th Street	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.78 (side street)	A/F
8	OR 34/ S 2nd Street	Highway Approaches 0.95 v/c; Side Street Approaches 1.00 v/c	0.41 (side street)	A/C
9	OR 34/ N 2nd Street	Highway Approaches 0.95 v/c; Side Street Approaches 1.00 v/c	0.23 (side street)	A/B
10	US 20/ OR 34 - Wheeler Street	0.90 v/c	0.85	D
11	Wheeler Street/ S Williams Street	0.90 v/c	0.16	A/B
12	5th Street/ Rose Street	0.90 v/c	0.24	A/C
13	2nd Street/ Sherman Street	0.90 v/c	0.28	A/C
14	US 20/ Grant Street	0.95 v/c	0.68	B
15	Grant Street/ Williams Street	LOS E; 1.00 v/c	0.66	B
16	Oak Street/ 12th Street	0.90 v/c	0.39	A/C
17	Oak Street/ 10th Street	0.90 v/c	0.21	A/C
18	Oak Street/ 5th Street	LOS E; 1.00 v/c	0.51	B
19	Oak Street/ 2nd Street	LOS E; 1.00 v/c	0.54	B

2040 Operating Conditions at Study Intersections (PM Peak Hour- Average Weekday Conditions)

	Location	Mobility Target	Volume/ Capacity	Level of Service
20	US 20/ Oak Street	0.95 v/c	0.69	B
21	US 20/ Milton Street	0.90 v/c	0.79	C
22	Milton Street/ Williams Street	0.90 v/c	0.34	A/C
23	Airport Road/ 12th Street	0.90 v/c	**1.80**	B/F
24	Airport Road/ Stoltz Hill Road	0.90 v/c	0.54	B/D
25	Airport Road/ 7th Street	0.90 v/c	**0.97**	A/F
26	Airport Road/ 5th Street	0.90 v/c	0.56	A/F
27	Airport Road/ 2nd Street	LOS E; 1.00 v/c	0.91	E
28	US 20/ Airport Road	0.90 v/c	**0.91**	D
29	US 20/ Russell Drive	Highway Approaches 0.90 v/c; Side Street Approaches 0.95 v/c	0.18 (highway approach)	B/E
30	Russell Drive/ Franklin Street	0.90 v/c	0.14	A/B
31	US 20/ Walker Road	0.90 v/c	0.89	E
32	Main Road/ Walker Road	LOS E; 1.00 v/c	0.62	B
33	US 20/ Market Street	0.90 v/c	0.64	B
34	US 20/ Weldwood Drive - Burdell Boulevard	0.85 v/c	0.61	C
35	Main Road/ Vaughan Lane	0.90 v/c	0.26	A/C
36	Main Road/ Crowfoot Road	0.90 v/c	0.16	A/B
37	US 20/ Weirich Drive	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	0.07 (side street)	A/B
38	US 20/ Crowfoot Road	Highway Approaches 0.85 v/c; Side Street Approaches 0.90 v/c	0.32 (side street)	B/C

Signalized intersections:
LOS = Level of Service of Intersection
V/C = Volume-to-Capacity Ratio of Intersection

Stop Controlled intersections:
LOS = Level of Service of Major Street/Minor Street
V/C = Volume-to-Capacity Ratio of Worst Movement

Intersection												
Int Delay, s/veh	5.4											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	155	15	65	60	10	20	25	85	10	5	10
Conflicting Peds, #/hr	2	0	2	2	0	2	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	0	7	0	0	11	0	0	9	0	0	0	0
Mvmt Flow	12	194	19	81	75	12	25	31	106	12	6	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	91	0	0	216	0	0	487	484	208	547	488	86
Stage 1	-	-	-	-	-	-	231	231	-	247	247	-
Stage 2	-	-	-	-	-	-	256	253	-	300	241	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.59	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.59	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.59	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.081	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1517	-	-	1366	-	-	494	473	837	451	483	978
Stage 1	-	-	-	-	-	-	776	700	-	761	706	-
Stage 2	-	-	-	-	-	-	753	685	-	713	710	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1514	-	-	1364	-	-	456	439	834	352	448	974
Mov Cap-2 Maneuver	-	-	-	-	-	-	456	439	-	352	448	-
Stage 1	-	-	-	-	-	-	767	692	-	753	662	-
Stage 2	-	-	-	-	-	-	691	643	-	588	702	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	3.8	12.5	12.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	641	1514	-	-	1364	-	-	502
HCM Lane V/C Ratio	0.254	0.008	-	-	0.06	-	-	0.062
HCM Control Delay (s)	12.5	7.4	-	-	7.8	-	-	12.6
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1	0	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	17.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	120	5	155	10	0	5	90	500	10	0	575	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	100	-	-	-	100	-	-	100	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	7	0	0	0	0	25	0	3	14	0	2	6
Mvmt Flow	126	5	163	11	0	5	95	526	11	0	605	68

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1329	1331	605	1329	1326	532	605	0	0	537	0	0
Stage 1	605	605	-	721	721	-	-	-	-	-	-	-
Stage 2	724	726	-	608	605	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.5	6.2	7.1	6.5	6.45	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4	3.3	3.5	4	3.525	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	129	156	501	133	157	505	983	-	-	1041	-	-
Stage 1	476	491	-	422	435	-	-	-	-	-	-	-
Stage 2	409	433	-	486	491	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 118	141	501	81	142	505	983	-	-	1041	-	-
Mov Cap-2 Maneuver	~ 118	141	-	81	142	-	-	-	-	-	-	-
Stage 1	430	491	-	381	393	-	-	-	-	-	-	-
Stage 2	366	391	-	324	491	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	90.8	42.3	1.4	0
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	983	-	-	119	501	112	1041	-	-
HCM Lane V/C Ratio	0.096	-	-	1.106	0.326	0.141	-	-	-
HCM Control Delay (s)	9.1	-	-	184	15.6	42.3	0	-	-
HCM Lane LOS	A	-	-	F	C	E	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	7.9	1.4	0.5	0	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	45	5	65	50	20	25	60	500	30	10	715	25
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	1	1	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	50	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	5	0	4	0	0	2	0
Mvmt Flow	47	5	68	53	21	26	63	526	32	11	753	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1483	1475	769	1496	1472	545	781	0	0	560	0	0
Stage 1	789	789	-	670	670	-	-	-	-	-	-	-
Stage 2	694	686	-	826	802	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.25	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.345	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	104	128	404	102	128	532	845	-	-	1021	-	-
Stage 1	387	405	-	450	459	-	-	-	-	-	-	-
Stage 2	436	451	-	369	399	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	80	117	403	76	117	531	844	-	-	1020	-	-
Mov Cap-2 Maneuver	80	117	-	76	117	-	-	-	-	-	-	-
Stage 1	358	400	-	416	424	-	-	-	-	-	-	-
Stage 2	364	417	-	299	394	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	50.7	77.8	1	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	844	-	-	80	343	76	206	1020	-	-
HCM Lane V/C Ratio	0.075	-	-	0.592	0.215	0.693	0.23	0.01	-	-
HCM Control Delay (s)	9.6	-	-	101.1	18.3	123	27.6	8.6	-	-
HCM Lane LOS	A	-	-	F	C	F	D	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	2.6	0.8	3.2	0.9	0	-	-

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	5	15	55	5	20	10	560	50	15	800	25
Conflicting Peds, #/hr	0	0	4	4	0	0	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	100	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	7	0	4	3	0	1	0
Mvmt Flow	10	5	16	57	5	21	10	583	52	16	833	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1503	1490	851	1500	1503	588	863	0	0	587	0	0
Stage 1	882	882	-	608	608	-	-	-	-	-	-	-
Stage 2	621	608	-	892	895	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.27	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.363	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	101	125	363	101	123	500	788	-	-	998	-	-
Stage 1	344	367	-	486	489	-	-	-	-	-	-	-
Stage 2	478	489	-	339	362	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	91	121	361	91	119	498	787	-	-	997	-	-
Mov Cap-2 Maneuver	91	121	-	91	119	-	-	-	-	-	-	-
Stage 1	338	360	-	478	481	-	-	-	-	-	-	-
Stage 2	447	481	-	314	355	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	33.8	89.6	0.2	0.2
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	787	-	-	156	117	997	-	-
HCM Lane V/C Ratio	0.013	-	-	0.2	0.712	0.016	-	-
HCM Control Delay (s)	9.6	-	-	33.8	89.6	8.7	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.7	3.9	0	-	-

Intersection												
Int Delay, s/veh	5.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	45	455	45	25	255	10	10	25	25	0	75	125
Conflicting Peds, #/hr	0	0	2	2	0	0	0	0	1	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	100	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	33	2	8	0	3	0	0	0	0	0	0	13
Mvmt Flow	47	479	47	26	268	11	11	26	26	0	79	132

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	280	0	0	527	0	0	1031	931	506	952	949	277
Stage 1	-	-	-	-	-	-	598	598	-	327	327	-
Stage 2	-	-	-	-	-	-	433	333	-	625	622	-
Critical Hdwy	4.43	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.33
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.497	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.417
Pot Cap-1 Maneuver	1124	-	-	1050	-	-	213	269	570	241	262	736
Stage 1	-	-	-	-	-	-	492	494	-	690	651	-
Stage 2	-	-	-	-	-	-	605	647	-	476	482	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1122	-	-	1048	-	-	124	251	569	200	244	734
Mov Cap-2 Maneuver	-	-	-	-	-	-	124	251	-	200	244	-
Stage 1	-	-	-	-	-	-	471	473	-	661	634	-
Stage 2	-	-	-	-	-	-	423	630	-	410	461	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.7	22.5	22
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	268	1122	-	-	1048	-	-	-	419
HCM Lane V/C Ratio	0.236	0.042	-	-	0.025	-	-	-	0.502
HCM Control Delay (s)	22.5	8.3	-	-	8.5	-	-	0	22
HCM Lane LOS	C	A	-	-	A	-	-	A	C
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0.1	-	-	-	2.7

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	420	25	25	260	20	20	0	20	50	25	20
Conflicting Peds, #/hr	2	0	2	2	0	2	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	3	0	0	3	0	0	0	0	0	0	0
Mvmt Flow	21	442	26	26	274	21	21	0	21	53	26	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	295	0	0	468	0	0	858	844	457	845	848	286
Stage 1	-	-	-	-	-	-	497	497	-	337	337	-
Stage 2	-	-	-	-	-	-	361	347	-	508	511	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1278	-	-	1104	-	-	279	302	608	285	301	758
Stage 1	-	-	-	-	-	-	559	548	-	681	645	-
Stage 2	-	-	-	-	-	-	662	638	-	551	540	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1276	-	-	1102	-	-	242	287	607	264	286	757
Mov Cap-2 Maneuver	-	-	-	-	-	-	242	287	-	264	286	-
Stage 1	-	-	-	-	-	-	547	536	-	666	627	-
Stage 2	-	-	-	-	-	-	598	620	-	519	528	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.7	16.8	21.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	346	1276	-	-	1102	-	-	313
HCM Lane V/C Ratio	0.122	0.016	-	-	0.024	-	-	0.319
HCM Control Delay (s)	16.8	7.9	0	-	8.3	0	-	21.8
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0.1	-	-	1.3

Intersection	
Int Delay, s/veh	14.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	385	60	60	280	35	30	65	40	30	115	30
Conflicting Peds, #/hr	2	0	4	4	0	2	3	0	0	0	0	3
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	2	0	2	0	0	2	0	0	2	0
Mvmt Flow	31	401	62	62	292	36	31	68	42	31	120	31

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	331	0	0	467	0	0	1011	954	439	990	967	317
Stage 1	-	-	-	-	-	-	498	498	-	438	438	-
Stage 2	-	-	-	-	-	-	513	456	-	552	529	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.52	6.2	7.1	6.52	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.52	-	6.1	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.52	-	6.1	5.52	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.018	3.3	3.5	4.018	3.3
Pot Cap-1 Maneuver	1240	-	-	1105	-	-	220	259	622	227	254	728
Stage 1	-	-	-	-	-	-	558	544	-	601	579	-
Stage 2	-	-	-	-	-	-	548	568	-	522	527	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1236	-	-	1101	-	-	114	232	618	151	227	724
Mov Cap-2 Maneuver	-	-	-	-	-	-	114	232	-	151	227	-
Stage 1	-	-	-	-	-	-	538	524	-	579	537	-
Stage 2	-	-	-	-	-	-	378	527	-	408	508	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	1.4	45.6	59.4
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	222	1236	-	-	1101	-	-	234
HCM Lane V/C Ratio	0.633	0.025	-	-	0.057	-	-	0.779
HCM Control Delay (s)	45.6	8	0	-	8.5	0	-	59.4
HCM Lane LOS	E	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3.8	0.1	-	-	0.2	-	-	5.6

Intersection							
Int Delay, s/veh	3.9						

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	280	170	85	290	85	60
Conflicting Peds, #/hr	0	4	4	0	5	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	0	0	3	0	0
Mvmt Flow	295	179	89	305	89	63

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	479	0	873	393
Stage 1	-	-	-	-	389	-
Stage 2	-	-	-	-	484	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1094	-	323	660
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	624	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1090	-	289	655
Mov Cap-2 Maneuver	-	-	-	-	289	-
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	561	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.9	21
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	376	-	-	1090	-
HCM Lane V/C Ratio	0.406	-	-	0.082	-
HCM Control Delay (s)	21	-	-	8.6	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.9	-	-	0.3	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	75	270	255	20	20	120
Conflicting Peds, #/hr	4	0	0	4	0	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	2	3	0	0	0
Mvmt Flow	79	284	268	21	21	126

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	294	0	-	0	726	288
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	442	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1279	-	-	-	394	756
Stage 1	-	-	-	-	769	-
Stage 2	-	-	-	-	652	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1275	-	-	-	362	750
Mov Cap-2 Maneuver	-	-	-	-	362	-
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	601	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1275	-	-	-	650
HCM Lane V/C Ratio	0.062	-	-	-	0.227
HCM Control Delay (s)	8	0	-	-	12.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	160	55	25	85	85	100	485	10	130	695	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	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.97			0.94		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1639			1530		1614	1695		1599	1707	
Flt Permitted		0.80			0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1328			1426		1614	1695		1599	1707	
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)	82	163	56	26	87	87	102	495	10	133	709	61
RTOR Reduction (vph)	0	7	0	0	24	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	294	0	0	176	0	102	504	0	133	768	0
Confl. Peds. (#/hr)	4		2	2		4	4					4
Confl. Bikes (#/hr)			3									
Heavy Vehicles (%)	2%	2%	2%	0%	3%	10%	3%	3%	0%	4%	1%	2%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)		26.3			26.3		11.4	48.5		13.5	50.6	
Effective Green, g (s)		27.3			27.3		11.4	49.5		13.5	51.6	
Actuated g/C Ratio		0.27			0.27		0.11	0.48		0.13	0.50	
Clearance Time (s)		5.0			5.0		4.0	5.0		4.0	5.0	
Vehicle Extension (s)		2.5			2.5		2.5	6.1		2.5	6.1	
Lane Grp Cap (vph)		354			380		179	820		211	861	
v/s Ratio Prot							0.06	0.30		c0.08	c0.45	
v/s Ratio Perm		c0.22			0.12							
v/c Ratio		0.83			0.46		0.57	0.62		0.63	0.89	
Uniform Delay, d1		35.3			31.4		43.1	19.4		42.0	22.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		14.5			0.7		3.4	3.4		5.3	13.5	
Delay (s)		49.8			32.0		46.5	22.8		47.3	36.3	
Level of Service		D			C		D	C		D	D	
Approach Delay (s)		49.8			32.0			26.8			37.9	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	35.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	102.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	2.3

Movement	SEL	SET	NWT	NWR	SWL	SWR
Vol, veh/h	15	255	120	45	70	25
Conflicting Peds, #/hr	0	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	2	7	0	0	0
Mvmt Flow	16	268	126	47	74	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	174	0	-	0	450	150
Stage 1	-	-	-	-	150	-
Stage 2	-	-	-	-	300	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1415	-	-	-	571	902
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	756	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1415	-	-	-	564	902
Mov Cap-2 Maneuver	-	-	-	-	564	-
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	746	-

Approach	SE	NW	SW
HCM Control Delay, s	0.4	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1415	-	626
HCM Lane V/C Ratio	-	-	0.011	-	0.16
HCM Control Delay (s)	-	-	7.6	0	11.8
HCM Lane LOS	-	-	A	A	B
HCM 95th %tile Q(veh)	-	-	0	-	0.6

Intersection												
Int Delay, s/veh	5.1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	45	25	25	45	15	25	125	35	30	195	10
Conflicting Peds, #/hr	0	0	7	7	0	0	5	0	5	5	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	5	0	10	7	0	0	1	6	7	1	20
Mvmt Flow	12	53	29	29	53	18	29	147	41	35	229	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	582	567	247	587	552	180	248	0	0	195	0	0
Stage 1	313	313	-	233	233	-	-	-	-	-	-	-
Stage 2	269	254	-	354	319	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.55	6.2	7.2	6.57	6.2	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.55	-	6.2	5.57	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.55	-	6.2	5.57	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.045	3.3	3.59	4.063	3.3	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	427	429	797	410	435	868	1330	-	-	1349	-	-
Stage 1	702	652	-	752	703	-	-	-	-	-	-	-
Stage 2	741	692	-	647	644	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	358	401	789	337	407	859	1324	-	-	1343	-	-
Mov Cap-2 Maneuver	358	401	-	337	407	-	-	-	-	-	-	-
Stage 1	680	629	-	729	681	-	-	-	-	-	-	-
Stage 2	650	671	-	551	621	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.7	16.2	1.1	1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1324	-	-	466	420	1343	-	-
HCM Lane V/C Ratio	0.022	-	-	0.202	0.238	0.026	-	-
HCM Control Delay (s)	7.8	0	-	14.7	16.2	7.8	0	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.7	0.9	0.1	-	-

Intersection												
Int Delay, s/veh	4.9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	65	15	15	50	25	30	220	45	15	225	10
Conflicting Peds, #/hr	1	0	0	0	0	1	1	0	6	6	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	0	0	0	0	0	0	4	0	4	0	0	0
Mvmt Flow	12	76	18	18	59	29	35	259	53	18	265	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	708	690	278	711	670	292	277	0	0	313	0	0
Stage 1	307	307	-	357	357	-	-	-	-	-	-	-
Stage 2	401	383	-	354	313	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.14	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.236	-	-	2.2	-	-
Pot Cap-1 Maneuver	352	371	766	351	381	752	1274	-	-	1259	-	-
Stage 1	707	665	-	665	632	-	-	-	-	-	-	-
Stage 2	630	616	-	667	661	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	283	352	762	273	361	748	1268	-	-	1253	-	-
Mov Cap-2 Maneuver	283	352	-	273	361	-	-	-	-	-	-	-
Stage 1	682	653	-	642	610	-	-	-	-	-	-	-
Stage 2	526	595	-	563	649	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.3	17.3	0.8	0.5
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1268	-	-	376	397	1253	-	-
HCM Lane V/C Ratio	0.028	-	-	0.282	0.267	0.014	-	-
HCM Control Delay (s)	7.9	0	-	18.3	17.3	7.9	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.1	1.1	0	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	25	175	20	0	0	0	0	155	1030	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)			4.0		4.0						7.0	
Lane Util. Factor			1.00		1.00						0.95	
Frpb, ped/bikes			0.98		1.00						1.00	
Flpb, ped/bikes			1.00		1.00						1.00	
Frt			0.86		1.00						1.00	
Flt Protected			1.00		0.96						0.99	
Satd. Flow (prot)			1488		1618						3285	
Flt Permitted			1.00		0.96						0.99	
Satd. Flow (perm)			1488		1618						3285	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	28	194	22	0	0	0	0	172	1144	17
RTOR Reduction (vph)	0	0	22	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	6	0	216	0	0	0	0	0	1332	0
Confl. Peds. (#/hr)	11		6	6		11	18		4	4		18
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	0%	0%	2%	12%	0%	0%	0%	0%	2%	0%	0%
Turn Type			Perm	Perm	NA					Perm	NA	
Protected Phases					8						2	
Permitted Phases			4	8						2		
Actuated Green, G (s)			10.9		10.9						32.6	
Effective Green, g (s)			11.4		11.4						32.6	
Actuated g/C Ratio			0.21		0.21						0.59	
Clearance Time (s)			4.5		4.5						7.0	
Vehicle Extension (s)			0.2		0.2						0.2	
Lane Grp Cap (vph)			308		335						1947	
v/s Ratio Prot												
v/s Ratio Perm			0.00		0.13						0.41	
v/c Ratio			0.02		0.64						0.68	
Uniform Delay, d1			17.3		19.9						7.7	
Progression Factor			1.00		1.00						1.00	
Incremental Delay, d2			0.0		3.2						2.0	
Delay (s)			17.4		23.1						9.6	
Level of Service			B		C						A	
Approach Delay (s)		17.4			23.1			0.0			9.6	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	67.4%	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)	15	240	20	115	150	95	10	95	145	155	170	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	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frpb, ped/bikes		1.00			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			0.92			1.00	
Flt Protected		1.00			0.98			1.00			0.98	
Satd. Flow (prot)		1710			1591			1544			1648	
Flt Permitted		0.98			0.81			0.98			0.69	
Satd. Flow (perm)		1674			1317			1521			1170	
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)	16	253	21	121	158	100	11	100	153	163	179	11
RTOR Reduction (vph)	0	3	0	0	15	0	0	72	0	0	2	0
Lane Group Flow (vph)	0	287	0	0	364	0	0	192	0	0	351	0
Confl. Peds. (#/hr)	1		2	2		1	2					2
Heavy Vehicles (%)	0%	1%	0%	3%	3%	6%	0%	2%	6%	6%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			8			6			6	
Permitted Phases	8			8			6			6		
Actuated Green, G (s)		33.3			33.3			24.4			24.4	
Effective Green, g (s)		33.3			33.3			24.4			24.4	
Actuated g/C Ratio		0.51			0.51			0.37			0.37	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		0.2			0.2			0.2			0.2	
Lane Grp Cap (vph)		848			667			564			434	
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.28			0.13			c0.30	
v/c Ratio		0.34			0.55			0.34			0.81	
Uniform Delay, d1		9.6			11.0			14.9			18.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.5			0.1			10.1	
Delay (s)		9.7			11.5			15.0			28.6	
Level of Service		A			B			B			C	
Approach Delay (s)		9.7			11.5			15.0			28.6	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	65.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	103.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	230	60	30	90	25	30	45	25	30	115	10
Conflicting Peds, #/hr	1	0	0	0	0	1	0	0	1	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	17	4	0	15	6	0	8	0	0	5	4	0
Mvmt Flow	11	256	67	33	100	28	33	50	28	33	128	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	129	0	0	323	0	0	563	507	291	533	527	116
Stage 1	-	-	-	-	-	-	312	312	-	182	182	-
Stage 2	-	-	-	-	-	-	251	195	-	351	345	-
Critical Hdwy	4.27	-	-	4.25	-	-	7.18	6.5	6.2	7.15	6.54	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.5	-	6.15	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.5	-	6.15	5.54	-
Follow-up Hdwy	2.353	-	-	2.335	-	-	3.572	4	3.3	3.545	4.036	3.3
Pot Cap-1 Maneuver	1369	-	-	1167	-	-	428	471	753	453	453	942
Stage 1	-	-	-	-	-	-	686	661	-	813	745	-
Stage 2	-	-	-	-	-	-	740	743	-	659	633	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1368	-	-	1166	-	-	316	451	752	386	434	940
Mov Cap-2 Maneuver	-	-	-	-	-	-	316	451	-	386	434	-
Stage 1	-	-	-	-	-	-	679	654	-	804	721	-
Stage 2	-	-	-	-	-	-	583	719	-	580	626	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.7	16	18.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	439	1368	-	-	1166	-	-	439
HCM Lane V/C Ratio	0.253	0.008	-	-	0.029	-	-	0.392
HCM Control Delay (s)	16	7.7	0	-	8.2	0	-	18.4
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	1.8

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	25	260	15	15	130	35	10	10	15	55	15	10
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	3	3	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	7	7	0	0	0	0	0	10	14
Mvmt Flow	28	289	17	17	144	39	11	11	17	61	17	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	186	0	0	309	0	0	570	576	301	570	564	168
Stage 1	-	-	-	-	-	-	356	356	-	200	200	-
Stage 2	-	-	-	-	-	-	214	220	-	370	364	-
Critical Hdwy	4.1	-	-	4.17	-	-	7.1	6.5	6.2	7.1	6.6	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.6	-
Follow-up Hdwy	2.2	-	-	2.263	-	-	3.5	4	3.3	3.5	4.09	3.426
Pot Cap-1 Maneuver	1401	-	-	1224	-	-	435	431	743	435	424	846
Stage 1	-	-	-	-	-	-	666	633	-	806	721	-
Stage 2	-	-	-	-	-	-	793	725	-	654	610	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1400	-	-	1223	-	-	402	412	741	403	405	843
Mov Cap-2 Maneuver	-	-	-	-	-	-	402	412	-	403	405	-
Stage 1	-	-	-	-	-	-	648	616	-	785	708	-
Stage 2	-	-	-	-	-	-	751	712	-	612	594	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.7	12.7	15.5
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	504	1400	-	-	1223	-	-	432
HCM Lane V/C Ratio	0.077	0.02	-	-	0.014	-	-	0.206
HCM Control Delay (s)	12.7	7.6	0	-	8	0	-	15.5
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0	-	-	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	250	30	15	165	85	15	95	20	65	205	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	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		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	0.98		1.00	0.95		1.00	0.97		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	1662		1657	1616		1659	1697		1662	1673	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	1662		1657	1616		1659	1697		1662	1673	
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	263	32	16	174	89	16	100	21	68	216	32
RTOR Reduction (vph)	0	3	0	0	14	0	0	6	0	0	3	0
Lane Group Flow (vph)	42	292	0	16	249	0	16	115	0	68	245	0
Confl. Peds. (#/hr)	7		4	4		7	2		5	5		2
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	3%	6%	0%	2%	1%	0%	0%	0%	0%	1%	11%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	3.7	20.9		0.9	18.1		0.9	13.6		4.4	17.1	
Effective Green, g (s)	3.7	20.9		0.9	18.1		0.9	13.6		4.4	17.1	
Actuated g/C Ratio	0.07	0.37		0.02	0.32		0.02	0.24		0.08	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	110	622		26	524		26	413		131	512	
v/s Ratio Prot	c0.03	c0.18		0.01	0.15		0.01	0.07		c0.04	c0.15	
v/s Ratio Perm												
v/c Ratio	0.38	0.47		0.62	0.47		0.62	0.28		0.52	0.48	
Uniform Delay, d1	25.0	13.2		27.3	15.1		27.3	17.1		24.7	15.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.6		31.7	0.7		31.7	0.3		2.6	0.5	
Delay (s)	26.6	13.8		58.9	15.7		58.9	17.4		27.3	16.2	
Level of Service	C	B		E	B		E	B		C	B	
Approach Delay (s)		15.4			18.2			22.2			18.6	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	44.5%	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												
Volume (vph)	30	245	100	40	175	25	50	245	45	20	245	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	
Lane Util. Factor	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	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.96		1.00	0.98			0.98			1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1593	1617		1580	1682			1699			1718	
Flt Permitted	0.62	1.00		0.49	1.00			0.91			0.97	
Satd. Flow (perm)	1039	1617		815	1682			1563			1667	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	33	272	111	44	194	28	56	272	50	22	272	11
RTOR Reduction (vph)	0	19	0	0	7	0	0	13	0	0	4	0
Lane Group Flow (vph)	33	364	0	44	215	0	0	365	0	0	301	0
Confl. Peds. (#/hr)	3		2	2		3	1		5	5		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	4%	4%	0%	5%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4			4		
Actuated Green, G (s)	30.7	30.7		30.7	30.7			16.3			16.3	
Effective Green, g (s)	30.7	30.7		30.7	30.7			16.3			16.3	
Actuated g/C Ratio	0.56	0.56		0.56	0.56			0.30			0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	0.2	0.2		0.2	0.2			0.2			0.2	
Lane Grp Cap (vph)	579	902		454	938			463			494	
v/s Ratio Prot		c0.23			0.13							
v/s Ratio Perm	0.03			0.05				c0.23			0.18	
v/c Ratio	0.06	0.40		0.10	0.23			0.79			0.61	
Uniform Delay, d1	5.5	6.9		5.7	6.2			17.8			16.6	
Progression Factor	1.00	1.00		1.08	1.05			1.00			1.00	
Incremental Delay, d2	0.2	1.3		0.4	0.5			8.0			1.6	
Delay (s)	5.7	8.3		6.5	7.0			25.7			18.2	
Level of Service	A	A		A	A			C			B	
Approach Delay (s)		8.1			6.9			25.7			18.2	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.3%	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)	0	210	110	50	130	0	0	0	0	40	1085	115
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	
Lane Util. Factor		1.00		1.00	1.00						0.95	
Frpb, ped/bikes		1.00		1.00	1.00						1.00	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.95		1.00	1.00						0.99	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1611		1661	1716						3238	
Flt Permitted		1.00		0.33	1.00						1.00	
Satd. Flow (perm)		1611		569	1716						3238	
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)	0	221	116	53	137	0	0	0	0	42	1142	121
RTOR Reduction (vph)	0	36	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	301	0	53	137	0	0	0	0	0	1294	0
Confl. Peds. (#/hr)	3		2	2		3	2		5	5		2
Heavy Vehicles (%)	0%	1%	7%	0%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						2	
Permitted Phases				8						2		
Actuated Green, G (s)		12.9		12.9	12.9						33.1	
Effective Green, g (s)		13.4		13.4	13.4						33.6	
Actuated g/C Ratio		0.24		0.24	0.24						0.61	
Clearance Time (s)		4.5		4.5	4.5						4.5	
Vehicle Extension (s)		0.2		0.2	0.2						0.2	
Lane Grp Cap (vph)		392		138	418						1978	
v/s Ratio Prot		c0.19			0.08							
v/s Ratio Perm				0.09							0.40	
v/c Ratio		0.77		0.38	0.33						0.65	
Uniform Delay, d1		19.4		17.4	17.1						6.9	
Progression Factor		1.14		1.00	1.00						0.51	
Incremental Delay, d2		7.4		0.6	0.2						1.3	
Delay (s)		29.5		18.0	17.3						4.9	
Level of Service		C		B	B						A	
Approach Delay (s)		29.5			17.5			0.0			4.9	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.8%	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												
Volume (vph)	25	105	35	235	85	10	40	855	245	35	1235	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	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		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	
Frt		0.97		1.00	0.98		1.00	0.97		1.00	1.00	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1682		1644	1692		1662	3118		1662	3247	
Flt Permitted		0.95		0.59	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1617		1029	1692		1662	3118		1662	3247	
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)	26	111	37	247	89	11	42	900	258	37	1300	32
RTOR Reduction (vph)	0	8	0	0	4	0	0	24	0	0	2	0
Lane Group Flow (vph)	0	166	0	247	96	0	42	1134	0	37	1330	0
Confl. Peds. (#/hr)	2		2	2		2	4		4	4		4
Heavy Vehicles (%)	0%	0%	0%	1%	0%	14%	0%	2%	4%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		26.0		26.0	26.0		4.5	40.4		4.3	40.2	
Effective Green, g (s)		26.0		26.0	26.0		5.0	40.9		4.8	40.7	
Actuated g/C Ratio		0.31		0.31	0.31		0.06	0.49		0.06	0.49	
Clearance Time (s)		4.0		4.0	4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		2.5		2.5	2.5		2.5	5.5		2.5	5.5	
Lane Grp Cap (vph)		502		319	525		99	1523		95	1578	
v/s Ratio Prot					0.06		c0.03	0.36		0.02	c0.41	
v/s Ratio Perm		0.10		c0.24								
v/c Ratio		0.33		0.77	0.18		0.42	0.74		0.39	0.84	
Uniform Delay, d1		22.2		26.2	21.1		38.0	17.2		38.0	18.7	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3		10.7	0.1		2.1	2.6		1.9	4.9	
Delay (s)		22.4		36.9	21.2		40.1	19.8		40.0	23.6	
Level of Service		C		D	C		D	B		D	C	
Approach Delay (s)		22.4			32.4			20.5			24.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	83.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.9

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	95	45	205	175	85	205
Conflicting Peds, #/hr	0	3	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	0	5	0	2	2
Mvmt Flow	100	47	216	184	89	216

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	706	311	0	0	403	0
Stage 1	311	-	-	-	-	-
Stage 2	395	-	-	-	-	-
Critical Hdwy	6.42	6.2	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.3	-	-	2.218	-
Pot Cap-1 Maneuver	402	734	-	-	1156	-
Stage 1	743	-	-	-	-	-
Stage 2	681	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	366	732	-	-	1156	-
Mov Cap-2 Maneuver	366	-	-	-	-	-
Stage 1	741	-	-	-	-	-
Stage 2	622	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	17.4	0	2.5
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	436	1156	-
HCM Lane V/C Ratio	-	-	0.338	0.077	-
HCM Control Delay (s)	-	-	17.4	8.4	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.5	0.3	-

Intersection	
Int Delay, s/veh	45.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	905	70	35	380	60	30	20	15	90	45	10
Conflicting Peds, #/hr	0	0	1	1	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	25	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	0	0	5	5	0	0	0	4	10	0
Mvmt Flow	11	953	74	37	400	63	32	21	16	95	47	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	463	0	0	1026	0	0	1545	1548	990	1534	1552	433
Stage 1	-	-	-	-	-	-	1011	1011	-	505	505	-
Stage 2	-	-	-	-	-	-	534	537	-	1029	1047	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.14	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.14	5.6	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.14	5.6	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.536	4.09	3.3
Pot Cap-1 Maneuver	1109	-	-	685	-	-	94	115	302	~ 94	109	627
Stage 1	-	-	-	-	-	-	291	320	-	546	527	-
Stage 2	-	-	-	-	-	-	534	526	-	280	295	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1108	-	-	684	-	-	56	108	302	~ 72	102	626
Mov Cap-2 Maneuver	-	-	-	-	-	-	56	108	-	~ 72	102	-
Stage 1	-	-	-	-	-	-	288	317	-	541	498	-
Stage 2	-	-	-	-	-	-	449	498	-	245	292	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.8	80.9	$ 483.8
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	56	149	1108	-	-	684	-	-	85
HCM Lane V/C Ratio	0.564	0.247	0.01	-	-	0.054	-	-	1.796
HCM Control Delay (s)	132.2	36.9	8.3	-	-	10.6	-	-	$ 483.8
HCM Lane LOS	F	E	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	2.2	0.9	0	-	-	0.2	-	-	12.9

Notes
~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	3.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	620	385	75	380	100	50
Conflicting Peds, #/hr	0	3	3	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	3	0	5	2	0
Mvmt Flow	653	405	79	400	105	53

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1058	0	1413	858
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	558	-
Critical Hdwy	-	-	4.1	-	6.42	6.2
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.2	-	3.518	3.3
Pot Cap-1 Maneuver	-	-	666	-	152	359
Stage 1	-	-	-	-	417	-
Stage 2	-	-	-	-	573	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	664	-	134	358
Mov Cap-2 Maneuver	-	-	-	-	269	-
Stage 1	-	-	-	-	417	-
Stage 2	-	-	-	-	504	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	30.8
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	293	-	-	664	-
HCM Lane V/C Ratio	0.539	-	-	0.119	-
HCM Control Delay (s)	30.8	-	-	11.2	-
HCM Lane LOS	D	-	-	B	-
HCM 95th %tile Q(veh)	3	-	-	0.4	-

Intersection	
Int Delay, s/veh	14.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	25	595	20	85	420	40	15	20	35	45	45	25
Conflicting Peds, #/hr	4	0	2	2	0	4	1	0	15	15	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	7	1	9	0	4	3	0	0	0	4	0	0
Mvmt Flow	26	626	21	89	442	42	16	21	37	47	47	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	499	0	0	662	0	0	1398	1382	656	1390	1372	482
Stage 1	-	-	-	-	-	-	704	704	-	657	657	-
Stage 2	-	-	-	-	-	-	694	678	-	733	715	-
Critical Hdwy	4.17	-	-	4.1	-	-	7.1	6.5	6.2	7.14	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.14	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.14	5.5	-
Follow-up Hdwy	2.263	-	-	2.2	-	-	3.5	4	3.3	3.536	4	3.3
Pot Cap-1 Maneuver	1040	-	-	936	-	-	119	145	469	119	147	588
Stage 1	-	-	-	-	-	-	431	443	-	451	465	-
Stage 2	-	-	-	-	-	-	436	455	-	409	438	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1037	-	-	933	-	-	72	125	462	86	126	579
Mov Cap-2 Maneuver	-	-	-	-	-	-	72	125	-	86	126	-
Stage 1	-	-	-	-	-	-	415	426	-	434	415	-
Stage 2	-	-	-	-	-	-	332	406	-	348	422	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	1.4	34.7	139
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	72	233	1037	-	-	933	-	-	125
HCM Lane V/C Ratio	0.219	0.248	0.025	-	-	0.096	-	-	0.968
HCM Control Delay (s)	68.5	25.5	8.6	-	-	9.3	-	-	139
HCM Lane LOS	F	D	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.8	1	0.1	-	-	0.3	-	-	6.5

Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	40	595	35	20	470	115	10	20	10	50	55	70
Conflicting Peds, #/hr	2	0	5	5	0	2	4	0	0	0	0	4
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	10	-	-	-	-	-	200	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	2	0	0	4	1	0	0	17	0	0	2
Mvmt Flow	42	626	37	21	495	121	11	21	11	53	58	74

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	620	0	0	667	0	0	1400	1395	654	1350	1352	564
Stage 1	-	-	-	-	-	-	733	733	-	601	601	-
Stage 2	-	-	-	-	-	-	667	662	-	749	751	-
Critical Hdwy	4.13	-	-	4.1	-	-	7.1	6.5	6.37	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4	3.453	3.5	4	3.318
Pot Cap-1 Maneuver	956	-	-	932	-	-	119	143	441	129	151	525
Stage 1	-	-	-	-	-	-	415	429	-	491	493	-
Stage 2	-	-	-	-	-	-	451	462	-	407	421	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	952	-	-	928	-	-	65	133	438	104	140	521
Mov Cap-2 Maneuver	-	-	-	-	-	-	65	133	-	104	140	-
Stage 1	-	-	-	-	-	-	395	409	-	468	480	-
Stage 2	-	-	-	-	-	-	331	450	-	359	401	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.3	49.3	47.1
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	122	952	-	-	928	-	-	104	237
HCM Lane V/C Ratio	0.345	0.044	-	-	0.023	-	-	0.506	0.555
HCM Control Delay (s)	49.3	9	-	-	9	-	-	70.7	37.6
HCM Lane LOS	E	A	-	-	A	-	-	F	E
HCM 95th %tile Q(veh)	1.4	0.1	-	-	0.1	-	-	2.3	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	440	205	75	390	75	175	265	75	90	295	40
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	0.99		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	0.95		1.00	0.98		1.00	0.97		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	1628		1662	1670		1599	1678		1646	1698	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	1628		1662	1670		1599	1678		1646	1698	
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)	21	463	216	79	411	79	184	279	79	95	311	42
RTOR Reduction (vph)	0	12	0	0	5	0	0	8	0	0	4	0
Lane Group Flow (vph)	21	667	0	79	485	0	184	350	0	95	349	0
Confl. Peds. (#/hr)	5		1	1		5	2		3	3		2
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	3%	0%	2%	0%	4%	0%	1%	1%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	2.9	42.6		8.5	48.2		16.4	34.1		9.5	27.2	
Effective Green, g (s)	2.9	42.6		8.5	48.2		16.4	34.1		9.5	27.2	
Actuated g/C Ratio	0.03	0.38		0.08	0.44		0.15	0.31		0.09	0.25	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	43	626		127	727		236	516		141	417	
v/s Ratio Prot	0.01	c0.41		c0.05	0.29		c0.12	0.21		0.06	c0.21	
v/s Ratio Perm												
v/c Ratio	0.49	1.07		0.62	0.67		0.78	0.68		0.67	0.84	
Uniform Delay, d1	53.2	34.1		49.5	24.9		45.4	33.5		49.1	39.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	54.5		7.9	2.1		14.4	3.2		10.9	13.4	
Delay (s)	59.4	88.6		57.5	27.0		59.8	36.7		60.0	53.1	
Level of Service	E	F		E	C		E	D		E	D	
Approach Delay (s)		87.7			31.2			44.6			54.5	
Approach LOS		F			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	56.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.6%	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 (vph)	105	155	340	200	140	95	230	840	110	245	1105	85
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		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		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	1.00	
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1646	1733	1439	1646	1625		1614	3194		1646	3223	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	1733	1439	1646	1625		1614	3194		1646	3223	
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)	111	163	358	211	147	100	242	884	116	258	1163	89
RTOR Reduction (vph)	0	0	281	0	18	0	0	7	0	0	4	0
Lane Group Flow (vph)	111	163	77	211	229	0	242	993	0	258	1248	0
Confl. Peds. (#/hr)	1		1	1		1	4		2	2		4
Heavy Vehicles (%)	1%	1%	2%	1%	1%	0%	3%	2%	2%	1%	2%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8									
Actuated Green, G (s)	13.4	18.3	18.3	18.8	23.7		22.0	50.0		22.5	50.5	
Effective Green, g (s)	13.4	18.3	18.3	18.8	23.7		22.5	50.5		23.0	51.0	
Actuated g/C Ratio	0.11	0.14	0.14	0.15	0.19		0.18	0.40		0.18	0.40	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	4.1		2.5	4.1	
Lane Grp Cap (vph)	174	250	208	244	304		286	1274		299	1298	
v/s Ratio Prot	0.07	0.09		c0.13	c0.14		0.15	0.31		c0.16	c0.39	
v/s Ratio Perm			0.05									
v/c Ratio	0.64	0.65	0.37	0.86	0.75		0.85	0.78		0.86	0.96	
Uniform Delay, d1	54.3	51.1	48.9	52.7	48.7		50.4	33.2		50.3	36.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.6	5.3	0.8	25.5	9.7		19.7	3.3		21.6	16.7	
Delay (s)	60.8	56.5	49.7	78.2	58.4		70.1	36.5		71.8	53.6	
Level of Service	E	E	D	E	E		E	D		E	D	
Approach Delay (s)		53.4			67.5			43.0			56.7	
Approach LOS		D			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	53.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	126.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	15	60	1170	35	95	1555
Conflicting Peds, #/hr	0	0	0	3	3	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	9	1	3	2	3	1
Mvmt Flow	15	62	1206	36	98	1603

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2221	624	0	0	1242	0
Stage 1	1224	-	-	-	-	-
Stage 2	997	-	-	-	-	-
Critical Hdwy	6.98	6.92	-	-	4.16	-
Critical Hdwy Stg 1	5.98	-	-	-	-	-
Critical Hdwy Stg 2	5.98	-	-	-	-	-
Follow-up Hdwy	3.59	3.31	-	-	2.23	-
Pot Cap-1 Maneuver	34	431	-	-	551	-
Stage 1	227	-	-	-	-	-
Stage 2	302	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	28	430	-	-	550	-
Mov Cap-2 Maneuver	121	-	-	-	-	-
Stage 1	227	-	-	-	-	-
Stage 2	248	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.7	0	0.7
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	121	430	550	-
HCM Lane V/C Ratio	-	-	0.128	0.144	0.178	-
HCM Control Delay (s)	-	-	39.1	14.8	13	-
HCM Lane LOS	-	-	E	B	B	-
HCM 95th %tile Q(veh)	-	-	0.4	0.5	0.6	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	55	265	165	30	35	40
Conflicting Peds, #/hr	1	0	0	1	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	2	1	0	0	3
Mvmt Flow	61	294	183	33	39	44

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	217	0	-	0	617	201
Stage 1	-	-	-	-	200	-
Stage 2	-	-	-	-	417	-
Critical Hdwy	4.1	-	-	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.327
Pot Cap-1 Maneuver	1365	-	-	-	457	837
Stage 1	-	-	-	-	838	-
Stage 2	-	-	-	-	669	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1364	-	-	-	433	836
Mov Cap-2 Maneuver	-	-	-	-	433	-
Stage 1	-	-	-	-	838	-
Stage 2	-	-	-	-	634	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1364	-	-	-	583
HCM Lane V/C Ratio	0.045	-	-	-	0.143
HCM Control Delay (s)	7.8	0	-	-	12.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	5	1290	130	95	960	5	220	15	145	30	20	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	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		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.86		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3212		1599	3226		1646	1475		1588	1660	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.43	1.00	
Satd. Flow (perm)	1662	3212		1599	3226		1276	1475		711	1660	
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)	5	1358	137	100	1011	5	232	16	153	32	21	11
RTOR Reduction (vph)	0	4	0	0	0	0	0	119	0	0	10	0
Lane Group Flow (vph)	5	1491	0	100	1016	0	232	50	0	32	22	0
Confl. Peds. (#/hr)	2		3	3		2			4	4		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	0%	4%	3%	0%	1%	0%	1%	4%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			3	
Permitted Phases							4			3		
Actuated Green, G (s)	1.0	54.7		12.8	66.5		28.5	28.5		8.4	8.4	
Effective Green, g (s)	2.0	55.7		13.8	67.5		29.5	29.5		9.4	9.4	
Actuated g/C Ratio	0.02	0.42		0.10	0.51		0.22	0.22		0.07	0.07	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.2		2.5	4.2		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	25	1354		167	1648		284	329		50	118	
v/s Ratio Prot	0.00	c0.46		c0.06	0.31			0.03			0.01	
v/s Ratio Perm							c0.18			c0.04		
v/c Ratio	0.20	1.10		0.60	0.62		0.82	0.15		0.64	0.18	
Uniform Delay, d1	64.3	38.2		56.5	23.1		48.7	41.2		59.7	57.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	57.1		4.8	0.8		16.0	0.2		22.1	0.6	
Delay (s)	67.1	95.3		61.3	23.9		64.8	41.4		81.8	58.3	
Level of Service	E	F		E	C		E	D		F	E	
Approach Delay (s)		95.2			27.2			54.9			70.0	
Approach LOS		F			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	64.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	132.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	78.9%	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												
Volume (vph)	80	190	90	65	155	90	65	275	155	105	425	105
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	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	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	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1657	1643		1597	1716	1423	1662	1606		1638	1664	
Flt Permitted	0.65	1.00		0.53	1.00	1.00	0.31	1.00		0.41	1.00	
Satd. Flow (perm)	1140	1643		893	1716	1423	547	1606		711	1664	
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)	84	200	95	68	163	95	68	289	163	111	447	111
RTOR Reduction (vph)	0	26	0	0	0	63	0	26	0	0	11	0
Lane Group Flow (vph)	84	269	0	68	163	32	68	426	0	111	547	0
Confl. Peds. (#/hr)	4		1	1		4			9	9		
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	1%	0%	4%	2%	2%	0%	2%	2%	1%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2		2	4			8		
Actuated Green, G (s)	13.6	13.6		13.6	13.6	13.6	18.2	18.2		18.2	18.2	
Effective Green, g (s)	13.6	13.6		13.6	13.6	13.6	18.2	18.2		18.2	18.2	
Actuated g/C Ratio	0.34	0.34		0.34	0.34	0.34	0.46	0.46		0.46	0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5	2.5	2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	389	561		305	586	486	250	734		325	760	
v/s Ratio Prot		c0.16			0.10			0.27			c0.33	
v/s Ratio Perm	0.07			0.08		0.02	0.12			0.16		
v/c Ratio	0.22	0.48		0.22	0.28	0.07	0.27	0.58		0.34	0.72	
Uniform Delay, d1	9.3	10.3		9.3	9.5	8.8	6.7	8.0		6.9	8.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.5		0.3	0.2	0.0	0.4	1.0		0.5	3.1	
Delay (s)	9.5	10.8		9.6	9.7	8.9	7.1	9.0		7.4	11.8	
Level of Service	A	B		A	A	A	A	A		A	B	
Approach Delay (s)		10.5			9.4			8.7			11.1	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	39.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	5	1320	60	110	990	10	55	10	195	0	10	5
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	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.86			0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1662	3235		1614	3224		1599	1454			1676	
Flt Permitted	0.26	1.00		0.10	1.00		0.75	1.00			1.00	
Satd. Flow (perm)	459	3235		178	3224		1257	1454			1676	
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)	5	1389	63	116	1042	11	58	11	205	0	11	5
RTOR Reduction (vph)	0	2	0	0	0	0	0	177	0	0	4	0
Lane Group Flow (vph)	5	1450	0	116	1053	0	58	39	0	0	12	0
Confl. Peds. (#/hr)			2	2					2	2		
Heavy Vehicles (%)	0%	2%	2%	3%	3%	0%	4%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA			NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	45.7	44.9		54.5	49.2		10.0	10.0			10.0	
Effective Green, g (s)	46.7	44.9		55.0	49.7		10.0	10.0			10.0	
Actuated g/C Ratio	0.64	0.62		0.75	0.68		0.14	0.14			0.14	
Clearance Time (s)	4.5	4.0		4.5	4.5		4.0	4.0			4.0	
Vehicle Extension (s)	2.5	4.1		2.5	4.1		2.5	2.5			2.5	
Lane Grp Cap (vph)	315	1989		254	2194		172	199			229	
v/s Ratio Prot	0.00	c0.45		c0.04	0.33			0.03			0.01	
v/s Ratio Perm	0.01			0.31			c0.05					
v/c Ratio	0.02	0.73		0.46	0.48		0.34	0.20			0.05	
Uniform Delay, d1	4.8	9.8		7.1	5.5		28.5	27.9			27.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0	1.5		0.9	0.2		0.8	0.4			0.1	
Delay (s)	4.8	11.3		8.1	5.8		29.4	28.3			27.4	
Level of Service	A	B		A	A		C	C			C	
Approach Delay (s)		11.3			6.0			28.5			27.4	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	70	955	155	55	615	10	365	15	115	25	25	55
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
Frpb, ped/bikes	1.00	1.00	0.99	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	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1662	3292	1438	1630	3191		3193	1505		1662	1750	1488
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1662	3292	1438	1630	3191		3193	1505		1662	1750	1488
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)	74	1005	163	58	647	11	384	16	121	26	26	58
RTOR Reduction (vph)	0	0	62	0	1	0	0	106	0	0	0	50
Lane Group Flow (vph)	74	1005	101	58	657	0	384	31	0	26	26	8
Confl. Peds. (#/hr)			3	3								
Heavy Vehicles (%)	0%	1%	2%	2%	4%	0%	1%	0%	1%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases			2									4
Actuated Green, G (s)	3.9	28.5	28.5	2.6	27.2		6.0	7.1		2.2	3.3	7.2
Effective Green, g (s)	4.4	30.0	30.0	3.1	28.7		6.5	7.6		2.7	3.8	8.2
Actuated g/C Ratio	0.07	0.51	0.51	0.05	0.48		0.11	0.13		0.05	0.06	0.14
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.8	4.8	2.5	4.8		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	123	1662	726	85	1541		349	192		75	111	305
v/s Ratio Prot	c0.04	c0.31		0.04	0.21		c0.12	c0.02		0.02	0.01	0.00
v/s Ratio Perm			0.07									0.00
v/c Ratio	0.60	0.60	0.14	0.68	0.43		1.10	0.16		0.35	0.23	0.03
Uniform Delay, d1	26.7	10.5	7.8	27.7	10.0		26.4	23.1		27.5	26.4	22.1
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.8	0.9	0.2	18.7	0.4		77.9	0.3		2.0	0.8	0.0
Delay (s)	33.5	11.4	8.0	46.3	10.4		104.4	23.4		29.5	27.2	22.2
Level of Service	C	B	A	D	B		F	C		C	C	C
Approach Delay (s)		12.2			13.3			83.1			25.1	
Approach LOS		B			B			F			C	

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	59.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	105	75	50	250	320	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	75	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	4	4	3	2	4
Mvmt Flow	117	83	56	278	356	128

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	808	419	483	0	-	0
Stage 1	419	-	-	-	-	-
Stage 2	389	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.14	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.236	-	-	-
Pot Cap-1 Maneuver	353	630	1069	-	-	-
Stage 1	668	-	-	-	-	-
Stage 2	689	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	335	630	1069	-	-	-
Mov Cap-2 Maneuver	454	-	-	-	-	-
Stage 1	668	-	-	-	-	-
Stage 2	653	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1069	-	454	630	-	-
HCM Lane V/C Ratio	0.052	-	0.257	0.132	-	-
HCM Control Delay (s)	8.6	-	15.7	11.6	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1	0.5	-	-

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	120	115	10	120	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	4	3	0	4	2
Mvmt Flow	11	126	121	11	126	132

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	510	126	0	0	132	0
Stage 1	126	-	-	-	-	-
Stage 2	384	-	-	-	-	-
Critical Hdwy	6.4	6.24	-	-	4.14	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	-	-	2.236	-
Pot Cap-1 Maneuver	527	919	-	-	1441	-
Stage 1	905	-	-	-	-	-
Stage 2	693	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	477	919	-	-	1441	-
Mov Cap-2 Maneuver	477	-	-	-	-	-
Stage 1	905	-	-	-	-	-
Stage 2	628	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	3.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	858	1441	-
HCM Lane V/C Ratio	-	-	0.159	0.088	-
HCM Control Delay (s)	-	-	10	7.7	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.3	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	60	1015	630	10	5	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	150	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	1	4	0	0	0
Mvmt Flow	63	1068	663	11	5	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	663	0	-	0	1324	332
Stage 1	-	-	-	-	663	-
Stage 2	-	-	-	-	661	-
Critical Hdwy	4.1	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	935	-	-	-	150	670
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	481	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	935	-	-	-	140	670
Mov Cap-2 Maneuver	-	-	-	-	276	-
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	449	-

Approach	EB	WB	SW
HCM Control Delay, s	0.5	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	935	-	-	-	569
HCM Lane V/C Ratio	0.068	-	-	-	0.074
HCM Control Delay (s)	9.1	-	-	-	11.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	980	35	60	620	20	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	50	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	0	3	4	0	0
Mvmt Flow	1032	37	63	653	21	116

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1032	0	1485	516
Stage 1	-	-	-	-	1032	-
Stage 2	-	-	-	-	453	-
Critical Hdwy	-	-	4.16	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.23	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	663	-	118	509
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	613	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	663	-	107	509
Mov Cap-2 Maneuver	-	-	-	-	225	-
Stage 1	-	-	-	-	309	-
Stage 2	-	-	-	-	555	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	17.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	426	-	-	663	-
HCM Lane V/C Ratio	0.321	-	-	0.095	-
HCM Control Delay (s)	17.4	-	-	11	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	1.4	-	-	0.3	-

Memo #9 Solutions Evaluation

MEMORANDUM

DATE: March 30, 2018

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #9: Solutions Evaluation P14180-012

This document details the transportation system investments recommended to serve travel in Lebanon. Included is a summary of the process utilized to develop and analyze the solutions and a description of the projects identified to improve the transportation system in the city.

Transportation Vision Statement

Before developing projects, we must first talk about the ideal transportation system for the city. The following vision statement was developed with the Project Advisory and Technical Advisory Committee to provide direction for the future of the transportation system.

> *The design of transportation infrastructure promotes safe, comfortable travel, shows respect for the city's resources, and showcases the natural environment. All transportation modes flow smoothly and safely to and throughout the city, meeting the needs of residents, businesses, visitors, and people of all physical and financial conditions. Connectivity facilitates travel between and within each neighborhood, where walking and biking environments complement mixed-use development.*

The vision statement and eight associated goals (see Technical Memorandum #4: Goals, Objectives and Evaluation Criteria) describe the desires of the city with regard to its transportation system. The eight transportation goals also help set priorities for transportation solutions. It is not the expectation that the city must achieve this vision, but instead that it act as a guide for developing projects within the TSP.

Approach to Developing Project

Lebanon's approach to developing transportation projects emphasized improved system efficiency and management over adding capacity. The approach considered four tiers of priorities that included:

1. Highest Priority – preserve the function of the system through management practices such as improved traffic signal operations, encouraging alternative modes of travel, and implementation of new policies and standards.

2. High Priority – improve existing facility efficiency through minor enhancement projects that upgrade roads to desired standards, fill important system connectivity gaps, or include safety improvements to intersections and corridors.

3. Moderate Priority – add capacity to the system by widening, constructing major improvements to existing roadways, or extending existing roadways to create parallel routes to congested corridors.

4. Lowest Priority – add capacity to the system by constructing new facilities.

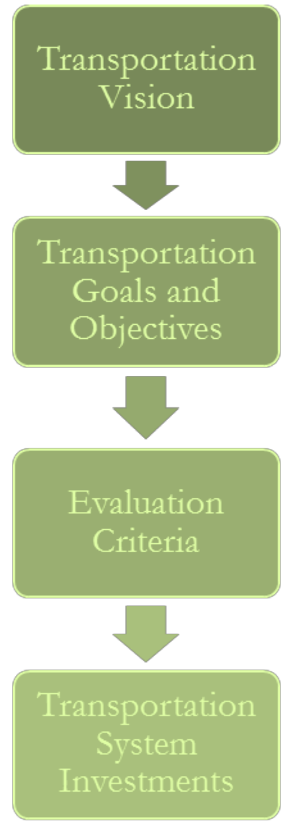

Figure 1: Reflecting the Vision in the Plan

The project team recommended higher priority solution types to address identified needs unless a lower priority solution was clearly more cost-effective or better supported the goals and objectives of the city. This process allowed the city to maximize use of available funds, minimize impacts to the natural and built environments, and balance investments across all modes of travel.

Measurable evaluation criteria was used (see Technical Memorandum #4: Goals, Objectives and Evaluation Criteria) based on the goals and objectives to screen and prioritize transportation solutions (see Figure 1). Projects deemed to contribute more towards achieving the transportation goals of Lebanon ranked higher, and the plan assigned higher priority to their implementation. Solutions recommended, consequently, are consistent with the goals and objectives.

TSP Investments

Earlier in this plan update, we worked with the city and ODOT to make our best guess about how much transportation funding might be available for local improvement projects (see Technical Memorandum #7 for details) over the 20-year planning horizon. Not all projects can be funded, so we developed a process for evaluating and ranking projects to help identify which transportation investments would be most valued by the community. As a reminder, the terminology being applied here is as follows:

- **Aspirational Projects** – The complete list of desired transportation projects within Lebanon. Depending on who is responsible for the roadway, the improvement project may be led by either the city, ODOT or county at a future date.

- **Financially Constrained Projects** – These are the most valued projects, in terms of how they meet critical needs and how well they work to deliver on community goals. In practice, they are a subset of the Aspirational Projects. Projects in this group have a total construction budget that is similar to the reasonably available funding over the planning horizon.

The full list of aspirational and financially constrained projects, shown in Table 1, includes 179 projects, totaling an estimated $232 million worth of investments. The TSP's multi-modal, network-wide approach to identifying transportation system solutions assigns the projects to one of several categories:

- **Motor vehicle** projects would improve safety and mobility throughout the city for motorists. Lebanon identified 41 projects to construct new roadways, or improve existing roadway segments, intersections and bridges, that, as originally proposed, would cost an estimated $81 million to complete.
- **Pedestrian and Bicycle** projects include sidewalk, path and roadway crossing improvements, and an integrated network of bicycle lanes, marked on-street routes and shared-use paths to facilitate safe and convenient travel citywide. Lebanon identified 129 pedestrian and bicycle projects that, as originally proposed, would cost an estimated $148 million to complete.
- **Transit** projects would enhance the quality and convenience for passengers. A total of six transit projects, as originally proposed, would cost an estimated $3 million.
- **Demand and System Management** projects to encourage more efficient usage of the transportation system. A total of three projects, as originally proposed, would cost an estimated $200 thousand.

Funding Gap

Each project was assigned a primary source of funding for planning purposes (city, state, county), although such designations do not create any obligation for funding. The $197 million total cost of the 151 identified locally-funded transportation system projects is far greater than the city's ability to raise funds with their existing programs. Much of Lebanon's current revenue streams for transportation fund maintenance of the existing system. Rising maintenance costs through 2040 will diminish the funds available for improvements. Unless Lebanon develops additional revenue streams, the city can expect to have no more than $27 million of local street funds to spend on locally-funded improvements over the next 20 years.

The TSP has identified over $26 million worth of needed investments (spread out over 19 projects) along state highways. ODOT has indicated that only $8.5 million in discretionary state and/or federal funds may be available to invest in Lebanon over the next 20 years[1] for system modernization and enhancement.

The TSP has identified nine projects estimated at over $9 million for which Linn County would be the primary source of funding.

Prioritizing Investments

Unless the city expands its funding options, very few of the desired transportation system projects on the city roadway system and along state highways are likely to happen before 2040. For this reason, the TSP splits transportation solutions into improvement packages.

- Package 1 is Financially Constrained, meaning it includes an estimate of how the city would use the $27 million likely to be available through existing city funding sources. Package 1 also includes an estimate of how the city would use revenue from various state and/or federal sources.
- Package 2 identifies projects from the Aspirational Project List that are highly supported but that, due to cost or jurisdiction, were unable to be included in the Financially Constrained list. Should additional funding become available, these are projects the city may want to consider.
- Package 3 is comprised of the Aspirational Projects, those remaining projects that likely would not have city or state funding by 2040.

The TSP evaluated and compared all proposed projects using the TSP goals and respective evaluation criteria. Based on a project's contribution to achieving the transportation goals of Lebanon, the process assigned each transportation solution a priority. The process favored implementation of low cost projects that would have more immediate impacts and spread investment benefits citywide.

Although the TSP identifies priorities for the investments, the city does not have to implement the projects in that order. Future circumstances could allow or require the city to

[1] The State has not committed any future funding for projects in Lebanon. This assumption is for long-range planning purposes only. This estimate is based on assuming that Lebanon will receive a reasonable share of the state/federal funding projected to be available over the 20-year planning horizon in Region 2 and based on ODOT sustaining their current revenue structure. It is used to illustrate the degree of financial constraints faced by ODOT as of the writing of this document. Actual funding through state and federal sources may be higher or lower than this estimate, which does not include projects that the federal Highway Safety Improvement Program (HSIP) could fund.

fund projects not on the Financially Constrained project list to address an unanticipated transportation need or take advantage of an unexpected opportunity.

The Aspirational Plan

The Aspirational Plan identifies valuable solutions that will not have funding by 2040, unless additional sources become available. Some of the projects require city funding and resources beyond what is available in the time frame of this plan. Others are contingent upon grants. Some of the Aspirational projects in Table 1 and in Figures 2, 3 and 4 have designations of Package 2, indicating their priority, should the city develop new sources of funding.

The aspirational projects address the gaps and deficiencies identified in Technical Memorandum #8 (Future Transportation Conditions and Needs) and was developed by following the four-tiered identification process detailed earlier in this document. The set includes projects for all of the major modes of travel in the city (motor vehicle, pedestrian, bicycle and transit). The full list of aspirational projects, shown in Table 1, and Figures 2, 3 and 4, includes those proposed in previous plans and studies as well as those added through the TSP planning process. The TSP planning process eliminates any project that may not be feasible for reasons other than financial (such as environmental or existing development limitations).

The Financially Constrained Plan

The Financially Constrained Plan identifies the transportation solutions that the city prioritizes for funding and implementation by 2040, presented in Table 1 and Figures 2, 3 and 4.

ODOT has projected that the city could receive up to $8.5 million from various state and/or federal sources over the next 20 years. Based on current needs, Table 1 and Figures 2, 3 and 4 show how the city would use the state funds. Because ODOT supports all of the projects listed in the Constrained and Aspirational Plans equally, they are illustrative only and ODOT does not give them higher priority than any other state highway project in the city's list. The city may modify and adapt the list within the limits of the financial constraint threshold, as it currently exists or as it may evolve, to advance any supported project along state highways in response to any opportunity or issue that may arise during the planning horizon.

Financially Constrained and Aspirational Projects

The following pages include the Financially Constrained and Aspirational Projects in table form and on an accompanying maps. Improvement Package 1, Financially Constrained Plan, totals the $27 million expected to be available through existing city funding sources. It also suggests how the city would use a likely amount of revenue from state and/or federal sources. Improvement Package 2 identifies projects from the Aspirational project list that are highly supported but that, due to cost or jurisdiction, were unable to be included in the Financially Constrained list. Should additional funding become available, these are projects the city may want to consider. Improvement Package 3, Aspirational Plan, includes projects that likely would not have city or state funding by 2040.

The project design elements depicted are identified for the purpose of creating a reasonable cost estimate for planning purposes. The actual design elements for any project are subject to change and will ultimately be determined through a preliminary and final design process, and are subject to city and/or ODOT approval.

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
Demand and System Management Projects							
A	Neighborhood Traffic Calming Program	Implement program to process community requests for neighborhood traffic calming, investigate options, and implement improvements.	Reduce motor vehicle travel speeds along residential streets.	Demand / System Management	$100,000	City	1
B	Bike Parking Program	Install new bike parking throughout the city.	Increase bike parking.	Demand / System Management	$30,000	City	1
C	Wayfinding Signage Program	Install wayfinding signage to assist pedestrians and bicyclists in choosing comfortable routes and to help visitors navigate through the city.	Improve wayfinding signage.	Demand / System Management	$75,000	City	1
Transit Projects							
T1	Cascade Ridge Transit Stop	Improve transit stop amenities as needed, to include sheltered stops with seating, landing pads, route information, bicycle parking and improved lighting.	Enhance transit service and amenities.	Transit	$75,000	City	1
T2	US 20 northbound/ Oak Street Transit Stop	Improve transit stop amenities as needed, to include sheltered stops with seating, landing pads, route information, bicycle parking and improved lighting.	Enhance transit service and amenities.	Transit	$75,000	City	1

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
T3	US 20 southbound/ Oak Street Transit Stop	Improve transit stop amenities as needed, to include sheltered stops with seating, landing pads, route information, bicycle parking and improved lighting.	Enhance transit service and amenities.	Transit	$75,000	City	1
T4	US 20/ Airport Road Transit Stop	Improve transit stop amenities as needed, to include sheltered stops with seating, landing pads, route information, bicycle parking and improved lighting.	Enhance transit service and amenities.	Transit	$75,000	City	1
T5	Lebanon Walmart Transit Stop	Improve transit stop amenities as needed, to include sheltered stops with seating, landing pads, route information, bicycle parking and improved lighting.	Enhance transit service and amenities.	Transit	$75,000	City	1
T6	Implement Deviated Fixed-Route Transit	Implement deviated fixed-route transit service, as identified in the Lebanon Transit Development Plan.	Enhance transit service and amenities.	Transit	$2,750,000 ($125,000 annually)	City/ State	2
Motor Vehicle Projects							
D1	Hansard Avenue extension from Reeves Parkway to Gore Drive	Extend Hansard Avenue from Reeves Parkway to Gore Drive. This street should be constructed as a Minor Arterial, with a sidewalk and bike lane on the east side and shared-use path on the west side.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$4,500,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
D2	New east to west street between the Hansard Avenue extension and the N. 5th Street extension	Construct a new east to west street between the Hansard Avenue extension and the N. 5th Street extension. This street should be constructed as a Collector, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$4,300,000	City	3
D3	N. 5th Street extension from Reeves Parkway to the new east to west street	Extend N. 5th Street from Reeves Parkway to the new east to west street. This street should be constructed as a Collector, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$1,025,000	City	3
D4	Reeves Parkway extension west of Hansard Avenue	Extend Reeves Parkway to the west of Hansard Avenue. This street should be constructed as a Minor Arterial, with a shared-use path on the north side and sidewalk and bike lane on the south side.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$2,725,000	City	3
D5	Lebanon Parkway extension from Oak Street to OR 34	Extend Lebanon Parkway from Oak Street to OR 34. This street should be constructed as a Collector, with a sidewalk and bike lane on the east side and shared-use path on the west side.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$4,450,000	City	3
D6	Lebanon Parkway extension from Oak Street to Airport Road	Extend Lebanon Parkway from Oak Street to Airport Road. This street should be constructed as a Collector, with a sidewalk and bike lane on the east side and shared-use path on the west side.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$4,475,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
D7	F Street extension from 12th Street to Airway Road	Extend F Street from 12th Street to Airway Road. This street should be constructed as a Collector, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$1,375,000	City	3
D8	Airport Road Realignment	Realign Airport Road to the south of the Lebanon Airport to allow for runway expansion. This street should be constructed as a Minor Arterial, with a sidewalk and bike lane on the north side and shared-use path on the south side.	Runway expansion; walking and biking facility gap	Airport (Pedestrian/ Bicycle)	$2,750,000	City	3
D9	Airway Road extension from Airport Road to the Walker Road extension	Extend Airway Road from Airport Road to the Walker Road extension. This street should be constructed as a Collector, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$2,525,000	City	3
D10	12th Street extension from Kees Street to Stoltz Hill Road	Extend 12th Street from Kees Street to Stoltz Hill Road. This street should be constructed as a Minor Arterial, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$1,650,000	City	2
D11	Walker Road extension from Stoltz Hill Road to Airport Road	Extend Walker Road from Stoltz Hill Road to Airport Road. This street should be constructed as a Collector, with a sidewalk and bike lane on the north side and shared-use path on the south side.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$6,325,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
D12	Crowfoot Road extension from South Main Road to 5th Street	Extend Crowfoot Road from South Main Road to 5th Street. This street should be constructed as a Collector, with a shared-use path and bike lane on the north side and sidewalk on the south side.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$2,275,000	City	3
D13	Weldwood Drive extension from Cascade Drive to Lebanite Drive	Extend Weldwood Drive from Cascade Drive to Lebanite Drive. This street should be constructed as a Collector, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$1,175,000	City	1
D14	Crowfoot Road realignment to Weirich Drive	Realign Crowfoot Road to connect with Weirich Drive at US 20, and improve the intersection (e.g., possible installation of a roundabout or traffic signal, if warranted). This street should be constructed as a Minor Arterial, with a shared-use path on the north side and sidewalk and bike lane on the south side.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$2,675,000	County/ State	3
D15	Burdell Boulevard extension to Market Street	Extend Burdell Boulevard to connect with Market Street at US 20. This street should be constructed as a Collector, with sidewalks and bike lanes. Create a Local Street connection to Railroad Street, with sidewalks and pavement markings/ signage designating it as a shared street for bikes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$2,500,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
D16	Dewey Street realignment to Walker Road	Realign Dewey Street to connect with Walker Road at US 20. This street should be constructed as a Collector, with sidewalks and pavement markings/ signage designating it as a shared street for bikes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	Funded	City	1
D17	Airport Road extension to Russell Drive	Extend Airport Road to Russell Drive. This street should be constructed as a Minor Arterial, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	Funded	City	1
D18	Mayfly Street extension from Mountain River Drive to the Milton Street extension	Extend Mayfly Street from Mountain River Drive to the Milton Street extension. This street should be constructed as a Local Street, with sidewalks and pavement markings/ signage designating it as a shared street for bikes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$3,450,000	City	3
D19	New north to south street between Grant Street and the Milton Street extension	Construct a new north to south street between Grant Street and the Milton Street extension. This street should be constructed as a Collector, with sidewalks and pavement markings/ signage designating it as a shared street for bikes. This street will require a new rail crossing (pending a ODOT Rail crossing order).	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$2,800,000	City	3
D20	Milton Street extension from Post Street to the Mayfly Street extension	Extend Milton Street from Post Street to the Mayfly Street extension. This street should be constructed as a Collector, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$1,200,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
D21	Oak Street extension from River Street to the new north to south street	Extend Oak Street from River Street to the new north to south street. This street should be constructed as a Collector, with sidewalks and bike lanes.	Street connectivity; walking and biking facility gap	Motor Vehicle (Pedestrian/ Bicycle)	$1,050,000	City	2
D22	US 20/ Reeves Parkway intersection improvements	Intersection improvements (e.g., possible installation of a roundabout or traffic signal, if warranted).	Motor vehicle congestion	Motor Vehicle	$2,000,000	State	1
D23	US 20/ Mullins Drive intersection improvements	Intersection improvements (e.g., possible installation of a roundabout or traffic signal, if warranted).	Motor vehicle congestion	Motor Vehicle	$2,000,000	State	3
D24	US 20/ Industrial Way intersection improvements	Intersection improvements (e.g., installation of a westbound left-turn lane on Industrial Way).	Motor vehicle congestion	Motor Vehicle	$175,000	State	3
D25	US 20/ OR 34 - Wheeler Street intersection improvements	Intersection improvements (e.g., installation of a southbound right-turn lane on US 20)	Motor vehicle congestion	Motor Vehicle	$1,050,000	State	1
D26	Wheeler Street bridge over Lebanon Santiam Canal improvements	Provide improvements to the structurally deficient Wheeler Street bridge over Lebanon Santiam Canal.	Bridge improvement	Motor Vehicle	$1,000,000	County	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
D27	OR 34/ N. 2nd Street - S. 2nd Street intersection improvements	Intersection improvements (e.g., installation of left-turn lanes on OR 34 to N. 2nd Street and S. 2nd Street).	Motor vehicle safety	Motor Vehicle	$650,000	State	3
D28	OR 34/ 5th Street intersection improvements	Intersection improvements (e.g., installation of northbound and southbound left-turn lanes on 5th Street).	Motor vehicle congestion	Motor Vehicle	$525,000	State	1
D29	OR 34/ 12th Street intersection improvements	Intersection improvements (e.g., installation of northbound left-turn lane on 12th Street).	Motor vehicle safety	Motor Vehicle	$300,000	State	1
D30	Oak Street/ Lebanon Parkway extension intersection Improvements	Intersection improvements (e.g., possible installation of a roundabout or traffic signal, if warranted).	Motor vehicle congestion	Motor Vehicle	$2,000,000	City	3
D31	Oak Street/ 12th Street intersection Improvements	Intersection improvements (e.g., possible installation of a roundabout or traffic signal, if warranted).	Motor vehicle congestion	Motor Vehicle	$2,000,000	City	1
D32	Airport Road/ Lebanon Parkway extension intersection Improvements	Intersection improvements (e.g., possible installation of a roundabout or traffic signal, if warranted).	Motor vehicle congestion	Motor Vehicle	$2,000,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
D33	Airport Road/ Airway Road intersection Improvements	Intersection improvements (e.g., possible installation of a roundabout or traffic signal, if warranted).	Motor vehicle congestion	Motor Vehicle	$2,000,000	City	3
D34	Airport Road/ 12th Street intersection Improvements	Intersection improvements (e.g., possible installation of a roundabout or traffic signal, if warranted).	Motor vehicle congestion	Motor Vehicle	$2,000,000	City	1
D35	Airport Road/ 7th Street intersection Improvements	Intersection improvements (e.g., installation of a southbound left-turn lane on 7th Street)	Motor vehicle congestion	Motor Vehicle	$275,000	City	3
D36	12th Street extension/ Walker Road intersection Improvements	Intersection improvements (e.g., possible installation of a roundabout or traffic signal, if warranted, and realignment of Stoltz Hill Road).	Motor vehicle congestion	Motor Vehicle	$3,300,000	City	2
D37	Stoltz Hill Road bridge over Oak Creek improvements	Provide improvements to the structurally deficient Stoltz Hill Road bridge over Oak Creek.	Bridge improvement	Motor Vehicle	$750,000	City	3
D38	5th Street bridge over Oak Creek improvements	Provide improvements to the structurally deficient 5th Street bridge over Oak Creek.	Bridge improvement	Motor Vehicle	$750,000	City	3
D39	Rock Hill Drive bridge over Oak Creek improvements	Provide improvements to the structurally deficient Rock Hill Drive bridge over Oak Creek.	Bridge improvement	Motor Vehicle	$750,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
D40	Crowfoot Road/ Cascade Drive intersection Improvements	Intersection improvements (e.g., possible installation of a roundabout).	Motor vehicle safety	Motor Vehicle	$2,375,000	County	2
D41	River Drive bridge over Lebanon Santiam Canal improvements	Provide improvements to the structurally deficient River Drive bridge over Lebanon Santiam Canal.	Bridge improvement	Motor Vehicle	$750,000	City	3
Pedestrian Projects							
P1	Wheeler Street pedestrian improvements between Williams Street and the Albany Santiam Canal	Add pedestrian improvements to Wheeler Street between Williams Street and the Albany Santiam Canal (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$400,000	City	3
P2	Tennessee Road pedestrian improvements between Wheeler Street and Beaton Lane	Add pedestrian improvements to Tennessee Road between Wheeler Street and Beaton Lane (e.g., complete sidewalk gap on the west side).	Walking facility gap	Pedestrian	$525,000	City	2
P3	OR 34 pedestrian improvements between the west urban growth boundary and 12th Street	Add pedestrian improvements to OR 34 between the west urban growth boundary and 12th Street (e.g., complete sidewalk gap on the north side).	Walking facility gap	Pedestrian	$1,125,000	State	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
P4	10th Street pedestrian improvements between OR 34 and Ash Street	Add pedestrian improvements to 10th Street between OR 34 and Ash Street (e.g., complete sidewalk gap on the west side).	Walking facility gap	Pedestrian	$925,000	City	3
P5	Sherman Street pedestrian improvements between 8th Street and 11th Street	Add pedestrian improvements to Sherman Street between 8th Street and 11th Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$525,000	City	3
P6	7th Street pedestrian improvements between Rose Street and Grant Street	Add pedestrian improvements to 7th Street between Rose Street and Grant Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$500,000	City	3
P7	Oak Street pedestrian improvements between the west urban growth boundary and Airway Road	Add pedestrian improvements to Oak Street between the west urban growth boundary and Airway Road (e.g., complete sidewalk gap on the south side).	Walking facility gap	Pedestrian	$1,100,000	City	3
P8	Airway Road pedestrian improvements between Oak Street and Airport Road	Add pedestrian improvements to Airway Road between Oak Street and Airport Road (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$2,700,000	City	3
P9	12th Street pedestrian improvements between Oak Street and F Street	Add pedestrian improvements to 12th Street between Oak Street and F Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$700,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
P10	12th Street pedestrian improvements between F Street and Antioch Street	Add pedestrian improvements to 12th Street between F Street and Antioch Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$1,175,000	City	3
P11	F Street pedestrian improvements between 12th Street and E Street	Add pedestrian improvements to F Street between 12th Street and E Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$950,000	City	3
P12	7th Street pedestrian improvements between E Street and Airport Road	Add pedestrian improvements to 7th Street between E Street and Airport Road (e.g., complete sidewalk gap on the west side).	Walking facility gap	Pedestrian	$750,000	City	2
P13	7th Street pedestrian improvements between Airport Road and Wassom Street	Add pedestrian improvements to 7th Street between Airport Road and Wassom Street (e.g., complete sidewalk gap on the west side).	Walking facility gap	Pedestrian	$600,000	City	2
P14	Airport Road pedestrian improvements between Airway Road and 7th Street	Add pedestrian improvements to Airport Road between Airway Road and 7th Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$2,600,000	City	1

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
P15	Airport Road pedestrian improvements between the west urban growth boundary and the Airport Road realignment	Add pedestrian improvements to Airport Road between the west urban growth boundary and the Airport Road realignment (e.g., complete sidewalk gap on the north side).	Walking facility gap	Pedestrian	$350,000	City	3
P16	Walker Road pedestrian improvements between Stoltz Hill Road and 9th Street	Add pedestrian improvements to Walker Road between Stoltz Hill Road and 9th Street (e.g., complete sidewalk gap on the north side).	Walking facility gap	Pedestrian	$450,000	City	3
P17	Stoltz Hill Road pedestrian improvements between Airport Road and Walker Road	Add pedestrian improvements to Stoltz Hill Road between Airport Road and Walker Road (e.g., complete sidewalk gap on the east side).	Walking facility gap	Pedestrian	$900,000	City	3
P18	Stoltz Hill Road pedestrian improvements between Walker Road and Vaughan Lane	Add pedestrian improvements to Stoltz Hill Road between Walker Road and Vaughan Lane (e.g., complete sidewalk gap on the east side).	Walking facility gap	Pedestrian	$1,325,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
P19	10th Street pedestrian improvements between Charlie Avenue and Vaughan Lane	Add pedestrian improvements to 10th Street between Charlie Avenue and Vaughan Lane (e.g., complete sidewalk gap on the west side).	Walking facility gap	Pedestrian	$275,000	City	3
P20	Vaughan Lane pedestrian improvements between Stoltz Hill Road and 10th Street	Add pedestrian improvements to Vaughan Lane between Stoltz Hill Road and 10th Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$1,850,000	City	3
P21	Vaughan Lane pedestrian improvements between 10th Street and 5th Street	Add pedestrian improvements to Vaughan Lane between 10th Street and 5th Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$1,125,000	City	1
P22	Vaughan Lane pedestrian improvements between 5th Street and South Main Road	Add pedestrian improvements to Vaughan Lane between 5th Street and South Main Road (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$1,300,000	City	1
P23	5th Street pedestrian improvements between Vaughan Lane and Oak Creek	Add pedestrian improvements to 5th Street between Vaughan Lane and Oak Creek (e.g., complete sidewalk gaps on the east side).	Walking facility gap	Pedestrian	$550,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
P24	Crowfoot Road pedestrian improvements between South Main Road and View Lane	Add pedestrian improvements to Crowfoot Road between South Main Road and View Lane (e.g., complete sidewalk gap on the south side).	Walking facility gap	Pedestrian	$675,000	County	2
P25	Crowfoot Road pedestrian improvements between View Lane and Cascade Drive	Add pedestrian improvements to Crowfoot Road between View Lane and Cascade Drive (e.g., complete sidewalk gap on the south side).	Walking facility gap	Pedestrian	$1,300,000	County	2
P26	Crowfoot Road pedestrian improvements between Cascade Drive and the Crowfoot Road realignment	Add pedestrian improvements to Crowfoot Road between Cascade Drive and the Crowfoot Road realignment (e.g., complete sidewalk gap on the south side).	Walking facility gap	Pedestrian	$375,000	County	3
P27	Cascade Drive pedestrian improvements between Weldwood Drive and Crowfoot Road	Add pedestrian improvements to Cascade Drive between Weldwood Drive and Crowfoot Road (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$1,475,000	City	1

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
P28	Russell Drive pedestrian improvements between Porter Street and Mountain River Drive	Add pedestrian improvements to Russell Drive between Porter Street and Mountain River Drive (e.g., complete sidewalk gap on the north side).	Walking facility gap	Pedestrian	$675,000	City	3
P29	Franklin Street pedestrian improvements between Russell Drive and the Lebanon Santiam Canal	Add pedestrian improvements to Franklin Street between Russell Drive and the Lebanon Santiam Canal (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$1,125,000	City	3
P30	Franklin Street pedestrian improvements between Oak Street and Elmore Street	Add pedestrian improvements to Franklin Street between Oak Street and Elmore Street (e.g., complete sidewalk gaps on both sides).	Walking facility gap	Pedestrian	$275,000	City	3
P31	Oak Street pedestrian improvements between Grove Street and Williams Street	Add pedestrian improvements to Oak Street between Grove Street and Williams Street (e.g., complete sidewalk gap on the south side).	Walking facility gap	Pedestrian	$175,000	City	3
Bicycle Projects							
B1	US 20 bicycle improvements between Olive Street and Wheeler Street	Add bicycle improvements to US 20 between Olive Street and Wheeler Street (e.g., bike lanes).	Biking facility gap	Bicycle	$1,200,000	State	1

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
B2	N Williams Street bicycle improvements between Wheeler Street and Olive Street	Add bicycle improvements to N Williams Street between Wheeler Street and Olive Street (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$25,000	City	3
B3	Wheeler Street bicycle improvements between US 20 and the Albany Santiam Canal	Add bicycle improvements to Wheeler Street between US 20 and the Albany Santiam Canal (e.g., restripe with bike lanes).	Biking facility gap	Bicycle	$75,000	City	3
B4	12th Street bicycle improvements between Sherman Street and Oak Street	Add bicycle improvements to 12th Street between Sherman Street and Oak Street (e.g., bike lanes).	Biking facility gap	Bicycle	$825,000	City	1
B5	9th Street-Sherman Street-Airway Road bicycle improvements between US 20 and S. 2nd Street, and Oak Street and 7th Street	Add bicycle improvements to 9th Street, Vine Street, 7th Street, Sherman Street and Airway Road between US 20 and S. 2nd Street, and Oak Street and 7th Street (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$75,000	City	1
B6	S. 2nd Street bicycle improvements between OR 34 and Oak Street	Add bicycle improvements to S. 2nd Street between OR 34 and Oak Street (e.g., restripe with bike lanes).	Biking facility gap	Bicycle	$100,000	City	1

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
B7	Grove Street bicycle improvements between Wheeler Street and Milton Street	Add bicycle improvements to Grove Street between Wheeler Street and Milton Street (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$75,000	City	1
B8	Sherman Street-Hiatt Street bicycle improvements between S. 2nd Street and Milton Street	Add bicycle improvements to Sherman Street-Hiatt Street between S. 2nd Street and Milton Street (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$75,000	City	1
B9	Oak Street bicycle improvements between S. 2nd Street and the east terminus of the street	Add bicycle improvements to Oak Street between S. 2nd Street and the east terminus of the street (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$25,000	City	3
B10	Oak Street bicycle improvements between S. 2nd Street and Williams Street	Add bicycle improvements to Oak Street between S. 2nd Street and Williams Street (e.g., bike lanes).	Biking facility gap	Bicycle	$1,325,000	City	3
B11	Oak Street bicycle improvements between 7th Street and S. 2nd Street	Add bicycle improvements to Oak Street between 7th Street and S. 2nd Street (e.g., bike lanes).	Biking facility gap	Bicycle	$1,575,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
B12	Oak Street bicycle improvements between Airway Road and 7th Street	Add bicycle improvements to Oak Street between Airway Road and 7th Street (e.g., bike lanes).	Biking facility gap	Bicycle	$2,700,000	City	3
B13	Oak Street bicycle improvements between the west urban growth boundary and Airway Road	Add bicycle improvements to Oak Street between the west urban growth boundary and Airway Road (e.g., bike lane on the south side). Included with project P7.	Biking facility gap	Bicycle	$700,000	City	3
B14	Airway Road bicycle improvements between Oak Street and Airport Road	Add bicycle improvements to Airway Road between Oak Street and Airport Road (e.g., bike lanes). Included with project P8.	Biking facility gap	Bicycle	$2,675,000	City	3
B15	12th Street bicycle improvements between F Street and Antioch Street	Add bicycle improvements to 12th Street between F Street and Antioch Street (e.g., bike lanes). Included with project P10.	Biking facility gap	Bicycle	$1,925,000	City	3
B16	F Street-E Street-7th Street bicycle improvements between 12th Street and S. 2nd Street, and Oak Street and E Street	Add bicycle improvements to F Street, E Street and 7th Street between 12th Street and S. 2nd Street, and Oak Street and E Street (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$75,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
B17	S. 2nd Street bicycle improvements between Oak Street and H Street	Add bicycle improvements to S. 2nd Street between Oak Street and H Street (e.g., restripe with bike lanes).	Biking facility gap	Bicycle	$50,000	City	1
B18	Milton Street bicycle improvements between S. 2nd Street and Franklin Street	Add bicycle improvements to Milton Street between S. 2nd Street and Franklin Street (e.g., bike lanes).	Biking facility gap	Bicycle	$1,950,000	City	3
B19	7th Street bicycle improvements between E Street and Airport Road	Add bicycle improvements to 7th Street between E Street and Airport Road (e.g., bike lane on the west side). Included with project P12.	Biking facility gap	Bicycle	$500,000	City	3
B20	7th Street bicycle improvements between Airport Road and Wassom Street	Add bicycle improvements to 7th Street between Airport Road and Wassom Street (e.g., bike lane on the west side). Included with project P13.	Biking facility gap	Bicycle	$425,000	City	3
B21	Franklin Street bicycle improvements between Milton Street and the Lebanon Santiam Canal	Add bicycle improvements to Franklin Street between Milton Street and the Lebanon Santiam Canal (e.g., restripe with bike lanes).	Biking facility gap	Bicycle	$50,000	City	1

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
B22	Franklin Street bicycle improvements between the Lebanon Santiam Canal and Russell Drive	Add bicycle improvements to Franklin Street between the Lebanon Santiam Canal and Russell Drive (e.g., bike lanes).	Biking facility gap	Bicycle	$1,050,000	City	1
B23	Milton Street-Park Drive-Mountain River Drive bicycle improvements between Franklin Street and Russell Drive	Add bicycle improvements to Milton Street, Park Drive and Mountain River Drive between Franklin Street and Russell Drive (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$75,000	City	3
B24	Russell Drive bicycle improvements between Porter Street and Mountain River Drive	Add bicycle improvements to Russell Drive between Porter Street and Mountain River Drive (e.g., bike lane on the north side). Included with project P28.	Biking facility gap	Bicycle	$400,000	City	3
B25	Porter Street-Primrose Street-Russell Street-Railroad Street bicycle pedestrian improvements between Russell Drive and the Burdell Boulevard extension	Add bicycle improvements to Porter Street, Primrose Street, Russell Street and Railroad Street between Russell Drive and the Burdell Boulevard extension (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$50,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
B26	Walker Road bicycle improvements between South Main Road and US 20	Add bicycle improvements to Walker Road between South Main Road and US 20 (e.g., bike lanes).	Biking facility gap	Bicycle	$325,000	City	2
B27	Market Street bicycle improvements between South Main Road and US 20	Add bicycle improvements to Market Street between South Main Road and US 20 (e.g., restripe with bike lanes).	Biking facility gap	Bicycle	$50,000	City	3
B28	Walker Road bicycle improvements between Stoltz Hill Road and 7th Street	Add bicycle improvements to Walker Road between Stoltz Hill Road and 7th Street (e.g., bike lanes). Included with project P16.	Biking facility gap	Bicycle	$1,425,000	City	2
B29	7th Street-Manor Way-8th Street-10th Street bicycle improvements between Walker Road and Vaughan Lane	Add bicycle improvements to 7th Street, Manor Way, 8th Street and 10th Street between Walker Road and Vaughan Lane (e.g., pavement markings/ signage designating it as a shared street for bikes).	Biking facility gap	Bicycle	$50,000	City	1
B30	Vaughan Lane bicycle improvements between Stoltz Hill Road and 10th Street	Add bicycle improvements to Vaughan Lane between Stoltz Hill Road and 10th Street (e.g., bike lanes). Included with project P20.	Biking facility gap	Bicycle	$1,850,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
B31	Vaughan Lane bicycle improvements between 10th Street and 5th Street	Add bicycle improvements to Vaughan Lane between 10th Street and 5th Street (e.g., bike lanes). Included with project P21.	Biking facility gap	Bicycle	$1,350,000	City	3
B32	Vaughan Lane bicycle improvements between 5th Street and South Main Road	Add bicycle improvements to Vaughan Lane between 5th Street and South Main Road (e.g., bike lanes). Included with project P22.	Biking facility gap	Bicycle	$1,375,000	City	3
B33	5th Street bicycle improvements between Vaughan Lane and Oak Creek	Add bicycle improvements to 5th Street between Vaughan Lane and Oak Creek (e.g., bike lanes). Included with project P23.	Biking facility gap	Bicycle	$1,750,000	City	3
B34	Crowfoot Road bicycle improvements between South Main Road and View Lane	Add bicycle improvements to Crowfoot Road between South Main Road and View Lane (e.g., bike lane on the south side). Included with project P24.	Biking facility gap	Bicycle	$400,000	County	2
B35	Crowfoot Road bicycle improvements between View Lane and Cascade Drive	Add bicycle improvements to Crowfoot Road between View Lane and Cascade Drive (e.g., bike lane on the south side). Included with project P25.	Biking facility gap	Bicycle	$775,000	County	2

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
B36	Crowfoot Road bicycle improvements between Cascade Drive and the Crowfoot Road realignment	Add bicycle improvements to Crowfoot Road between Cascade Drive and the Crowfoot Road realignment (e.g., bike lane on the south side). Included with project P26.	Biking facility gap	Bicycle	$225,000	County	2
B37	Cascade Drive bicycle improvements between Seven Oak Middle School and Crowfoot Road	Add bicycle improvements to Cascade Drive between Seven Oak Middle School and Crowfoot Road (e.g., bike lanes). Included with project P27.	Biking facility gap	Bicycle	$725,000	City	1
B38	US 20 bicycle improvements between Weirich Drive and the south urban growth boundary	Add bicycle improvements to US 20 between Weirich Drive and the south urban growth boundary (e.g., bike lane on the east side).	Biking facility gap	Bicycle	$875,000	State	3
Shared Pedestrian and Bicycle Projects							
S1	Gore Drive shared-use path connection between the Hansard Avenue extension and the Albany Santiam Canal	Create a shared-use path connection along the south side of Gore Drive between the Hansard Avenue extension and the Albany Santiam Canal.	Walking and biking facility gap	Pedestrian/ Bicycle	$950,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S2	Albany Santiam Canal shared-use path connection between Gore Drive and US 20	Create a shared-use path connection along the west side of the Albany Santiam Canal between Gore Drive and US 20.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,100,000	City	3
S3	US 20 shared-use path connection between Gore Drive and the Albany Santiam Canal	Create a shared-use path connection along the west side of US 20 between Gore Drive and the Albany Santiam Canal. Includes improvements to the US 20 bridge over Lebanon Santiam Canal.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,225,000	State	3
S4	US 20 shared-use path connection between the Albany Santiam Canal and Reeves Parkway	Create a shared-use path connection along the west side of US 20 between the Albany Santiam Canal and Reeves Parkway.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,150,000	State	1
S5	US 20 shared-use path connection between Reeves Parkway and the existing path north of Mullins Drive	Create a shared-use path connection along the west side of US 20 between Reeves Parkway and the existing path north of Mullins Drive.	Walking and biking facility gap	Pedestrian/ Bicycle	$450,000	State	1
S6	Reeves Parkway shared-use path connection between N. 5th Street and US 20	Create a shared-use path connection along the north side of Reeves Parkway between Hansard Avenue and N. 5th Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$350,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S7	Reeves Parkway shared-use path connection between Hansard Avenue and N. 5th Street	Create a shared-use path connection along the north side of Reeves Parkway between Hansard Avenue and N. 5th Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$700,000	City	3
S8	Shared-use path connection between the Reeves Parkway extension and OR 34	Create a shared-use path connection between the Reeves Parkway extension and OR 34.	Walking and biking facility gap	Pedestrian/ Bicycle	$3,050,000	City	3
S9	OR 34 shared-use path connection between the west urban growth boundary and Burkhart Creek	Create a shared-use path connection along the south side of OR 34 between the west urban growth boundary and Vine Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,850,000	State	2
S10	Burkhart Creek shared-use path connection between the west urban growth boundary and Vine Street	Create a shared-use path connection along the west side of Burkhart Creek between the west urban growth boundary and Vine Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,525,000	City	3
S11	Burkhart Creek shared-use path connection between Vine Street and Sherman Street	Create a shared-use path connection along the west side of Burkhart Creek between Vine Street and Sherman Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$600,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S12	Oak Street shared-use path connection between the west urban growth boundary and Airway Road	Create a shared-use path connection along the north side of Oak Street between the west urban growth boundary and Airway Road.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,500,000	State	2
S13	Airway Road shared-use path connection between Oak Street and D Street	Create a shared-use path connection along the east side of Airway Road between Oak Street and D Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$500,000	City	3
S14	Shared-use path connection between Airway Road and 12th Street	Create a shared-use path connection between Airway Road and 12th Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$725,000	City	3
S15	Burkhart Creek shared-use path connection between D Street and F Street	Create a shared-use path connection along the west side of Burkhart Creek between D Street and F Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$375,000	City	3
S16	Burkhart Creek shared-use path connection between F Street and Airport Road	Create a shared-use path connection along the west side of Burkhart Creek between F Street and Airport Road.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,175,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S17	Burkhart Creek shared-use path connection between Airport Road and 7th Street	Create a shared-use path connection along the west side of Burkhart Creek between Airport Road and 7th Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$850,000	City	3
S18	Airport Road shared-use path connection between the west urban growth boundary and the Airport Road realignment	Create a shared-use path connection along the south side of Airport Road between the west urban growth boundary and the Airport Road realignment.	Walking and biking facility gap	Pedestrian/ Bicycle	$500,000	City	3
S19	Stoltz Hill Road shared-use path connection between Airport Road and Walker Road	Create a shared-use path connection along the west side of Stoltz Hill Road between Airport Road and Walker Road.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,275,000	City	3
S20	Stoltz Hill Road shared-use path connection between Walker Road and Vaughan Lane	Create a shared-use path connection along the west side of Stoltz Hill Road between Walker Road and Vaughan Lane.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,875,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S21	Stoltz Hill Road shared-use path connection between Vaughan Lane and the south urban growth boundary	Create a shared-use path connection along the west side of Stoltz Hill Road between Walker Road and Vaughan Lane.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,975,000	City	3
S22	Shared-use path connection between the Walker Road extension and Stoltz Hill Road	Create a shared-use path connection between the Walker Road extension and Stoltz Hill Road.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,050,000	City	3
S23	Shared-use path connection between Stoltz Hill Road and Vaughan Lane	Create a shared-use path connection between Stoltz Hill Road and Vaughan Lane.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,050,000	City	3
S24	Shared-use path connection between Vaughan Lane and 5th Street	Create a shared-use path connection between Vaughan Lane and 5th Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,775,000	City	3
S25	Shared-use path connection between 5th Street and Joy Street	Create a shared-use path connection between 5th Street and Joy Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$775,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S26	5th Street shared-use path connection between Vaughan Lane and Oak Creek	Create a shared-use path connection along the west side of 5th Street between Vaughan Lane and Oak Creek.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,250,000	City	3
S27	5th Street shared-use path connection between Oak Creek and the south urban growth boundary	Create a shared-use path connection along the east side of 5th Street between Oak Creek and the south urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,850,000	City	3
S28	Oak Creek shared-use path connection between 10th Street and 5th Street	Create a shared-use path connection along the south side of Oak Creek between 10th Street and 5th Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,775,000	City	3
S29	Oak Creek shared-use path connection between 5th Street and South Main Road	Create a shared-use path connection along the south side of Oak Creek between 5th Street and South Main Road.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,375,000	City	3
S30	Oak Creek shared-use path connection between South Main Road and the south urban growth boundary	Create a shared-use path connection along the north side of Oak Creek between South Main Road and the south urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,275,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S31	South Main Road shared-use path connection between Crowfoot Road and the south urban growth boundary	Create a shared-use path connection along the west side of South Main Road between Crowfoot Road and the south urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,175,000	City	3
S32	Shared-use path connection between View Lane and Crowfoot Road	Create a shared-use path connection between View Lane and Crowfoot Road.	Walking and biking facility gap	Pedestrian/ Bicycle	$925,000	City	3
S33	Crowfoot Road shared-use path connection between Bald Eagle Drive and Cascade Drive	Create a shared-use path connection along the north side of Crowfoot Road between Bald Eagle Drive and Cascade Drive.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,975,000	City	1
S34	Crowfoot Road shared-use path connection between Cascade Drive and the Crowfoot Road realignment	Create a shared-use path connection along the north side of Crowfoot Road between Cascade Drive and the Crowfoot Road realignment.	Walking and biking facility gap	Pedestrian/ Bicycle	$525,000	County	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S35	Shared-use path connection between Crowfoot Road and the south urban growth boundary	Create a shared-use path connection between Crowfoot Road and the south urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,025,000	City	3
S36	Shared-use path connection to Oregon Street, north segment	Create a shared-use path connection between the Crowfoot Road to south urban growth boundary path and Oregon Street (north segment).	Walking and biking facility gap	Pedestrian/ Bicycle	$1,725,000	City	3
S37	Shared-use path connection to Oregon Street, south segment	Create a shared-use path connection between the Crowfoot Road to south urban growth boundary path and Oregon Street (south segment).	Walking and biking facility gap	Pedestrian/ Bicycle	$1,650,000	City	3
S38	Central Avenue shared-use path connection between Crowfoot Road and the south urban growth boundary	Create a shared-use path connection along the east side of Central Avenue between Crowfoot Road and the south urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,650,000	City	3
S39	Shared-use path connection between Central Avenue and Cascade Drive	Create a shared-use path connection between Central Avenue and Cascade Drive.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,150,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S40	Cascade Drive shared-use path connection between Crowfoot Road and the south urban growth boundary	Create a shared-use path connection along the west side of Cascade Drive between Crowfoot Road and the south urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,550,000	City	3
S41	Shared-use path connection between Crowfoot Road and Cascade Drive	Create a shared-use path connection between Crowfoot Road and Cascade Drive.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,050,000	City	3
S42	US 20 shared-use path connection between Weldwood Drive and Weirich Drive	Create a shared-use path connection along the west side of US 20 between Weldwood Drive and Weirich Drive.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,075,000	State	1
S43	US 20 shared-use path connection between Weirich Drive and the south urban growth boundary	Create a shared-use path connection along the west side of US 20 between Weirich Drive and the south urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,075,000	State	3
S44	Weirich Drive shared-use path connection between US 20 and the east urban growth boundary	Create a shared-use path connection along the north side of Weirich Drive between US 20 and the east urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,600,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S45	Lebanon Santiam Canal shared-use path connection between the Cheadle Lake Trail and Sodaville Road	Create a shared-use path connection along the south side of the Lebanon Santiam Canal between the Cheadle Lake Trail and Sodaville Road.	Walking and biking facility gap	Pedestrian/ Bicycle	$925,000	City	3
S46	Shared-use path connection between River Road and Burdell Boulevard	Create a shared-use path connection between River Road and Burdell Boulevard.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,475,000	City	1
S47	Shared-use path connection between Russell Drive and Burdell Boulevard	Create a shared-use path connection between Russell Drive and Burdell Boulevard.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,150,000	City	3
S48	Russell Drive-River Road shared-use path connection between Porter Street and the Lebanon Santiam Canal	Create a shared-use path connection along the south side of Russell Drive-River Road between Porter Street and the Lebanon Santiam Canal.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,225,000	City	1
S49	River Road shared-use path connection between the Lebanon Santiam Canal and the east urban growth boundary	Create a shared-use path connection along the south side of River Road between the Lebanon Santiam Canal and the east urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,325,000	City	1

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S50	Shared-use path connection between River Road and Robbins Way	Create a shared-use path connection between River Road and Robbins Way.	Walking and biking facility gap	Pedestrian/ Bicycle	$450,000	City	1
S51	Shared-use path connection between Russell Drive and Milton Street	Create a shared-use path connection between Russell Drive and Milton Street.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,775,000	City	3
S52	Shared-use path connection between Mayfly Street and Brewster Road	Create a shared-use path connection between Mayfly Street and Brewster Road.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,825,000	City	1
S53	Berlin Road shared-use path connection between Brewster Road and the south urban growth boundary	Create a shared-use path connection along the west side of Berlin Road between Brewster Road and the south urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$4,400,000	City	3
S54	Brewster Road shared-use path connection between the South Santiam River and the east urban growth boundary	Create a shared-use path connection along the south side of Brewster Road between the South Santiam River and the east urban growth boundary.	Walking and biking facility gap	Pedestrian/ Bicycle	$575,000	City	3

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Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S55	Shared-use path connection between Grant Street and Isabella Street	Create a shared-use path connection between Grant Street and Isabella Street. Create a shared-use path connection to the proposed South Santiam River path.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,525,000	City	3
S56	South Santiam River shared-use path connection between River Park and Marks Slough	Create a shared-use path connection along the west side of the South Santiam River between River Park and Marks Slough Trail.	Walking and biking facility gap	Pedestrian/ Bicycle	$2,400,000	City	3
S57	Shared-use path connection between Tennessee Road and Nelson Avenue	Create a shared-use path connection between Tennessee Road and Nelson Avenue.	Walking and biking facility gap	Pedestrian/ Bicycle	$600,000	City	3
S58	Tennessee Road shared-use path connection between the Albany Santiam Canal and Marks Slough Trail	Create a shared-use path connection along Tennessee Road between the Albany Santiam Canal and Marks Slough Trail.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,175,000	City	1
S59	Shared-use path connection between Williams Street and the Had Irvine Park Trail	Create a shared-use path connection between Williams Street and the Had Irvine Park Trail.	Walking and biking facility gap	Pedestrian/ Bicycle	$250,000	City	3

Table 1: Aspirational Project List

Project ID	Project Description	Project Elements*	Project Purpose	Primary (Secondary) Mode	Estimated Cost (2017 Dollars)	Primary Funding Source**	Package ***
S60	Albany Santiam Canal shared-use path connection between Cemetery Road and Industrial Way	Create a shared-use path connection along the west side of the Albany Santiam Canal between Cemetery Road and Industrial Way.	Walking and biking facility gap	Pedestrian/ Bicycle	$1,725,000	City	3

Note: * The project design elements depicted are identified for the purpose of creating a reasonable cost estimate for planning purposes. The actual design elements for any project are subject to change, and will ultimately be determined through a preliminary and final design process, and are subject to City and/or ODOT approval.

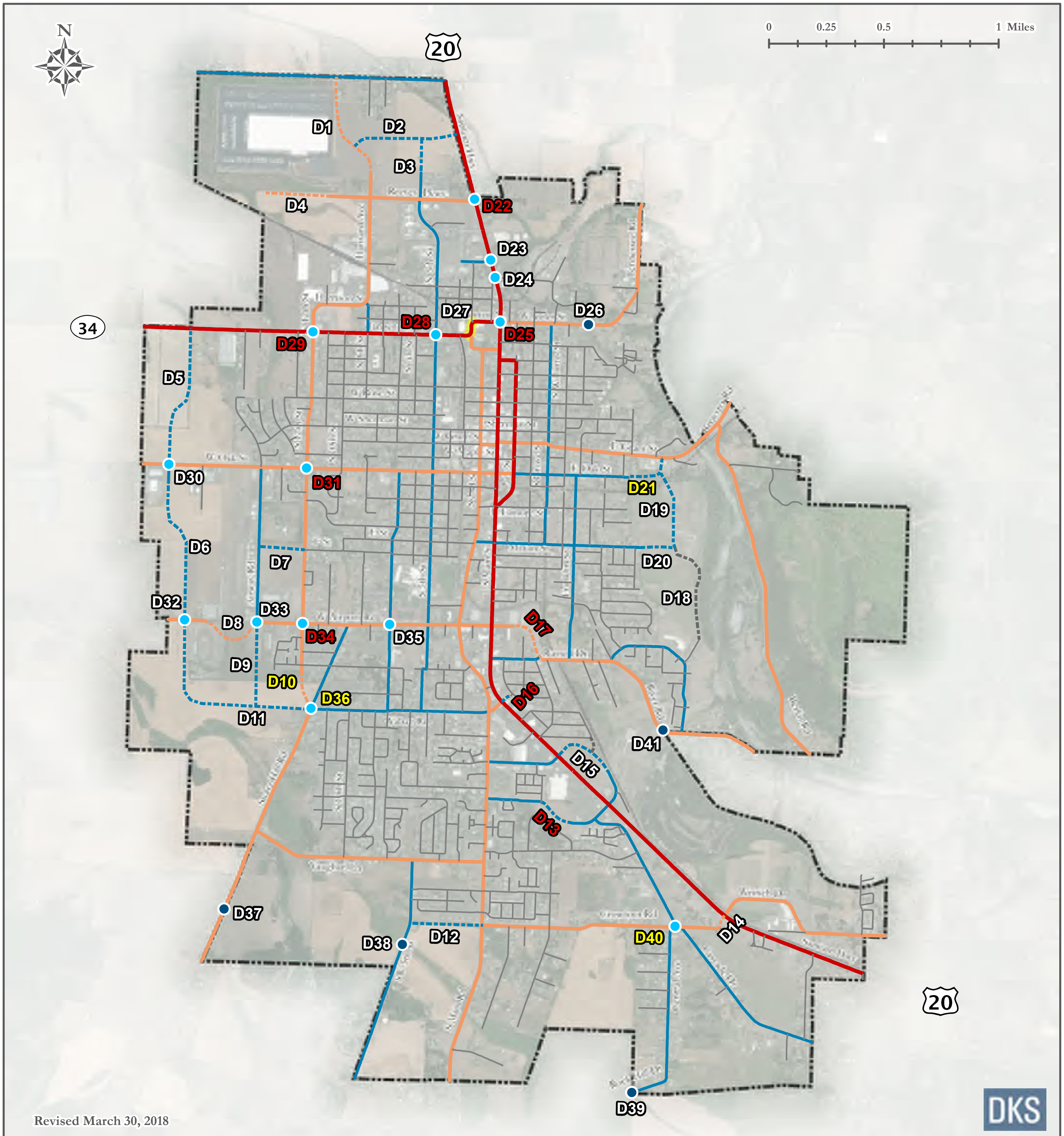
**Funding will come from a variety of sources. Primary funding source is based on the agency who has jurisdiction over an existing facility, or who is expected to construct a new facility.

***Improvement Package 1: Financially Constrained Plan (Totals the $27 million likely to be available through existing city funding sources. Package 1 also includes a reasonable estimate of how the city would use revenue from various state and/or federal sources).

Improvement Package 2: Identifies projects from the Aspirational project list that are highly supported but that, due to cost or jurisdiction, were unable to be included in the Financially Constrained list. Should additional funding become available, these are projects the city may want to consider.

Improvement Package 3: Comprised of the Aspirational Projects, those remaining projects that likely would not have city or state funding by 2040.

2 Motor Vehicle Projects



Legend:

- Planned Intersection Improvement
- Planned Bridge Improvement
- Planned Roadway Segment Improvement

Roadways:

Existing	Planned (Conceptual Alignments)	
		Principal Arterial Streets
		Minor Arterial Streets
		Collector Streets
		Local Streets

- Urban Growth Boundary
- # Project included in the Financially Constrained Plan (Package 1)
- # Priority project with additional funding (Package 2)
- # Project included in the Aspirational Plan (Package 3)

3 Pedestrian Projects

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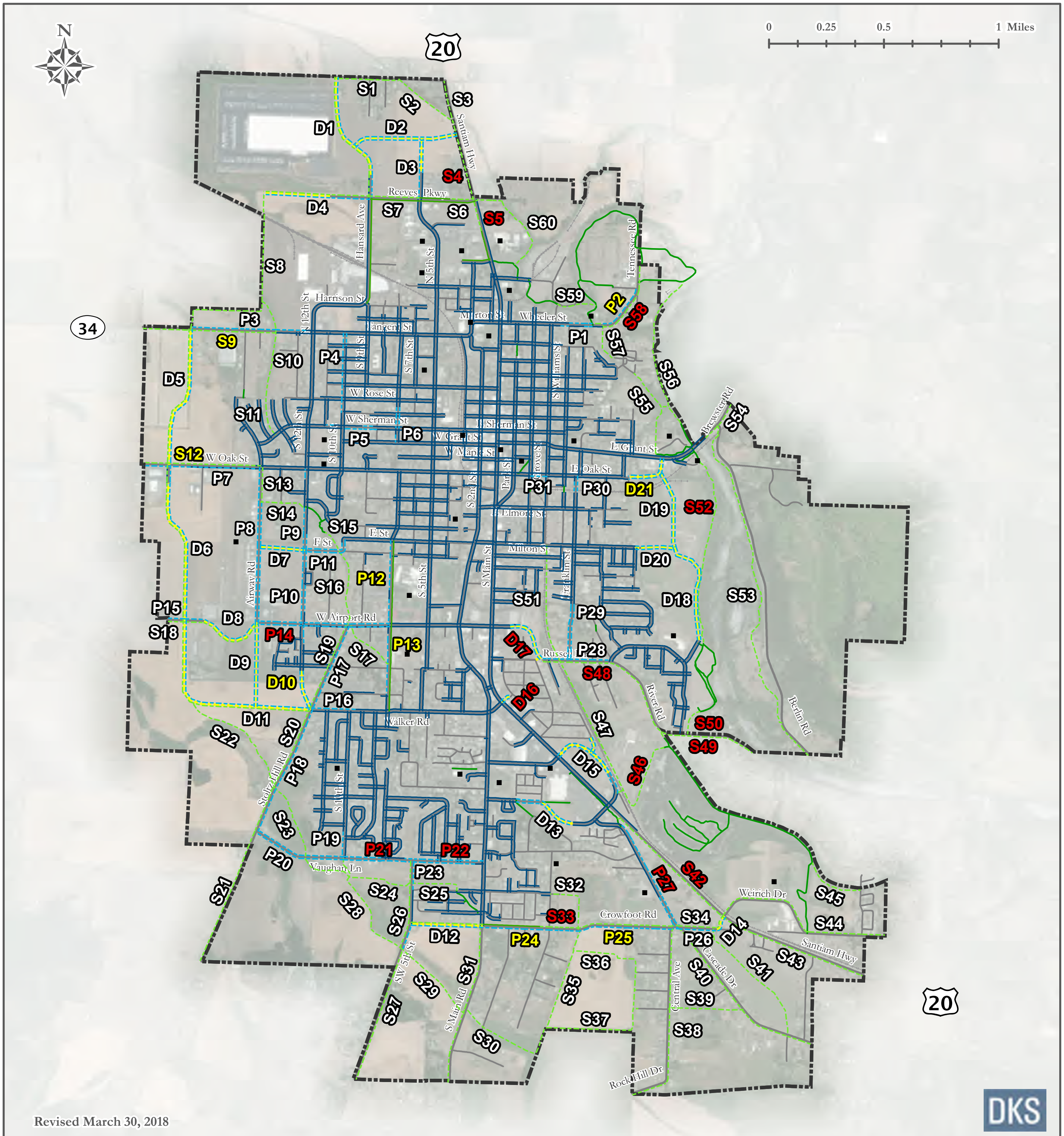

Legend:

Pedestrian Facilities

Existing	Planned	
(solid blue line)	(dashed blue line)	Sidewalk
(solid green line)	(dashed green line)	Shared-Use Path

Roadway Facilities with Pedestrian Projects

(dashed yellow line) Planned Street Extension (Conceptual Alignment)

\# Project included in the Financially Constrained Plan (Package 1)

\# Priority project with additional funding (Package 2)

\# Project included in the Aspirational Plan (Package 3)

Urban Growth Boundary

Arterial or Collector Street

Major Activity Generator

4 Bicycle Projects

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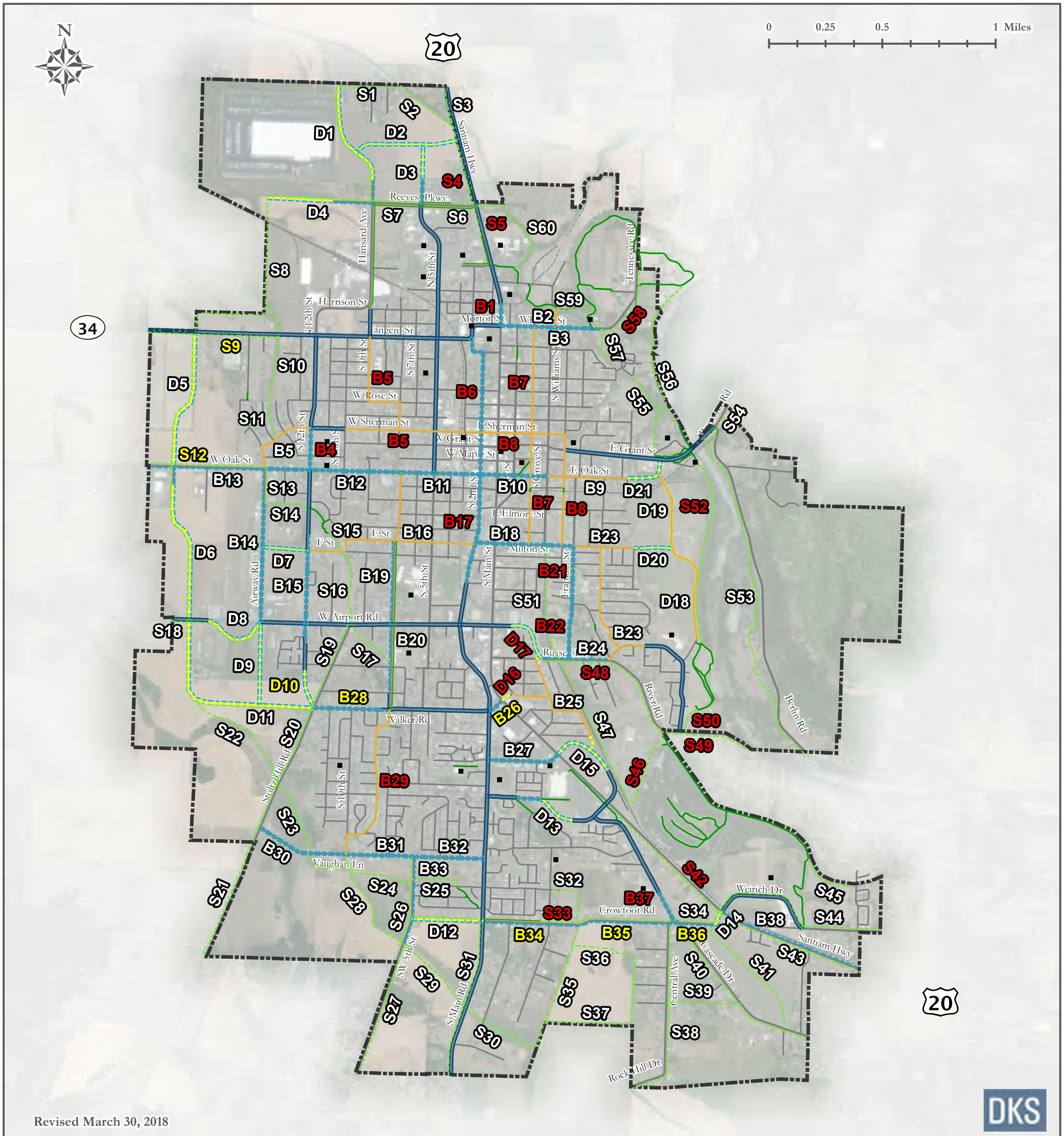


Legend:

Bicycle Facilities

Existing	Planned	
(dark blue line)	(blue dashed line)	Bike Lane
(green line)	(green dashed line)	Shared-Use Path
	(orange line)	Planned Shared Street

Roadway Facilities

Planned Street Extension (Conceptual Alignment)

\# Project included in the Financially Constrained Plan (Package 1)

\# Priority project with additional funding (Package 2)

\# Project included in the Aspirational Plan (Package 3)

Urban Growth Boundary

Arterial or Collector Street

Major Activity Generator

Memo #10 Transportation Standards

MEMORANDUM

DATE: March 21, 2018

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski, DKS Associates
Kevin Chewuk, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #10: Transportation Standards P14180-012

This document provides an overview of the transportation system standards recommended for adoption as part of the TSP update for Lebanon. Included is a detail of the roadway functional classification system, typical designs for roadways and shared use paths, special route designations, access spacing and mobility standards, and guidance for Traffic Impact Analysis requirements. Together, these standards will help ensure future facilities are designed appropriately and that all facilities are managed to serve their intended purpose.

Functional Classification

Traditionally, roadways are classified based on the type of vehicular travel they are intended to serve (local versus through traffic). In Lebanon, the functional classification of a roadway (shown in Figure 1) determines the level of mobility for all travel modes, level of access, and use. The roadway functional classification system recognizes that individual roadways do not act independently, but instead form a network that serves travel needs on a local and regional level. From highest to lowest intended use, the classifications are principal arterial, minor arterial, collector and local roadways. Roadways with higher intended usage generally limit access to adjacent property in favor of more efficient motor vehicle traffic movement (i.e., mobility). Local roadways with lower intended usage have more driveway access and intersections, and generally accommodate shorter trips to nearby destinations.

- **Principal Arterials** are state roadways, serving the highest volume of motor vehicle traffic and primarily used for longer distance regional trips.
- **Minor Arterials** are intended to move traffic between principal arterials and collector roadways. These roadways generally experience higher traffic volumes and often act as a corridor connecting many parts of the city.
- **Collectors** are intended to serve local traffic traveling to and from principal arterial or minor arterial roadways. These roadways provide greater accessibility to neighborhoods, often connecting to major activity generators and providing efficient through movement for local traffic.
- **Local Streets** provide more direct access to residences. These roadways are often lined with homes and are designed to serve lower volumes of traffic.

The federal government also has a functional classification system that is used to determine federal aid funding eligibility. Roadways federally designated as a major collector, minor arterial, principal arterial, or interstate are eligible for federal aid. Lebanon's functional classification system uses the similar designations as the federal government (e.g., a city designated minor arterial is intended to be the same as a federally designated minor arterial and a city designated collector is intended to be the same as a federally designated major collector). Future updates to the federal functional classification system should incorporate the designations reflected in the TSP along city roadways.

Functional Classification Changes

Table 1 shows the TSP recommended changes to the existing functional classifications of roadways in Lebanon to better reflect their intended use. Since state highways serve regional travel through the city, they are principal arterial roadways (i.e., US 20 and OR 34). Roadways providing primary access to principal arterial roadways are minor arterials. Roadways providing primary access to neighborhoods and activity generators in Lebanon are collectors. All other roadways are classified as local streets. The updated functional classification recommendations can be seen in Figure 1. The Lebanon functional classification map shows the designations of roadways within the Urban Growth Boundary (UGB) only; refer to the county TSP for designations of other roadways outside of the UGB.

Table 1: Functional Classification Changes

Roadway	From	To	Change from Prior Functional Classification
Airport Road	US 20	Russell Drive	Upgrade from Local Street to Minor Arterial
Burdell Boulevard	US 20	Existing east terminus	Upgrade from Local Street to Collector
Crowfoot Road	US 20	S Main Road	Upgrade from Collector to Minor Arterial
E Street-F Street	S 2nd Street	S 12th Street	Downgrade from Collector to Local Street
Elmore Street	S 2nd Street	Grove Street	Downgrade from Collector to Local Street
Gore Drive	US 20	West Urban Growth Boundary	Upgrade from Local Street to Collector
Grant Street	S 2nd Street	Berlin Road	Upgrade from Collector to Minor Arterial

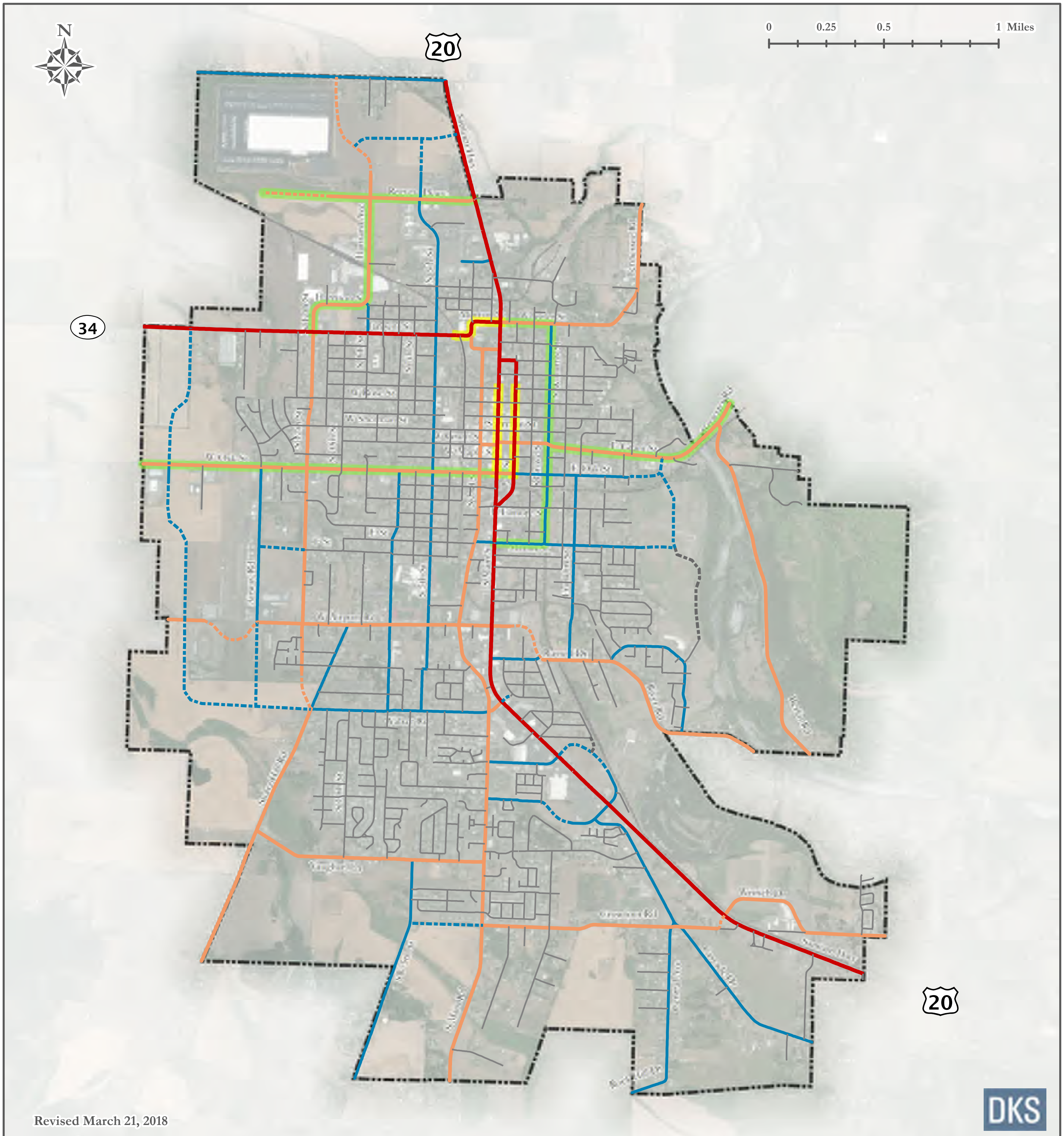
Table 1: Functional Classification Changes

Roadway	From	To	Change from Prior Functional Classification
Grant Street	S 2nd Street	S 10th Street	Downgrade from Collector to Local Street
Grove Street	Wheeler Street	Milton Street	Downgrade from Collector to Local Street
Hansard Avenue	Reeves Parkway	Existing north terminus	Upgrade from Local Street to Minor Arterial
Hansard Avenue-12th Street	Reeves Parkway	Kees Street	Upgrade from Collector to Minor Arterial
Maple Street	US 20	S 2nd Street	Downgrade from Collector to Local Street
Market Street	US 20	S Main Road	Upgrade from Local Street to Collector
Mullins Drive	US 20	Existing west terminus	Upgrade from Local Street to Collector
Oak Street	US 20	Existing east terminus	Downgrade from Minor Arterial to Collector
Oak Street	Airway Road	West Urban Growth Boundary	Upgrade from Collector to Minor Arterial
Primrose Street	Russell Drive	Porter Street	Downgrade from Collector to Local Street
Reeves Parkway	US 20	Hansard Avenue	Upgrade from Collector to Minor Arterial
Reeves Parkway	Hansard Avenue	Existing west terminus	Upgrade from Local Street to Minor Arterial
Rose Street	S 9th Street	S. 5th Street	Downgrade from Collector to Local Street
Russell Drive	US 20	Airport Road	Downgrade from Minor Arterial to Collector
Sherman Street	US 20	S 12th Street	Downgrade from Collector to Local Street
Stoltz Hill Road	Walker Road	Vaughan Lane	Upgrade from Collector to Minor Arterial
Truman Street-Porter Street	US 20	Russell Drive	Downgrade from Collector to Local Street

Table 1: Functional Classification Changes

Roadway	From	To	Change from Prior Functional Classification
Vaughan Lane	S Main Road	Stoltz Hill Road	Upgrade from Collector to Minor Arterial
Walker Road	Main Road	Stoltz Hill Road	Downgrade from Minor Arterial to Collector
Weirich Drive	US 20	East Urban Growth Boundary	Upgrade from Collector to Minor Arterial
Weldwood Drive	US 20	S Main Road	Upgrade from Local Street to Collector
5th Street	Reeves Parkway	Existing north terminus	Upgrade from Local Street to Collector
7th Street	OR 34	W Grant Street	Downgrade from Collector to Local Street
9th Street	OR 34	W Rose Street	Downgrade from Collector to Local Street
10th Street	OR 34	W Oak Street	Downgrade from Collector to Local Street
10th Street	Walker Road	Vaughan Lane	Downgrade from Collector to Local Street

I Functional Classification



Legend:

Roadways:

Existing	Planned (Conceptual Alignments)	
(red solid line)		Principal Arterial Streets
(orange solid line)	(orange dashed line)	Minor Arterial Streets
(blue solid line)	(blue dashed line)	Collector Streets
(grey solid line)	(grey dashed line)	Local Streets

Special Designation

Lebanon Local Truck Route

Special Transportation Area

Urban Growth Boundary

Freight and Truck Routes

Figure 2 shows roadways designated to help ensure trucks can efficiently travel through and access major destinations in Lebanon. These routes play a vital role in the economical movement of raw materials and finished products, while maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system.

State and Federal Freight Routes

ODOT has classified OR 34 and US 20 south of OR 34 as freight routes and reduction review routes in Lebanon. These routes and US 20 north of OR 34 are also designated as truck routes by the federal government. Federal truck routes generally require 12-foot travel lanes, but allow 11-foot travel lanes within Special Transportation Areas with lower truck volumes. Reduction review routes are highways that require review with any proposed changes to determine if there will be a reduction of vehicle-carrying capacity. The TSP update has not changed the ODOT designations.

Local Truck Routes

The city has local truck routes designed to facilitate the movement of truck freight between major destinations and state highways. These roadways serve an important role in the city roadway network and should be designed and managed to safely accommodate the movement of goods. These routes require a minimum of 11-foot travel lanes.

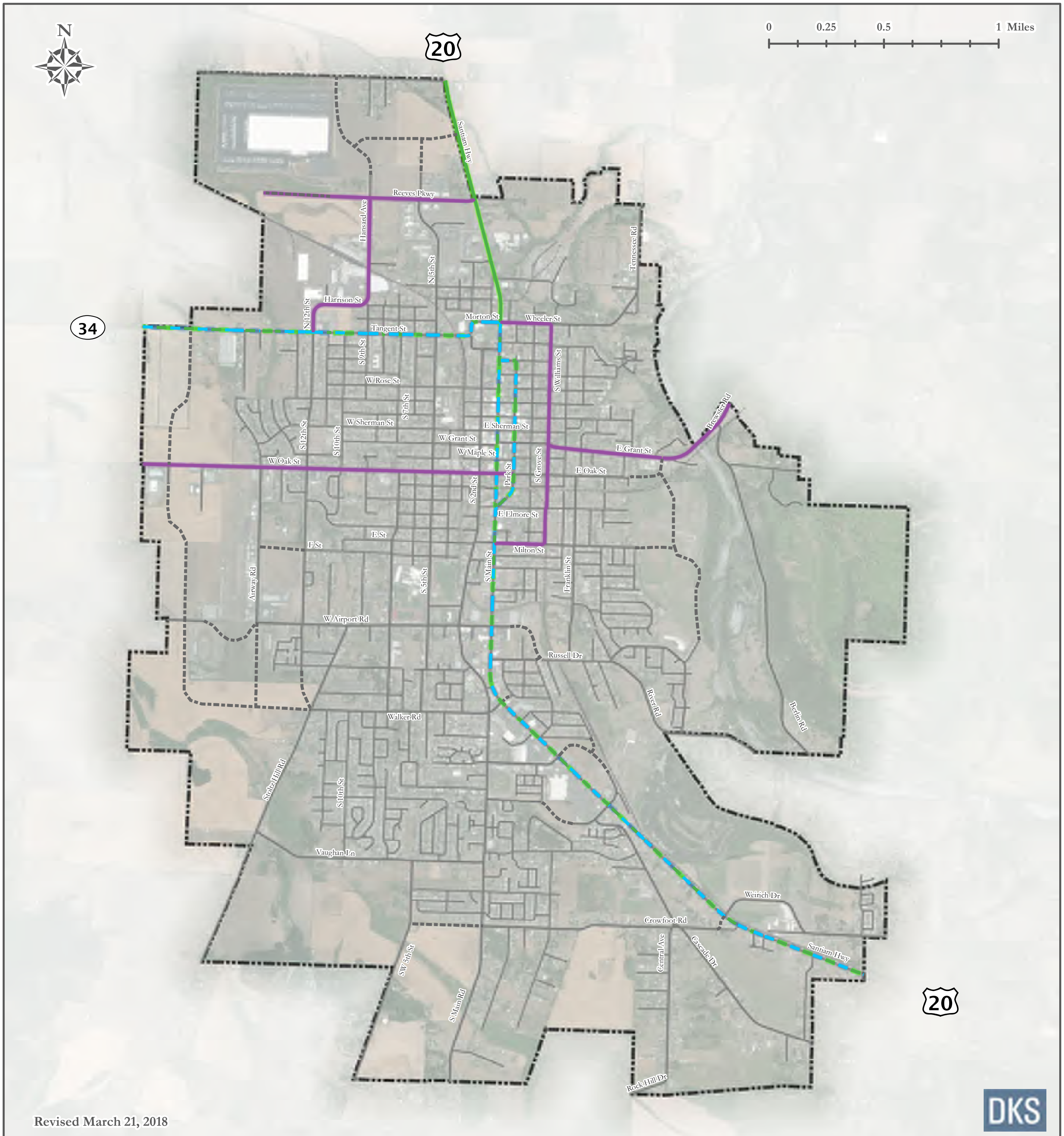
Existing designated local truck routes include:

- Wheeler Street between US 20 and Williams Street, Williams Street between Wheeler Street and Milton Street and Milton Street between Williams Street and US 20
- Grant Street and Brewster Road, east of Williams Street
- Oak Street, west of US 20

As part of the TSP update, it is recommended that new local truck routes be designated. Newly designated local truck routes would include portions of:

- Hansard Avenue-12th Street between OR 34 and Reeves Parkway
- Reeves Parkway between US 20 and the west street terminus

2 Freight and Truck Routes



Legend:

Freight Routes

- Oregon Freight Route and Federal Truck Route
- Federal Truck Route
- Local Truck Route
- Urban Growth Boundary
- Arterial or Collector Street
- Planned Street Extension (Conceptual alignment)

Typical Roadway Cross-section Standards

Figures 3a to 3g include typical standard cross-section types for city roadways and private roadways, with guidelines for constrained areas where design elements may need to be reduced shown in Table 2. These are generally consistent with the current roadway design standards, with a few exceptions. Minor arterial roadways now require buffered bike lanes (5-foot bike lane with a 2-foot buffer) and a narrower center turn lane/median (12 feet versus 14 feet). Collector roadways now require narrower through travel lanes (11 feet versus 12 feet) in favor of wider sidewalks (6 feet versus 5 feet). Parking will be allowed on collector roadways (see Figure 3c), but it will now require a wider bike lane adjacent to the parking lane (6 feet versus 5 feet). Local roadways also now require narrower parking lanes (7 feet versus 8 feet). A new private roadway cross-section will be allowed in residential areas with 10 or fewer dwelling units.

A local truck route along a collector roadway now requires a 12-foot center turn lane/median in addition to the elements of a standard collector roadway. A local truck route along a local roadway requires wider through travel lanes (11 feet versus 10 feet) and wider parking lanes (8 feet versus 7 feet) compared to a standard local roadway. A local truck route designation along a minor arterial roadway does not change the standard cross-section.

The TSP update does not modify the design standards for US 20 and OR 34, the city's only principal arterials. These roadways are state highways and subject to the design criteria in the state's Highway Design Manual.

Constrained roadway option: The construction of some roadways may be constrained by challenging topography or environmentally sensitive, historic, or developed areas. These roadways may require modified designs to allow for reasonable construction costs. Guidance for modifications to the standard designs is provided in Table 2. Any modification of a standard design requires approval of a variance prior to construction.

Table 2: Constrained Roadway Design Options

	Principal Arterial Roadway	Minor Arterial Roadway	Collector Roadway	Local Roadway
Minimum Through Lane Width*		11 feet	10 feet	10 feet
Landscape Strip Width	N/A	4.5 feet	4.5 feet	None
Bike Facilities		5-foot bike lane (without a buffer)	Shared roadway**	N/A

* The minimum through lane width along a local truck route should be maintained at 11 feet.
** The minimum through lane width along a shared roadway should be maintained at 12 feet where feasible.

Figure 3a: Minor Arterial Roadway

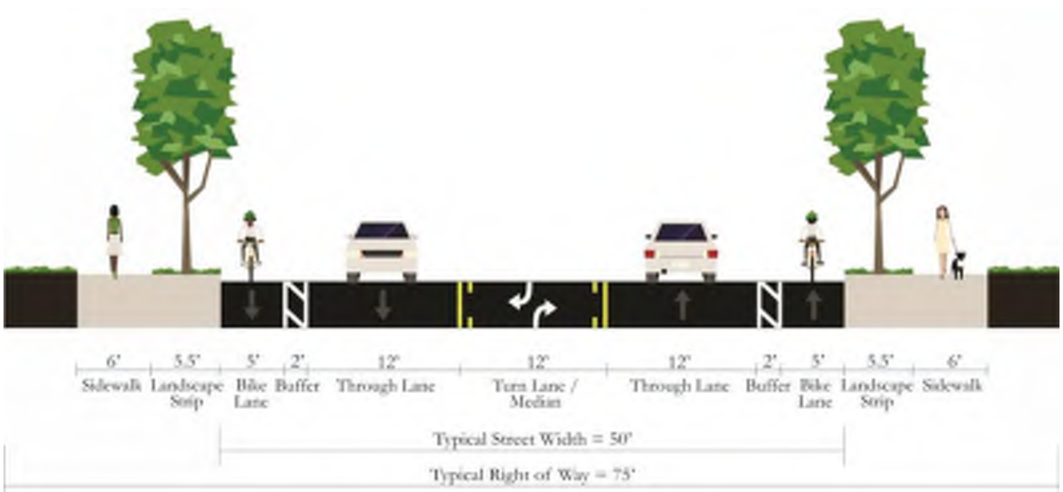


Figure 3b: Collector Roadway, without Parking

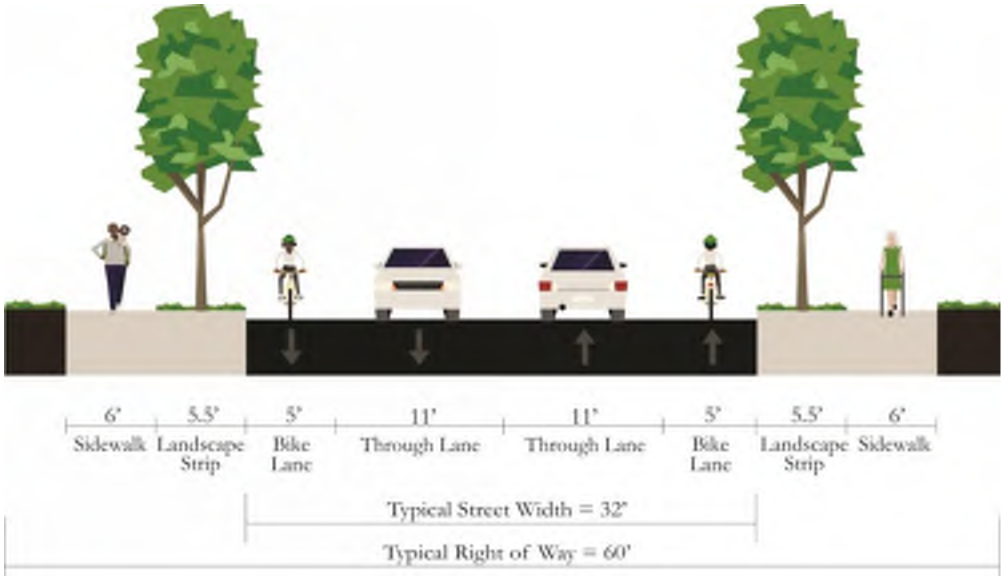


Figure 3c: Collector Roadway, with Parking

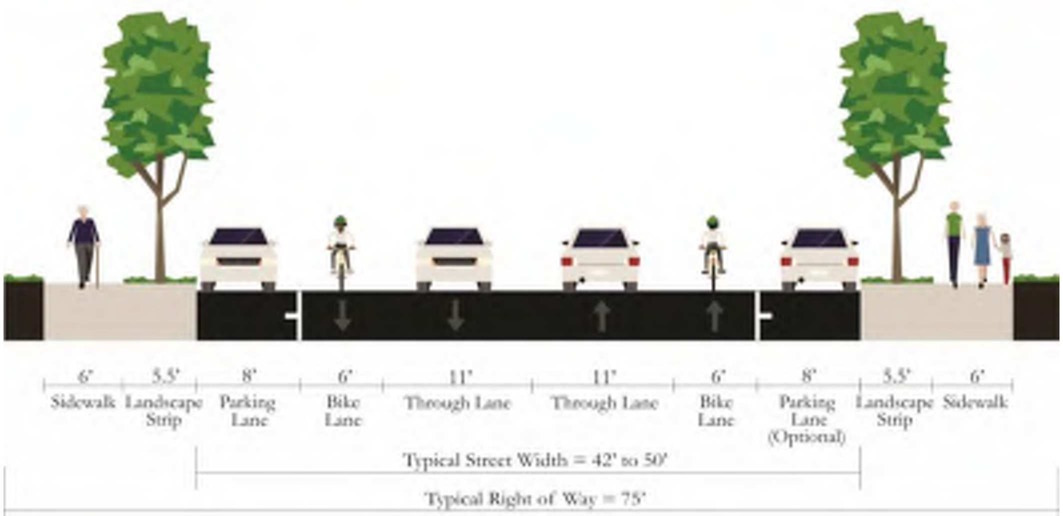


Figure 3d: Collector Roadway, on a Truck Route

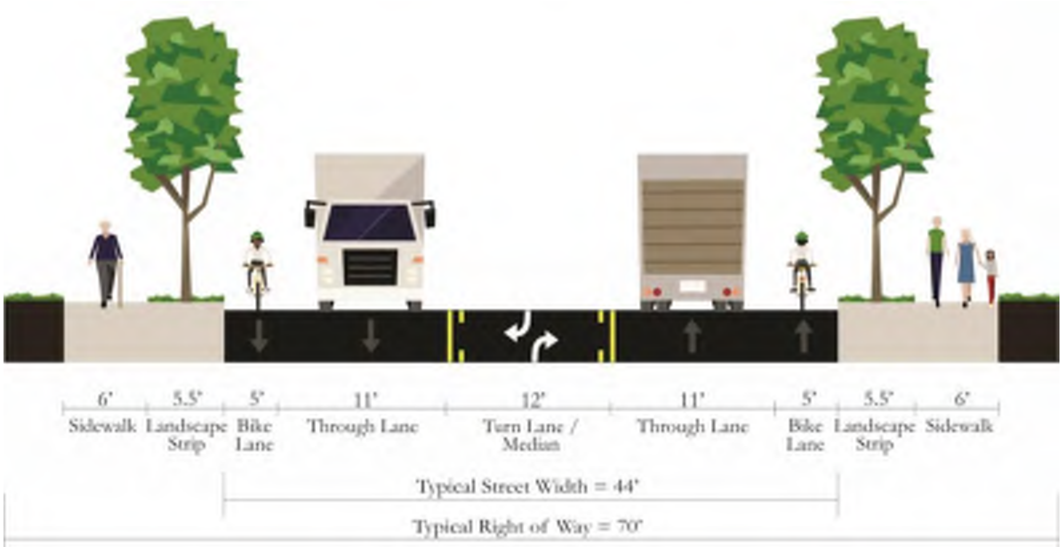


Figure 3e: Local Roadway

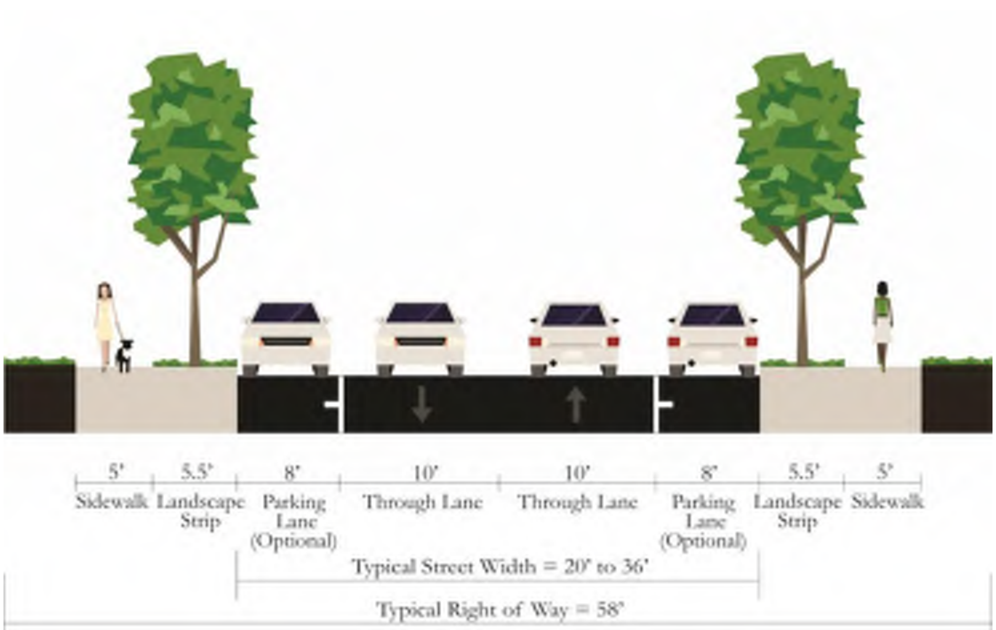


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Figure 3f: Local Roadway, on a Truck Route

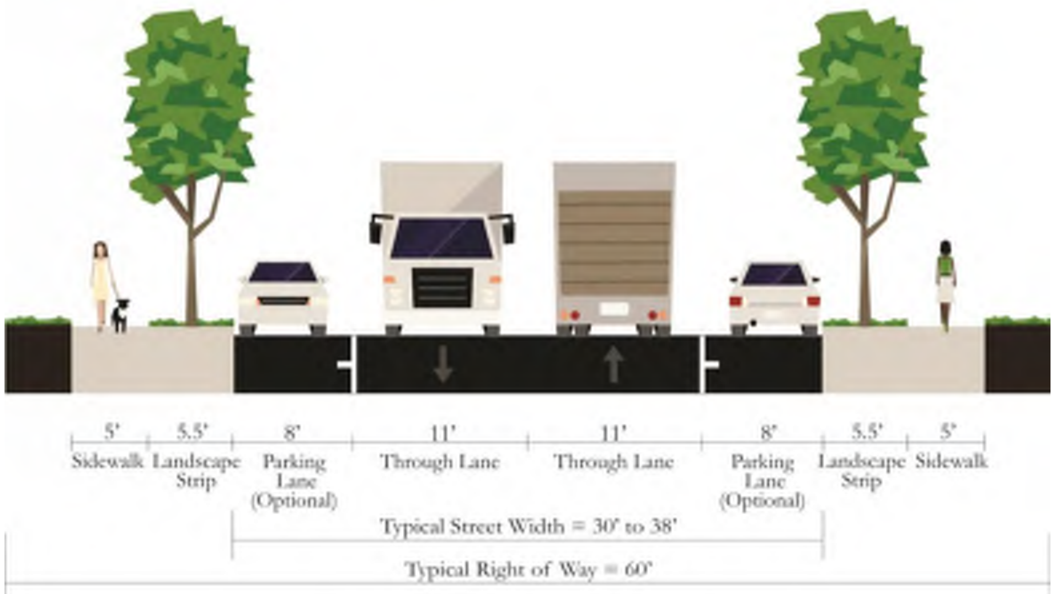
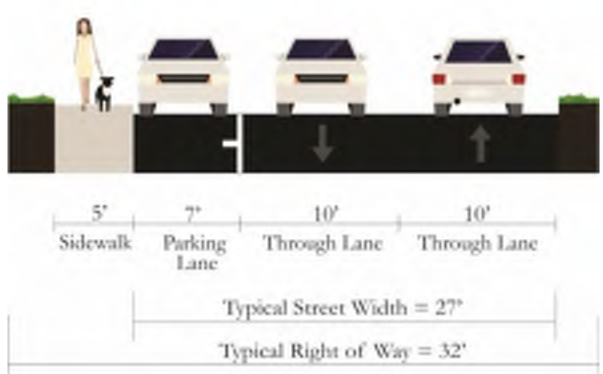


Figure 3g: Private Roadway (16 or fewer dwelling units only)



Walking and Biking Design Standards

The following sections detail various walking and biking standards and treatment guidelines.

Walking and Biking Facilities

As shown in Figures 3a to 3g, the existing city roadway design standards will be modified to require buffered bike lanes along minor arterial roadways and wider sidewalks along collector roadways. Wider bike lanes will also now be required adjacent to parking lanes along collector roadways. Newly constructed roadways should provide accommodations to walking and biking users via a six-foot sidewalk and five-foot bike lane with 2-foot buffer along minor arterial roadways, a six-foot sidewalk and five-foot bike lane along collector roadways and a five-foot sidewalk along local roadways. Shared streets for bikes will also be designated throughout the city and will include pavement markings/ signage.

Shared-Use Paths

Shared-use paths provide off-roadway facilities for walking and biking travel. Depending on their location, they can serve both recreational and transportation needs. Shared-use path designs vary in surface types and widths. Hard surfaces are generally better for bicycle travel. Widths need to provide ample space for both walking and biking and should be able to accommodate maintenance vehicles.

The TSP update recommends that a paved shared-use path should be 15 feet wide in areas with significant walking or biking demand; otherwise, it should be 12 feet wide (see Figure 4). The city may reduce the width of the typical paved shared-use path to a minimum of ten feet in constrained areas (e.g., steep, environmentally sensitive, historic, or previously developed areas).

Figure 4: Design Standards for Shared-Use Paths

Street Crossings

Roadways with high traffic volumes and/or speeds in areas with nearby transit stops, residential uses, schools, parks, shopping and employment destinations generally require enhanced street crossings with treatments, such as marked crosswalks, high visibility crossings, and curb extensions to improve the safety and convenience. Crossings should be consistent with the block spacing standards shown in Table 3. Blocks longer than the maximum block size shown in Table 3 should have mid-block pedestrian and bicycle access ways at spacing no more than 330 feet. Exceptions include where the connection is impractical due to topography, inadequate sight distance, high vehicle travel speeds, or other factors that may prevent safe crossing (as determined by the city).

Roadway and Access Spacing Standards

Access management is a broad set of techniques that balance the need to provide for efficient, safe, and timely travel with the ability to allow access to individual destinations. Appropriate access management standards and techniques can reduce congestion and accident rates, and may lessen the need for construction of additional roadway capacity.

Table 3 identifies new recommended maximum and minimum public roadway intersection and minimum private access spacing standards for roadways in Lebanon. New roadways or redeveloping properties must comply with these standards to the extent practical, as determined by the city. As the opportunity arises through redevelopment, roadways not complying with these standards could improve with strategies such as shared access points, access restrictions (through the use of a median or channelization islands), or closure of unnecessary access points, as feasible.

Like roadway design and mobility targets, access spacing standards for state highways are determined by ODOT. ODOT spacing standards are defined in the Oregon Highway Plan, OAR 731-051, and ODOT's Highway Design Manual.

Table 3: Roadway and Access Spacing Standards

	Principal Arterial Roadway	Minor Arterial Roadway	Collector Roadway	Local Roadway
Maximum Block Size (Public Street to Public Street) *	See Oregon Highway Plan	530 feet	530 feet	530 feet
Minimum Block Size (Public Street to Public Street)		265 feet	265 feet	150 feet
Minimum Driveway Spacing (Public Street to Driveway and Driveway to Driveway)		265 feet	130 feet	25 feet

Note: all distances measured from center to center of adjacent approaches.

* If the maximum block size is exceeded, mid-block pedestrian and bicycle accessways on public easements or rights-of-way must be provided at spacing no more than 330 feet, unless the connection is impractical due to existing development, topography, environmental constraints or other factors (as determined by the city).

Mobility Targets

Mobility targets for streets and intersections in Lebanon provide a metric for assessing the impacts of new development on the existing transportation system and for identifying where capacity improvements may be needed. They are the basis for requiring improvements needed to sustain the transportation system as growth and development occur. Two methods used to gauge operational conditions for motor vehicles include volume-to-capacity (v/c) ratios and level of service (LOS).

- **Volume-to-capacity (v/c) ratio:** A v/c ratio is a decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used at a turn movement, approach leg, or intersection. The ratio is the peak hour traffic volume divided by the hourly capacity of a given intersection or movement. A lower ratio indicates smooth operations and minimal delays. A ratio approaching 1.00 indicates increased congestion and reduced performance.
- **Level of service (LOS):** LOS is a "report card" rating (A through F) based on the average delay experienced by vehicles at the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay is excessive and demand exceeds capacity, typically resulting in long queues and delays.

All roadways and intersections owned by Lebanon must operate at or below the following mobility targets. The TSP update does not modify these mobility targets.

Signalized, All-way Stop, or Roundabout Controlled Intersections: The intersection as a whole must operate with a Level of Service (LOS) "E" or better and a volume to capacity (v/c) ratio not higher than 1.00 during the highest one-hour period on an average weekday (typically, but not always the evening peak period between 4 p.m. and 6 p.m. during the spring or fall).

Two-way Stop and Yield Controlled Intersections: All intersection approaches during the highest one-hour period on an average weekday (typically, but not always the evening peak period between 4 p.m. and 6 p.m. during the spring or fall) shall operate with a v/c ratio not higher than 0.90.

- **State-owned roadways** must comply with the mobility targets included in the Oregon Highway Plan. The TSP update does not modify these mobility targets.

Traffic Calming

Traffic calming (primarily in residential and mixed-use areas) refers to street design techniques that slow traffic and make streets safer and more pleasant for users and adjoining land uses without significantly changing their vehicle capacity.

Table 4 lists common traffic calming applications and suggests which devices may be appropriate for streets in Lebanon. Traffic calming measures must balance vehicle speeds and volumes with mobility, circulation, and function. Any traffic calming project should include coordination with emergency service providers to ensure the project does not impede response.

Traffic calming influences driver behavior through physical and psychological means, by using one or more of the following:

- Narrowing of the street by providing curb extensions or bulbouts, or mid-block pedestrian refuge islands
- Deflecting the vehicle path vertically by installing speed humps, speed tables, or raised intersections
- Deflecting the vehicle path horizontally with chicanes, roundabouts, and mini-roundabouts
- Providing visual cues such as placing buildings, street trees, on-street parking, and landscaping next to the street to create a sense of enclosure that prompts drivers to reduce vehicle speeds

Table 4: Traffic Calming Measures by Street Functional Classification

	Minor Arterial Roadway	Collector Roadway	Local Roadway
Narrowing travel lanes	Yes	Yes	All calming measures are generally appropriate on local streets that connect to two or more streets and are infrequent emergency response routes.
Placing buildings, street trees, on-street parking, and landscaping next to the street	Yes	Yes	
Curb Extensions or Bulbouts	Yes	Yes	
Roundabouts	Yes	Yes	
Mini-Roundabouts	No	Yes	
Medians and Pedestrian Islands	Yes	Yes	
Pavement Texture	Yes	Yes	
Speed Hump or Speed Table	No	No	
Raised Intersection or Crosswalk	No	No	
Speed Cushion (provides emergency pass-through with no vertical deflection)	No	Yes	
Choker	No	No	
Traffic Circle	No	No	
Diverter (with emergency vehicle pass through)	No	Yes	
Chicanes	No	No	

Traffic Impact Analysis (TIA) Guidelines

The TSP update is recommending updated Traffic Impact Analysis (TIA) requirements to implement Sections 660-012-0045(2)(b) and -0045(2)(e) of the State Transportation Planning Rule (TPR). These sections require the city to adopt mobility targets and a process to apply conditions to land use proposals in order to minimize impacts on and protect transportation facilities. The updated required content for a TIA is summarized in the supplemental document "Lebanon Guidelines for Transportation Impact Analysis".

The city's development review process is designed to help the city achieve its goal of managing growth in a responsible and sustainable manner. The applicant for development is required to submit full and accurate information upon which the city staff and elected officials can base decisions. A developer-submitted transportation study prepared by a professional engineer qualified in the traffic engineering field is a critical tool used by the city to assess the expected transportation system impacts associated with a proposed development and the long-term viability of the transportation system.

A TIA may be required to be submitted with a land use application at the request of the city or if the proposal is expected to involve one (1) or more of the following:

1. Changes in land use designation, or zoning designation that will generate more vehicle trip ends.
2. Projected increase in trip generation of 25 or more trips during either the AM or PM peak hour, or more than 300 daily trips.
3. Potential impacts to intersection operations.
4. Potential impacts to residential areas or local roadways, including any non-residential development that will generate traffic through a residential zone.
5. Potential impacts to pedestrian and bicycle routes, including, but not limited to school routes and multimodal roadway improvements identified in the TSP.
6. The location of an existing or proposed access driveway does not meet minimum spacing or sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles are likely to queue or hesitate at an approach or access connection, thereby creating a safety hazard.
7. A change in internal traffic patterns may cause safety concerns.
8. A TIA is required by ODOT pursuant with OAR 734-051.
9. Projected increase of five trips by vehicles exceeding 26,000-pound gross vehicle weight (13 tons) per day, or an increase in use of adjacent roadways by vehicles exceeding 26,000-pound gross vehicle weight (13 tons) by 10 percent.

It is the responsibility of the applicant to provide enough detailed information for the city to make a determination.

Transportation System Management (TSM)

Lebanon has several regional state-owned roadways, and major city roadways (e.g., OR 34, US 20, W Oak Street, and Airport Drive) that could benefit from transportation system management (TSM) infrastructure. The TSP update recommends that before future investments are made along these roadways, designs should be reviewed with city and ODOT staff to determine if communications or other ITS infrastructure should be addressed as part of the roadway design/construction.

Memo #12 Implementing Ordinances

DRAFT MEMORANDUM

DATE: April 23, 2018

TO: Lebanon TSP Project Management Team

FROM: Reah Flisakowski and Kevin Chewuk, DKS Associates
Darci Rudzinski and Kyra Haggart, Angelo Planning Group

SUBJECT: Lebanon Transportation System Plan Update
Technical Memorandum #12 PMT Review Draft

The purpose of this memorandum is to provide recommended modifications to adopted city policies and regulations to ensure consistency with the draft 2018 Lebanon Transportation System Plan (TSP). Proposed Lebanon Comprehensive Plan amendments update Chapter 8 Transportation. Updated transportation goals and policies reflect the draft TSP goals and objectives (Chapter X), as well as support the code amendments recommended in this memorandum. Policy amendments reflect issues identified through the TSP update, including supporting active transportation modes and increasing safety for all users of the transportation system.

Recommended development requirements update the Lebanon Development Code (LDC or "code") to be consistent with and implement the draft TSP, as well as the Oregon Transportation Planning Rule (OAR 660-012, the "TPR").

Proposed Transportation Goals and Policies

Transportation-related goals and policies can be found in Comprehensive Plan Chapter 8: Transportation. The goals and policies reflect the local, regional, and State goals and policies existing at the time of TSP adoption. The Transportation chapter was last updated in 2004. The background information is out of date and has been supplanted by new information documented in the draft 2018 TSP. The goals and policies need to be refreshed to reflect the goals and objectives of the TSP update. The recommendation is to replace the background information in Chapter 8 with a summary of the TSP update process and direction to use the adopted TSP as the transportation element of the Comprehensive Plan. In this way, the Comprehensive Plan can describe the TSP without duplicating its content. Transportation goals and policies are to be retained in Comprehensive Plan Chapter 8, but goals will mirror those of the TSP and policies will articulate the objectives of the TSP update process.

Part One: Narrative

1.0 Introduction

1.1 Statewide Planning Goal 12

[No recommended changes.]

1.2 State's Transportation Planning Rule (TPR)

[No recommended changes.]

1.3 Transportation and the Lebanon Comprehensive Plan

[No recommended changes.]

1.3.1 Compliance with Goal 12 and TPR.

[Replace existing bullet points with the following text.]

In 2016 the City of Lebanon began a planning project to replace the City's 2007 Transportation System Plan and to prepare associated land use ordinances. The primary objective of the project was to plan for a multi-modal transportation system that supports the next 20 years of planned residential, commercial, and industrial growth in the City. The Transportation System Plan update focused in particular on the mobility and access improvements needed to support commercial and industrial users, in particular economic development activity in the northern and western sections of the City.

The resulting 2018 Transportation System Plan is a multi-modal plan that embodies the community's vision for an equitable and efficient transportation system. It is a planning tool that will help the City balance its investments to ensure that it can develop and maintain the transportation system adequately to serve everyone who travels in and through Lebanon. The TSP outlines strategies and projects that are important for protecting and enhancing the quality of life in Lebanon through the next 20 years and includes standards to guide future development.

1.3.2 Purposes of this Chapter.

[Replace existing text with the following.]

The Transportation System Plan describes the City's existing transportation system, identifies future needs, and provides solutions and prioritized projects to meet those needs. Comprehensive Plan Chapter 8 contains goals and policies that are consistent with and help implement the objectives and recommendations of the Transportation System Plan.

1.3.3 Relationship of the Transportation System Plan to the Comprehensive Plan

[Replace existing text with the following.]

The 2018 Transportation System Plan serves as the Transportation element of the City's Comprehensive Plan; additional information, including forecasted future transportation needs, roadway functional classifications, and transportation facility standards can be found in the plan document.

2.0 – 8.0 *[Remove.]*

PART TWO: GOALS, POLICIES AND RECOMMENDATIONS

2.0 Overall Goals

[From final 8/5/16 Technical Memorandum #4: Goals, Objectives and Evaluation Criteria.]

The City's Transportation Related Goals include the following:

G-1: An equitable, balanced and well-connected multi-modal transportation system.

G-2: Convenient facilities for pedestrians and bicyclists.

G-3: Transit service and amenities that encourage a higher level of ridership.

G-4: Efficient travel to and through the City.

G-5: Safe and active residents.

G-6: A sustainable transportation system.

G-7: A transportation system that supports a prosperous and competitive economy.

G-8: Coordinate with local and state agencies and transportation plans.

3.0 Equity and Multi-Modal Connectivity Policies

[Policies are the objectives from final 8/5/16 Technical Memorandum #4: Goals, Objectives and Evaluation Criteria. Track changes show how the TSP objectives have been further modified for the Comprehensive Plan.]

P-1: Ensure that the transportation system provides equitable access to underserved and vulnerable populations and is friendly and accommodating to travelers of all ages.

P-2: Ensure the pedestrian, and bike throughways are clear of obstacles and obstructions (e.g., utility poles, grates).

P-3: Provide connections for all modes that meet applicable Lebanon and Americans with Disabilities Act (ADA) standards.

4.0 Multi-Modal Accessibility Policies

P-4: Allow more walking and biking by ~~providing for their needs~~encouraging improvements (e.g., street lighting, bike parking) that make these modes of transportation more safe and convenient.

P-5: Improve commuting and recreational walking and biking connections to community facilities and amenities.

P-6: Enhance way finding signage for those walking and biking, directing them to bus stops, and key routes and destinations.

P-7: Promote walking, bicycling, and sharing the road through public information and events.

P-8: ~~Make necessary changes to the land development code to allow compatible uses to locate within walking and biking distance of each other (e.g., residential use and employment).~~Ensure that land development requirements support the implementation of the planned transportation system.

P-9: Safe and convenient bicycle and pedestrian facilities shall be provided by new development within and between new subdivisions, planned developments, shopping centers, industrial parks, residential areas, transit stops, and neighborhood activity centers such as schools, parks, and shopping. *[Revised existing P-47 and P-55.]*

5.0 Transit Policies

P-10: Locate transit stops where safe and convenient for users.

P-11: Encourage additional transit services and coordinate with transit providers to improve the coverage, quality and frequency of services, where needed.

P-12: Encourage higher levels of transit use ~~Provide for transit user~~by enhancing multi-modal connections~~ needs beyond basic provision of service~~ (e.g., by providing sidewalk and bicycle connections) and available facilities (~~,~~ shelters, benches, technology)~~ to~~, ~~encourage higher levels of use~~.

P-13: Explore opportunities to develop~~Identify locations for~~ designated Park-and-Ride lots, consistent with the direction provided in the adopted Transportation System Plan.

P-14: Work with the Lebanon School District when evaluating new subdivision and multi-family development proposals to identify the optimal location and design of transit facilities to serve student busing *[Existing P-63]*

6.0 Efficiency Policies

P-13: Develop and preserve north-south arterial and collector corridors through the City to provide alternative routes to US 20 for local traffic and improve connectivity across OR 34.

P-14: Develop and preserve east-west arterial and collector corridors through the City to provide alternative routes to OR 34 for local traffic and improve connectivity across US 20.

P-15: ~~Make~~ Ensure that new or improved transportation connections ~~to~~ enhance system efficiency, consistent with the adopted Transportation System Plan.

P-16: Coordinate with ODOT to ensure that ~~Distribute~~ travel information is available for motorists to maximize the reliability and effectiveness of US 20 and OR 34.

P-17: Implement the City mobility standard to help maintain a minimum level of motor vehicle travel efficiency for local streets. State and County standards for mobility will be supported by the City on facilities under the respective jurisdiction.

7.0 Safety and Active Transportation Policies

P-18: At high collision locations, improve safety for walking, biking, and driving.

P-19: Enhance existing crossings of US 20 and OR 34 for safe walking and biking (e.g., install rapid flashing beacons, and aids for vulnerable populations, such as chirpers, at signalized pedestrian crossings).

P-20: ~~Provide~~ Ensure that new crossings for pedestrians and bicyclists ~~where needed~~are consistent with the planned transportation system and improve safety and mobility for these users.

P-21: Improve the visibility of travelers in constrained areas, such as on blind curves.

P-22: Promote walking and bicycling by educating users regarding good traffic behavior and consideration for all.

P-23: Apply appropriate traffic calming solutions in residential neighborhoods to discourage high speed traffic on local existing or newly constructed residential streets. *[Revised existing P-5.]*

P-24: Maintain compatible land uses, particularly industrial land uses, adjacent to the Airport and shall enforce development standards to ensure the operational safety of the Airport. *[Revised existing P-80.]*

8.0 Sustainability Policies

~~Reduce reliance on US 20 and OR 34 for local trips.~~ *[See P-13 and P-14.]*

P-25: Avoid impacts to the scenic, natural and cultural resources in the City.

P-26: Support alternative vehicle types (e.g., with electric vehicle plug-in stations).

P-27: Encourage an arrangement of land use that would shorten trip lengths significantly or reduce the need for motor vehicle travel within the City.

P-28: Maintain the existing transportation system assets to preserve their intended function and useful life.

P-29: Improve travel reliability and safety with system management solutions.

P-30: Establish stable and diverse revenue sources to meet the need for transportation investments in the City.

P-31: Determine transportation system investment priorities through open and transparent processes.

~~Develop and support reasonable alternative mobility targets that align with economic and physical limitations on US 20 and OR 34 and City streets where necessary.~~ *[No longer necessary.]*

9.0 Economic Development Policies

P-32: Design and implement elements of the transportation system to be aesthetically pleasing to through travelers, residents, visitors, and users of adjoining land.

P-33: ~~Identify~~ Prioritize transportation improvements that will enhance access to employment.

P-34: Design and implement streets and street improvements to capture and highlight views.

P-35: Improve ~~the~~ freight ~~system~~ movement efficiency, access, capacity and reliability on identified freight routes.

P-36: Support continued improvements to the Lebanon Airport as an important transportation element in the economic growth of the community. *[Revised existing P-78.]*

10.0 Coordination Policies

P-37: Work with the Cascades West Area Commission on Transportation and the South Valley / Mid Coast Regional Solutions Center to promote projects that improve regional linkages.

~~Develop TSP policy and municipal code language to implement the TSP update.~~ *[No longer necessary.]*

P-38: Coordinate transportation projects, policy issues, and development actions with all affected government agencies in the area, including Linn County, and the Oregon Department of Transportation.

P-39: Coordinate local neighborhood plans and visions with the ~~TSP~~Transportation System Plan.

Proposed Development Code Amendments

Proposed code amendments are based on the recommendations in Technical Memorandum #3, Regulatory Review (Table 1 in the April 22, 2016 memorandum) and the draft TSP. The recommended changes to the Development Code are summarized in Table 1, which includes comments regarding the basis for the changes, such as references to applicable TPR requirements and recommendations in the draft TSP.

Following the summary table, the draft proposed code amendments are presented according to numbering in the summary table and in an adoption-ready format, with text that is proposed to be added shown as underlined and text that is proposed to be removed shown as ~~struck through~~. Table 1 and the amendments that follow are presented sequentially, where the proposed text changes would appear in the LDC. The proposed code amendment language is based primarily on the State of Oregon Transportation and Growth Management's Model Development Code for Small Cities, 3rd Edition ("Model Code") and, secondarily, on development code language from peer jurisdictions around Oregon.

Table 1 – Summary of Proposed Development Code Amendments (Municipal Code Title 16)

#	Proposed Amendments	Comments
LDC Chapter 16.12: Transportation Access, Access Management and Circulation		
1	Update references to TSP Figure 6-2 (Future Functional Classification) in Section 16.12.030.	Access control measures, such as spacing standards, are required to be adopted pursuant to OAR 660-012-0045(2)(a). Subsection (2) requirements are intended to protect transportation facilities for their identified functions; they serve to promote safety as well. Access spacing is addressed in LDC 16.12.030(G) as well as in the draft TSP (Table ____), so requirements need to be consistent between the two documents. LDC 16.12.030 includes three references TSP Figure 6-2 from the current TSP that

		will need to be updated to reference Table ____ in the draft TSP.
2	Consider adding requirements specifically designed to support transit facilities to Section 16.12.040 (Bicycle Access and Management Requirements).	Although Transit stops are mentioned in Section 16.12.040(B) as part of Safe and Convenient Bicycle Facilities under Bicycle Access and Management Requirements, there are no specific standards for supporting transit routes and transit facilities consistent with OAR 660-012-0045(4).
3	Consider adding requirements specifically designed to support transit facilities to Section 16.12.050 (Pedestrian Access and Management Requirements); amend to require that new development provide pedestrian access to existing and planned transit routes.	Section 16.12.050 (Pedestrian Access and Management Requirements) does not include specific standards for supporting transit routes and transit facilities consistent with OAR 660-012-0045(4). Transit stops are mentioned in Section 16.12.040(B) as part of Safe and Convenient Bicycle Facilities under Bicycle Access and Management Requirements, but not under Pedestrian Access and Management Requirements (Section 16.12.050). Although standards in Section 16.12.050 do not address transit facilities, they do require continuous pathways extending throughout the site and connecting with all future phases and adjacent spaces whenever possible. In addition, developments

		which are subject to site design review are required to have pathways connect to all building entrances parking areas, and adjacent developments.
LDC Chapter 16.13: Transportation Improvements and Design Standards for Streets, Alleys and Pathways		
4	Standards and references in Section 16.13.030 should be made consistent between the updated TSP and the code.	Local street standards for width and right-of-way are found in Section 16.13.030 in Table 16.13.030-1 and Table 16.13.030-2. The TSP update process will evaluate the cross-sections established in the 2007 TSP to ensure that right-of-way and pavement dimensions are sufficient to serve the operational needs of each roadway functional classification without requiring excessive paved widths.
LDC Chapter 16.14: Off-Street Parking and Loading		
5	Amend Section 16.14.030 to allow the redevelopment of existing parking areas for transit-oriented uses.	The development code currently does not include regulations or standards which allow portions of existing parking areas to be redeveloped for transit-orients uses consistent with OAR 660-012-0045(4)(e).

LDC Amendment #1 – References to Figure 6-2 in 2007 TSP

16.12.030 MOTOR VEHICLE ACCESS AND MANAGEMENT REQUIREMENTS

C. Access Permits Required

Access to a public street requires an Access Permit issued in accordance with the following procedures:

[…]

2. State Highways 20 and 34: Permits to develop or use access to State Highways 20 and 34 (defined as Principal Arterials in the Lebanon TSP, as per Figure ~~6-2~~ XX) must be obtained from the Oregon Department of Transportation (ODOT). Permits are subject to the requirements established in applicable Oregon Administrative Rules.

[…]

F. Access Options For City Streets and Alleys

When vehicle access is required for development (e.g., for off-street parking, delivery, service, drive-through facilities, etc.), access shall be provided by one of the following methods (a minimum of 12 feet per lane is required). These methods are “options” for the applicant, unless one method is specifically required by applicable regulations. Street accesses shall comply with the access spacing standards in Subsection 16.12.030.G, below.

[…]

4. Subdivisions Fronting onto an Arterial Street: In order to minimize or preclude access to arterials, new residential land divisions fronting on an arterial street shall be required to provide access from alleys or secondary (local or collector) streets to individual lots. When alleys, collectors or local streets cannot provide access due to topographic or other physical constraints, access may be provided by creating a frontage street or other suitable alternatives acceptable to the City Engineer, and where access to Highway 20 or 34 (defined as Principal Arterials in the Lebanon TSP, as per Figure ~~6-2~~ XX) is proposed, acceptable to the Oregon Department of Transportation.

G. Access Spacing

When required to serve the proposed development, accesses shall be separated from driveways and street intersections in accordance with the following standards and procedures:

[…]

2. Arterial and Collector Streets: Where a collector or arterial street or a controlled intersection is under the jurisdiction of the City of Lebanon (see Figure ~~6-2~~ XX in the Lebanon TSP), access spacing shall be determined based on the policies and standards contained in the City's Transportation System Plan as well as the Manual for Uniform Traffic Control Devices. Exceptions to this may be granted by the City Engineer. Evaluations of exceptions shall consider posted speed of the street on which access is proposed, constraints due to lot patterns, and effects on safety and capacity of the adjacent public street, bicycle and pedestrian facilities. Access spacing on State Highways 20 and 34 (defined as Principal Arterials in the Lebanon TSP, as per Figure ~~6-2~~ XX) is subject to the requirements of applicable Oregon Administrative Rules as determined by Oregon Department of Transportation.

LDC Amendment #2 – Bicycle Access to Transit Facilities

16.12.040 BICYCLE ACCESS AND MANAGEMENT REQUIREMENTS

A. On-Street Bike Lanes

On- and/or off-street bike lanes or shared-use paths shall be provided as per the street standards and specifications in the Lebanon Transportation System Plan (TSP) and constructed at the time of street improvements.

B. Safe and Convenient Bicycle Facilities

Safe and convenient bicycle facilities that strive to minimize travel distance to the greatest extent practicable shall be provided in conjunction with applicable redevelopment as well as new development within and between new subdivisions, planned developments, commercial developments, industrial areas, residential areas, transit stops, and neighborhood activity centers such as schools and parks. For the purposes of this section, "safe and convenient" means bicycle facilities that:

1. are reasonably free from hazards that would interfere with or discourage bicycle travel for short trips.

2. provide a direct route of travel between destinations and other modes of travel, such as transit.

3. meet the travel needs of bicyclists considering destination and length of trip.

C. Bicycle or ~~Multi-Use Pathway~~ Shared-use Path Facility Paving Standards

Adequate widths for bicycle or ~~Multi-Use pathway~~ shared-use path facilities shall be provided in accordance with the standards summarized below.

1. Paving Standards: ~~Table 16.12.040-1 shows paving and width standards for each classification category.~~ ***[Recommend removing Table 16.12.040.]*** Shared-use path shall be 12-15 feet wide, consistent with the standards in the adopted Transportation System Plan (Figure XX). The city may reduce the width of the typical paved shared-use path to a

minimum of ten feet in constrained areas (e.g., steep, environmentally sensitive, historic, or previously developed areas).

2. Bicycle/Pedestrian Rights-Of-Way: Bicycle/pedestrian rights-of-way connecting cul-de-sacs or passing through unusually long or oddly shaped blocks shall be a minimum of 15 feet wide.

D. Connectivity and Creating an Effective Bicycle Network

To provide for orderly development of an effective bicycle network, bicycle facilities installed concurrent with development of a site, or applicable redevelopment, shall be extended through the site to the edge of adjacent property(-ies).

E. Safe Lines of Sight

To maximize the personal safety of the pedestrians and cyclists that use paths that connect streets, such paths should be developed with a straight line of site from the streets at both ends, except where terrain does not permit such a linear layout.

LDC Amendment #3 – Pedestrian Access to Transit Facilities

16.12.050 PEDESTRIAN ACCESS AND MANAGEMENT REQUIREMENTS

A. Pedestrian Access and Circulation

To ensure safe, direct and convenient pedestrian circulation, all developments, except single-family detached housing on individual lots, shall provide a continuous pedestrian and/or multi-use pathway system.

1. Pathways only provide for pedestrian circulation.

2. ~~Multi-~~Shared-use pathways accommodate pedestrians and bicycles.

3. Recreational Trails -- See Parks Master Plan and related documents for standards.

4. The system of pathways shall be designed based on the standards in Subsections B, C, and D, below.

B. Continuous Pathways

The pathway system (also applicable for bike paths) shall extend throughout the development site, and connect to all future phases of development, adjacent trails, public parks and open space areas whenever possible. The developer may also be required to connect or stub pathway(s) to adjacent streets and private property, in accordance with the provisions of Chapter 16.13 (Transportation Improvements and Design Standards).

C. Safe, Direct, and Convenient Pathways

Pathways within developments shall provide safe, reasonably direct and convenient connections between primary building entrances and all adjacent streets, based on the following definitions:

1. Reasonably Direct: A route that does not deviate unnecessarily from a straight line or a route that does not involve a significant amount of out-of-direction travel for likely users.

2. Safe and Convenient: Bicycle and pedestrian routes that are reasonably free from hazards and provide a reasonably direct route of travel between destinations.

3. Primary Entrance for Commercial, Industrial, Mixed-Use, Public, and Institutional Buildings: For such development, the "primary entrance" is the main public entrance to the building. In the case where no public entrance exists, street connections shall be provided to the main employee entrance. The primary entrance of the building closest to the street where the transit stop is located shall be oriented to that street.

4. Primary Entrance for Residential Buildings: For such development the "primary entrance" is the front door (i.e., the entrance that faces the street). For multifamily buildings in which each unit does not have its own exterior entrance, the "primary entrance" may be a lobby, courtyard or breezeway that serves as a common entrance for more than one dwelling.

D. Connections Within Development

For all developments subject to any site design review (e.g., Planning process, Engineering Services process), pathways shall connect all building entrances to one another. In addition, pathways shall connect all parking areas, storage areas, recreational facilities and common areas (as applicable), and ~~adjacent~~ developments and existing and planned transit stops adjacent to the site, as applicable.

E. Street Connectivity

Pathways (for pedestrians and bicycles) shall be provided at or near mid-block where the block length exceeds the length required by Section 16.12.030 above. Pathways shall also be provided where cul-de-sacs or dead-end streets are planned, to connect the ends of the streets together, to other streets, and/or to other developments, as applicable. Pathways used to comply with these standards shall conform to all of the following criteria:

1. ~~Multi~~ Shared-use pathways: Multi-use pathways for pedestrians and bicyclists shall be no less than 12 feet wide in a 15 foot wide ROW and if warranted and required located within a ~~20~~18-foot-wide right-of-way or easement that allows access for emergency vehicles.

2. Lighting: If the streets within the subdivision or neighborhood are lighted, the pathways shall also be lighted (also applicable for bike paths), subject to Review Authority approval.

3. Alternatives for Areas with Steep Grades: Stairs or switchback paths using a narrower right-of-way/easement may be required in lieu of a multi-use pathway where grades are steep.

4. Required Landscaping: The City may require landscaping within the pathway easement or right-of-way for screening and the privacy of adjoining properties (also applicable for bike paths).

5. Exceptions: The hearings body or Planning Official, as appropriate, may determine, based upon facts in the record, that installation of a pathway (also applicable for bike paths) is impracticable due to: a. physical or topographic conditions (e.g., railroads, extremely steep slopes, sensitive lands, and similar physical constraints), b. buildings or other existing development on adjacent properties that physically prevent a connection now or in the future, considering the potential for redevelopment, and c. sites where the provisions of recorded leases, easements, covenants, restrictions, or other agreements recorded as of the effective date of this Code prohibit the pathway connection.

F. Design and Construction Standards

Pathways shall conform to all of the standards in subsections "1" – "8" below:

1. Vehicle/Pathway Separation: Where off-street pathways (also applicable for bike paths) are parallel and adjacent to a driveway or street (public or private), they shall generally be raised 6 inches and curbed, or separated from the driveway/street by a 5- foot minimum strip with bollards, a landscape berm, or other physical barrier. If a raised path is used, the ends of the raised portions must be equipped with curb ramps. Alternative safety features may be approved by the City Engineer.

2. Housing/Pathway Separation: Pedestrian pathways (also applicable for bike paths) shall be separated a minimum of 5 feet from all residential living areas on the ground floor, except at building entrances. Separation is measured as measured from the pathway edge to the closest dwelling unit. The separation area shall be landscaped in conformance with the provisions of Chapter 16.15 of this Code. No pathway/building separation is required for commercial, industrial, public, or institutional uses.

3. Pathway Surface: Pathway surfaces (also applicable for bike paths) shall be concrete, asphalt, brick/masonry pavers, or other durable surface, at least 5 feet wide, and shall conform to ADA requirements. Multi-use paths for bicycles and pedestrians shall be the same materials, at least 12 feet wide. (See also, Transportation Standards for public, multi-use pathway standards.)

4. Accessible Routes: Pathways shall comply with the provisions of the Americans with Disabilities Act (ADA) that require accessible routes of travel.

5. Internal Pedestrian Connections – Accessway and Walkway Connections within Commercial and Office Park Development: Acceptable methods for meeting the State's Transportation Planning Rule (TPR) requirements for internal pedestrian connections within new office parks and commercial developments include:

a. Providing at least one sidewalk connection between abutting developments.

b. Providing walkways to the street for every 300 feet of frontage.

c. Providing direct connections and minimizing driveway crossings.

d. Linking connections to the internal circulation of the building.

e. Providing walkways that are at least 5 feet wide and are raised, have curbing, or have different paving material when crossing driveways.

f. Providing accessways for through parking lots that are physically separated from adjacent vehicle parking or parallel vehicle traffic by curbs or similar devices and include landscaping, trees and lighting.

6. Paving Width Standards for Pedestrian Facilities (e.g., Pathways, Sidewalks): The following paving width standards shall apply to all new development and redevelopment

(See Table 16.12.050-1.) ***[Check consistency of this table with updated TSP.]***

LDC Amendment #4 – Consistency Between Code and TSP

16.13.030 DESIGN STANDARDS FOR IMPROVEMENTS: STREETS, ALLEYS, & PATHWAYS

[…]

E. Minimum Rights-of-Way and Street Sections

The City of Lebanon Street Cross-Section Standards are summarized in ~~Table 16.13.030-1 (also see~~ TSP Table ~~6-1~~ XX), and the Right-of-Way and Street Design Standards ~~are shown in Table 16.13.030-2 (also see~~ TSP Tables ~~6-2 thru 6-5~~ XX). ~~Table 16.13.030-1 also contains typical alley and cul-de-sac information.~~

Can Table 16.13.030-1: Typical Street Cross-Sections and Table 16.13.030-2: Typical Street Design Standards (Subject to Engineering Site Plan Reviews) be replaced by TSP standards/TSP reference? Are there updated alley and cul-de-sac standards?

[…]

G. Future Street Plan and Extension of Streets

1. When a new subdivision or planned development includes the creation of a new street(s), the subdivision proposal must include a proposed street plan as part of the application for the subdivision in order to facilitate orderly development of the street system. The plan shall show the pattern of existing and proposed future streets from the boundaries of the proposed land division and shall include other parcels within 600 feet surrounding and adjacent to the proposed land division. The plan must demonstrate that connectivity can be achieved in a practical manner by connections with potential street extensions within future development on the surrounding and adjacent parcels.

2. Streets shall be extended to the boundary lines of the parcel or tract to be developed. These extended streets or street stubs to adjoining properties are not considered to be cul-de-sacs since they are intended to continue as through streets when the adjoining property is developed. The point where the streets temporarily end shall conform to Subsections "a" and "b" below:

a. A MUTCD barricade shall be constructed at the end of the street and shall not be removed until authorized by the City or other applicable agency with jurisdiction over the street. The cost of the barricade shall be included in the street construction cost.

b. Emergency Vehicle turnarounds (e.g., hammerhead or bulb-shaped configuration) shall be constructed for stub streets in compliance with the Oregon Fire Code and Lebanon Fire District's requirements, as determined by the Fire Code Official.

H. Street Alignment and Connections

1. Spacing between street intersections shall have a minimum separation of ~~300~~ 265 feet for arterial and collector streets and 150 feet for local roadways, except where more closely spaced intersections are warranted by site specific considerations.

2. Through Circulation of Local and Collector Streets: Unless superseded by a local street network plan, all local and collector streets that abut a development site shall be extended within the site to provide through circulation and connection to abutting streets unless prevented by environmental or topographical constraints, existing development patterns or compliance with other standards in this code.

I. Sidewalks, Planter Strips, Bicycle Lanes

Sidewalks, planter strips, and bicycle lanes shall be installed in conformance with the standards in Transportation System Plan Table ~~16.13.030-2~~ XX, ~~applicable provisions of the Transportation System Plan,~~ Public Improvement standards, and adopted street plans. Maintenance of sidewalks, and planter strips is the continuing obligation of the adjacent property owner. Also see Chapter 16.12 of this Code, subsections 16.12.040 (Bicycle Access and Management Requirements), and 16.12.O50 (Pedestrian Access and Management Requirements) for further details on Bicycle and Pedestrian pathways.

J. Intersection Angles

Streets shall be laid out so as to intersect at an angle as near to a right angle as practicable, except where topography requires a lesser angle or where a reduced angle is necessary to provide an open space, park, common area or similar neighborhood amenity.

K. Existing Rights-of-Way

Whenever existing rights-of-way adjacent to or within a tract are of less than standard width, additional rights-of-way shall be provided at the time of subdivision or development.

L. Cul-de-sacs

1. The length of a cul-de-sac street shall not exceed 400 feet. However, cul-de-sacs may be up to 600 feet in length with a pedestrian/bicycle accessway to neighboring streets and/or pathways for connectivity that includes a dedicated right-of-way for utilities, and subject to approval of the Lebanon Fire District.

2. The length of a cul-de-sac is measured from the edge of the street right-of-way along the length of the "stem" to the back of the "bulb."

3. All cul-de-sacs of more than 150 feet in length shall terminate with a circular turnaround. Such Emergency Vehicle turnarounds shall be constructed in compliance with the Oregon Fire Code and Lebanon Fire District's requirements.

4. Also see Section 16.12.030.K.7 (Chapter 16.12), and Table 16.13.030-1 (in this Chapter).

M. Development Adjoining Arterial Streets

Where a development adjoins or is crossed by an existing or proposed arterial street, the development design shall separate residential access and through traffic, and shall minimize traffic conflicts. The design shall include one or more of the following:

1. Parallel access street along the arterial with a landscape buffer separating the two streets;

2. Deep lots abutting the arterial or major collector to provide adequate buffering with frontage along another street (double-frontage lots shall conform to the buffering standards in Section 16.12.030.O (Chapter 16.12) of this Code;

3. Screen planting at the rear or side property line to be contained in a non-access reservation (e.g., public easement or tract) along the arterial; or

4. Other treatment suitable to meet the objectives of this subsection;

5. If a lot has access to two streets with different classifications, primary access shall be from the lower classification street, in conformance with Section 16.12.030.O (Chapter 16.12) of this Code.

N. Private Streets Standards

1. Private streets shall not be used to avoid connections with public streets.

2. A new private roadway shall only be allowed in residential areas with 10 or fewer dwelling units.

~~2.~~3. All private streets shall conform to the adopted City Standards for Private Streets in the Transportation System Plan, and with the Oregon Fire Code and Lebanon Fire District's requirements.

O. Gated Communities

Developments that have a gate limiting access from a public street (i.e., a "Gated Community") shall allow unrestricted access for emergency service vehicles and the vehicles of public and private utility providers that service the community.

P. Street Names

Proposed new street names must conform to City of Lebanon requirements, and with the requirements of the Linn County Sheriff's Office, Emergency Services division. Accordingly, no street name shall be used that will duplicate or be confused with the names of existing streets except for extensions of existing streets. Street names, signs and addresses shall conform to the established City standards in the surrounding area, except as requested by emergency service providers.

Q. Street Signage

The developer shall be responsible for funding and installing all signs for traffic control and street names. Street name signs shall be installed at all street intersections. Stop signs and other signs may be required. All signage shall conform to the applicable City, County, and State Standards, and be subject to the approval of the appropriate jurisdiction.

R. Mailboxes

Plans for mailboxes to be installed shall be approved by the United States Postal Service. All such units shall comply with clear vision area restrictions, including appropriate height limitations.

S. Street Light Standards

Streetlights shall be installed in accordance with City standards.

T. Utility Pedestals

The plans and locations for all utility Pedestals to be installed shall be subject to the approval of the appropriate jurisdiction. All such units shall comply with clear vision area restrictions, including appropriate height limitations.

LDC Amendment #5 – Redevelopment of Parking for Transit-Oriented Uses

Chapter 16.14: Off-Street Parking and Loading

16.14.090 SPECIAL PARKING REQUIREMENTS

A. Group Care Facilities and Other Similar Facilities

The number of spaces required may be modified for uses such as group care facilities where it can be demonstrated that automobile use or ownership is significantly lower than the standards listed above. Reductions may be granted by the review authority if the site design provides a correspondingly sized area reserved for parking expansion (e.g., as open space) should the reduced number of parking spaces prove inadequate in actual practice.

B. Other Parking Reductions

1. An applicant for Industrial, Commercial and Multi-Family developments may request a reduction in required parking spaces if the applicant can demonstrate that in another location within the City of Lebanon or in another city similar demographically to Lebanon such a facility has lower parking demands than the standards listed above. Reductions may be granted by the review authority if the site design provides a correspondingly sized area reserved for parking expansion (e.g., as open space) should the reduced number of parking spaces prove inadequate in actual practice. Such open space reserves for parking may not also be part of the minimum required Open Space for the development.

2. Transit-Related Facilities in Parking Lots. Parking spaces and portions of parking lots may be used for transit-related uses such as transit stops and park-and-ride or rideshare areas, provided that the total number of vehicular parking spaces can meet at a minimum 80% of the total spaces required, pursuant to Table 16.14.070-1.

LDC Amendment #6 – Chapter 16.32: Glossary Definitions)

16.32.020 Meaning of Specific Words and Terms

~~MULTI~~ SHARED-USE PATHWAY: Pathways for both pedestrians and bicycles.

Public Involvement Summary

Lebanon Transportation System Plan Update

Technical Advisory Committee (TAC) Meeting #1 Summary

MEETING DATE: July 26, 2016

MEETING TIME: 3:00 p.m. to 5:00 p.m.

MEETING LOCATION: Santiam Travel Station, 750 S 3rd Street, Lebanon

MEETING PURPOSE: The purpose of this meeting was to introduce the Project and review the draft technical memorandum for the Plans and Policies Review (TM #2), Regulatory Review (TM #3), and Goals, Objectives and Evaluation Criteria (TM #4).

TOPICS

1. Sign-in, Agenda Overview, and Introductions

Project staff and TAC members in attendance introduced themselves. The following were in attendance:

- Nikki Bakkala – ODOT Freight Mobility
- Valerie Grigg Devis – ODOT
- Robert Emmons – City of Lebanon
- Walt Wendolowski – City of Lebanon
- Reah Flisakowski – DKS Associates
- Kevin Chewuk – DKS Associates

2. Project/Process Introduction

The project team briefly discussed what a transportation system plan is and why it is important. The TAC had no comments or questions.

3. Plans and Policies Review (TM #2)

The project team briefly introduced Technical Memorandum #2, and the following topics were discussed:

- Add a reference to "coordinate with the Transit Plan" to Oregon Transportation Plan Goal #1
- Add more specific detail to reference freight in Oregon Transportation Plan Goal #3

- Soften the language to say "identify" in the summary of Oregon Transportation Plan Goal #5
- Soften the language to say "people through-put" in Oregon Transportation Plan Goal #4
- The TAC questioned what a multi-modal street classification would entail. The project team explained that it would result in different street designs based on the adjacent land use, similar to how the functional classification has different street designs based on the classification.
- The TAC asked how the Special Transportation Areas works. The City noted that they have not had to deal with it previously. It was noted that the classification could be considered for extension through the unclassified portion of downtown.
- The TAC discussed local freight routes, and if there are better options available than the current routes. The City noted that the project team should look at old TSP memos to determine why the routes exist where they do, and that the original ordinance for the local routes dates back to the 60's. The TAC would like to improve truck circulation through downtown.
- The TAC discussed lifeline routes. The TSP should consider the condition of existing bridges in the City to help determine what bridges may be left standing after an earthquake. The project team noted that the bridge conditions will be included in Technical Memorandum #4.
- The TAC discussed the Airport Master Plan recommendations. They noted that the TSP should be aware of the potential realignment of Airport Road.

4. Regulatory Review (TM #3)

The project team briefly discussed Technical Memorandum #3. The TAC had no comments or questions.

5. Transportation Goals, and Objectives (TM #4)

The project team briefly introduced Technical Memorandum #4, and the following topics were discussed:

- The TAC noted that the project team should consider using the evaluation criteria to score some of the projects jointly with the TAC.
- The TAC would like to add a reference to technology to objective 3C.

6. Existing Transportation Conditions

The project team discussed existing transportation conditions and deficiencies, including:

- The TAC discussed how to make the proposed Parkway in the south end of the City a reality, including what alignment would it follow.
- Upgrades to Airport Road.

- Working with the County on a new alignment of the Parkway following Denny School Road to save industrial land and not have as much wetland impact
- Congestion on Highway 20 through downtown (during the afternoon).

7. Next Steps

The project team noted that they are moving ahead with future memorandums to continue making progress while the delay is occurring with the travel demand model update.

- Technical Memorandum #5: Existing Conditions
- Technical Memorandum #7: Finance Program
- Technical Memorandum #10: Transportation Standards

Lebanon Transportation System Plan Update

Project Advisory Committee (PAC) Meeting #1 Summary

MEETING DATE: July 26, 2016

MEETING TIME: 6:00 p.m. to 8:00 p.m.

MEETING LOCATION: Santiam Travel Station, 750 S 3rd Street, Lebanon

MEETING PURPOSE: The purpose of this meeting was to introduce the Project and review the draft technical memorandum for the Plans and Policies Review (TM #2), Regulatory Review (TM #3), and Goals, Objectives and Evaluation Criteria (TM #4).

TOPICS

1. Sign-in, Agenda Overview, and Introductions

Project staff and PAC members in attendance introduced themselves. The following were in attendance:

- Jim Ruef – Lebanon Bike & Pedestrian Committee
- Michelle Steinhebel – Western University of Health Sciences
- Monica Pepin – Lebanon Downtown Association
- Ginny Wood – Industrial/Rail (Albany & Eastern Railroad)
- Bill Flesher – Lebanon Area Chamber of Commerce
- Mac McNulty – Lebanon Senior Center
- Walt Wendolowski – City of Lebanon
- Reah Flisakowski – DKS Associates
- Kevin Chewuk – DKS Associates

PAC members noted what they hoped to accomplish through the TSP, including the following:

- Improving walkability and biking in the City
- Improving public safety in regards to rail
- Enhancing connectivity and ability to make things work well

2. Project Orientation

The project team gave a brief overview of a Transportation System Plan. PAC members were provided a handout summarizing what a TSP is, why it is important, what elements it should include, and the PAC roles and responsibilities during the process (see attachment). The PAC had no questions or comments.

3. Plans and Policies Review (TM #2)

The project team briefly introduced Technical Memorandum #2, and the following topics were discussed:

- The PAC noted that the pieces of the TSP will make sense as they come together through the process
- It was noted that the Transit Plan is an ongoing process at the same time looking at transit options in the City. It is a separate, but coordinated process with the TSP.

4. Regulatory Review (TM #3)

The project team briefly introduced Technical Memorandum #3, and the following topics were discussed:

- Bike parking at transit stops and park and ride lots is needed.
- The PAC asked if the focus is on improving existing facilities or building new stuff. The project team explained that the focus is on both, but it is dependent on the existing and forecasted issues.
- A PAC member asked why the plan focuses on bikes. Noting that it seems like they cause more traffic by reducing roadway width for motor vehicles. The project team noted that you can build bike facilities cheaper and is generally reducing motor vehicles on the streets. The project team also noted that the TSP focus is more on daily travel, rather than a single hour. The perception of traffic congestion in small communities is often during a single "peak" hour of traffic volumes, but that is too costly to build your way out of.

5. Transportation Goals, and Objectives (TM #4)

The project team briefly introduced Technical Memorandum #4, and the following topics were discussed:

- A PAC member asked how the eight goals came about. The project team explained that they were proposed as a starting point to help guide the process, and can be revised as new information is obtained through the process.
- A PAC member asked if the TSP will incorporate Lebanon Trails. The project team noted that they will revise a goal to incorporate recreational travel.

- The PAC questioned if the plan would propose connectivity improvements. The project team noted that the TSP will look at connectivity improvements, but the PAC could give ideas if they have them.

6. Questions/Comments from Non-PAC Attendees

There were no questions/comments from Non-PAC attendees.

7. Next Steps

The project team noted that they are moving ahead with future memorandums to continue making progress while the delay is occurring with the travel demand model update.

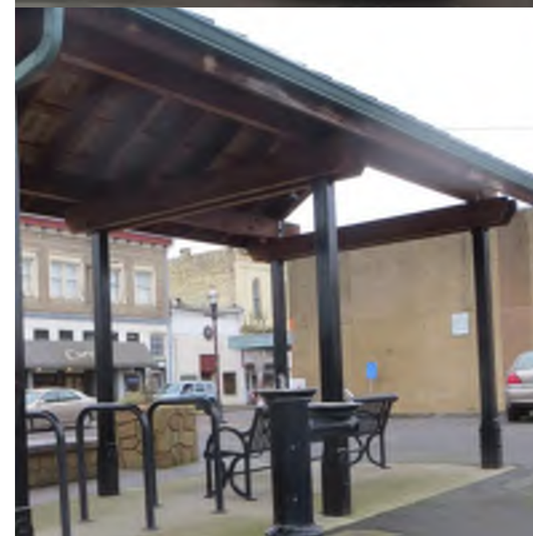
- Technical Memorandum #5: Existing Conditions
- Technical Memorandum #7: Finance Program
- Technical Memorandum #10: Transportation Standards

Attachment-

Lebanon Transportation System Plan Project Orientation

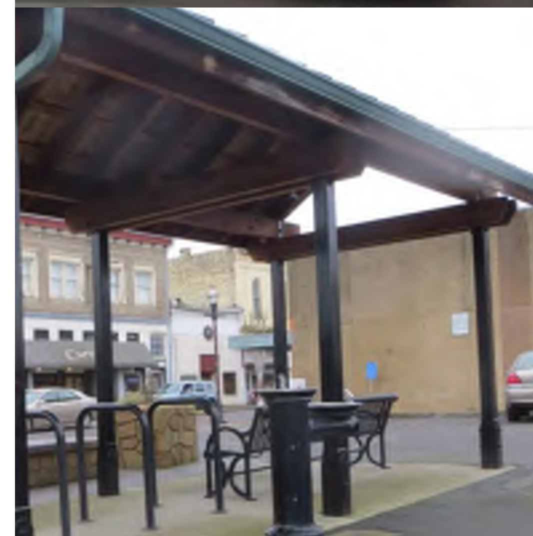
Lebanon
Transportation System Plan

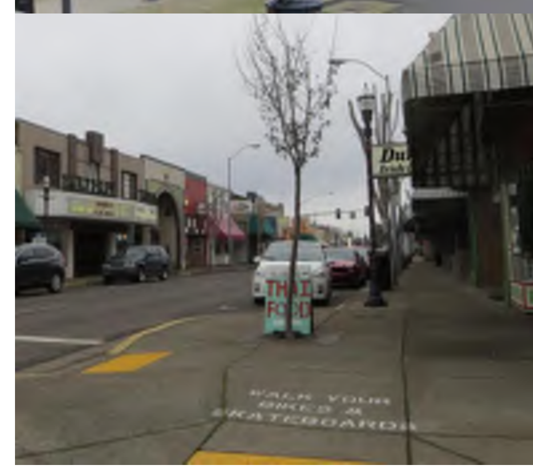
Project Orientation



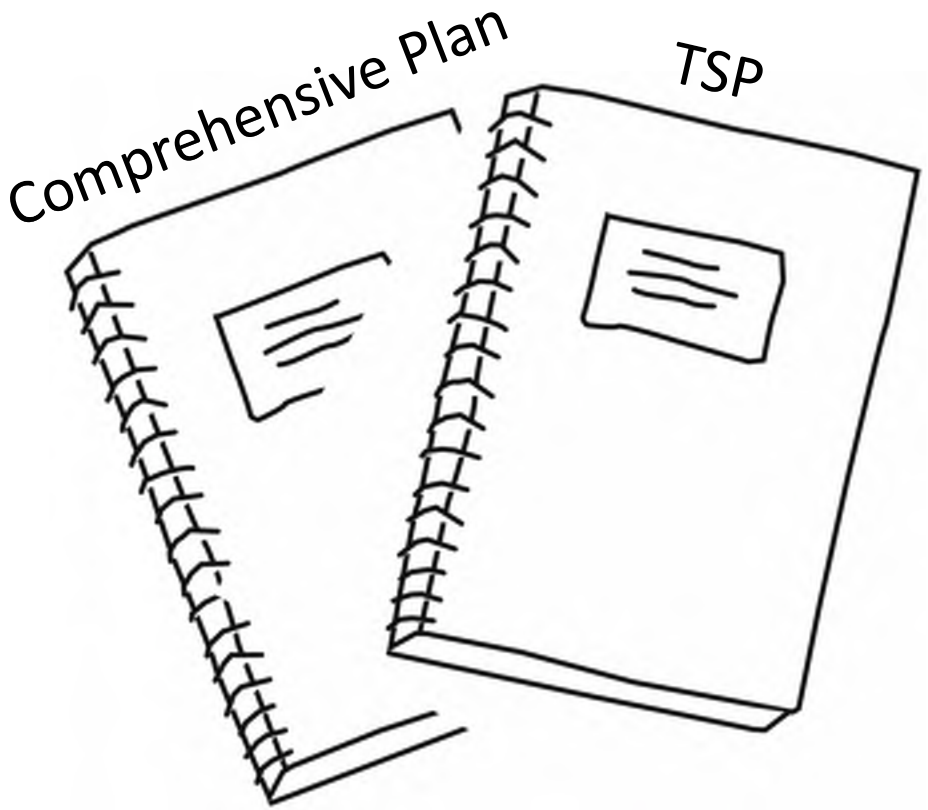
Lebanon
Transportation System Plan

- What is a TSP?
- Why are TSPs important?
- What should TSPs include?
- PAC Roles & Responsibilities

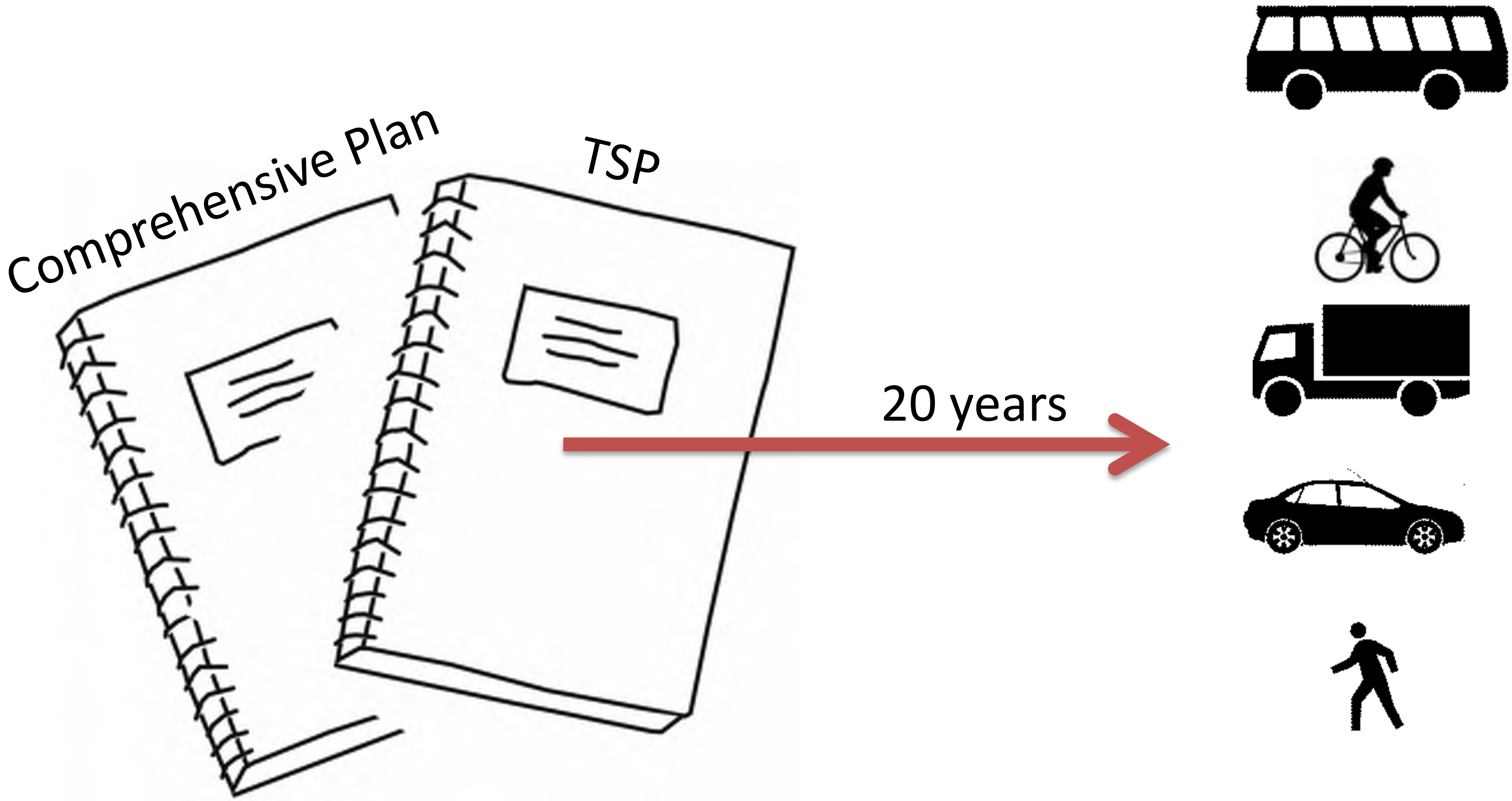




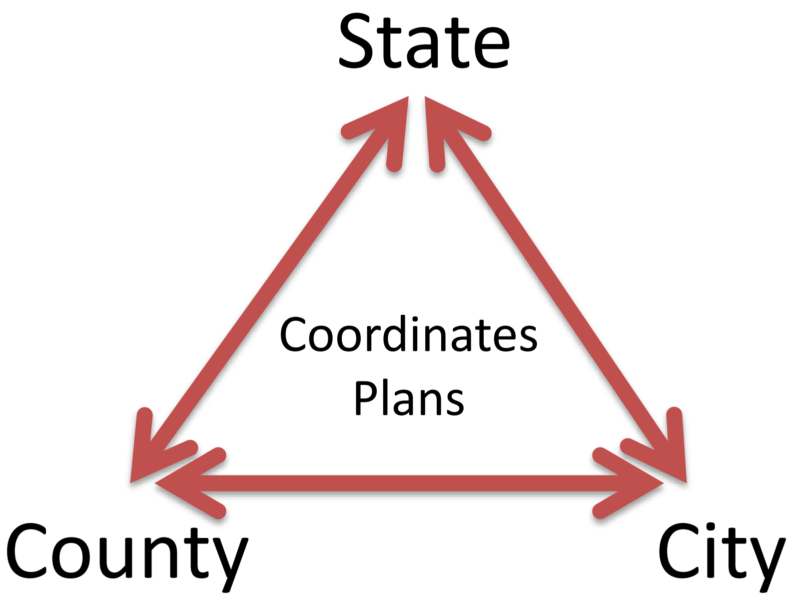
What is a TSP?



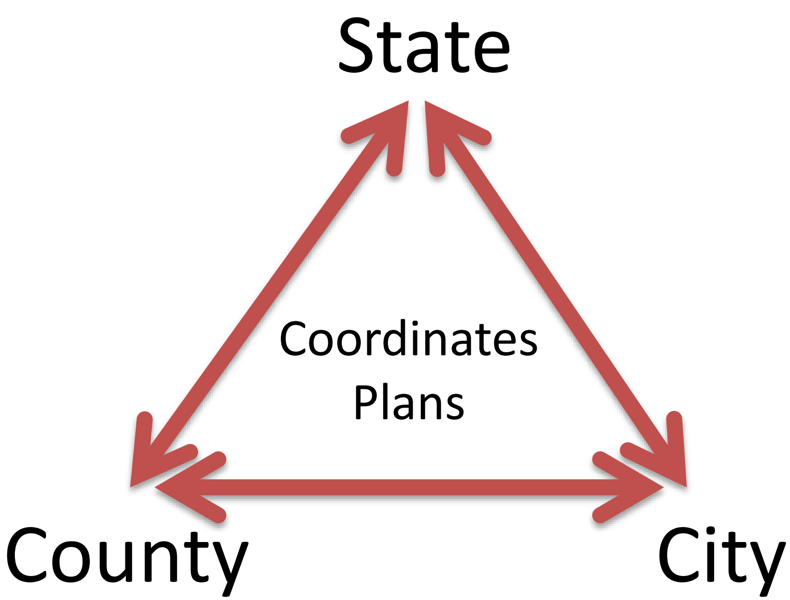
What is a TSP?



Why are TSPs important?



Why are TSPs important?



What do we do next?

Why are TSPs important?

Better investment decisions

“Good fortune is what happens when opportunity meets with planning.” – Thomas Edison

Why are TSPs important?

Better investment decisions

More competitive for funding

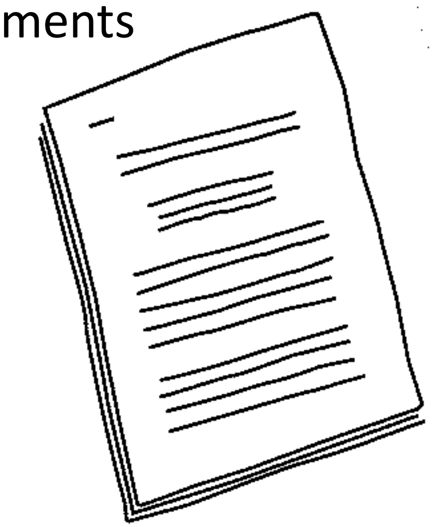
"Good fortune is what happens when opportunity meets with planning." – Thomas Edison

What should TSPs include?

Direction for future decisions

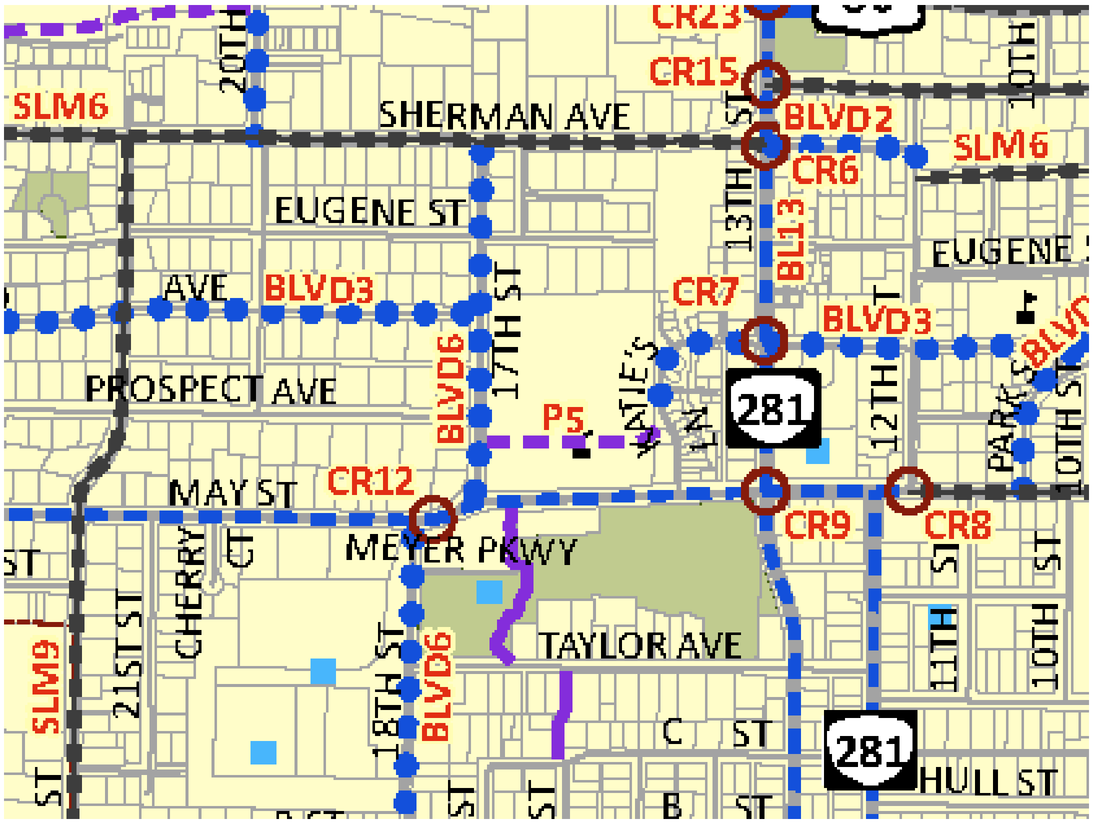
Vision, Goals,
and Policies

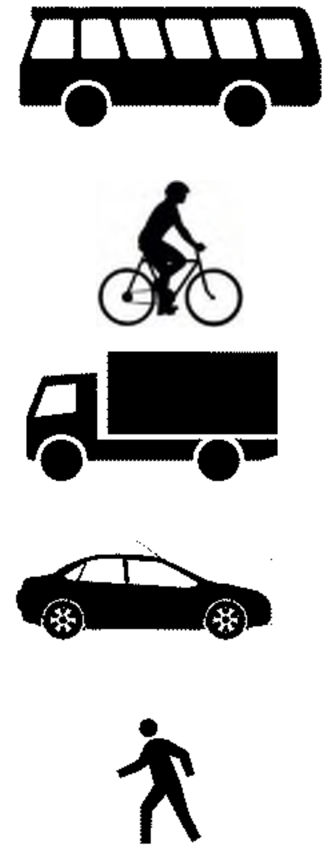
Municipal Code
amendments



What should TSPs include?

Projects to expand and improve the system



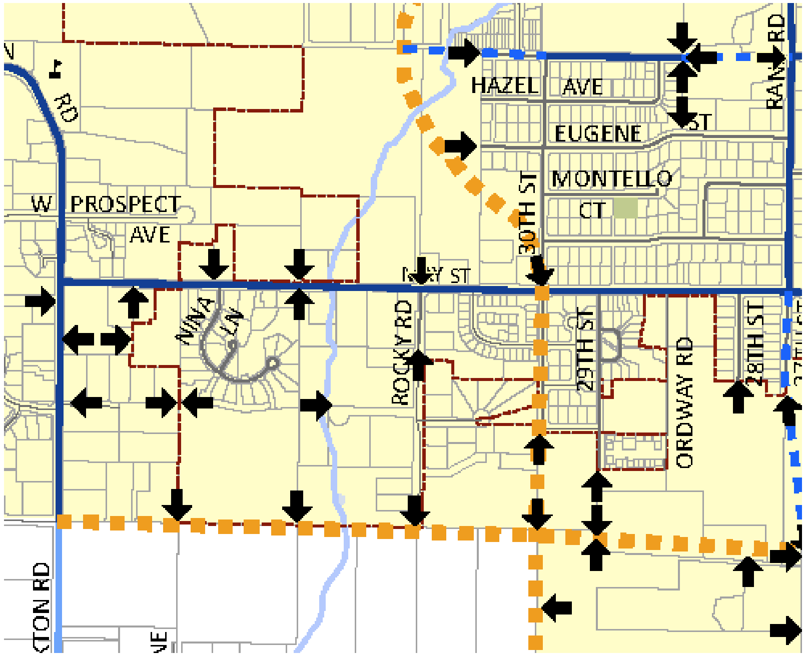


...for all modes of travel

What should TSPs include?

Tools to manage what you have

Street Connectivity requirements



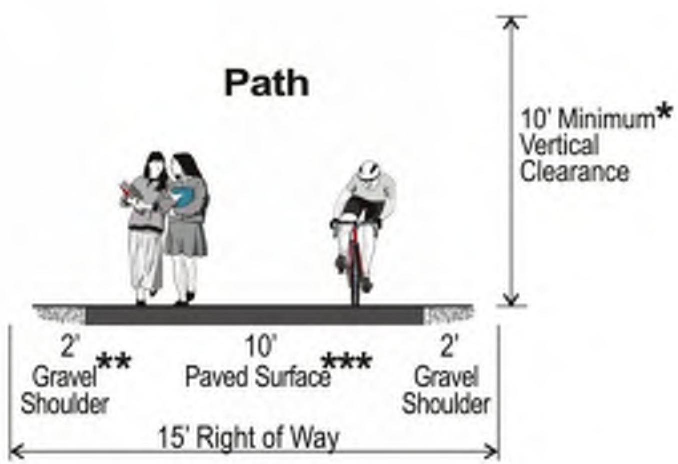
Neighborhood Traffic Management

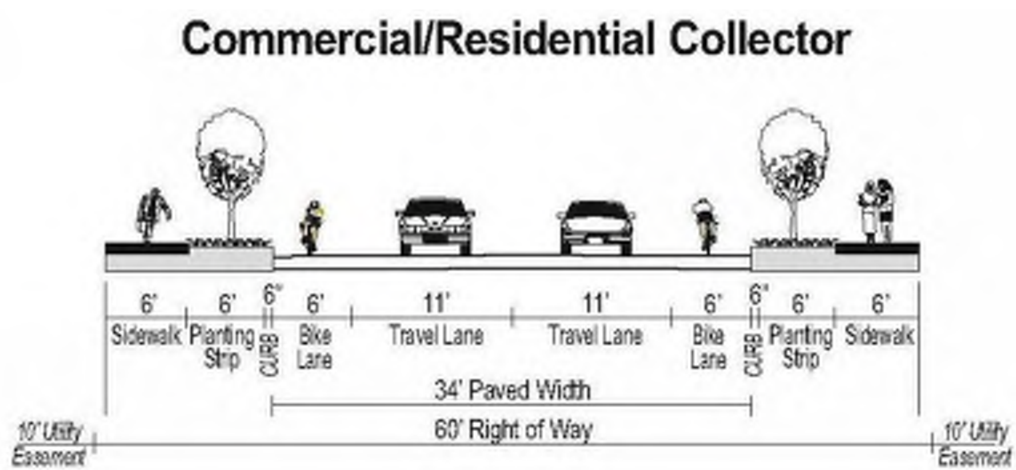

www.pedbikeimages.org/Dan Burden

What should TSPs include?

Tools to manage what you have

Street Design Standards

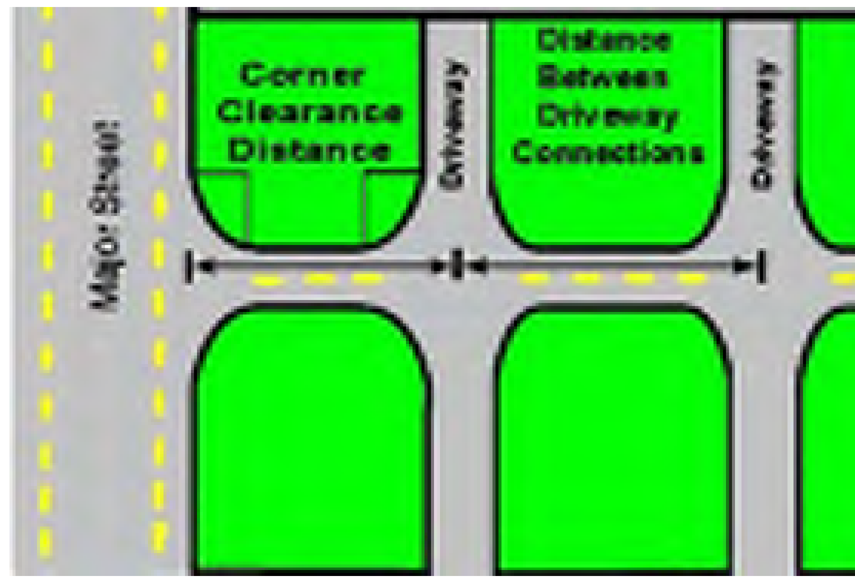




What should TSPs include?

Tools to manage what you have

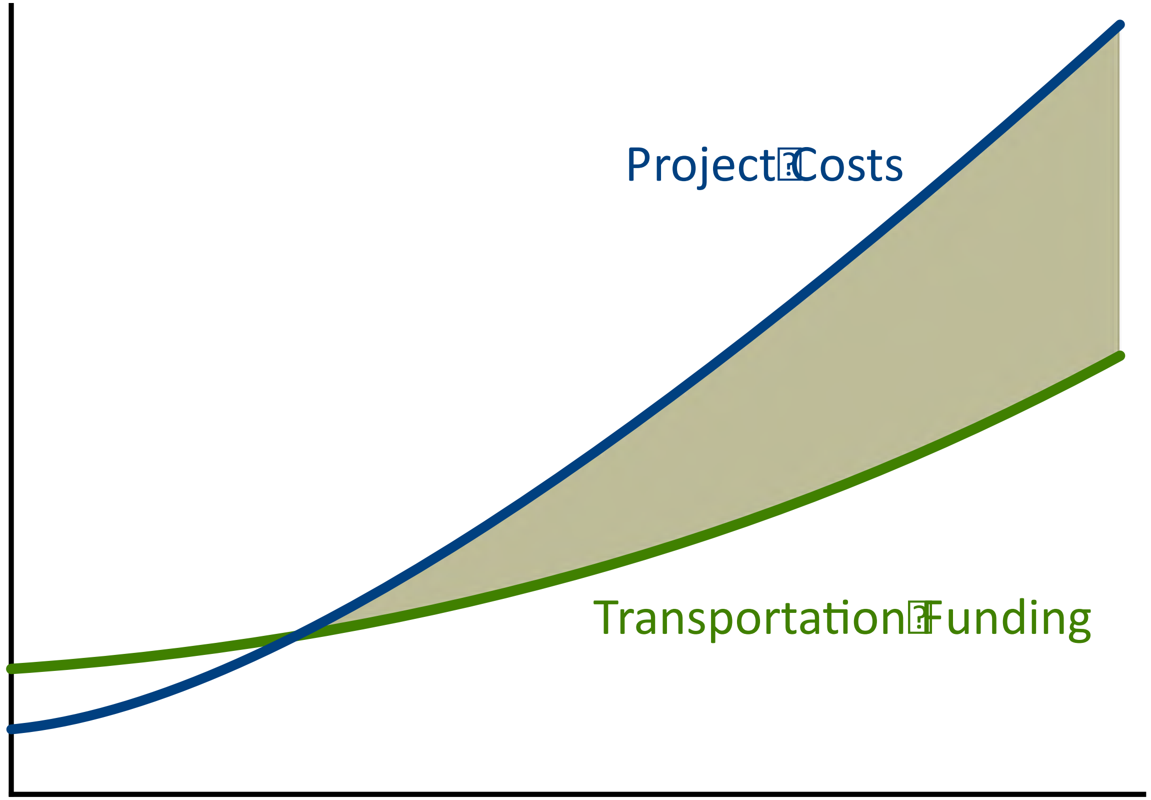
Standards for Mobility and Driveway Spacing…



…that vary with the intended function of the street

What should TSPs include?

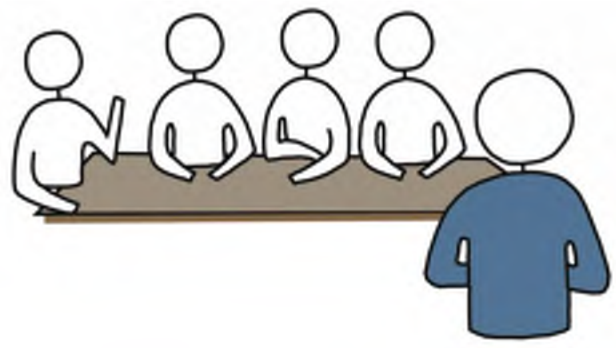
Strategic approach based on fiscal constraints



You can’t spend what you won’t have, so plan accordingly…

PAC Roles & Responsibilities

Provide recommendations as community representatives



- Vision, Goals, and Objectives
- Identifying system needs
- Developing solutions
- Prioritization/Evaluation of solutions
- Endorse the Plan

www.lebanontsp.org

LEBANON TRANSPORTATION SYSTEM PLAN

City Council Work Session – February 8, 2017

Overview

- TSP Introduction
- Goals
- Finance Program
- Current Conditions
- Your Input

Why Adopt a TSP?

- Required by the **Transportation Planning Rule** (TPR) OAR 660-012-0015
- Serves as the transportation element of a local comprehensive plan
- Provides long range direction for development of transportation facilities and services for all modes of travel

What do TSPs do?

What MUST a TSP do?

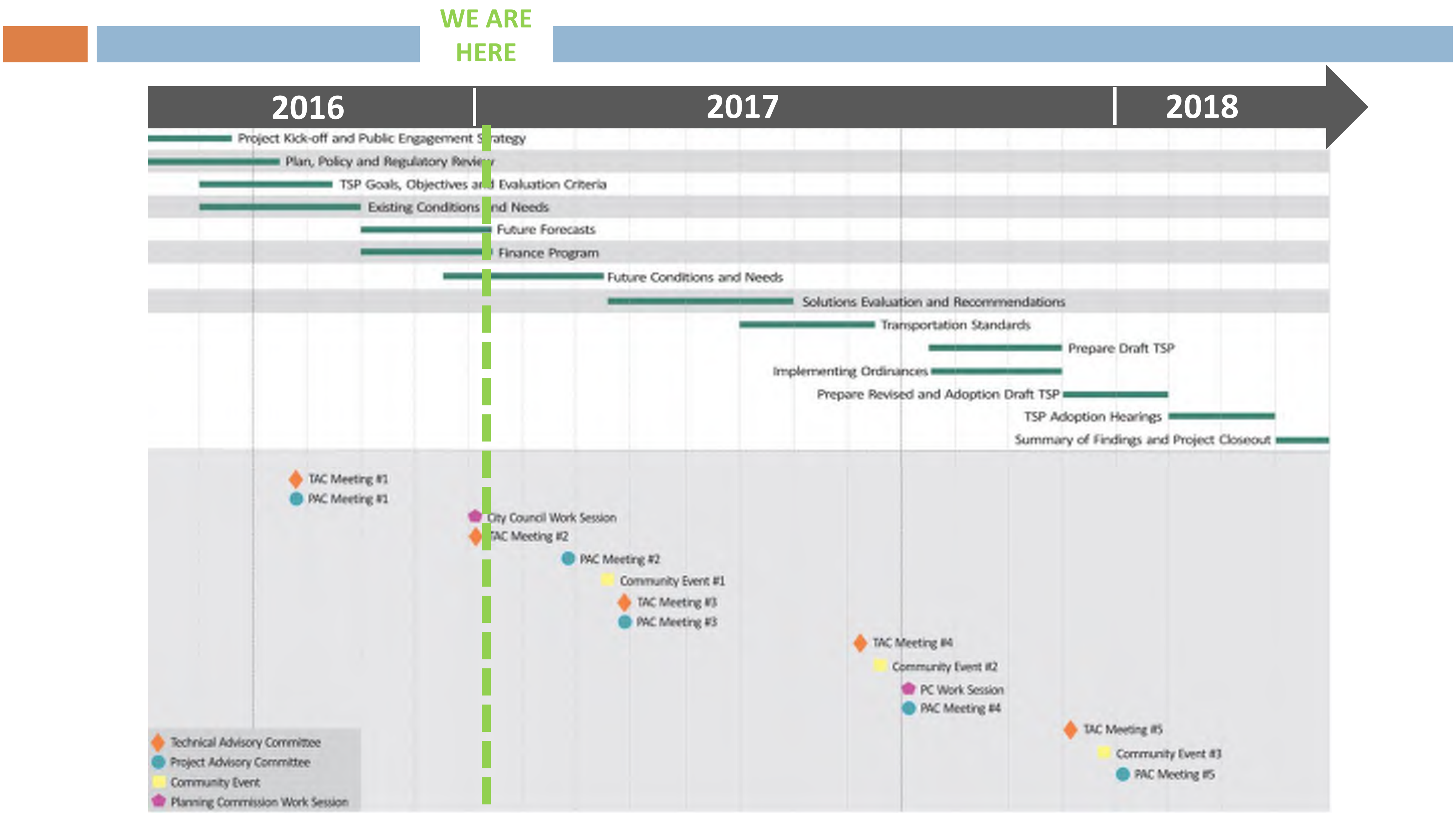
- Provide consistency with state and regional plans
- Establish an efficient network of arterials & collectors
- Sidewalks and bikeways linking residential areas to activity centers
- Provide transit services to meet basic needs
- Standards for street layout, spacing, and connectivity
- Include a reasonable finance program

What do TSPs do?

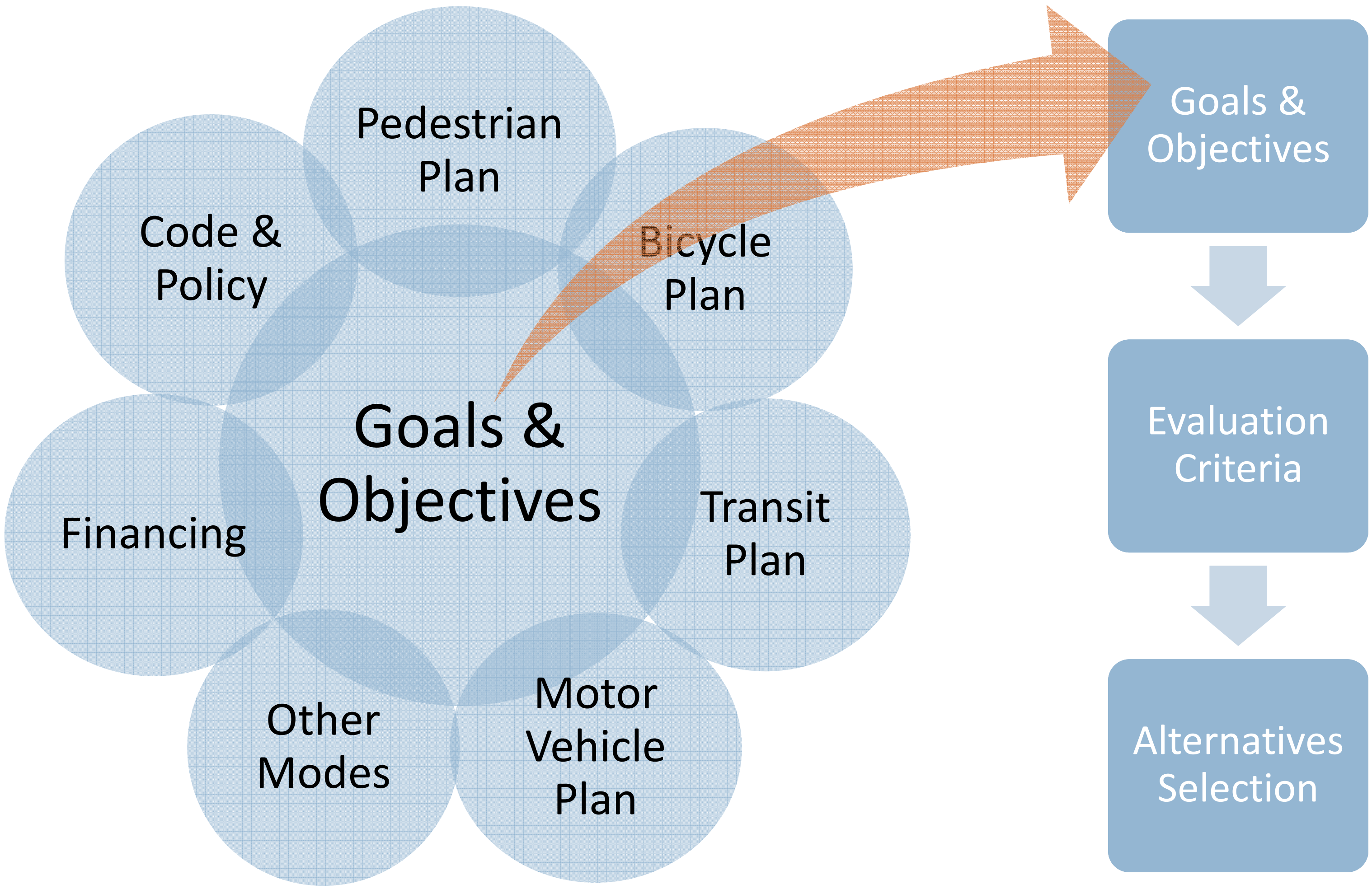
What SHOULD a TSP do?

- Uphold community vision and expectation for future
- Support a variety of travel choices
- Serve all people in community
- Promote safe travel
- Support local and state economy
- Minimize impacts to natural and built environment

TSP Schedule



Common TSP Elements



TSP Goals

Based on review of 2007 TSP, 2004 Comp Plan and 2040 Vision Statement

Goal 1: An equitable, balanced and well-connected multi-modal transportation system

Goal 2: Convenient facilities for pedestrians and bicyclists

Goal 3: Transit service and amenities that encourage a higher level of ridership

Goal 4: Efficient travel to and through the City

Goal 5: Safe and active residents

Goal 6: A sustainable transportation system

Goal 7: A transportation system that supports a prosperous and competitive economy

Goal 8: Coordinate with local and state agencies and transportation plans

Finance Program

*Maintaining and operating City streets requires **more than half** of current revenue ($22.8 million of the $40.8 million in revenue through 2040).*

Lebanon Revenue and Expenditures (2016)

City Revenue Source	Average Annual Amount	Estimated Amount Through 2040
Surface Transportation Program (STP)*	$180,000	$4,320,000
State Highway Trust Fund*	$875,000	$21,000,000
Bikeway/Walkway (1% of State* Highway Trust Fund Revenue)	$10,000	$240,000
System Development Charges	$600,000	$14,400,000
Miscellaneous Fees*	$35,000	$840,000
Total Revenue	**$1,700,000**	**$40,800,000**
City Expenditures*	**Average Annual Amount**	**Estimated Amount Through 2040**
Personnel Services	$300,000	$7,200,000
Materials and Services	$365,000	$8,760,000
Capital Outlay/Maintenance	$285,000	$6,840,000
Total Expenditures	**$950,000**	**$22,800,000**
Funding Summary	**Average Annual Amount**	**Estimated Amount Through 2040**
Funding Summary for City Streets (City Revenue – City Expenditures)	**$750,000**	**$18,000,000**

Finance Program

Additional funding would help to address existing or new needs identified in Lebanon's TSP

Potential Additional Funding Sources

Funding Option	Allowed Use of Funds	Existing or New Funding Source	Action Required to Implement	Example Charge	Potential Additional Annual Revenue
System Development Charge Update	Capital improvements	Existing	City Council action	+$245 per peak hour trip for new development	$80,000
Transportation Utility Fee	Capital improvements or maintenance	New	City Council action	$1 per month for residential units and $.01 per month per square foot for non-residential uses	$400,000
Local Fuel Tax	Capital improvements or maintenance	New	Voter Approval	One cent per gallon	$72,000
County Vehicle Registration Fee	Capital improvements or maintenance	New	Voter Approval (County- wide)	$18 for passengers cars, and $8 for motorcycles per year	$400,000
Property Tax Levy	Capital improvements or maintenance	New	Voter Approval	$0.20 per $1,000 in assessed value (per year, for 5 years)	$200,000 (per year, for 5 years)

Current Conditions

Walking

- Overall, the walking network rates relatively high near downtown, and poor towards the edges of the City.
- Most crashes involving pedestrians occur downtown, along US 20 between Airport Road and Russell Drive, and at the Airport Road intersection with 2nd Street.
- The majority of pedestrian-involved crashes (71%) were caused by drivers failing to yield the right of way to a pedestrian in a crosswalk or along a sidewalk.
- Key themes from **public comments** related to the walking network included:
  - Sidewalk improvements are needed along streets with heavy pedestrian traffic, including OR 34, and Airport Road.
  - Rail crossings need pedestrian safety features.
  - Safety concerns for pedestrians was expressed at the US 20- Main Street intersection with Oak Street.
  - Pedestrian crossings at off-set intersections should be improved, including at the US- Main Street/ Grant Street, US 20/ Walker Road-Dewey Street, and 2nd Street/ E Street- Milton Street intersections.
  - Areas near schools need better sidewalk connectivity.

Current Conditions

Biking

- Significant segments of continuous bicycle lanes exist along OR 34, 5th Street, S 2nd Street and Main Road, and Airport Road.
- Most crashes involving bicycles occur at intersections, caused by drivers failing to yield the right of way when turning.
- The streets in downtown Lebanon generate high or extreme levels of stress for people on bicycles.
- Key themes from **public comments** related to the biking network included:
  - Bike connections to schools are needed.
  - Narrower and slower roads are desired to increase safety and encourage more trips by bicycle.

Current Conditions

Transit

- Bus stops in Lebanon are located near US 20 and Weldwood Drive-Burdell Boulevard, Main Street-Park Street (US 20) and Oak Street, and US 20 and Industrial Way.
- Only the bus stop near US 20 and Industrial Way (in front of Linn-Benton Community College) is signed and provides a bench, shelter, and bus pull-out.
- All remaining bus stops are unsigned and have no amenities.
- Most transit users in the City are more than a half-mile from a bus stop.
- Key themes from **public comments** related to the transit network included:
  - Extend bus service west of US 20.

Current Conditions

Driving

- More than 60% of the workers in Lebanon live in another City located more than 10 miles away, creating many long commute trips and encouraging travel by motor vehicle.
- Lebanon experiences an average of around 150 crashes a year, though the severity of most crashes is generally low, with 84% involving only property damage or minor injuries.
- Nine intersections in Lebanon were noted as having a high rate of crashes, three were identified as having a high combination of crash frequency and severity.
- All study intersections meet mobility targets for existing PM peak hour summer conditions.
- Key themes from **public comments** related to the driving network included:
  - Peak hour congestion issues at US 20/ Airport Road.
  - Traffic at US 20/ Walker Road-Dewey Street backs up and impacts Main Road/ Walker Road.
  - 12th Street is used as a bypass route for Denny School Road and OR 34.
  - Walnut Street and Ash Street are used by drivers to avoid traffic signals along Grant Street.
  - Improvements are needed at Crowfoot Road/ Central Avenue/ Cascade Drive intersection.

Current Conditions

Other Users

- Five bridges are flagged as structurally deficient with poor or serious substructure conditions, and one bridge is flagged as functionally obsolete.
- OR 34 and US 20 south of OR 34 are classified as Oregon Freight Routes and Federal Truck Routes, while US 20 north of OR 34 is only classified as a Federal Truck Route.
- City truck routes include portions of Wheeler Street, Williams Street, Milton Street, Grant Street, and Oak Street.
- The Lebanon State Airport serves 9,800 annual operations (i.e., take-offs or landings).
- Key themes from **public comments** related to the other network users included:
  - Modify the Wheeler Street, Williams Street, and Milton Street local truck route. The current route directs trucks through residential neighborhoods.

Your Input

Thoughts?

- Suggestions for the Vision and Goals?
- Input on Finance Program?
- Transportation Issues to Address?

LEBANON TRANSPORTATION SYSTEM PLAN

PAC Meeting #2 – April 11, 2017

Overview

- TM #5 - Existing Conditions
- TM #6 - Future Traffic Demands
- TM #8 - Future Needs
- TM #7 - Finance Program
- Next Steps

Existing Conditions

Walking

- Overall, the walking network rates relatively high near downtown, and poor towards the edges of the City.
- Most crashes involving pedestrians occur downtown, along US 20 between Airport Road and Russell Drive, and at the Airport Road intersection with 2nd Street.
- The majority of pedestrian-involved crashes (71%) were caused by drivers failing to yield the right of way to a pedestrian in a crosswalk or along a sidewalk.
- Key themes from **public comments** related to the walking network included:
  - Sidewalk improvements are needed along streets with heavy pedestrian traffic, including OR 34, and Airport Road.
  - Rail crossings need pedestrian safety features.
  - Safety concerns for pedestrians was expressed at the US 20- Main Street intersection with Oak Street.
  - Pedestrian crossings at off-set intersections should be improved, including at the US- Main Street/ Grant Street, US 20/ Walker Road-Dewey Street, and 2nd Street/ E Street- Milton Street intersections.
  - Areas near schools need better sidewalk connectivity.

Existing Conditions

Biking

- Long segments of continuous bicycle lanes exist along OR 34, 5th Street, S 2nd Street and Main Road, and Airport Road.
- Most crashes involving bicycles occur at intersections, caused by drivers failing to yield the right of way when turning.
- The streets in downtown Lebanon generate high or extreme levels of stress for cyclists.
- Key themes from **public comments** related to the biking network included:
  - Bike connections to schools are needed.
  - Narrower and slower roads are desired to increase safety and encourage more trips by bicycle.

Existing Conditions

Transit

- Bus stops in Lebanon are located near US 20 and Weldwood Drive-Burdell Boulevard, Main Street-Park Street (US 20) and Oak Street, and US 20 and Industrial Way.
- Only the bus stop near US 20 and Industrial Way (in front of Linn-Benton Community College) is signed and provides a bench, shelter, and bus pull-out.
- All remaining bus stops are unsigned and have no amenities.
- Most transit users in the City are more than a half-mile from a bus stop.
- Key themes from **public comments** related to the transit network included:
  - Extend bus service west of US 20.

Existing Conditions

Driving

- More than 60% of the workers in Lebanon live in another City located more than 10 miles away, creating many long commute trips and encouraging travel by motor vehicle.
- Lebanon experiences an average of around 150 crashes a year, though the severity of most crashes is generally low, with 84% involving only property damage or minor injuries.
- Nine intersections in Lebanon were noted as having a high rate of crashes, three highway segments rank among top most hazardous in Oregon.
- All study intersections meet mobility targets for existing PM peak hour summer conditions.
- Key themes from **public comments** related to the driving network included:
  - Peak hour congestion issues at US 20/ Airport Road.
  - Traffic at US 20/ Walker Road-Dewey Street backs up and impacts Main Road/ Walker Road.
  - 12th Street is used as a bypass route for Denny School Road and OR 34.
  - Walnut Street and Ash Street are used by drivers to avoid traffic signals along Grant Street.
  - Improvements are needed at Crowfoot Road/ Central Avenue/ Cascade Drive intersection.
  - Desire to modify the Wheeler Street, Williams Street, and Milton Street local truck route.

Existing Conditions

Other Users

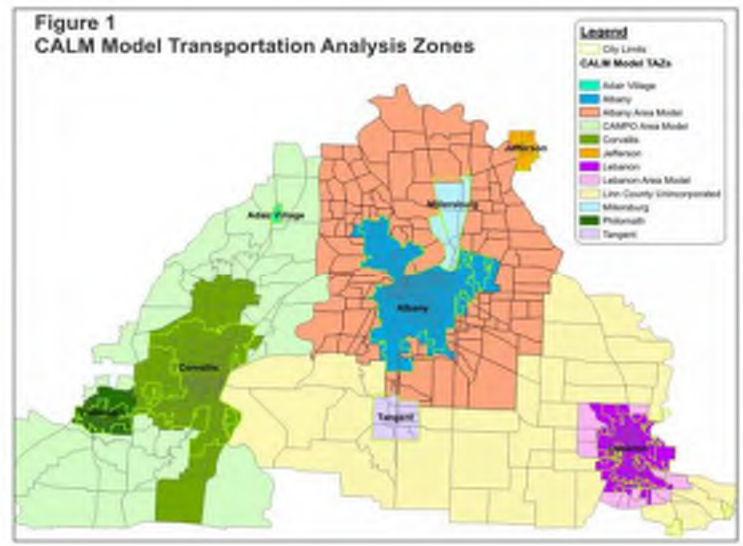
- Five bridges are flagged as structurally deficient with poor or serious substructure conditions, and one bridge is flagged as functionally obsolete.
- OR 34 and US 20 south of OR 34 are classified as Oregon Freight Routes and Federal Truck Routes, while US 20 north of OR 34 is only classified as a Federal Truck Route.
- City truck routes include portions of Wheeler Street, Williams Street, Milton Street, Grant Street, and Oak Street.
- The Lebanon State Airport serves 9,800 annual operations (i.e., take-offs or landings).
- Key themes from **public comments** related to the other network users included:
  - Modify the Wheeler Street, Williams Street, and Milton Street local truck route. The current route directs trucks through residential neighborhoods.

Future Traffic Demands

Expected Growth

CALM Model Land Use Changes			
Lebanon Area	**2010**	**2040**	**% Increase**
Population	18,348	28,365	55%
Households	7,238	12,373	71%
Total Employment	5,711	11,783	106%

Vehicle Trip Generation (PM Peak Hour)				
	2010 Trips	**2040 Trips**	**Trip Increase**	**% Increase**
Lebanon Area	4,818	7,876	3,058	63%
CALM Model	50,023	69,624	19,601	39%

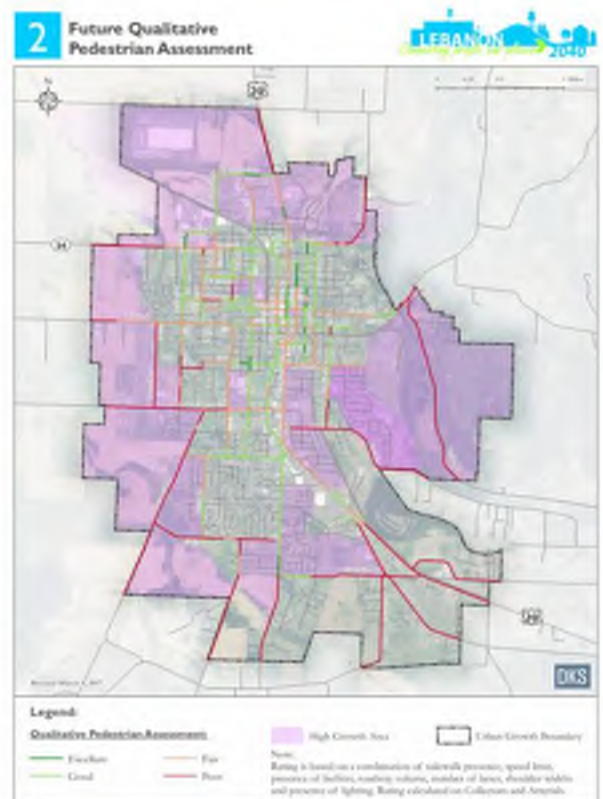


Year 2040 evening peak hour vehicle trips are likely to increase by 30% at intersections along US 20 and OR 34.

Future Needs

Walking

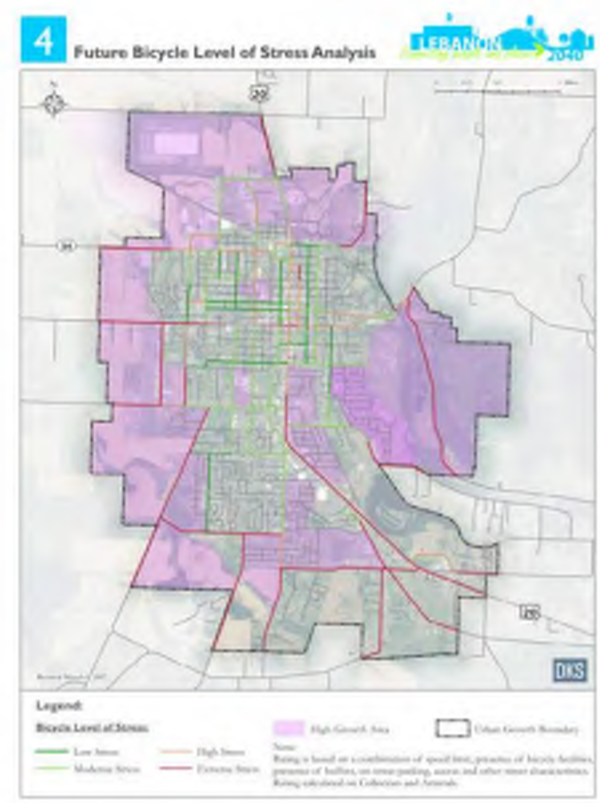
- Sidewalk gaps in developed areas, growth areas and along undeveloped frontage
- Top problematic areas for pedestrians include:
  - US 20/ Oak Street
  - US 20/ Grant Street
  - US 20/ Walker Road-Dewey Street
  - 2nd Street/ E Street- Milton Street intersections
- Potential **solutions** include:
  - Sidewalk infill
  - Crosswalks with enhancements (curb extensions, flashers)
  - ADA improvements



Future Needs

Biking

- Identified major gaps in bike network
- Identified 14 major street segments with high or extreme bicycle street level in 2040
- Potential **solutions** include:
  - Enhance bike connections to key destinations
  - Expand network of low stress bikeways
  - Bicycle parking at key destinations



Future Needs

Transit – coordinated with Transit Development Plan

- Future trends suggest increase in transit demand by 2040:
  - Population and employment growth
  - Growth in transit dependent citizens – older adults, youth, low-income, persons with disabilities
  - Continued regional commuter connections
- Potential **solutions** include:
  - Increased City staff assigned to transit service operations
  - Expanded service hours and frequency
  - New and improved bus stops
  - New vehicle storage and maintenance
  - Incorporate transit technology – route scheduling software, real-time arrival information

Future Needs

Driving

- 10 study intersections operate below standard in year 2040 PM peak hour
- High collision intersections and segments carry forward from TM #5 Existing Conditions, likely worsen with growth in traffic
- Freight route concerns carry forward from TM #5 Existing Conditions
- Potential **solutions** include:
  - Demand management strategies to reduce vehicle trips – carpool, encourage walking, biking and transit
  - System management – signal timing, coordinated
  - New street connections
  - Safety projects – access management, modified design
  - Intersection projects – add traffic signal, turn lane
  - New freight route designations

Finance Program

*Maintaining and operating City streets requires **more than half** of current revenue ($22.8 million of the $40.8 million in revenue through 2040).*

Lebanon Revenue and Expenditures (2016)

City Revenue Source	Average Annual Amount	Estimated Amount Through 2040
Surface Transportation Program (STP)*	$180,000	$4,320,000
State Highway Trust Fund*	$875,000	$21,000,000
Bikeway/Walkway (1% of State* Highway Trust Fund Revenue)	$10,000	$240,000
System Development Charges	$600,000	$14,400,000
Miscellaneous Fees*	$35,000	$840,000
Total Revenue	**$1,700,000**	**$40,800,000**
City Expenditures*	**Average Annual Amount**	**Estimated Amount Through 2040**
Personnel Services	$300,000	$7,200,000
Materials and Services	$365,000	$8,760,000
Capital Outlay/Maintenance	$285,000	$6,840,000
Total Expenditures	**$950,000**	**$22,800,000**
Funding Summary	**Average Annual Amount**	**Estimated Amount Through 2040**
Funding Summary for City Streets (City Revenue – City Expenditures)	**$750,000**	**$18,000,000**

Finance Program

Additional funding would help to address existing or new needs identified in Lebanon's TSP

Potential Additional Funding Sources

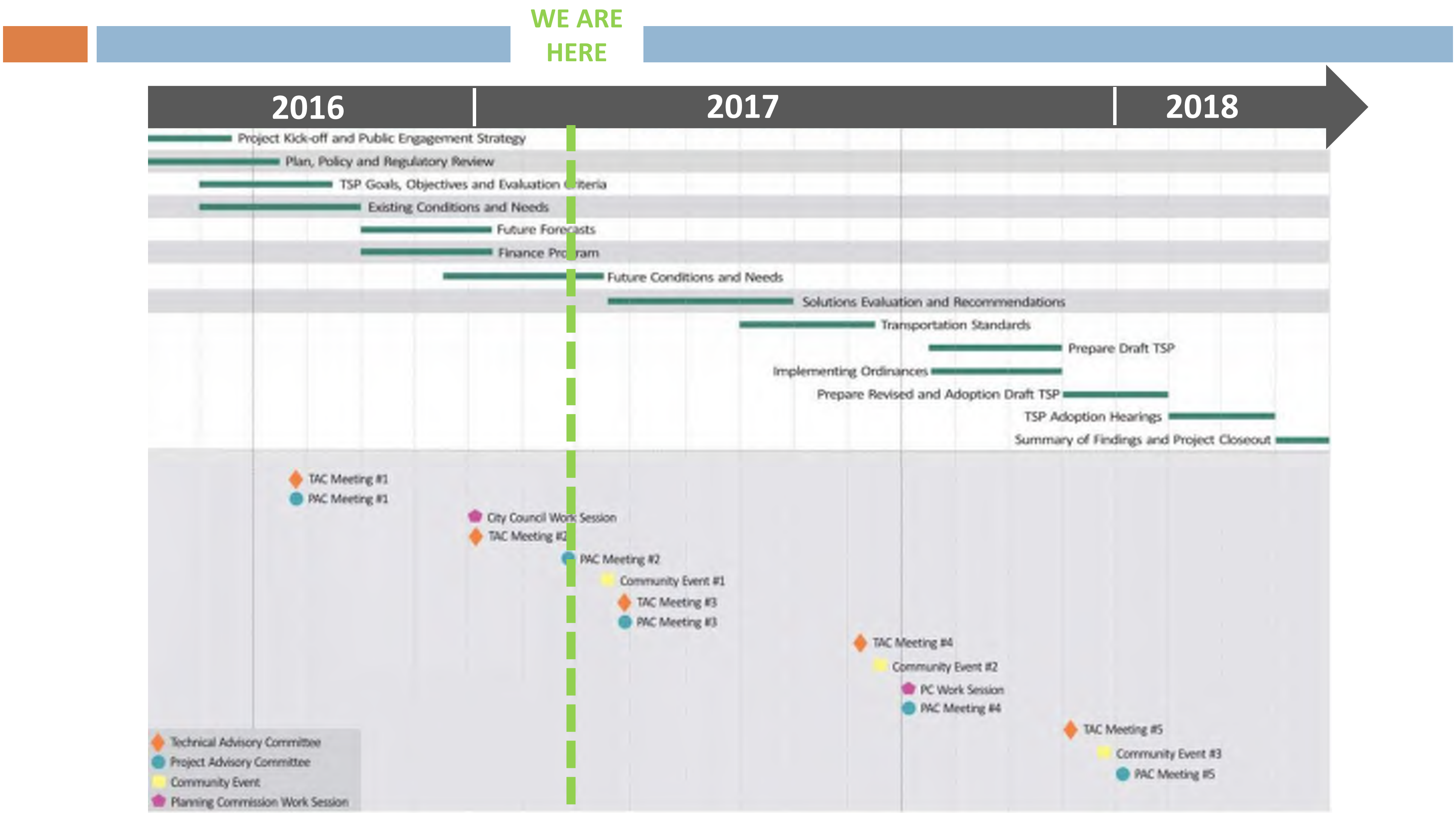
Funding Option	Allowed Use of Funds	Existing or New Funding Source	Action Required to Implement	Example Charge	Potential Additional Annual Revenue
System Development Charge Update	Capital improvements	Existing	City Council action	+$245 per peak hour trip for new development	$80,000
Transportation Utility Fee	Capital improvements or maintenance	New	City Council action	$1 per month for residential units and $.01 per month per square foot for non-residential uses	$400,000
Local Fuel Tax	Capital improvements or maintenance	New	Voter Approval	One cent per gallon	$72,000
County Vehicle Registration Fee	Capital improvements or maintenance	New	Voter Approval (County- wide)	$18 for passengers cars, and $8 for motorcycles per year	$400,000
Property Tax Levy	Capital improvements or maintenance	New	Voter Approval	$0.20 per $1,000 in assessed value (per year, for 5 years)	$200,000 (per year, for 5 years)

Next Steps – Evaluate TSP Solutions

Early Community Input

- What improvements are best for Lebanon?
- How can we stretch available funding to meet future needs?
- How much congestion will be acceptable?

TSP Schedule



Lebanon Transportation System Plan Update

Technical Advisory Committee (TAC) Meeting #4 Summary

MEETING DATE:	December 5, 2017
MEETING TIME:	1:00 p.m. to 3:00 p.m.
MEETING LOCATION:	Santiam Travel Station, 750 S 3rd Street, Lebanon
MEETING PURPOSE:	The purpose of this meeting is to discuss future conditions, recommended transportation solutions and standards

TOPICS

1. Sign-in, Agenda Overview, and Introductions

Project staff and TAC members in attendance introduced themselves. The following were in attendance:

- Dan Fricke – ODOT
- Robert Emmons – City of Lebanon
- Walt Wendolowski – City of Lebanon
- Chuck Knoll – Linn County
- Reah Flisakowski – DKS Associates

2. TM #8 Future Conditions and Needs

The project team presented Technical Memorandum #8, and the following topics were discussed:

- The TAC reviewed the future land use growth projects and confirmed that the new PSU population forecast of 16,735 residents is very close to the population forecast used to estimate future traffic conditions.
- A TAC member asked how future traffic volumes were developed and questioned the validity of the future operation findings suggesting future volumes will be higher resulting in more congestion. The group discussed the significant lack in funding for capital projects and the TSP update focus on low cost-high benefit projects walking, biking, safety and spot capacity improvements. The TAC agreed that even if future forecasts were doubled for the analysis, the TSP project list and implementation plan would be the same.

- The TAC agreed the need for walking and biking projects near the center of the city and connecting to schools and parks.
- The TAC reviewed the existing local freight route designation on Williams Street and the need to keep it in the TSP update due to the freight demand generated by business east of Lebanon and the restricted geometrics at

3. TM #9 Solutions Evaluation

The project team presented Technical Memorandum #9, and the following topics were discussed:

- The TAC reviewed the planned collector connections south of Grant Street on the east side of the city (see Figure 1). It was agreed to drop the planned collector between E Street and Mayfly Street and show with arrows on the Local Street Connectivity Plan instead.
- The Airport Master Plan recommendations to extend the runway to the south were assessed. The solutions of the potential realignment of Airport Road. The projects D8, D9 and D10 will be reevaluated by the project team to determine the recommended street connections south of the airport.
- The TAC asked about planned pipeline infrastructure. The project team will include in final TM #9.
- The TAC asked about future rail operations and impacts to operations. The project team will add narrative to address this in final TM #9.

4. TM #10 Transportation Standards

The project team presented Technical Memorandum #109, and the following topics were discussed:

- The TAC discussed the private street cross-section . It was decided there will be two private street sections
    - 1 to 6 lots require 10 feet of pavement, no curbs or sidewalk
    - 7 to 12 lots require 10 feet of pavement, curbs on both sides and 5-foot sidewalk on one side

5. Next Steps

The project team will review the future needs, solutions and standards with the PAC and City Council in January. After these meetings, TM #8, 9 and 10 will be finalized and the project team will start working on the draft TSP.

MEMORANDUM

DATE: January 11, 2018

TO: Lebanon Planning Commission

FROM: Reah Flisakowski, DKS Associates

SUBJECT: Lebanon Transportation System Plan Update P14180-012

This memorandum provides a high-level summary of future transportation system needs and recommended improvements presented in Technical Memorandum 8: Future Transportation Conditions and Needs and Technical Memorandum 9: Solutions Evaluations.

Rising Population and Employment

The 2040 transportation conditions in Lebanon were based on estimated growth in housing and employment within the Lebanon TSP study area and the region. The future conditions analysis identified where the transportation system will perform satisfactorily and areas of the network likely to be congested or in need of investments to function adequately in the future.

Table 1: Future Growth Projects for Lebanon TSP Study Area

2016	2040	Growth
7,200 households	12,350 households	+5,150 households
5,700 jobs	11,750 jobs	+6,050 jobs
		+3,000 vehicle trips

Summary of Needs

Driving

Nine study intersections are substandard under 2040 design hour conditions and require additional capacity (i.e. traffic signal, turn lane).

Walking

About 40 percent of State highway miles, and half of City street miles (including City arterial, collector and local streets) lack sidewalk coverage along one or both sides. Despite the high level of sidewalk coverage towards downtown, parts of the City experience sidewalk gaps, predominately concentrated on the edge of the City.

Community input: top problematic areas for pedestrians include the US 20/ Oak Street, US 20/ Grant Street, US 20/ Walker Road-Dewey Street, and 2nd Street/ E Street- Milton Street intersections.

Bicycle

Over 60 percent of State highway and City arterial street miles, and over 80 percent of City collector street miles lack bicycle facilities (bike lanes or shoulder bikeways). Major street segments with high or extreme bicycle stress levels on OR 34, US 20, Oak Street, Airport Road, River Road, and Crowfoot Road.

Community input: provide bicycle connections to key destinations and expand low stress bicycle routes.

TSP Project Development

Lebanon's approach to developing transportation projects emphasized improved system efficiency and management over adding capacity. Projects deemed to contribute more towards achieving the transportation goals of Lebanon ranked higher, and the plan assigned higher priority to their implementation.

The **Aspirational Project** list addresses all of the identified city transportation needs, regardless of the ability for the city or state to fund them. The list will be refined to indicate the highest priority projects that can be reasonably funded during the 20-year planning horizon. The shorter list is referred to as **Financially Constrained Projects**.

The preliminary list of aspirational projects includes 175 projects for all of the major modes of travel in the city (motor vehicle, pedestrian, bicycle and transit). The full list of aspirational projects is shown in Technical Memorandum 9 (Table 1, and Figures 2, 3 and 4). The TSP planning process eliminates any project that may not be feasible for reasons other than financial (such as environmental or existing development limitations).

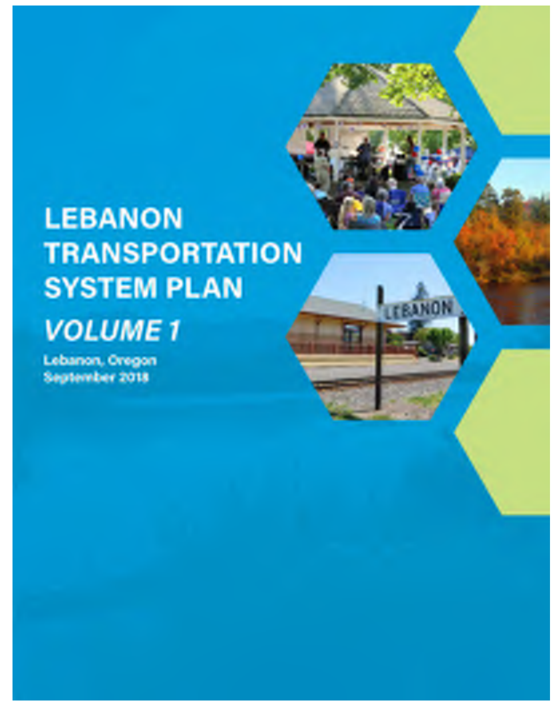
Each project was assigned an initial primary source of funding for planning purposes (city, state, county, or developer), although such designations do not create any obligation for funding.

LEBANON TRANSPORTATION SYSTEM PLAN

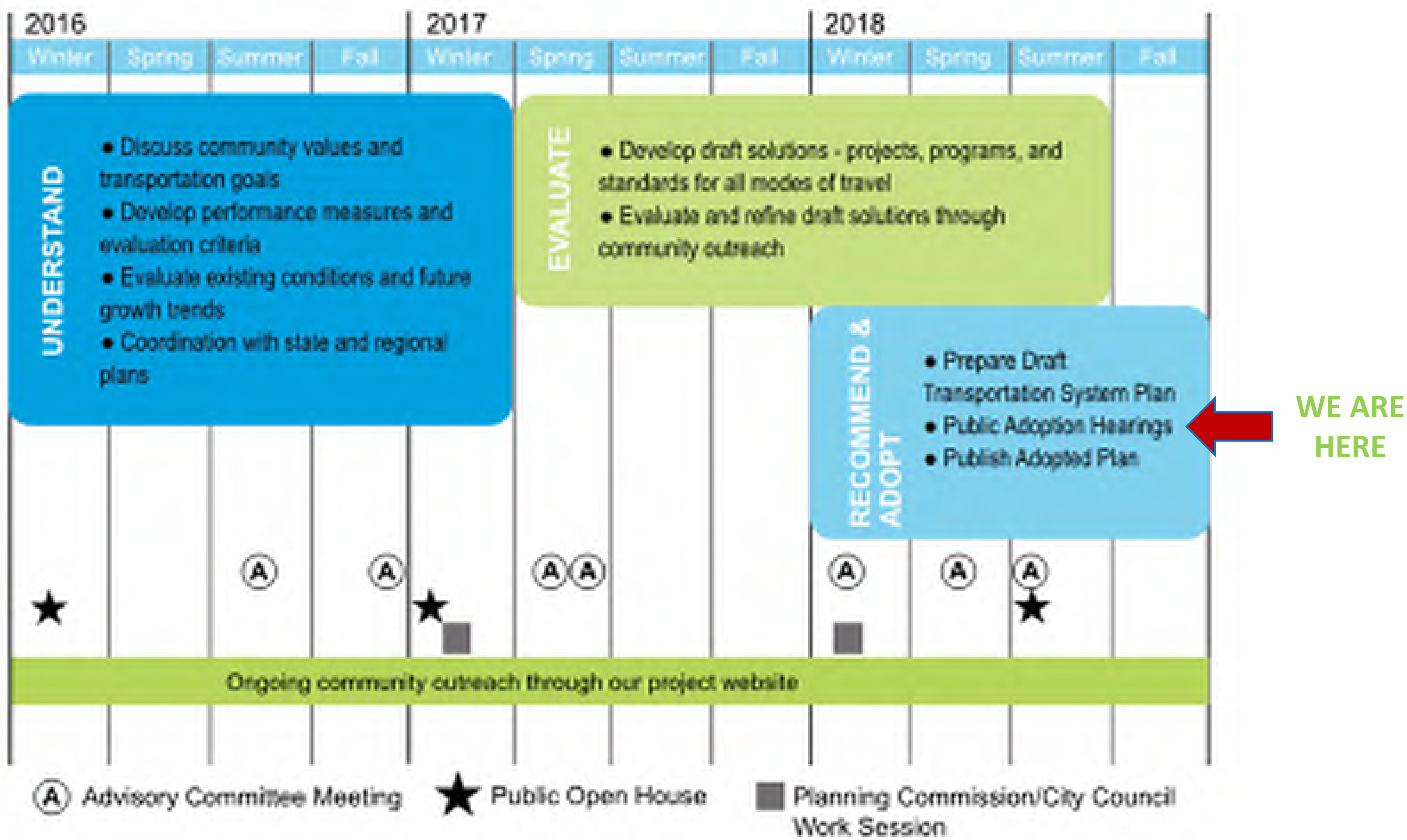
Planning Commission Hearing – November 28, 2018

Why Adopt a TSP?

- Last updated in 2007 (11 years ago)
- Required by the Transportation Planning Rule (TPR) OAR 660-012-0015
- Serves as the transportation element of a local comprehensive plan
- Provides long range direction for development of transportation facilities and services for all modes of travel
- Basis for grant applications
- Opportunity to coordinate with regional partners and reflect current community values

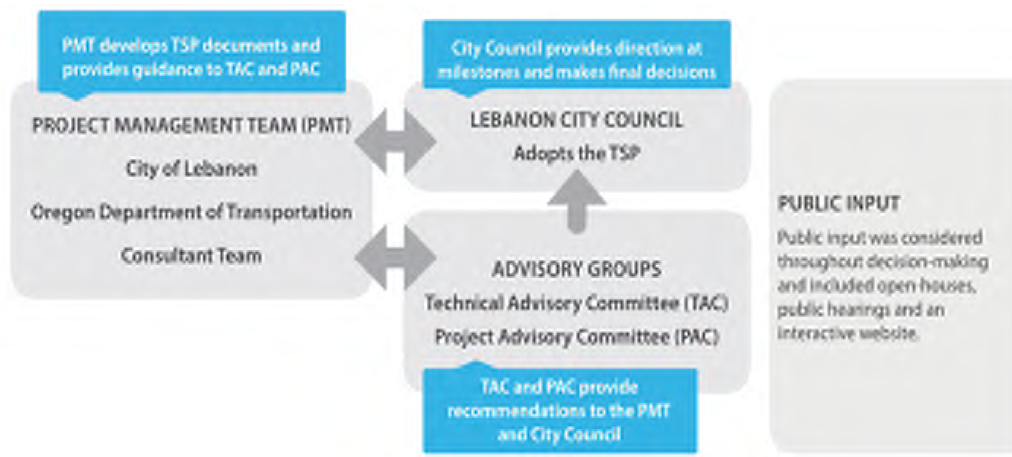


TSP Schedule



Public Involvement

- Project Website
  www.lebanontsp.org
- 3 Public Open Houses
- 1 Planning Commission Work Session
- 1 City Council Work Session
- 5 Project Advisory Committee Meetings
- 4 Technical Advisory Committee Meetings



The Process

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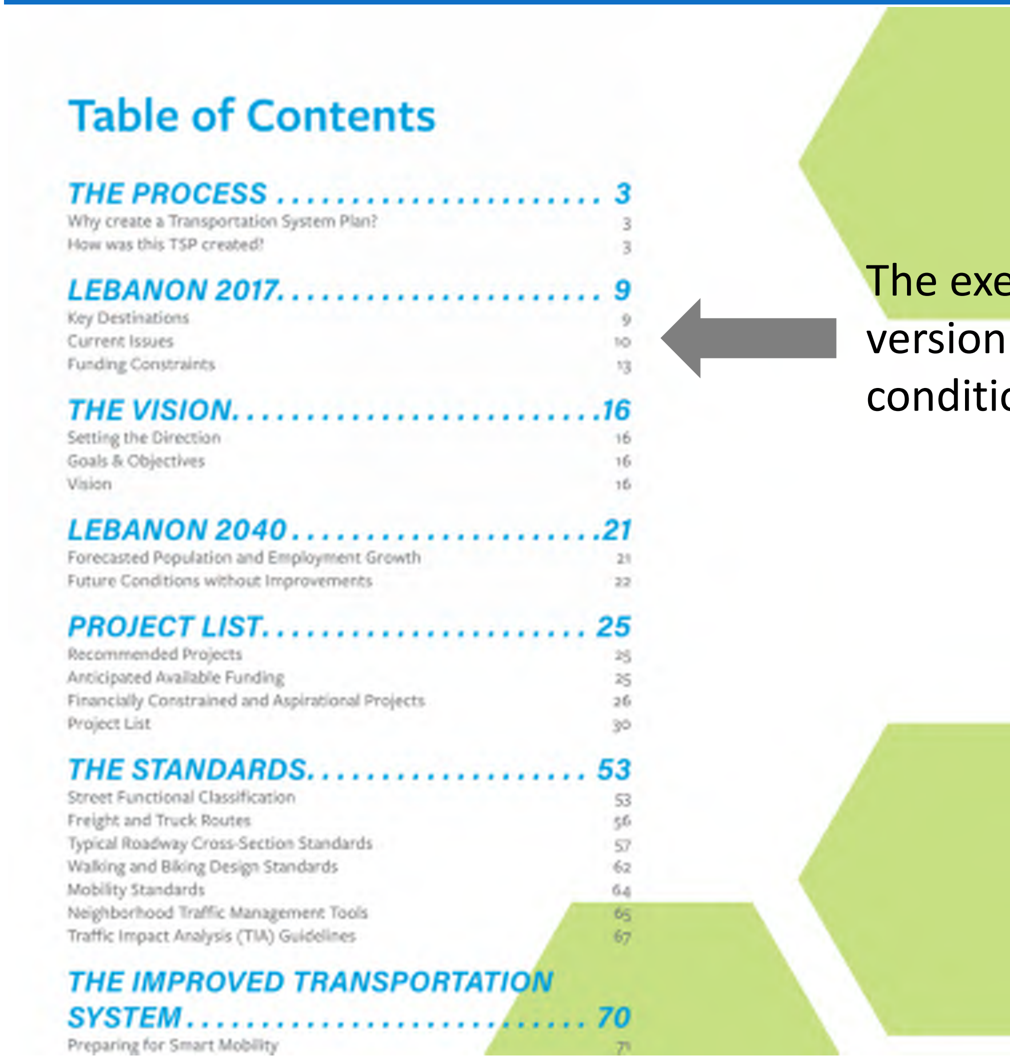
Purpose of the TSP, our committee and decision-making structure, and public outreach

DKS Associates

Lebanon 2017



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The executive summary version of the existing conditions and funding memos

Current Conditions

Walking

- Gaps in the sidewalk system are more common in southwest and southeast Lebanon, and on roadway segments outside the City limits.
- The vast majority of pedestrian-involved crashes (71 percent) were caused by drivers failing to yield the right of way to a pedestrian in a crosswalk or along a sidewalk.
- Overall, the walking network rates relatively high near downtown, and poor towards the edges of the City.

Biking

- Significant segments of continuous bicycle lanes exist along OR 34, 5th Street, S 2nd Street and Main Road, and Airport Road.
- Most of the crashes involving a bicyclist were caused by drivers failing to yield the right of way when turning.
- Flat topography and connected street grid support biking

Current Conditions

Driving

- More than 60 percent of the workers in Lebanon live in another City that is located more than ten miles away, creating long trips and encouraging travel by motor vehicle.
- Lebanon experiences an average of 160 crashes a year, though the severity of most crashes is generally low, 84 percent involving only property damage or minor injuries.
- Nine intersections in Lebanon were noted as having a high rate of crashes.
- All study intersections meet the mobility targets under 2017 evening peak hour summer conditions.

Transit

- Only the bus stop near US 20 at Linn-Benton CC is signed and provides a bench, shelter, and bus pull-out.
- Most transit users in the City are more than a half-mile from a bus stop.

The Vision

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Community Vision,
Goals and Objectives

Lebanon 2040

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Growth assumptions and executive summary version of future conditions memo

DKS Associates

Future Growth and Conditions

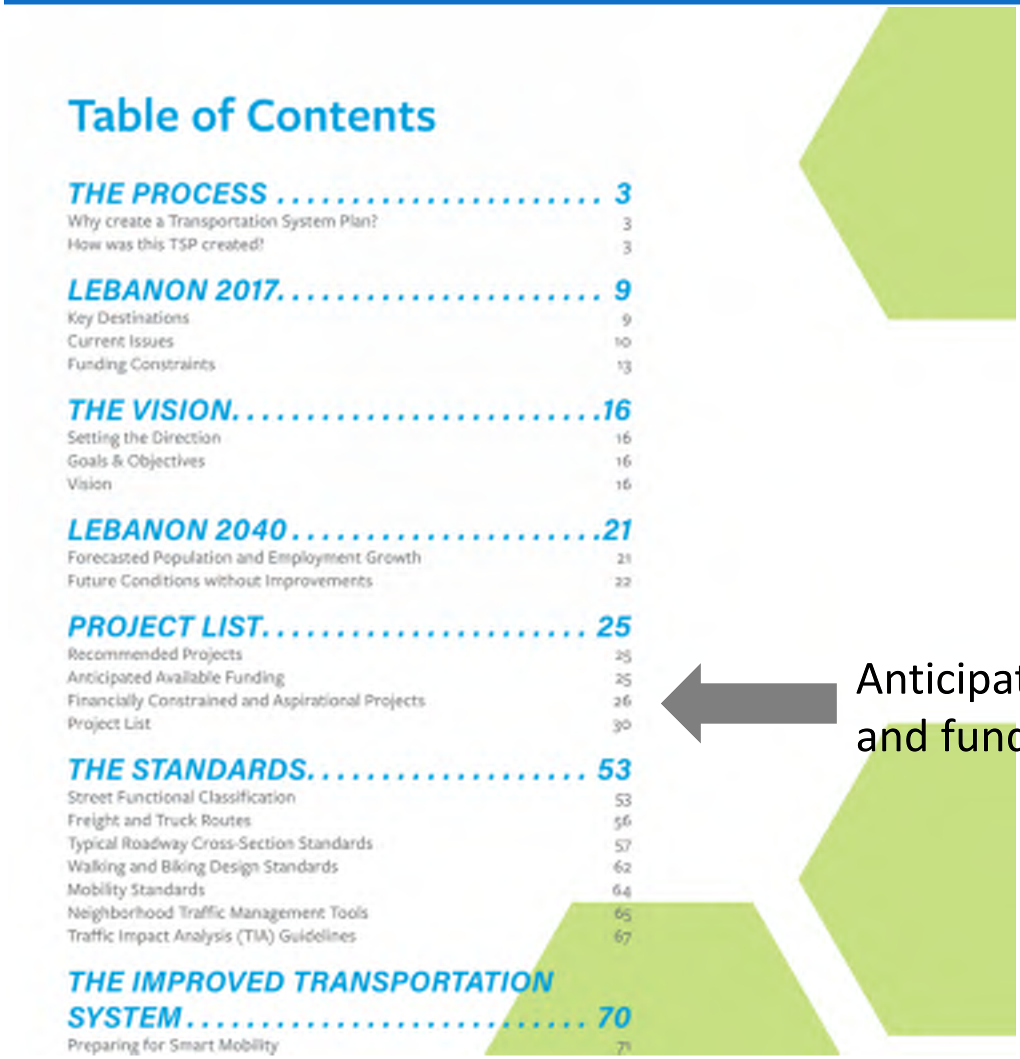
Table 1: CALM Model Land Use Changes (2010-2040)

LEBANON AREA*	2010	2040	PERCENT INCREASE
Population	18,348	28,365	55%
Households	7,238	12,373	71%
Total Employment	5,711	11,783	106%

The forecast generated by analysis of the future 2040 roadway system identifies the following findings.

- Motor vehicle congestion will likely exceed acceptable levels at some intersections, with nine of the study intersections not meeting their respective mobility target/standard during the 2040 design hour conditions.
- The demand for walking and biking will increase, but key gaps in the infrastructure to support it will remain and crossing busy streets will continue to discourage some trips.
- There will likely continue to be safety concerns at several locations in the city.
- Increased congestion along freight routes may necessitate the need for improvements.
- No major new rail, air, pipeline, or water-based transportation needs were identified.

Project List



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Anticipated projects and funding

DKS Associates

Funding

2040 Transportation Funding Summary

- $232M in identified projects
- $27M expected City funds
- $8.5M expected ODOT funds
- $9M expected Linn County funds
- $187.5M funding shortfall

Package 1 is Financially Constrained, and identifies the high priority projects from the Aspirational Projects list that could be constructed with funding anticipated through 2040.

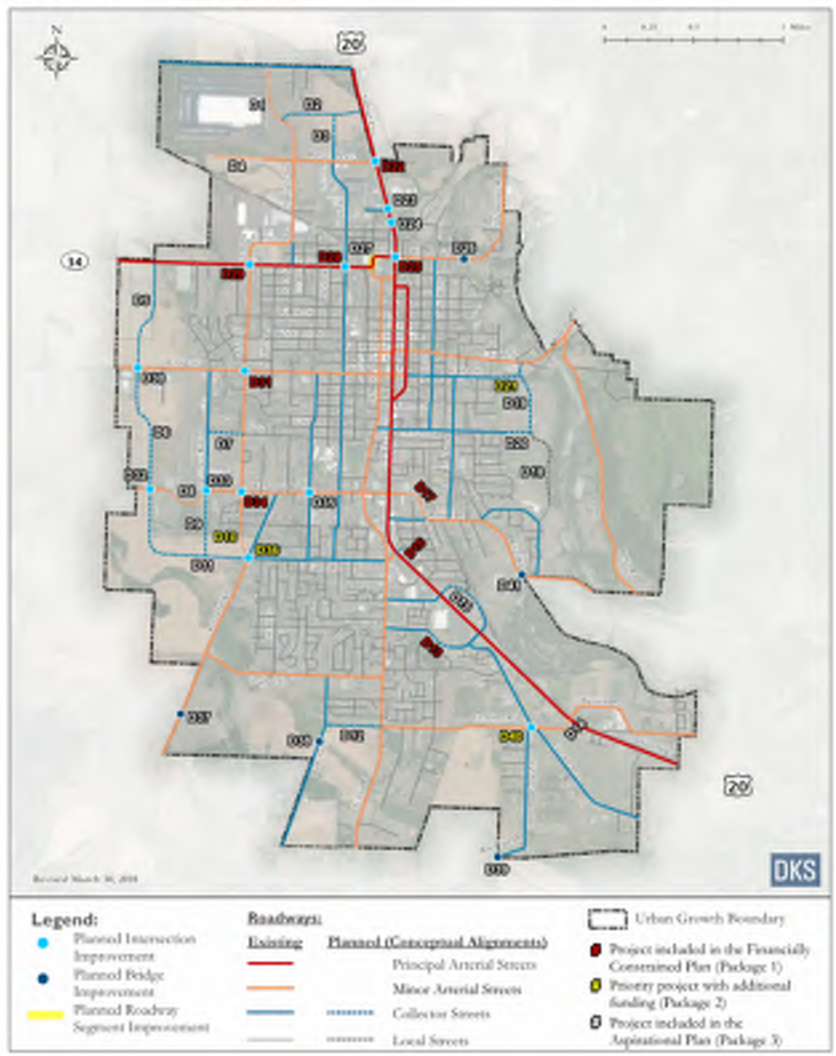
Package 2 identifies projects from the Aspirational Project list that are highly supported but that, due to cost or jurisdiction, were unable to be included in the Financially Constrained list. Should additional funding become available, these are projects the City may want to consider.

Package 3 is comprised of the Aspirational Projects that are neither in the Financially Constrained Project list nor Package 2 Project list. These projects likely will not have city or state funding by 2040.

- Project included in the Financially Constrained Plan (Package 1)
- Priority project with additional funding (Package 2)
- Project included in the Aspirational Plan (Package 3)

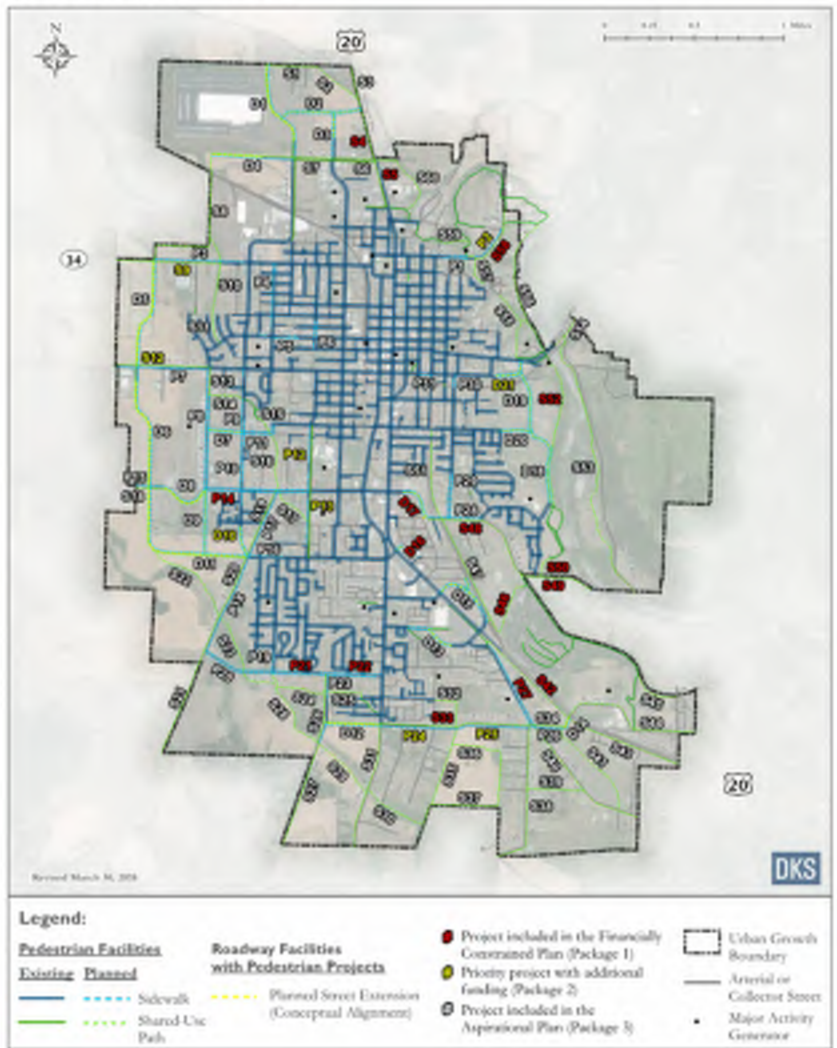
Driving

Figure 4. Proposed Motor Vehicle Projects



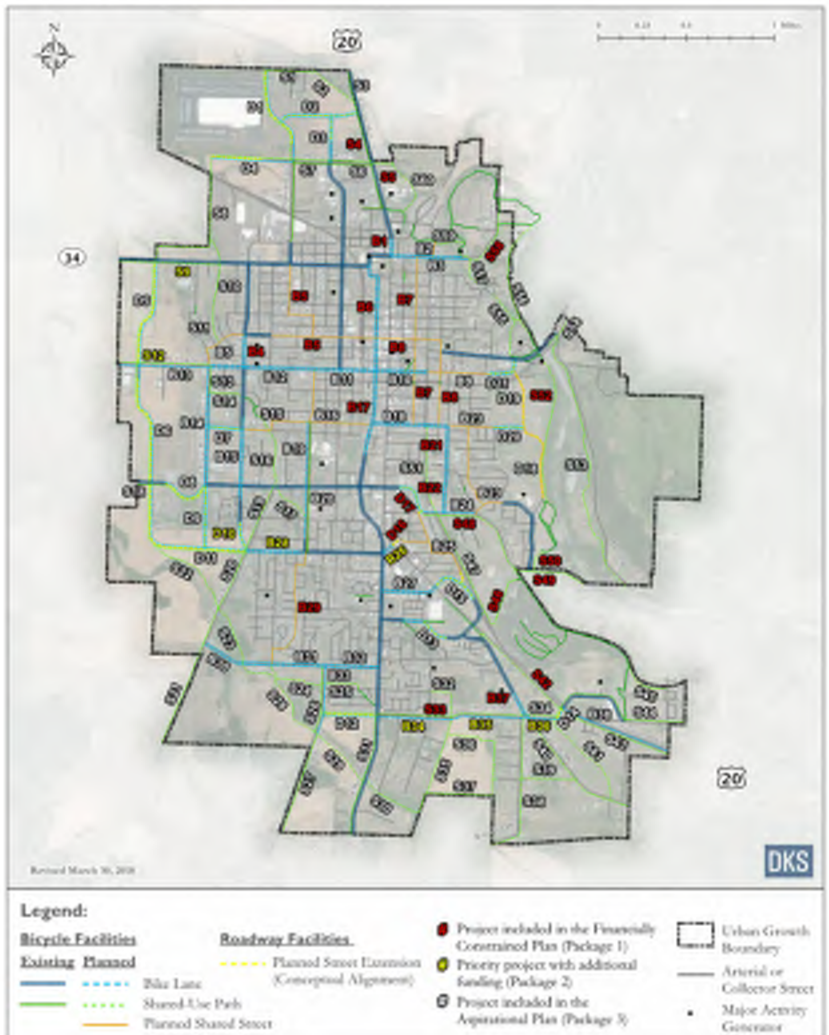
Walking

Figure 5. Proposed Pedestrian Projects



Biking

Figure 6. Proposed Bicycle Projects



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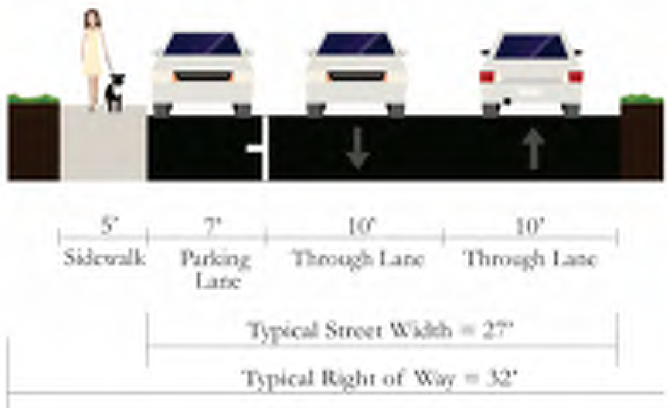
Facility classifications and standards

Cross-sections

Figure 15. Private Roadway (16 or fewer dwelling units only)



The Improved System

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Expected results
by 2040